

A Faunistic study on Heteropterans (Hemiptera: Heteropter) in the "Altyn-Emel" State National Natural Park, Kazakhstan

Makhabbat B. Amanbayeva^{1*}, Assiya D. Maimatayeva¹, Kalampyr Zhumagulova²,
Toleu Karimzhan¹, Kulzhanova Dina Kuanyshovna¹, Shynybekova Sholpan²

1. Department of Biology, Abai Kazakh National Pedagogical University, 050010, Almaty, Dostyk Ave. 13, Kazakhstan

2. Institute of Natural Sciences and Geography, Abai Kazakh National Pedagogical University, Almaty, 13, Dostyk Av., 050010 Almaty, the Republic of Kazakhstan, Kazakhstan

* Corresponding author's Email: Mahabbat_82@mail.ru

ABSTRACT

The Altyn-Emel State National Natural Park (Kazakhstan) was surveyed for Heteroptera in spring-summer period (April-August), 2022-2023. A total of 172 species belonging to 22 families of Heteroptera were identified. Some species of: Heteroptera serve as bioregulators of mosquitoes (Diptera: Culicidae) under natural conditions.

Key words: Kazakhstan, Heteroptera, Mosquito, Aquatic Heteroptera, Zoophytophages.

Article type: Research Article.

INTRODUCTION

"Altyn-Emel" State National Natural Park was established by Order No.460, dated April 10, 1996, Republic of Kazakhstan, on the basis of forest and hunting committee. It is located on the territory of two administrative districts, Kербулак and Панфилов of Almaty region, the coordinates 44°20'0"N, 78°26'0"E. Heteroptera represent the largest order of insects with incomplete metamorphosis, occupying a variety of habitats and playing an important role in biological processes in biogeocenosis (Dolling 1991; Aukema & Rieger 1999). Currently, there are more than 40,000 species of Heteroptera from 50 families. Heteroptera in the territory of Altyn-Emel National Park is poorly studied. Preliminary surveys can be used as a baseline assessment for the biodiversity of "Altyn-Emel" National Park. This provides an annotated list of the Heteroptera fauna of Altyn-Emel National Park under the International Convention for conservation, restoration, and sustainable use of biodiversity. All of Heteropterans are represented in the fauna of Kazakhstan (with the exception of tropical Enicocephalomorpha), where 1,250 species from 35 families and 411 genera are recorded (Yesenbekova 2013). Among Heteroptera, species that feed on plants are dominant, and cause significant damage to agricultural crops (grain, forage, vegetables, fruit), as well as to pastures and forests. Some Heteroptera are beneficial and prey on crop and forest pests.

MATERIALS AND METHODS

For the collection of terrestrial insects, grass, shrub and tree were swept with a plain net. The soil, leaf litter and basal parts of plants were checked by hand. Aquatic Heteroptera were found in all wet habitats: along the banks of the Ile River, in wet meadows, along streams and swamps, and caught in the light at night. Insects (except for the largest ones) is caught by exhaustor and killed by ethyl acetate (Angus 1992; Kerzhner 2005). Larger specimens are mounted on pins, and smaller (on average less than 5 mm), narrow and small ones were glued on cardboard rectangles. The materials for this study were collected in spring-summer period (April-August), 2022-

2023. In the first part of study are listed the species, place of collection, brief information on the distribution, biology and ecology are given.

Family Nabidae

Predators. They feed on a variety of insects and inhabit the surface of the soil and herbaceous plants. They are distributed world-wide (Kerzhner 1990). *Aspilaspis viridis* Brulle, 1835. Cordon Shygan. Found on tamarisk (Tamarix). Polyphagous predator feed on aphids and eggs and larvae of insects.

Nabis ferus Linnaeus, 1758. Cordon Shygan, cordon Uzynbulak, Konakbaysay Gorge. Mesophilic species. Predator. Polyphagous species feeding on flies. *Nabis rugosus* Linnaeus, 1758. Cordon Uzynbulak, Konakbaysay Gorge. Predator. Predator live in various habitats on herbaceous vegetation. *Nabis brevis* Scholtz, 1847. Cordon Uzynbulak, Konakbaysay Gorge. Mesophilic species. Polyphagous.

Family Anthocoridae

They are relatively small family (Asanova 1966). Predators. They feed on aphids, mites, scale insects, thrips, beetle larvae, etc., often benefit by destroying agricultural pests. They inhabit most often flowers, litter, bark of trees, etc. *Anthocoris nemorum* Linnaeus, 1761. Cordon Uzynbulak, Konakbaysay Gorge. They polyphagous are found on herbaceous, shrub, and trees. *Anthocoris sibiricus* Reuter, 1875. Cordon Shygan, intrazonal biotope, cordon Kyzylauyz, Kyzylauyz Gorge, cordon Uzynbulak, Konakbaysay Gorge. *Anthocoris limbatus* Fieber, 1836. Cordon Uzynbulak, Konakbaysay Gorge. They inhabit willows. Predator.

Orius (H.) horvathi (Reuter, 1884). Kyzylauyz Gorge. They inhabit woody and herbaceous plants. Predator.

Orius (D.) agilis (Flor, 1860). Cordon Shygan. Predator.

Orius minutus Linnaeus, 1758. Cordon Shygan, cordon Uzynbulak, Konakbaysay Gorge. Polyphagous zoophages. Predator. *Orius niger* Wolff, 1811. Taygak Gorge, cordon Shygan, cordon Togyzbulak.

Family Miridae

Phytophagous species are prevailing in this family, but quite a few predatory species or species with mixed nutrition (predator and phytophagous). One or more generations per year (Kerzhner & Yachevskiy 1964).

Deraeocoris (Camptobrochis) lutescens (Schilling, 1830). Taygak Gorge. They inhabit deciduous trees. Predator.

Deraeocoris (Camptobrochis) punctulatus (Fallen, 1807). Cordon Shygan, cordon Uzynbulak, Konakbaysay Gorge, Cordon Mynbulak, They live in steppe areas on herbaceous plants. They are zoophytophages.

Capsus ater Linnaeus, 1758. Cordon Uzynbulak, Konakbaysay Gorge. They inhabit the mesophytic and hygrophytic forb-grass meadows and wetlands.

Adelphocoris seticornis (Fabricius, 1775). Cordon Shygan, cordon Uzynbulak Konakbaysay Gorge. Pest of alfalfa. *Cyllecoridea decorata* Kiritshenko, 1931. Ile River floodplain, Taigak Gorge. They inhabit woody and herbaceous plants, destroy aphids. *Orthocephalus saltator* (Hahn, 1835).

Taigak Gorge. They live in grassy meadow (grasses). *Lygus pratensis* (Linnaeus, 1758). Cordon Togyzbulak, cordon Uzynbulak Konakbaysay Gorge. They are eurybiont, polyphagous and seriously damage fruits, cereals, legumes, truck crops, alfalfa. *Lygus gemellatus* (Herrich-Schaffer, 1835). Cordon Shygan, cordon Uzynbulak Konakbaysay Gorge. They are polyphagous, mainly inhabits herbaceous plants. And damage grains, legumes.

Lygus punctatus (Zetterstedt, 1838). Cordon Shygan, cordon Togyzbulak, cordon Uzynbulak, Konakbaysay Gorge. They are eurybionts, polyphagous. They mainly inhabit herbaceous plants and damages different crops.

Lygus rugulipennis Poppius, 1911. Cordon Togyzbulak, cordon Uzynbulak, Konakbaysay Gorge. They are polyphagous. They damage many crops: fruits, cereals, medicinal and other plants. *Lygocoris lucorum* (Meyer-D, 1843). Taigak Gorge, cordon Togyzbulak, cordon Uzynbulak, Konakbaysay Gorge. *Lygocoris rugicollis* (Fallen, 1807). Taigak Gorge, Kyzylauyz Gorge. They inhabit willow (Sáliz).

Lygocoris pabulinus (Linnaeus, 1761). Taigak Gorge, Ili River floodplain, Kyzylauyz valley. They inhabit willows (Sáliz). *Pilophorus reticulata* (Kirschb., 1855). Taigak Gorge, Ili River floodplain, Kyzylauyz valley. They inhabit deciduous trees. They are zoophytophages. *Pilophorus pusillus* Reuter, 1878. Taigak Gorge, Ili River floodplain, Kyzylauyz valley. They inhabit the trees and bushes. They are zoophytophages. *Phaxia festiva* Kerzhner, 1984. Taigak Gorge, Ili River floodplain, Kyzylauyz valley. They inhabit flowers *Atraphaxis* sp. *Calocoris fulvomaculatus* (De Geer, 1773).

Cordon Togyzbulak, cordon Uzynbulak, Konakbaysay Gorge. They inhabit herbaceous plants. *Polymerus cognatus* Fieber, 1858. Kyzylauyz valley, cordon Shygan, cordon Uzynbulak, Konakbaysay Gorge. They are polyphages. *Polymerus unifasciatus* (Fabricius, 1794). Cordon Shygan, cordon Togyzbulak, cordon Uzynbulak,

Konakbaysay Gorge. They are polyphages. *Polymerus vulneratus* (Panzer, 1798). Cordon Shygan, cordon Uzynbulak, Konakbaysay Gorge. They damage many crops and medicinal plants. *Stenodema calcaratum* (Fallen, 1807). Cordon Shygan. They are phytophages. They are potential pest of cereals. *Stenodema laevigatum* (Linnaeus, 1758). Cordon Togyzbulak, cordon Uzynbulak, Konakbaysay Gorge. *Stenodema holsatum* (Fabricius, 1787). Kyzylauyz Gorge, cordon Shygan, cordon Uzynbulak, Konakbaysay Gorge. They are phytophages. *Stenodema turanica* Reuter, 1904. Steppe plateau between Seriktas and Sholak. They inhabit grasses and sedges. *Chlamydatus pullus* (Reuter, 1870). Taigak Gorge. Cordon Shygan, cordon Uzynbulak, Konakbaysay Gorge. They inhabit grasses. They are polyphytophages. *Psallus betuleti* (Fallen, 1826). Taigak Gorge. They live on Betule, Salix, trees and bushes. They are zoophytophages. *Psallus lepidus* Fieber, 1858. Taigak Gorge. They are zoophytophages.

Psallus roseus Fabricius, 1777. Cordon Uzynbulak, Konakbaysay Gorge. They live on Salix, trees and bushes. They are zoophytophages. *Apantilius prasinus* (Fieber), 1870. Taigak Gorge, cordon Uzynbulak, Konakbaysay Gorge. They inhabit herbaceous plants. *Plagiognathus chrysanthemi* Wolff 1864. Taigak Gorge. They are polyphages. They inhabit various herbaceous grasses. Pest of legumes. *Orthops campestris* Linnaeus, 1758. Taigak Gorge. They inhabit umbelliferous plants. Dangerous pest of all umbelliferous plants cultivated for seed. *Litoxenus tenellus* Reuter, 1885. Cordon Shygan. Steppe species. *Notostira erratica* (Linnaeus, 1758). Found in Ili River, Kyzylauyz Gorge, cordon Shygan, 12.06.2014. 3 species. They inhabit meadow grass plants.

Trigonotylus coelestialium (Kirkaldy, 1902). Kyzylauyz Gorge, cordon Shygan, cordon Uzynbulak, Konakbaysay Gorge. They inhabit various cereals. *Trigonotylus ruficornis* (Geoffroy, 1758). Cordon Shygan, intrazonal biotope. *Trigonotylus brevipes* Jakovlev, 1880. Taigak Gorge. They inhabit various cereals on floodplains, damage cereal sowing grass. *Leptopterna ferrugata* (Fallen, 1807). Cordon Shygan. They inhabit cereals. *Leptopterna dolobrata* (Linnaeus, 1758). Steppe plateau between Seriktas and Sholak. They inhabit cereals. *Myrmecophyes alboornatus* (Stal, 1858). Kyzylauyz Gorge, cordon Shygan. They live in mesophytic and xerophytic grassland habitats. They are polyphage. *Anapus freyi* Fieber, 1864. Kyzylauyz Gorge, cordon Shygan. They inhabit *Agropyron repens*. *Orthocephalus bivittatus* Fieber, 1869. Taigak Gorge, Kyzylauyz Gorge. *Orthocephalus vittipennis* (Herrich-Schaffer, 1835). Taigak Gorge, Kyzylauyz Gorge. They inhabit meadow grass plants. *Globiceps fulvicollis* Jakovlev, 1877. Steppe plateau between Seriktas and Sholak. They inhabit forbs and are predators. *Globiceps sordidus* Reuter, 1876. Kyzylauyz Gorge, cordon Shygan. They inhabit forbs. *Orthotylus marginalis* Reuter, 1883. Cordon Shygan, cordon Mynbulak. They inhabit willows. *Orthotylus virens* (Fallen, 1807). Found in Ili River. They inhabit saltworts. *Orthotylus eleagni* Jakovlev, 1880. Found in Ili River. They live in semi-deserts. *Orthotylus (M.) flavosparsus* (C.Sahlb., 1842) (*parallelus* Lindb.). Cordon Shygan, Ili River floodplain. They inhabit the plants of the family Chenopodiaceae. *Psallus lapponicus* Reuter, 1874. Cordon Shygan, cordon Mynbulak. They inhabit trees and bushes. They are zoophytophages. *Psallus nebulosus* Reuter, 1878. Taigak Gorge, cordon Shygan, cordon Mynbulak. They inhabit trees and bushes. They are zoophytophages. *Atractotomus albipennis* Reuter, 1876. Steppe plateau between Seriktas and Sholak. They inhabit herbaceous plants. *Plagiognathus bipunctatus* Reuter, 1883. Kyzylauyz Gorge, cordon Shygan, cordon Uzynbulak, Konakbaysay Gorge. They inhabit Asteraceae and legumes. *Plagiognathus (P.) albipennis* (Fallen, 1829). Steppe plateau between Seriktas and Sholak, cordon Uzynbulak, Konakbaysay Gorge. They inhabit wormwoods. *Atomoscelis onustus* (Fieber, 1861). Cordon Shygan, cordon Mynbulak. They inhabit the plants of the family Chenopodiaceae. *Campylomma annulicornis* (Signoret, 1865). Cordon Shygan, cordon Mynbulak. They are zoophytophages. *Tuponia sahlbergi* Reuter, 1901. Cordon Shygan. Found on tamarisk (Tamarix). *Tuponia distincta* Drapolyuk, 1980. Cordon Shygan. They inhabit tamarisk (Tamarix). *Tuponia elegans* (Jakovlev, 1867). Cordon Shygan. Found on tamarisk (Tamarix). They live in semi-desert. Found in *tugai* (a floodplain forest). *Tuponia roseipennis* Reuter, 1878. Cordon Shygan, cordon Mynbulak. *Tuponia conspersa* Reuter, 1901. Cordon Shygan, cordon Mynbulak. *Tuponia prasina* (Fieber, 1864). Cordon Shygan, found on tamarisk (Tamarix). Found in the semi-desert and desert along the river valleys. *Tuponia vulnerata* Linnavuori, 1961. Cordon Shygan, cordon Mynbulak. *Tuponia spinifera* Drapolyuk, 1982. Cordon Shygan, cordon Mynbulak. *Tuponia brevicornis* Reuter, 1890. Cordon Shygan, cordon Mynbulak.

Family Tingidae

They are herbivorous, living on the leaves of trees, shrubs and herbs, as well as on mosses, sometimes forming large clumps causing significant damage to its host

plants. Most of the species has a narrow food specialization.

Agramma atricapillum (Spinola, 1837). Cordon Shygan, cordon Uzynbulak, Konakbaysay Gorge. They inhabit motley grasses.

Galeatus inermis Jakovlev 1876. Cordon Shygan. They inhabit the Asteraceae (or Compositae).

Tingis angustata Herrich-Schaffer, 1838. Cordon Shygan. They inhabit the Asteraceae (or Compositae), forage plants.

Dictyonota (Dictyonota) atraphaxius Golub, 1975. Ili River floodplain. Found on *Atraphaxis* (Polygonaceae).

Galeatus affinis Herrich-Schaffer, 1835. Ili River floodplain. They inhabit the Compositae (Synanthereae).

Catoplatus carthusianus (Goeze, 1778). Cordon Uzynbulak, Konakbaysay Gorge. They inhabit the Ferula.

Family Reduviidae

They are large- or medium-sized. They have short, stout, strongly curved proboscis. Predators feed on a variety of insects and injections of large species are painful. They live in trees and grass, on the soil surface.

Coranus subapterus (De Geer, 1773). Singing Sand Dunes. They are predators.

Rhynocoris annulatus Linnaeus, 1758. Taigak Gorge, cordon Uzynbulak, Konakbaysay Gorge.

Rhynocoris iracundus Poda, 1761. Ili River floodplain, Taigak Gorge, Kyzylauyz Gorge, cordon Shygan.

Vachiria deserta (Becker, 1867). Cordon Shygan, cordon Kyzylauyz.

Family Berytidae

Berytinus crassipes Herrich-Schaeffer, 1835. Taigak Gorge, Kyzylauyz Gorge, Ili River floodplain. They inhabit legumes, sedges, grasses (wheat grass).

Family Piesmatidae

Small family. They are phytophagous. Adults overwinter.

Piesma maculatum Laporte, 1832. Cordon Shygan. They inhabit the Chenopodiaceae – the species of the genera *Chenopodium* and *Atriplex*.

Family Lygaeidae

Most species live in the soil under the plants. They are phytophagous, and predators rarely have extensive food specialization. Adults overwinter, sometime he larvae too.

Aellopus atrata Goeze, 1778. Taigak Gorge. Found on the Boraginacea, on the ground among plants.

Artheneis intricata Putshkovi, 1969. Cordon Shygan. They inhabit the tamarisk (*Tamarix*). *Artheneis alutacea* Fieber, 1861. Ili River floodplain, Cordon Shygan. They inhabit the *Tamarix* and willows (*Sáliz*).

Blissus putoni Jakovlev, 1875. Singing Sand Dunes, Ili River floodplain. They live in sandy habitats.

Cymus glandicolor Hahn, 1832. Cordon Shygan, intrazonal habitats. Found in wet meadows.

Cymophyes ochroleuca Fieber, 1870. Cordon Shygan, intrazonal habitats.

Geocoris grylloides Linnaeus, 1761. Cordon Uzynbulak, Konakbaysay Gorge. They are predators, living on dry meadows, steppes, in the bushes.

Lygaeus equestris Linnaeus, 1758. Kyzylauyz Gorge. Found on blossoming cherry tree; Cordon Shygan, intrazonal habitats.

Found among the grasses.

Lasiocoris (Pezocoris) apicimacula Costa, 1855. Kyzylauyz Gorge. They live on the ground, in floodplains.

Lamprodema maurum Fabricius, 1803. Kyzylauyz Gorge, Cordon Shygan, intrazonal habitats. Found on the ground under the plants and in the litter.

Henestaris halophilus Burmeister, 1835. Cordon Shygan, saline desert. Found on saltworts, often under one-year-old saltworts.

Engistus salinus Jakovlev, 1874. Cordon Uzynbulak, Konakbaysay Gorge. They inhabit plants

Halocnemum, *Artriplex*, *Kallidium*. *Holcocranum satirejae* (Kolenati 1845). Cordon Mynbulak, Ili River floodplain.

They inhabit willows (*Sáliz*). *Chilacis typhae* (Perris, 1857). Ili River floodplain. Found on *Thypha latifolia*.

Heterogaster artemisiae Schilling, 1829. Cordon Uzynbulak, Konakbaysay Gorge, cordon Shygan, intrazonal habitats.

Ischnodemus sabuleti (Fallen, 1826). Taigak Gorge, Ili River floodplain, Cordon Uzynbulak, Konakbaysay Gorge.

Found in open areas. *Nysius thymi* (Wolff, 1804). Taigak Gorge, cordon Uzynbulak, Konakbaysay Gorge, Cordon Shygan, intrazonal habitats.

They are polyphytophage, inhabiting mesophytic and xerophytic grasslands.

Nysius (Macroparius) cymoides Spinola, 1837. Cordon Shygan, intrazonal habitats. They inhabit desert herbaceous plants.

Nysius (M.) graminicola Kolenati, 1846. Small and Big Kalkan Mountains. Found in the desert herbaceous plants.

Nysius (Tropinysius) senecionis Schilling, 1829. Singing Sand Dunes, Ili

River floodplain. Found on wormwoods and yarrows (*Achilléa*). *Kleidocerys resedeae* Panzer, 1797. Taigak Gorge, Kyzylauyz Gorge, Cordon Shygan, Ili River floodplain, cordon Uzynbulak, Konakbaysay Gorge. *Cymus melanocephalus* Fieber, 1861. Ili River floodplain, Cordon Shygan. Found on the plants of the family *Cyperáceae* and *Juncaceae*. *Dimorphopterus spinolai* Signoret, 1857. Ili River floodplain, cordon Uzynbulak, Konakbaysay Gorge. Found on *Elymus*, *Juncus*. *Dimorphopterus blissoides* (Baerensprung, 1859). Ili River floodplain. Riparian forests on floodplains. Found on the plants of genus *Phragmites*. *Oxycarenus modestus* (Fallen, 1829). Cordon Shygan, intrazonal habitats. *Peritrechus geniculatus* (Hahn, 1832). Cordon Uzynbulak, Konakbaysay Gorge. They inhabit mixed grass steppe habitats, among the detritus. *Proderus crassicornis* Jakovlev, 1875. Cordon Uzynbulak, Konakbaysay Gorge. *Pterotmetus staphyliniformis* (Schilling, 1829). Cordon Uzynbulak, Konakbaysay Gorge. They are polyphytophages, inhabiting meadows and forest glades. *Trapezonotus arenarius* Linnaeus, 1758. Cordon Kyzylauyz. Found on mountain subalpine and dry meadows with sandy soil, on the steppe grasslands, often under the wormwood, considered as a pest of legumes, sugar beet. *Trapezonotus anorus* (Flor, 1860). Cordon Togyzbulak, cordon Uzynbulak, Konakbaysay Gorge. Found in the litter of different plants.

Family Pyrrhocoridae

They feed on seeds, dead insects, insect eggs, etc. Adults overwinter. *Pyrrhocoris apterus* (Linnaeus, 1758). Taigak Gorge, Kyzylauyz Gorge, cordon Togyzbulak, cordon Uzynbulak, Konakbaysay Gorge, cordon Shygan. Found on the ground, under rocks. They are polyphages.

Family Alydidae

They are phytophagous, suck the juice of leaves, stems, young branches, eat seeds and overwinter in the adult phase. *Alydus calcaratus* (Linnaeus, 1758). Cordon Shygan. They are phytophagous, trophically associated with legumes. *Camptopus lateralis* Germar, 1817. Cordon Togyzbulak, cordon Uzynbulak, Konakbaysay Gorge. They are phytophagous.

Family Coreidae

They are phytophagous, suck the juice of leaves, stems, young branches, eat seeds and overwinter in the adult phase (Moulet 1995). *Coreus marginatus* (Linnaeus, 1758). Cordon Shygan, cordon Uzynbulak, Konakbaysay Gorge. They are phytophagous, found on sorrels and other plants. *Syromastus rhombeus* (Linnaeus, 1767). Kyzylauyz Gorge. They are phytophagous, found on Caryophyllaceae (*Arenaria*, *Cerastium et al.*).

Family Rhopalidae

They are phytophagous, living mainly on herbaceous vegetation. They overwinter in the adult phase or egg phase. *Corizus hyoscyami* (Linnaeus, 1758). Cordon Shygan, cordon Uzynbulak, Konakbaysay Gorge. Imagos are polyphagous, considered a pest of legumes. *Chorosoma schillingii* (Schilling, 1829). Cordon Shygan, Kyzylauyz Gorge, cordon Uzynbulak, Konakbaysay Gorge. They are steppe species, founding among the grasses, on the *Artemisia*. *Chorosoma gracile* Josifov, 1968. Singing Sand Dunes. They live on cereals, on dry sandy places at different cereals - *Stipa*, *Elymus*. *Brachycarenus tigrinus* (Schilling, 1829). Cordon Shygan, Kyzylauyz Gorge, cordon Uzynbulak, Konakbaysay Gorge. They inhabit steppe areas. They are phytophagous, polyphagous, more often found on cruciferous plants. *Maccevethus corsicus* Signoret, 1862. Singing Sand Dunes, cordon Uzynbulak, Konakbaysay Gorge. *Stictopleurus angustus* Reuter, 1900. Cordon Uzynbulak, Konakbaysay Gorge. They are phytophagous. *Stictopleurus viridicatus* (Uhler, 1872). Cordon Togyzbulak, cordon Uzynbulak, Konakbaysay Gorge. They are phytophagous. They inhabit steppe areas.

Family Cydnidae

They are phytophagous, found usually on the ground under the plant or in the ground, overwinter in the adult phase. *Sehirus luctuosus* Mulsant and Rey, 1866. Cordon Shygan. Found on Mesophytes.

Family Scutelleridae

All species are of polyphytophagous, living on herbaceous plants. Some of them, like *Eurygaster integriceps*, are dangerous pests of crops. The adults overwinter. Also, the larvae of *Odontoscelis* and *Irochrotus* overwinter too. *Odontotarsus purpureolineatus* Rossi, 1790. Cordon Kyzylauyz. They are polyphagous.

Family Pentatomidae

The representatives of the subfamily Asopinae are predators; other species are herbivorous. Adults overwinter, larvae of the *Pentatoma* or eggs of the *Picromerus* overwinter rarely (Pericart 2002; Kerzhner 2005). They inhabit all landscape and mountain zones in different habitats in Kazakhstan. *Anthemina pusio* Kolenati, 1846. Cordon Uzynbulak, Konakbaysay Gorge. Found on wormwood, herbaceous plants and dwarf shrubs. *Anthemina lunulata* (Goeze, 1778). Cordon Shygan, gravelly desert. Singing Sand Dunes, cordon Uzynbulak, Konakbaysay Gorge. They are polyphagous. *Aelia furcula* Fieber, 1868. Cordon Uzynbulak, Konakbaysay Gorge. Widespread species often caused significant damage to grain crops in Kazakhstan. *Brachynema germari* Kolenati, 1846. Cordon Shygan, gravelly desert. Singing Sand Dunes. Kyzylauyz Gorge, cordon Uzynbulak, Konakbaysay Gorge. Found in the desert steppe areas, polyphagous and halophiles. *Carpocoris fuscispinus* (Boheman, 1850). Cordon Kyzylauyz. Found on fruits of ephedra. They are thermophiles. *Codophila varia* Fabricius, 1787. Cordon Shygan, cordon Kyzylauyz. Omni-mediterranean species. Found on *Artemisia*, *Lepidium*, *Achillea*, *Echium*. *Eurydema maracandica* Oshanin, 1871. Cordon Shygan. They live on crucifers in deserts, semi-deserts, in floodplains of rivers and lakes, and on foothills, known as a pest of cruciferous vegetable crops. *Eurydema ornatum* (Linnaeus, 1758). Kyzylauyz Gorge. Found on cruciferous plants in the foothills. *Eurydema wilkinsi* Dist., 1879. Cordon Uzynbulak, Konakbaysay Gorge. *Dolycoris baccarum* (Linnaeus, 1758). Kyzylauyz Gorge, Taigak Gorge, Cordon Shygan, cordon Uzynbulak, Konakbaysay Gorge. They are mesophilic species, polyphages and pests of cultivated plants. Found in the steppe and forest areas. *Dolycoris penicillatus* Horvath, 1904. Cordon Shygan, Taigak Gorge, Gory Sholak Mountains, cordon Uzynbulak, Konakbaysay Gorge. Species is common and sometimes en masse in all habitats on herbaceous plants and shrubs. They are polyphagous, agricultural pests. *Desertomenida quadrimaculata* Horvath, 1892. Cordon Shygan, inhabiting tamarisk; Singing Sand Dunes, inhabiting saxaul in the desert. *Desertomenida albula* Kiritshenko, 1914. Singing Sand Dunes. Found on saxaul. Sholak Gorge, Kalkan Mountains, middle reaches of the Ili River. *Graphosoma consimile* Horvath, 1903. Taigak Gorge. Found on the plains and in quite high mountains. *Graphosoma lineatum* Linnaeus, 1758. Cordon Shygan, Taigak Gorge, Gory Sholak Mountains, cordon Uzynbulak, Konakbaysay Gorge. They are found everywhere in Kazakhstan, in lowland and mountain areas. *Tarisa elevata* Reuter, 1901. Kyzylauyz Gorge, cordon Uzynbulak, Konakbaysay Gorge. *Tarisa salsae* Kerzhner, 1964. Cordon Shygan, Singing Sand Dunes, Kyzylauyz Gorge.

Family Corixidae

Corixa linnaei (Fieber, 1848). Floodplain ponds of Ili River. Caught in the light. They live and overwinter in the pond. *Sigara falleni* (Fieber, 1848). Floodplain ponds of Ili River. They live and overwinter in the pond. Found in floodplain ponds and river pools. *Sigara lateralis* (Leach, 1818). Floodplain ponds of Ili River. They fly well and fly to the light at night. *Sigara (C.) armata* (Linnaeus, 1758). Floodplain ponds of Ili River. They fly to the light at night. *Sigara assimilis* (Fieber, 1848). Floodplain ponds of Ili River. Caught in the light in the desert. *Sigara sibirica* Jaczewski, 1963. Floodplain ponds of Ili River.

Family Naucoridae

They are more active predators, living in ponds and other still waters, overwintering on land (Saulich & Musolin 2007). They feed on the larvae of dragonflies, leeches, amphipods, and the larvae of mosquitoes of the genera *Aedes* and *Culex*. *Ilyocoris cimicoides* (Linnaeus, 1758). Floodplain ponds of Ili River.

Family Notonectidae

They inhabit still pools of rivers. The larvae feed on small larvae of water beetles, mosquitoes and insects fallen into the water. *Notonecta glauca* Linnaeus, 1758. Floodplain ponds of Ili River.

Family Pleidae

They are predators, living and overwintering in ponds. Found among aquatic plants. The adults and the larvae feed on the larvae of various *Hydrobionts*.

Plea minutissima Fuessly, 1775. Cordon Shygan, constantly and slowly flowing small ponds. Floodplain ponds of Ili River.

Family Nepidae

Nepa cinerea Linnaeus, 1758. Floodplain ponds of Ili River, environs of cordon Shygan, slowly flowing shallow ponds. They are aggressive predators. Adults and larvae feed on the larvae of dragonflies, flies and beetles.

Ranatra linearis (Linnaeus, 1758). Floodplain ponds of Ili River, environs of cordon Shygan, slowly flowing shallow ponds. Found in various water bodies. They are predators, feeding on fish fry, larvae of dragonflies and beetles.

Family Gerridae

Gerris costai (Herrich-Schaffer, 1853). Floodplain ponds of Ili River, environs of cordon Shygan, slowly flowing shallow ponds. They are aggressive predators. *Gerris odontogaster* (Zetterstedt, 1828). Floodplain ponds of Ili River environs of cordon Shygan, slowly flowing shallow ponds. *Gerris (Aguarius) paludum* (Fabricius, 1794). Floodplain ponds of Ili River, environs of cordon Shygan. They are aggressive predators. *Gerris argentatus* Schummel, 1832. In a spring between the Basshi village and the cordon Shygan. They are predators. *Gerris lateralis* Schummel, 1832. In a spring between the Basshi village and the cordon Shygan. They are predators, feeding on various insects.

Family Saldidae

Found on the banks of ponds overgrown with grass, and various wet places and wet soil. They are predators, leaping or taking flight. *Salda sahlbergi* Reuter, 1870. Cordon Mynbulak, Ili River floodplain, cordon Uzynbulak, Konakbaysay Gorge. *Salda littoralis* (Linnaeus, 1758). Ili River floodplain. *Salda pellucens* (Fabricius, 1779). Ili River floodplain. *Saldula saltatoria* (Linnaeus, 1758). Ili River floodplain. *Saldula opacula* (Zetterstedt, 1839). Ili River floodplain. *Saldula variabilis* (Herrich-Schaffer, 1835). Ili River floodplain. *Saldula pallipes* (Fabricius, 1794). Ili River floodplain. *Saldula pilosella* (Thomson, 1871). Cordon Mynbulak, Ili River floodplain. *Saldula orthochila* (Fieber, 1859). Ili River floodplain. Shore species. In the second part of research we want will stop on economic value of Heteroptera. Researches on complex studying of wreckers and their entomophages are carried out at Institute of Zoology, Committee of Science, Ministry of Education and Science Kazakhstan. When analyzing the literature data, it became clear that the species of water bugs from the order Heteroptera inhabiting all types of water bodies, are predators that feed on a variety of representatives of aquatic insects, including larvae, pupae and adults of families *Culicidae* and *Simuliidae* (Childibayev 1980; Yesenbekova 2006; Childibayev & Amanbayeva 2014). Fighting mosquitoes (the *Culicidae*) is still a big problem. Habitat versatility of mosquitoes (the *Culicidae*), and especially the fact that their distribution centers are reservoirs make it difficult and even impossible the use of chemicals. The alternative method is a biological control which includes the use of entomophagous predators. The complex of various representatives of invertebrate predators, providing some effect on the number of mosquitoes (the *Culicidae*), attracted the attention of researchers for a long time. They are summarized, analyzed and presented in the works (Akhmetbekova 1973; Akhmetbekova 2005). Studies on the detection of mosquitoes (the *Culicidae*) breeding sites and their bio regulators were conducted in various floodplain (permanent and temporary) waters of the Ile River in the territory of Natural Park "Altyn-Emel" by conventional entomological techniques in spring-summer period (April-August), 2022-2023. During the spring-summer and autumn field trips, over 50 different water bodies which are the places of mass breeding of family *Culicidae* were examined. As a result of research, the larvae of the *Culicidae* and predators simultaneously developed in these water bodies. The larvae and adults of the genera *Aedes*, *Culex* and *Anopheles* of family *Culicidae* were found. In the collection, the representatives of water bugs from families *Naucoridae*, *Notonectidae*, *Nepidae*, *Corixidae*, *Gerridae* were found (Figs. 1-2).



Fig. 1. Field experiments with *Notonecta glauca*.



Fig. 2. Field experiments with *Ilyocoris cimicoides*.

“We observed several species of water bugs consumed mosquito larvae. *Ilyocoris cimicoides* (Heteroptera: Naucoridae) consumed up to 63 mosquito larvae per day. *Notonecta glauca* (Heteroptera: Notonectidae) consumed up to 69 mosquito larvae per day”.

Table 1. Average daily extermination of mosquito larvae by water bugs.

Species	Number of experiments	Number of larvae used	Number of exterminated mosquito larvae
<i>Ilyocoris cimicoides</i> (L., 1758)	20	100	56-63
<i>Notonecta glauca</i> (Linnaeus, 1758)	20	100	64-69

As a result of study of certain species of water bugs, it was found that *Ilyocoris cimicoides* kill up to 63 mosquito larvae, and *Notonecta glauca* kill up to 69 mosquito larvae (Table 1). As a result of experiments conducted in the field, it became clear that each individual of *Notonecta glauca* and *Ilyocoris cimicoides* attacks victim corresponding to its size, which is about one-third or one-fourth less than the length of their bodies. The larvae (stage I-II) of Heteroptera often attack the small larvae of mosquitoes and larvae (stage IV-V) attack the larger individuals. A similar activity is shown by Heteroptera also in nature.

CONCLUSION

Heteroptera in Altyn-Emel National Park is rich and diverse. The vast majority of species are typical representatives of desert fauna. A total of 172 species from 22 families of Heteroptera, including 6 families of aquatic Heteroptera; the remaining 16 families belong to terrestrial Heteroptera. According to food specialization, they are zoophages, and rarely zoophytophages. Aquatic Heteroptera are predatory and play a role in reducing the number of certain pests.

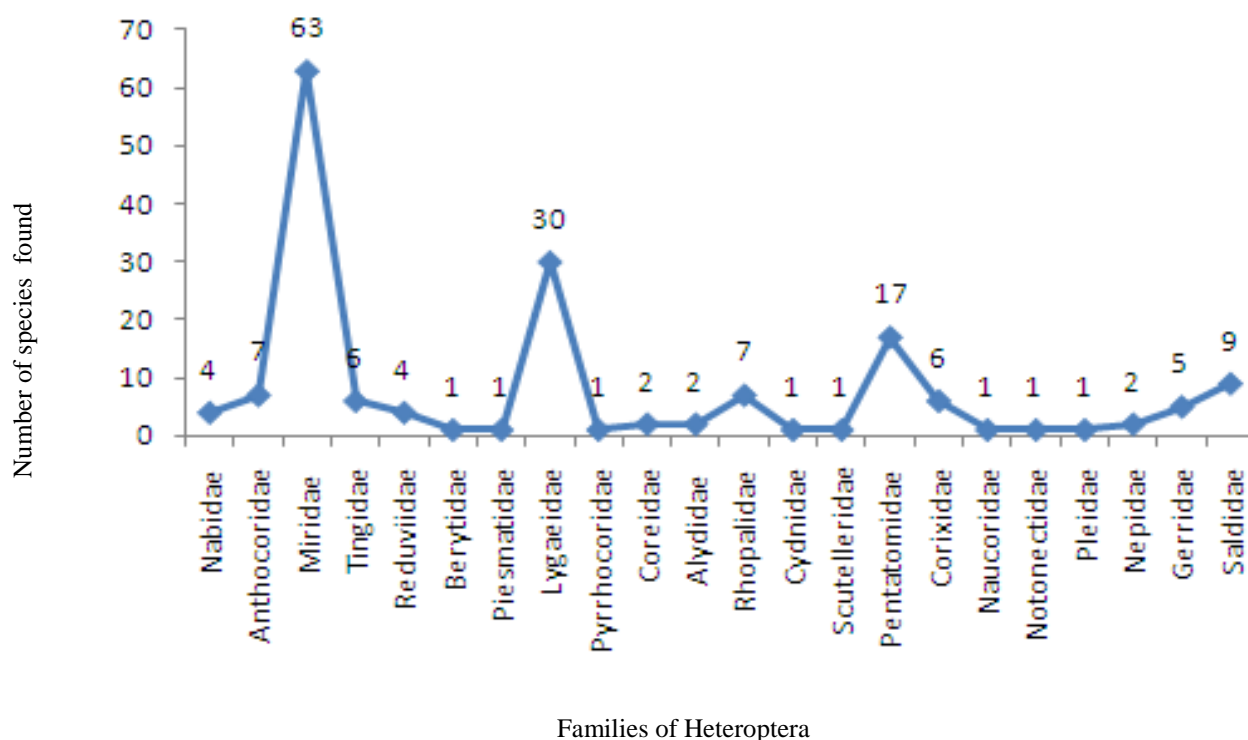


Fig. 3. Distribution of families of Hemiptera.

Species diversity is represented by families Miridae (63), Lygaeidae (30), Pentatomidae (17), Saldidae (9), Rhopalidae and Anthocoridae (7), Tingidae and Corixidae (6), Gerridae (5), Nabidae and Reduviidae (4), Coreidae, Alydidae, Nepidae (2). The other 8 families are represented by 1 species each (Fig. 3). This study was

a Faunistic survey of Heteropterans and an identification of predation on mosquito larvae. The article was carried out on the basis of financial support from the rector's grant dedicated to the 95th Anniversary of Abai KazNPU.

REFERENCES

- Akhmetbekova, RT 1973, Perspective species of water bugs for fighting the mosquito larvae in the south-east of Kazakhstan. Abstracts of the All-Union Conference "Survey, Study and Application of New Insecticides in Medical Practice. Moscow, pp: 19-20.
- Akhmetbekova RT 2005, Results of the study of regulators of bloodsucking Diptera - *aquatic arthropoda* in the south-east of Kazakhstan, Proceedings of the Institute of Zoology of Kazakhstan, Ministry of Education and Science of the Republic of Kazakhstan, Almaty, pp: 266-272.
- Angus, R 1992. Insecta, Coleoptera, Hydrophilidae, Helophorinae. Süßwasserfauna von Mitteleuropa 20/10–2, Gustav Fischer Verlag, Stuttgart, Jena, New York, 142 p.
- Asanova, RB 1966, The Heteroptera in Central Kazakhstan: Abstract of thesis of Doctoral Candidate of Biological Science, Alma-Ata, p: 14.
- Aukema, B & Rieger Ch 1999, Catalogue of the Palaearctic Region. Vol. 3. -Amsterdam: The Netherlands Entomological Society, 577 p.
- Childibayev, DB 1980. Environmental complexes of the Heteroptera in southeast of Kazakhstan: Proceedings of the Institute of Zoology of SSR Academy of Science. p: 55-60.
- Childibayev, DB & Amanbayeva, MB 2014, Predatory insects: Regulators of the number of harmful arthropods and their ecological features in the southeast of Kazakhstan: Bulletin of the al-Farabi KazNU, 1 :86-91.
- Dolling, WR 1991, The Hemiptera. Oxford: Oxford University Press (Natural History Museum Publication), 274 p.
- Ghahari, H & Ostovan, H 2006, Predator arthropods, fauna of whiteflies (Homoptera: Aleyrodidae) in Mazandaran and Golestan Provinces and their feeding efficiency. *Journal of Agriculture and Natural Resources Science* 12: 171-180 (in Persian with English summary).
- Kerzhner, IM 1990, Family Nabidae of Heteroptera of the world fauna. Leningrad, 326 p.
- Kerzhner, IM 2005, Notes on nomenclature and distribution of some Palaearctic Pentatomidae (Heteroptera) *Zoosystematica Rossica*, 14: 73-75.
- Kerzhner IM & Yachevskiy, TL 1964, Heteroptera: Determinants of the insects of the European part of the USSR (ed. Gya, Bay Bienko), Moscow, pp: 655-845.
- Kerzhner IM & Henry, TJ 2008, Three new species, notes and new records of poorly known species, and an updated checklist for the North American Nabidae (Hemiptera: Heteroptera). Proceedings of the Entomological Society of Washington, 110: 988-1011.
- Moulet, P 1995, Hemipteres Coreoidea, Pyrrhocoridae and Stenocephalidae Euro-Mediterraneans: Federation Française des sociétés de sciences naturelles. Paris, 336 p.
- Pericart, J 2002, Note sur le genre *Sciocoris* Fllen, 1829, Euro-Mediterranean representatives (Heteroptera, Pentatomidae): *Bulletin of the Entomological Society of France*, 107: 435-448.
- Saulich, Akh & Musolin, DL 2007, Seasonal development of aquatic and semi-aquatic Hemiptera insects (Heteroptera) St. Peterburg, 57 p.
- Yesenbekova, PA 2013, The Heteroptera in Kazakhstan. Monograph. Almaty, pp: 25-262.
- Yesenbekova, PA 2006, Aquatic Heteroptera in "Altyn-Emel" State National Natural Park, News of the National Academy of Sciences of the Republic of Kazakhstan, Biological and Medical Series. No. 6. Almaty, pp: 9-11.
- Yesenbekova PA 2008, The fauna of terrestrial Hemiptera (Heteroptera) State National Natural Park "Altyn-Emel: Research and results. No. 1, Almaty, pp: 180-182.

Bibliographic information of this paper for citing:

Amanbayeva, MB, Maimatayeva, AD, Zhumagulova, K, Karimzhan, T, Kuanyshovna, KD, Sholpan, S 2024, A Faunistic study on Heteropterans (Hemiptera: Heteroptera) in the "Altyn-Emel" State National Natural Park, Kazakhstan. *Caspian Journal of Environmental Sciences*, 22: 83-91.
