

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

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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*.

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Keywords

Triplax aenea, *T. melanocephala*, pleasing fungus beetles, new findings, key, Akmol, 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, Droghvalenko 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) Quélet, Veiled oyster mushroom *Pleurotus dryinus* (Persoon) P. Kummer, 1871, Oyster mushroom *Pleurotus ostreatus* (Jacquin) P. Kummer, 1871, Pale Oyster mushroom *Pleurotus pulmonarius* (Fr.) Quélet, *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 *Laetiporus 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, Drogvalenko 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, Buşmachi 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

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, Buşmachi 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 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, SNPP 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, SNPP 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, Kryzhanovsky 1965, Krivolutskaya 1992, Drogvalenko 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 (Wegrzynowicz 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*.

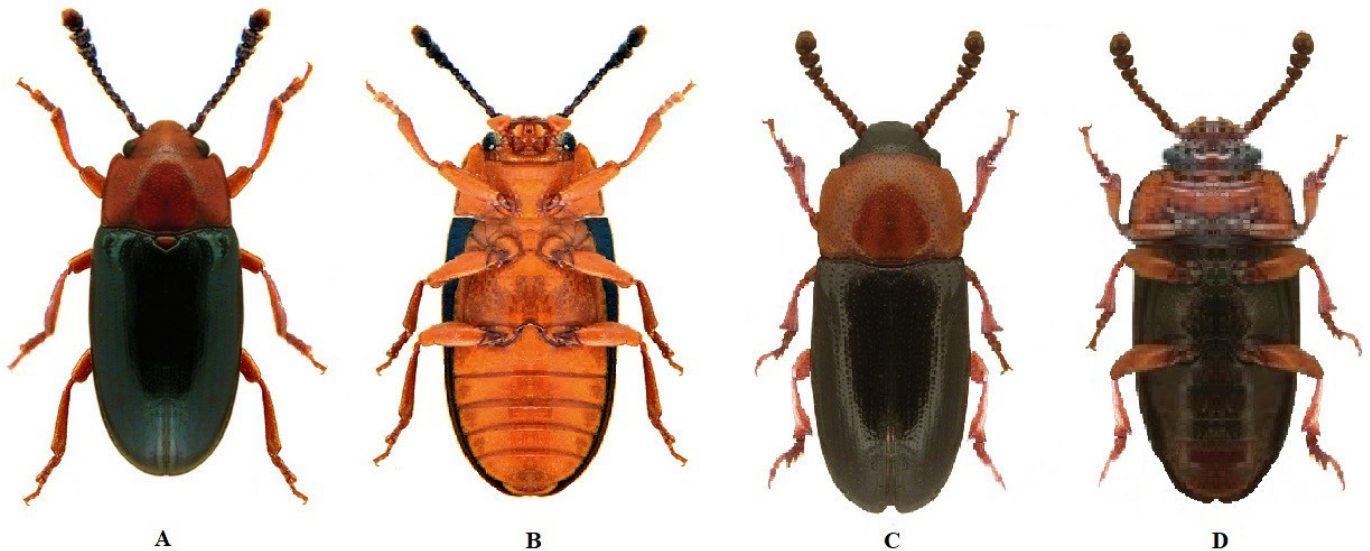


Figure 1. *Triplax aenea*, habitus, dorsal (A) and ventral (B) view, Central Kazakhstan; *Triplax melanocephala*, habitus, dorsal (C) and ventral (D) view, South-East Kazakhstan.

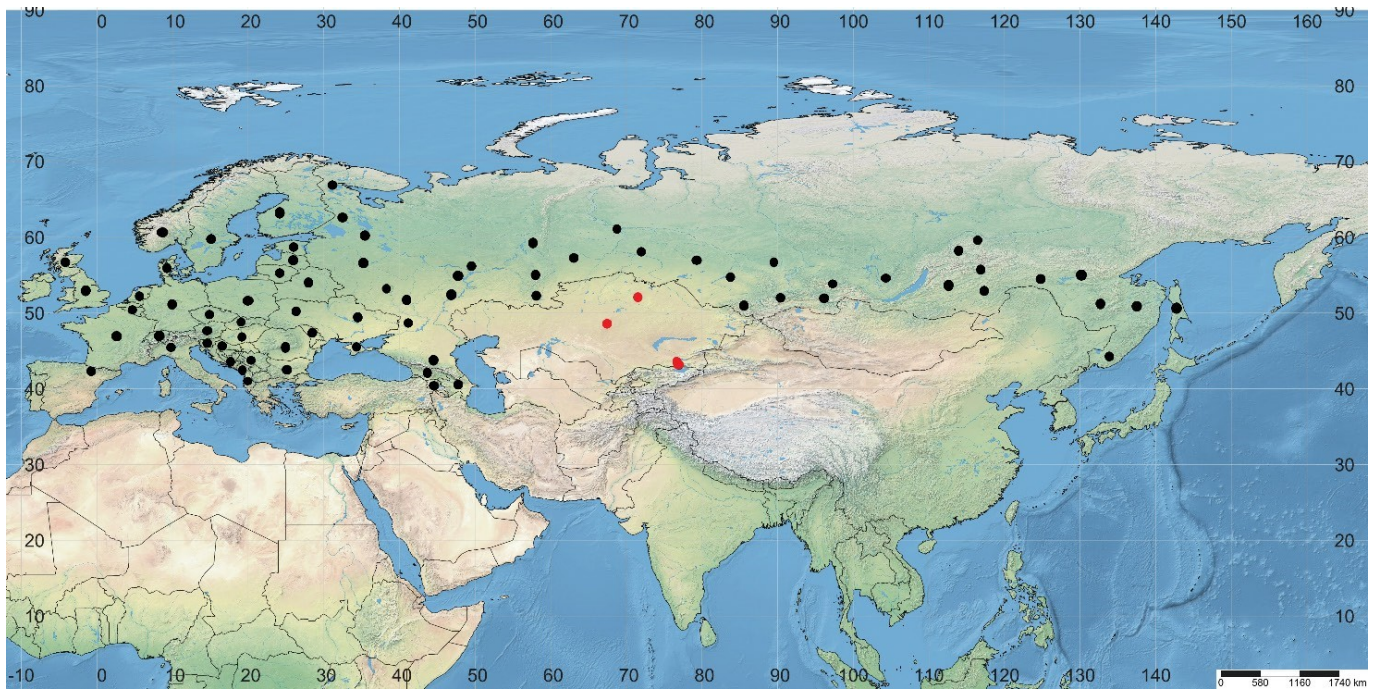


Figure 2. Distribution of *Triplax aenea* in world and in Kazakhstan. New records are indicated with red circles. Known indicated in black circles.

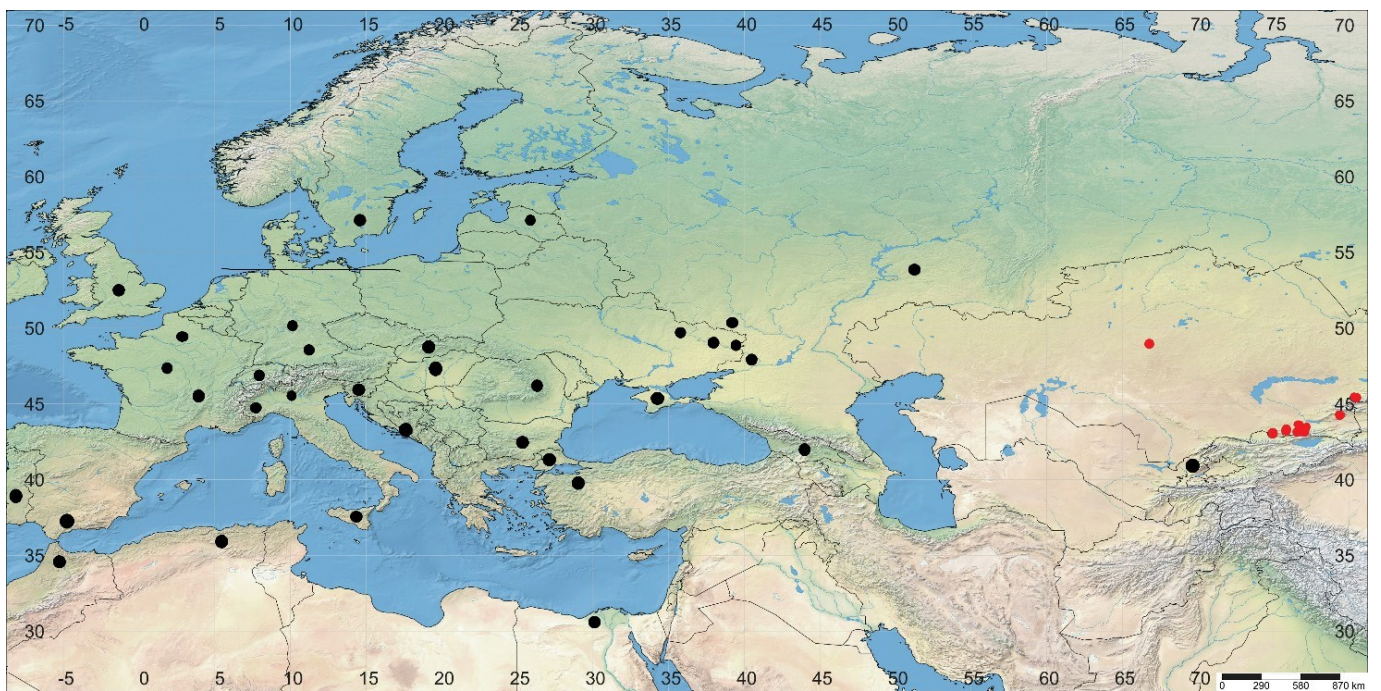


Figure 3. Distribution of *Triplax melanocephala* in world and in Kazakhstan. New records are indicated with red circles. Known indicated in black circles.



A



B



C



D



E



F



G



H

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.

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