

# First records of two *Triplax* species (Coleoptera, Erotylidae) from Kazakhstan

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Academic editor: R. Yakovlev | Received 2 August 2024 | Accepted 29 August 2024 | Published 2 October 2024

<http://zoobank.org/7F7F2B0B-ADE0-4A5B-B8DC-16CECDD8A146>

**Citation:** Temreshev II (2024) First records of two *Triplax* species (Coleoptera, Erotylidae) from Kazakhstan. Acta Biologica Sibirica 10: 1075–1086. <https://doi.org/10.5281/zenodo.13859514>

## Abstract

Pleasing fungus beetles *Triplax aenea* (Schaller, 1783) and *T. melanocephala* (Latreille, 1804) from the family Erotylidae are firstly recorded from Kazakhstan. A new key to known species of the genus *Triplax* from Kazakhstan is given. The finds of *T. aenea* from South-East Kazakhstan are currently new record for this species for Central Asia. The finds of *T. melanocephala* from South-East Kazakhstan are currently the easternmost localities for this species and new record for Central Asia. Dryad's saddle mushroom *Cerioporus squamosus*, big sheath mushroom *Volvopluteus gloiocephalus*, *Rhodofomes roseus* and milk-caps mushroom *Lactarius badiusanguineus* are firstly recorded from Kazakhstan for *T. aenea*; fungi from family Agaricaceae – field mushroom *A. campestris* and Prince mushroom *A. augustus* for *T. melanocephala*.

## Keywords

*Triplax aenea*, *T. melanocephala*, pleasing fungus beetles, new findings, key, Akmola, Almaty, Jetisu and Zhambyl oblast

## Introduction

Pleasing fungus beetles (Erotylidae) includes about 280 genera and above 3500 species in the world fauna (Wegrzynowicz 2007, Ślipiński et al. 2011, Drilling et al.

2013; Liu et al. 2021). Some new genera and species of this family were described from Australia, French Guiana, Mexico and USA (Tang, Skelley and Pérez-Farrera 2018, Skelley and Gasca-Álvarez 2020, Skelley, Leschen and Liu 2021). Seven genera and seventeen species were known from Kazakhstan (Wegrzynowicz 2007, Temreshev 2017, Temreshev 2022, 2023). Their imagoes and larvae feed on plant and fungal matter, are found on fungi, especially tinder fungi, pupate in the soil; some are important pollinators (e.g. of the ancient cycads) (Krivolutskaya 1992, Krasutsky 2005, Robinson 2005, Drake 2009, Tang, Skelley and Pérez-Farrera 2018, Skelley and Gasca-Álvarez 2020). Representatives of the subfamily Languriinae are associated primarily with herbaceous plants. Some species are xylobionts (Robinson 2005; Drake 2009; Tang, Skelley and Pérez-Farrera 2018; Skelley and Gasca-Álvarez 2020). Several species were listed as pests of food supplies and / or invasive species (Mordkovich and Sokolov 1999, Krasutsky 2005, Robinson 2005, Drake 2009, Hagstrum and Subramanyam 2009, Denux and Zagatti 2010, Temreshev 2017)

The genus *Triplax* Herbst, 1793 includes 93 species from the world (Goodrich and Skelley 1997) and is comprised of 67 species in the Palaearctic Region (Wegrzynowicz, 2007). Beetles from this genus are widespread in the Palaearctic, Nearctic and extend into the Oriental regions (GBIF Secretariat 2023). Four species (*T. nikritini* Nikitsky & Kompanzev, 1997, *T. rubrica* Reitter, 1891, *T. subtilissima* Reitter, 1901 and *T. russica* (Linnaeus, 1758)) were known from Kazakhstan (Reitter 1901, Nikitsky and Kompantsev 1997, Wegrzynowicz 2007; Temreshev 2023). Beetles of this genus are obligate mycetophages that eat various fungi. The larva develops in the fruiting bodies of tree mushrooms, pupates in the soil, in cracks in the bark, under the bark, in rotten wood of trees where mushrooms grew. At the adult stage, it visits some ground and xylotrophic fungi, using them as an additional food resource and they are carriers of their spores (Kryzhanovsky 1965, Khalidov 1984, Krivolutskaya 1992, Nikitsky et al. 1996, Krasutsky 1996, Drogvalenko 1997, Mitter 2004, Krasutsky 2005, Robinson 2005, Nikitsky et al. 2008).

Typical habitats of *Triplax aenea* (Schaller, 1783) are deciduous woodland and wooded parkland. Adults overwinter under bark or among decaying wood on trunks and stumps; they occur year-round. Beetles active from March or April and remain so until the autumn. Females oviposit directly into fungi or in crevices next to them. Larvae develop through the summer, pupate among host material or in the soil, in cracks in the bark, under the bark, in the rotten wood of trees where mushrooms grew. According to literature data, *T. aenea* found on fungi *Pleurotus calypttratus* (Lindblad ex Fr.) Sacc., Golden Oyster Mushroom *Pleurotus citrinopileatus* Singer, Branched Oyster mushroom *Pleurotus cornucopiae* (Paulet) Qué., Veiled oyster mushroom *Pleurotus dryinus* (Persoon) P. Kummer, 1871, Oyster mushroom *Pleurotus ostreatus* (Jacquin) P. Kummer, 1871, Pale Oyster mushroom *Pleurotus pulmonarius* (Fr.) Qué., *Pleurotus* sp., Sheathed Woodtuft *Kuehneromyces mutabilis* (Schaeff.) Singer & A.H. Sm., Violet-Toothed Polypore *Trichaptum bifforme* (Fr.) Ryvarden, Velvet Foot *Flammulina velutipes* (Curtis) Singer, Hoof or Tinger Fungus *Fomes fomentarius* (L.) Fr., Honey Fungus *Armillaria mellea* (Vahl) P. Kumm.,

Sulphur Tuft *Hypholoma fasciculare* (Huds.) P. Kumm., Chicken-of-the-woods *Lactiporus sulphureus* (Bull.) Murrill, 1920, Poplar mushroom *Cyclocybe aegerita* (V. Brig.) Vizzini and Oysterlings *Crepidotus* sp. Also found in rotting hay (Nikitsky and Kompantsev 1995, Krasutsky 1996, Droghvalenko 1997, Schiegel 2007, Nikitsky et al. 2008, Bekchiev Smets and Crevecoeur 2012, Dodelin and Saurat 2014, García 2021). A common species of Pleasing fungus beetles in many countries and it can be locally common or even abundant (Nikitsky and Kompantsev 1995, Krasutsky 1996, Droghvalenko 1997, Schiegel 2007, Cáliz et al. 2018). However, *T. aenea* is considered to be threatened in some countries, for example in Germany (Esser 2021).

*Triplax melanocephala* (Latreille, 1804) is associated in its development with the King oyster mushroom *Pleurotus eryngii* (De Candolle) Quélet, 1872, formed on dead roots and stems of *Eryngium* sp., *Ferula* sp., and some other plants from the family Apiaceae. Beetles found in tree fungi from orders Polyporales and Agaricales. It is possible that the beetle is also associated with the fruiting bodies of fungi of the orders Agaricales and Boletales, growing on the soil (Nikitsky and Kompantsev 1995, Droghvalenko 1997, Franc 2001). It was also found under the mushroom bark of a lying oak trunk. The host fungal species has not been identified (Möller 2009), and in the Oyster mushroom *P. ostreatus* on the fallen poplar (Molina Molina 2021). Is a very local and generally rare species and is considered to be threatened in some countries (Méndez et al. 2010, Red Data Book of Kharkiv Region of Ukraine 2013, Garcia et al. 2018, Bernáldez 2020).

## Materials and methods

The material was collected in Central and South-East Kazakhstan, Akmola, Almaty, Jetisu and Zhambyl oblast. Standard techniques (Fasulati 1971) used in entomology were used during the collection of the material. The following sources (Reitter 1901, Jacobson 1905-1915, Khalidov 1984, Kryzhanovsky 1965, Krivolutskaya 1992, Nikitsky and Kompantsev 1995, Nikitsky et al. 1996, Droghvalenko 1997, Nikitsky and Kompantsev 1997, Franc 2001, Merkl 2004, Mitter 2004, Krasutsky 2005, Schiegel 2007, Wegrzynowicz 2007, Nikitsky et al. 2008, Möller 2009, Méndez et al. 2010, Ruta et al. 2011, Bekchiev Smets and Crevecoeur 2012, Red Data Book of Kharkiv Region of Ukraine 2013, Dodelin and Saurat 2014, Cáliz et al. 2018, Garcia et al. 2018, Bernáldez 2020, Buşmachiu et al. 2021, Esser 2021, García 2021, Molina Molina 2021) were used for species determination of the beetles, clarification of their taxonomic position, biology and the distribution. Studied specimens are kept in the private collection of I.I. Temreshev (Almaty, Kazakhstan).

Photographs of *Triplax aenea* and *T. melanocephala* were taken with a camera Canon EOS 50 D by author (Figs 1, 2). Photographs of the mushrooms were taken with a camera Redmi 7 by I.I. Temreshev (Figs. 5). Descriptions and body measuring were performed using a Micromed MC var 1-C dissecting stereomicroscope and microscope Levenhuk DTX RC.

The mushrooms that the material was collected were determined using special literature (Samgina 1981, 1985) and the materials from the site "Mushrooms of Kazakhstan" ("Mushroom classification 2004).

For convenience as well as some geographical and administrative terms: AO – Almaty oblast, AkO – Akmola oblast, JO – Jetisu oblast, UO – Ulytau oblast, ZO – Zhambyl oblast, SNNP – state natural national park, d. – district, ex. – exemplar, nei. – neighborhoods, v. – village.

## Results

As a result of the research, two species of this genus, are determinates as new for Kazakhstan, and the list of mushrooms on which they are found is clarified.

### *Triplax aenea* (Schaller, 1783)

Fig. 1 A, B.

**Material examined.** 4 ex. – 17.06.2005, AkO, Akkol d., Azat v., 52°5'7.16"N 71°31'27.64"E, on Dryad's saddle mushroom *Cerioporus squamosus* (Hudson) Quélet, 1886, I.I. Temreshev; 2 ex. – 21.05.2014, AO, Ili d., 8 km W Karaoy v., 43°31'38"N 76°43'35"E, on King oyster mushroom *P. eryngii*, I.I. Temreshev; 3 ex. – 15.05.2024, UO, Ulytau d., 48°38'47.27"N 66°59'32.04"E, on Big Sheath Mushroom *Volvopluteus gloiocephalus* (DC.) Vizzini, Contu & Justo and *Rhodofomes roseus* (Alb. & Schwein.) Kotl. & Pouzar, I.I. Temreshev; 2 ex. – 19.06.2024, AO, SNNP Ile-Alatau, Kazachka gorge, 43°7'43.62"N 76°57'14.76"E, on Branched Oyster mushroom *P. cornucopiae* and Milk-caps mushroom *Lactarius badiosanguineus* Kuhner & Romagn., 1954, I.I. Temreshev.

**Remarks.** *T. aenea* is distributed in Europe (Albania, Armenia, Austria, Azerbaijan, Belgium, Belarus, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Great Britain, Hungary, Italy, Latvia, Lithuania, Moldova, Montenegro, Netherlands, Norway, Poland, Romania, Russia, Serbia, Slovakia, Spain, Sweden, Switzerland, Ukraine) and Asia (Siberia and Far East) (Jacobson 1905-1915, Kryzhanovsky 1965, Krivolutskaya 1992, Drogvalenko 1997, Franc 2001, Merkl 2004, Krasutsky 2005, Wegrzynowicz 2007, Ruta et al. 2011, Bekchiev Smets and Crevecoeur 2012, Buşmachiu et al. 2021) (Fig. 2). There are the first records these species on the Dryad's saddle mushroom *C. squamosus*, Big Sheath Mushroom *V. gloiocephalus*, *R. roseus* and Milk-caps mushroom *L. badiosanguineus* (Fig. 4).

### *Triplax melanocephala* (Latreille, 1804)

Fig. 1 C, D

**Material examined.** 3 ex. – 18.06.2011, AO, Kerbulak d., SNPP Altyn-Emel, Katutau mounts, 10 km E Konyrolen v., 44°16'19.8"N 79°22'15.3"E, on Field mushroom *Agaricus*

*ricus campestris* L., I.I. Temreshev; 2 ex. – 12.06.2012, ZO, Kordai d., 43°2'24.83"N 74°53'57.63"E, on Field mushroom *A. campestris*, I.I. Temreshev; 4 ex. – 21.05.2014, AO, Ili d., 8 km W Karaoy v., 43°31'38"N 76°43'35"E, King oyster mushroom *P. eryngii* and under dried dung, I.I. Temreshev; 4 ex. – 8.08.2014, JO, SNNP Zhongar-Alatau, Sarkand d., nev. Topolevka v., 45°25'58.97"N 80°20'47.68"E, on Dryad's saddle mushroom *C. squamosus* and Prince mushroom *Agaricus augustus* Fr. 1838, I.I. Temreshev; 2 ex. – 23.04.2018, AO, Karasai d., Kaskelenskoe v., 43°17'28.58"N 76°41'38.83"E, on King oyster mushroom *P. eryngii* and under dried dung, I.I. Temreshev; 3 ex. – 24.05.2020, AO, Talgar d., Arkabay v., 43°24'51.58"N 77°6'8.82"E, on King oyster mushroom *P. eryngii*, I.I. Temreshev; 3 ex. – 25.08.2021, AO, SNNP Ile-Alatau, Maloye Almaty g., 43°10'33"N 77°00'43"E, on Veiled oyster mushroom *P. dryinus*, I.I. Temreshev; 2 ex. – 11.05.2021, AO, Karasai d., nei. Kairat v., 43°9'28.82"N 76°33'41.48"E, on Dryad's saddle mushroom *C. squamosus*, I.I. Temreshev; 2 ex. – 25.08.2023, UO, Ulytau d., 48°38'47.27"N 66°59'32.04"E, on Rough-stemmed bolete *Leccinum scabrum* (Bull.) Gray, (1821), I.I. Temreshev; 1 ex. – 6.04.2024, Almaty city, Bostandyk d., floodplain of the Esentai river, 43°13'15.61"N 76°55'52.87"E, on Oyster mushroom *P. ostreatus*, I.I. Temreshev; 13.04.2024 – 1 ex., AO, Karasai d., nei. Degeres v., 43°14'6.59"N 75°48'33.40"E, on King oyster mushroom *P. eryngii*, I.I. Temreshev.

**Remarks.** *T. melanocephala* is distributed in Europe (Bulgaria, Croatia, Finland, France, Georgia, Germany, Great Britain, Hungary, Italy, Latvia, Portugal, Romania, Russia, Slovakia, Spain, Sweden, Switzerland, Ukraine), North Africa (Algeria, Egypt, Morocco), Asia (Turkey, Uzbekistan) (Jacobson 1905-1915, Kryzhanovskiy 1965, Krivolutskaya 1992, Drozvalenko 1997, Franc 2001, Merkl 2004, Krasutsky 2005, Wegrzynowicz 2007, Ruta et al. 2011, Bekchiev Smets and Crevecoeur 2012) (Fig. 3). The records of *T. melanocephala* were absent for Kazakhstan (Wegrzynowicz 2007; Temreshev 2023). The beetles were on the mushroom (Fig. 4). There are the first records these species on the fungi from family Agaricaceae – Field mushroom *A. campestris* and Prince mushroom *A. augustus*.

## Discussion

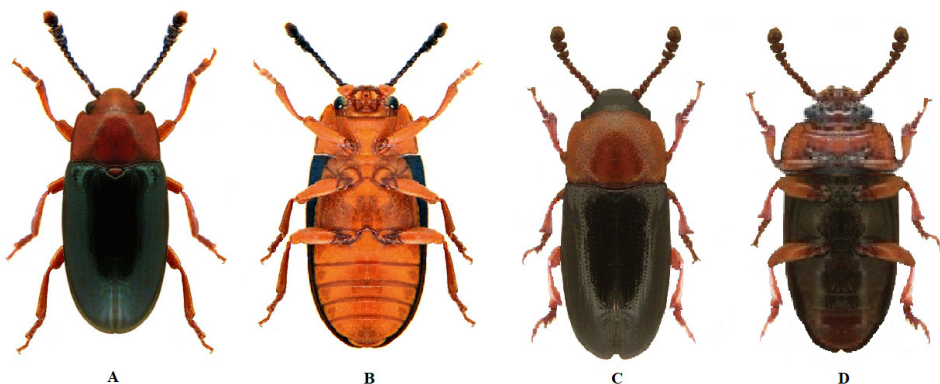
In total, two species of pleasing fungus beetles from genus *Triplax* are additionally recorded for Kazakhstan.

### Key to known species of the genus *Triplax* from Kazakhstan

- 1 Elytra red or brown-red. The whole body brownish-red, only the eyes black. 3 mm ..... ***T. rubrica***
- Elytra metallic blue or green ..... **2**
- 2 Head, scutellum and the rest of the body, legs orange, antennae black. 3.3–4.3 mm ..... ***T. aenea***

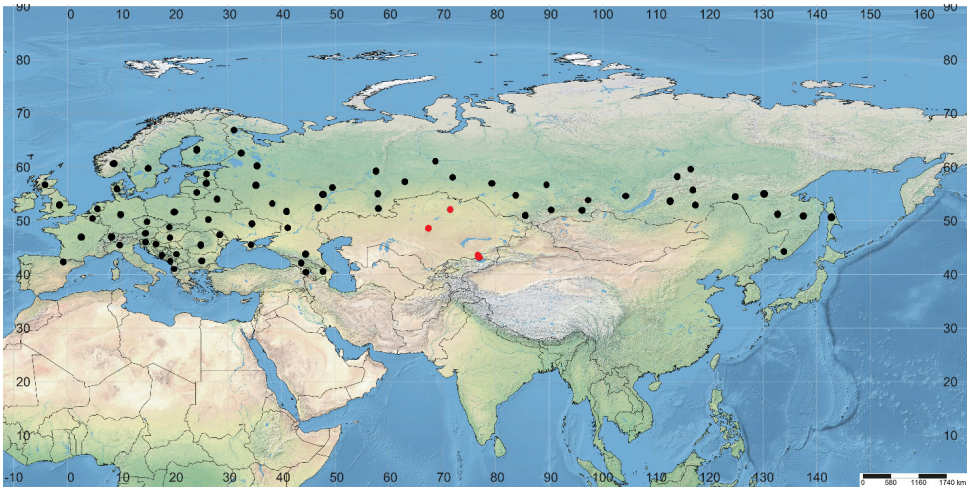
- Elytra black..... 3
- 3 Scutellum black. Head, abdomen, legs orange, antennae, mesothorax and metathorax, coxae black. 4.5–6.5 mm..... *T. russica*
- Head, abdomen and legs black, antennae and coxae reddish-brown ..... 4
- 4 Prothorax is red. 3.5–4.8 mm..... *T. melanocephala*
- Head, except for the reddish front part, darkened. Antennae and legs reddish-brown ..... 5
- 5 Anterior part and base of pronotum black or darkened. 3–3.8 mm.....  
..... *T. subtilissima*
- Scutellum light. Head and pronotum single-colored, reddish-brown or red-brown ..... 6
- 6 Body, antennae, and legs rufous-brown or red-brown, mesothorax, metathorax, and abdomen somewhat darkened. 2.5–3 mm ..... *T. nikritini*

Seven genera and sixteen species pleasing fungus beetles were known from Kazakhstan (Wegrzynowichz 2007, Temreshev 2017a, Temreshev 2023). Taking into consideration *T. aenea* and *T. melanocephala* seven genera and eighteen species of Erotylidae are recorded for Kazakhstan. In the future, it is possible to find of *T. aenea* in the forests of Kostanay, North Kazakhstan, East Kazakhstan, Abai and Pavlodar oblast. The finds of *T. melanocephala* from South-East Kazakhstan are currently the easternmost localities for this species and new record for Central Asia. In the future, it is possible to find the species in the foothills of East Kazakhstan and Turkistan oblast. These regions of the country are also frequently home to one of its main development sites – King oyster mushroom *P. eryngii*.

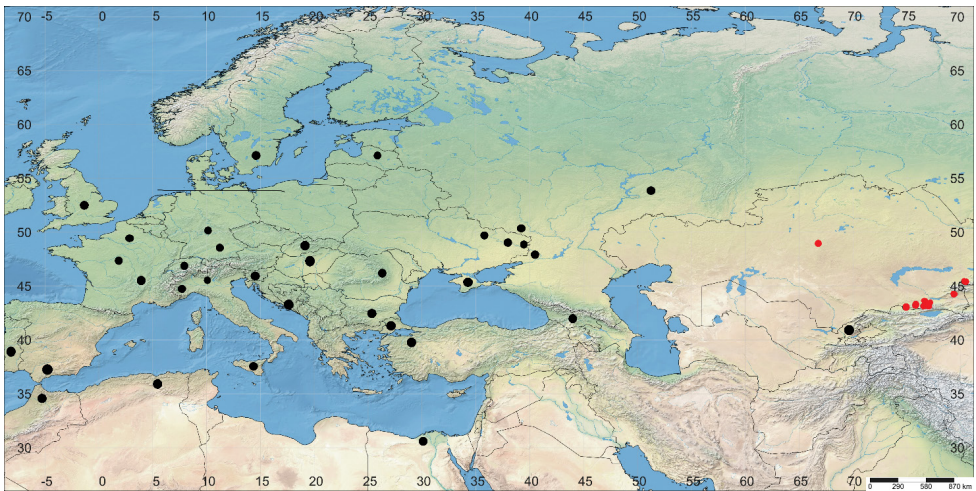


**Figure 1.** *Triplax aenea*, habitus, dorsal (A) and ventral (B) view, Central Kazakhstan; *Triplax melanocephala*, habitus, dorsal (C) and ventral (D) view, South-East Kazakhstan.

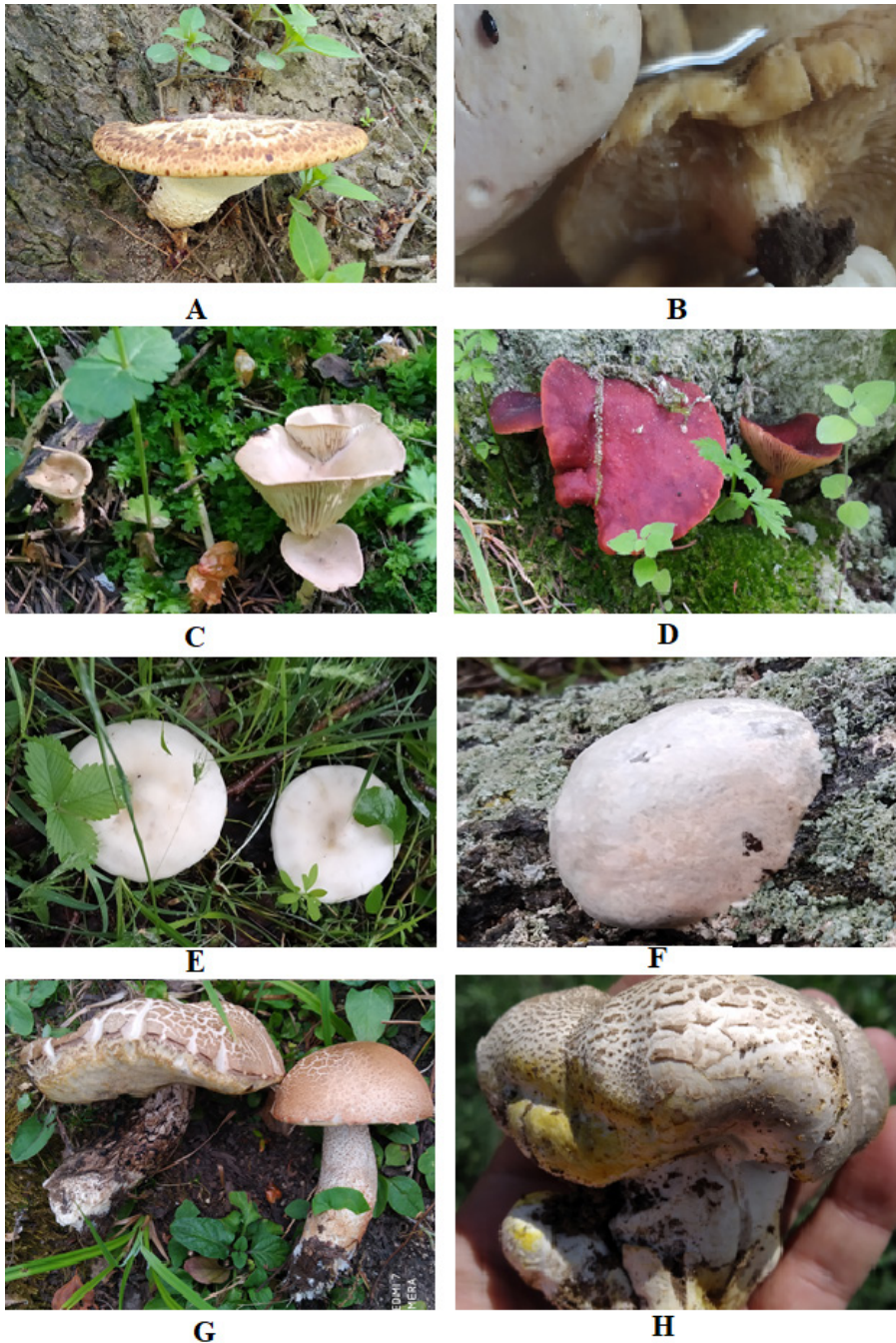




**Figure 2.** Distribution of *Triplax aenea* in world and in Kazakhstan. New records are indicated with red circles. Known indicated in black circles.



**Figure 3.** Distribution of *Triplax melanocephala* in world and in Kazakhstan. New records are indicated with red circles. Known indicated in black circles.



**Figure 4.** Mushrooms species with *Triplax aenea* and *Triplax melanocephala*: A – Dryad's saddle mushroom *Cerioporus squamosus*; B – King oyster mushroom *Pleurotus eryngii*; C – Branched Oyster mushroom *Pleurotus cornucopiae*; D – Milk-caps mushroom *Lactarius badiosanguineus*; E – Big Sheath Mushroom *Volvopluteus gloiocephalus*; F – *Rhodofomes roseus*; G – Rough-stemmed bolete *Leccinum scabrum*; H – Field mushroom *Agaricus campestris*. Central, South and South-East Kazakhstan.



## Acknowledgement

The work was carried out within the framework of the project "Comprehensive assessment of the state of the environment and health of the population of the cities of Zhezkazgan, Satpayev and Ulytau district of the Ulytau region with the formation of an environmental electronic geographic information system".

Author thanks to anonymous reviewer for the valuable comments that improved the manuscript.

## References

- Bekchiev R, Smets K, Crevecoeur L (2012) Contribution to the knowledge of the genus *Triplax* Herbst, 1793 (Coleoptera: Erotylidae) in Bulgaria. *ZooNotes* 30: 1–6.
- Bernáldez FG Fundación (Ed.) (2020) EUROPARC-Spain. Manual 14. Mediterranean Old-Growth Forests: Characteristics and Management Criteria in Protected Areas, Madrid, 139 pp.
- Buşmachiu G, Bacal S, Mînzat C, Burduja D (2021) Contributions to the knowledge of invertebrates associated with decomposed wood from the Plaiul Fagului. Reserve Muzeul Olteniei Craiova. Oltenia. *Studii și comunicări. Științele Naturii* 37 (1): 66–70.
- Cálix M, Alexander KNA, Nieto A, Dodelin B, Soldati F, Telnov D, Vazquez-Albalade X, Aleksandrowicz O, Audisio P, Istrate P, Jansson N, Legakis A, Liberto A, Makris C, Merkl O, Mugerwa Pettersson R, Schlaghamersky J, Bologna MA, Brustel H, Buse J, Novák V, Purchart L (2018) European Red List of Saproxyllic Beetles. Brussels, Belgium: IUCN. Available at: <http://www.iucnredlist.org/initiatives/europe/publications>.
- Denux O, Zagatti P (2010) Coleoptera families other than Cerambycidae, Curculionidae sensu lato, Chrysomelidae sensu lato and Coccinelidae. Chapter 8.5. In: Roques A, Kenis M, Lees D, Lopez-Vaamonde C, Rabitsch W, Rasplus J-Y, Roy D (Eds) Alien terrestrial arthropods of Europe. *BioRisk* 4 (1): 315–406. <https://doi.org/10.3897/biorisk.4.61>
- Dodelin B, Saurat R (2014) New data for *Triplax collaris* (Schaller) and *T. aenea* (Schaller) in Rhone-Alps (France) (Coleoptera, Erotylidae). *Bulletin mensuel de la Société linnéenne de Lyon* 83 (1–2): 49–51.
- Drake JA (2009) Handbook of Alien Species in Europe. Invading nature Springer series in invasion ecology. Volume 3. Springer Science + Business Media B.V., 399 p.
- Drogvalenko AN (1997) Review of Erotylidae (Coleoptera) fauna of Ukraine. *The Kharkov Entomological Society Gazette* V (1): 74–78. [In Russian]
- Esser J (2021) Rote Liste und Gesamtartenliste der "Clavicornia" (Coleoptera: Cucujoidea) Deutschlands. In: Ries M, Balzer S, Gruttke H, Haupt H, Hofbauer N, Ludwig G, Matzke-Hajek G (Eds) Rote Liste gefährdeter Tiere, Pflanzen und Pilze Deutschlands, Band 5: Wirbellose Tiere (Teil 3). Münster (Landwirtschaftsverlag). *Naturschutz und Biologische Vielfalt* 70 (5): 127–161.
- Fasulati KK (1971) Field study of terrestrial invertebrates. Higher school, Moscow, 424 pp. [In Russian]

- Franc V (2001) Beetles of the family Erotylidae (Coleoptera) in the Slovakian fauna. *Acta Zoologica Universitatis Comenianae* 44: 63–69.
- García F (2021) *Triplax aenea* (Schaller, 1783). Un escarabat micòfag. *Butlletí de la Societat Micològica Valenciana* 25: 107–110. [In Spanish]
- García N, Numa C, Bartolozzi L, Brustel H, Buse J, Norbiato M, Recalde JI, Zapata JL, Dodelin B, Alcázar E, Barrios V, Verdugo A, Audisio P, Micó E, Otero JC, Bahillo P, Viñolas A, Valladares L, Méndez M, El Antry S, Galante E (2018) The conservation status and distribution of Mediterranean saproxylic beetles. IUCN, Malaga, Spain, 58 pp.
- Goodrich MA and Skelley PE (1997) New synonymy in the genus *Triplax* (Coleoptera: Erotylidae), with notes on the biology of *Triplax californica*. *Annales Zoologici* 47 (1 & 2): 55–58.
- Hagstrum DW, Subramanyam B (2009) Stored-product insect resource. AACC International, Inc., 509 pp.
- Jacobson GG (1905–1915) Beetles of Russia and Western Europe. Publication of A.F. Devrient, St. Petersburg, 1024 pp. [In Russian]
- Hartmann O, Schmidl J (2012) Bestimmungsschlüssel und Ikonografie der Familie Erotylidae s.str. (Coleoptera) für den europäischen Teil und den Fernen Osten der ehemaligen UdSSR – eine Übersetzung aus dem Russischen ins Deutsche. Bericht zur Projektarbeit der AG Ökologie am Department für Biologie, Lehrstuhl für Entwicklungsbiologie, Friedrich-Alexander-Universität Erlangen-Nürnberg, 96 pp. <http://dx.doi.org/10.13140/RG.2.2.30138.39360> [In German]
- Khalidov AB (1984) Insects – fungus destroyers. Kazan: Kazan University Press, 151 pp. [In Russian]
- Krasutsky BV (1996) Mycetophilic beetles of the Urals and Trans-Urals. Vol. 1. Brief illustrated guide to determining the most common coleoptera in the entomocomplexes of wood-destroying basidiomycetes. Ekaterinburg Publishing House, Ekaterinburg, 146 pp. [In Russian]
- Krasutsky BV (2005) Mycetophilic beetles of the Urals and Trans-Urals. Vol. 2. System "Mushrooms-insects". Chelyabinsk, 213 pp. [In Russian]
- Kryzhanovsky OL (1965) Family Erotylidae – Pleasing fungus beetles. In: Key of insects in the European part of the USSR. Vol. II. Beetles and twisted-wing insects. Science, Moscow-Leningrad, 316–317. [In Russian]
- Krivolutskaya GO (1992) Family Erotylidae – Pleasing fungus beetles. In: Key to insects of the Far East. Vol. III. Part 2. Coleoptera, or beetles. Science, St. Petersburg, 285–303. [In Russian]
- Liu J, Wang Y, Zhang R, Shi C, Lu W, Li J, Bai M (2021) Three complete mitochondrial genomes of Erotylidae (Coleoptera: Cucujoidea) with higher phylogenetic analysis. *Insects* 12: 524. <https://doi.org/10.3390/insects12060524>
- Méndez M, Dodelin J, Petrakis P, Schlaghamersky J, Nardi G (2010) *Triplax melanocephala* (Europe assessment). The IUCN Red List of Threatened Species 2010: e.T157581A5100034. Accessed on 14 April 2024.
- Merkel O (2004) Cryptophilinae and Xenoscelinae of Hungary, with a check-list of Hungarian Erotylidae (Coleoptera). *Folia historico-naturalia Musei Matraensis* 28: 123–134.

- Mitter H (2004) Notizen zur Biologie und Verbreitung der Erotylidae und Biphyllidae (Schwammkäfer) in Oberösterreich (Coleoptera: Erotylidae, Biphyllidae). *Denisia* 13: 239–245. [In German]
- Molina Molina D (2021) Primeros registros de *Leucohimatium arundinaceum* (Forsk., 1775) y *Triplax melanocephala* (Latreille, 1804) para la provincia de Alicante, España (Coleoptera: Erotylidae). *Revista gaditana de Entomología* 12: 207–211. [In Spanish]
- Möller G (2009) Struktur- und Substratbindung holzbewohnender Insekten, Schwerpunkt Coleoptera – Käfer. Dissertation zur Erlangung des akademischen Grades des Doktors der Naturwissenschaften (Dr. rer. nat.). Eingereicht im Fachbereich Biologie, Chemie, Pharmazie der Freien Universität Berlin, 294 pp. [In German]
- Mordkovich YaB, Sokolov EA (1999) Key of quarantine and other dangerous pests of raw materials, storage products and seed. VNIИ plant quarantine. Kolos, Moscow, 384 pp. [In Russian]
- Mushroom classification (n.d.) In: Mushrooms of Kazakhstan, from [http://fungi.su//infusions/advanced\\_articles\\_sort/fungi\\_cl.php](http://fungi.su//infusions/advanced_articles_sort/fungi_cl.php) (Retrieval date: 18.04.2024). [In Russian]
- Nikitsky NB, Bibin AR, Dolgin MM (2008) Xylophilous beetles (Coleoptera) of the Caucasian State Biospheric Natural Reserve and adjacent territories. Institute of Biology of Komi centre of science. Ural branch of the Russian Academy of Sciences, Siktivkar, 452 pp. [In Russian]
- Nikitsky NB, Kompantsev AV (1995) New species of mushroom beetles (Coleoptera, Erotylidae) from the Russian Far East with comments on the distribution and biology of other species. *Zoological Journal* 74 (6): 83–92. [In Russian]
- Nikitsky NB, Kompantsev AV (1997) Two new species of genus *Triplax* Herbst. (Coleoptera, Erotylidae) from Middle Asia and Kazakhstan. *Bulletin of Moscow Society of Naturalists. Biological series* 102 (3): 31–33. [In Russian]
- Nikitsky NB, Osipov IN, Chemeris MV, Semenov VB, Gusakov AA (1996) Coleoptera-xylobionts, mycetobionts and lamellar beetles of the Prioksko-Terrasny Biosphere Reserve (with a review of the fauna of these groups of the Moscow Region). *Moscow State University, Moscow*, 197 pp.
- Red Data Book of Kharkiv Region of Ukraine (2013) Animals. Tokarsky VA (Ed) VN Karazin Kharkiv National University, Kharkiv, 472 pp. [In Ukrainian]
- Reitter E (1901) Uebersicht der Arten der Coleopteren-Gattung *Triplax* Payk. aus Europa und den angrenzenden Ländern. *Wiener Entomologische Zeitung*, 20(4): 73–76.
- Robinson WH (2005) *Handbook of Urban Insects and Arachnids*. Cambridge University Press, Cambridge, 456 pp. <https://doi.org/10.1017/CBO9780511542718>
- Ruta R, Jałoszyński P, Sienkiewicz P, Konwerski S (2011) Erotylidae (Insecta, Coleoptera) of Poland – problematic taxa, updated keys and new records. *ZooKeys* 134: 1–13. <https://doi.org/10.3897/zookeys.134.1673>
- Samgina DI (1981) Flora of spore plants of Kazakhstan. Vol. 13. Book 1. Gilled mushrooms. Agaricales. Science of the Kazakh SSR, Alma-Ata, 272 pp. [In Russian]
- Samgina DI (1985) Flora of spore plants of Kazakhstan. Vol. 13. Book 2. Gilled mushrooms. Agaricales. Science of the Kazakh SSR, Alma-Ata, 269 pp. [In Russian]

- Schiegel DS (2007) Fleshy fungi of the genera *Armillaria*, *Pleurotus*, and *Grifola* as habitats of Coleoptera. *Karstenia* 47: 37–48. Helsinki.
- Skelley PE, Gasca-Álvarez HJ (2020) *Michyrus*, a new genus of pleasing fungus beetles with coarsely faceted eyes (Coleoptera: Erotylidae). *Insecta mundi* 0836: 1–8.
- Skelley PE, Leschen RAB, Liu Z (2021) New Australian Erotylinae with notes on Dacnini (Coleoptera: Cucujoidea: Erotylidae). *Zootaxa* 4948 (3): 363–380. <https://doi.org/10.11646/zootaxa.4948.3.3>
- Ślipiński SA, Leschen RAB, Lawrence JF (2011) Order Coleoptera Linnaeus, 1758. In: Zhang Z-Q (Ed.) *Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness*. *Zootaxa* 3148: 203–208. <https://doi.org/10.11646/zootaxa.3148.1.39>
- Tang W, Skelley P, Pérez-Farrera MA (2018) *Ceratophila*, a new genus of erotylid beetles (Erotylidae: Pharaxonothinae) inhabiting male cones of the cycad *Ceratozamia* (Cycadales: Zamiaceae). *Zootaxa* 4508 (2): 151–178. <https://doi.org/10.11646/zootaxa.4508.2.1>
- Temreshev II (2017) Pests of storage and raw materials, distributed in the territory of the Republic of Kazakhstan, and some accompanying and quarantine species (species composition and brief technology protection measures). Second edition, revised and supplemented. LLP "Nur-Print", Almaty, 419 pp. [In Russian]
- Temreshev II (2022) Review of the genus *Dacne* Latr. (Coleoptera, Erotylidae) from Kazakhstan. *Acta Biologica Sibirica* 8: 367–380. <https://doi.org/10.5281/zenodo.7703397>
- Temreshev II (2023) First record of *Triplax russica* (Linnaeus, 1758) (Coleoptera, Erotylidae) from Kazakhstan. *Acta Biologica Sibirica* 9: 147–155. <https://doi.org/10.5281/zenodo.7825636>
- Triplax* Herbst, 1793 in GBIF Secretariat (2023) GBIF Backbone Taxonomy. Checklist dataset (Retrieval date 24.07.2024).
- Wegrzynowicz P (2007) Erotylidae. In: Löbl I, Smetana A (Eds) *Catalogue of Palaearctic Coleoptera*. Vol. 4: Elateroidea-Derodontoidea-Bostrichoidea-Lymexyloidea-Cleroidea-Cucujoidea. Apollo Books, Stenstrup, 531–546.