

A Faunistic Study on Hemiptera: Heteroptera-Natural Regulators of the Mosquitoes (The culicidae) in the “Altyn-Emel” State National Natural Park, Kazakhstan

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Abstract: In this study conducted in summer seasons of 2013 and 2014 in the territory of the “Altyn-Emel” State National Natural Park (Kazakhstan), we have recorded 172 species belonging to 22 families of the Heteroptera. This study describes the biological and ecological characteristics of Heteroptera as mosquito (the Culicidae) bioregulators under natural conditions. This is the first study to determine the Hemiptera: Heteroptera fauna of “Altyn-Emel” State National Natural Park. Until the present researchers, no record of belonging to the Hemiptera: Heteroptera family has been known in “Altyn-Emel” State National Natural Park.

Key words: Kazakhstan, “Altyn-Emel” State National Natural Park, Hemiptera, Heteroptera, bloodsucking Diptera, Bioregulators, mosquitoes, faunistic study, natural regulators, aquatic Heteroptera, zoophytophages, polyphag

INTRODUCTION

“Altyn-Emel” State National Natural Park was established by the Order No.460 dated April 10, 1996 of the Government of the Republic of Kazakhstan on the basis of Kapchagai state hunting. It is located on the territory of two administrative districts, Kerbulak and Panfilov 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 (Aukema and Rieger, 1999; Akhmetbekova, 2005; Dolling, 1991). Currently, there are >40,000 species of Heteroptera from approximately 50 families, spread across the globe.

Heteroptera in the territory of “Altyn-Emel” national park is still poorly studied. The research results can be used for general assessment of biodiversity of “Altyn-Emel” national park. Annotated list of the Heteroptera given in the research meets the objectives of the inventory of fauna of “Altyn-Emel” national park under the international convention for the conservation, restoration and sustainable use of biodiversity.

All of them are represented in the fauna of Kazakhstan (with the exception of tropical Enicocephalomorpha) where 1250 species from 35 families

and 411 genera are recorded (Yesenbekova, 2013). Among Heteroptera there are many predatory species or species with a mixed diet but herbivorous forms dominate. They cause significant damage to agricultural crops (grain, forage, vegetables, fruit) as well as to pastures and forests. Some Hemiptera, being predators, destroy the pests of crop and forest.

MATERIALS AND METHODS

For the collection of terrestrial insects, grass, shrub and tree vegetation was mown with plain net, also the soil, litter and basal parts of plants were checked in a lying position. Potential aquatic predators (water bugs) were collected by means of water entomological net. The use of special methods of collection was required for some species (living under the bark, in the soil, on the banks of ponds, etc.). Insects (except for the largest ones) is caught by exhaustor and killed by ethyl acetate (Angus, 1992; Kerzhner, 2005). Larger species with hard cover were pricked on entomological pins and smaller (on average <5 mm), narrow and small ones were pasted on cardboard rectangles. The materials for this study are the collections of researchers in Summer seasons of 2013 and 2014. The species found in the research area are listed below. For each species the place of collection brief information on the distribution, biology and ecology are given.

RESULTS AND DISCUSSION

Terrestrial heteroptera

Family nabidae: Predators; they feed on a variety of insects and inhabit on 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. It feeds on aphids, eggs and larvae of bugs. *Nabis fesus* Linnaeus, 1758. Cordon Shygan, Cordon Uzynbulak, Konakbaysay Gorge. Mesophilic species. Predator. Polyphagous species feeding on flies. *Nabis rugosus* Linnaeus, 1758. Cordon Uzynbulak, Konakbaysay Gorge. They live in various habitats on herbaceous vegetation. Predator. *Nabis brevis* Scholtz, 1847. Cordon Uzynbulak, Konakbaysay Gorge. Mesophilic species. Polyphagous.

Family anthocoridae: Predators; they feed on aphids, mites, scale insects, thrips, beetle larvae, etc., often benefit by destroying agricultural pests. They inhabit most often flowers, litter, on the bark and under the bark of trees, etc. They are relatively small family (Asanova, 1966). *Anthocoris nemorum* Linnaeus, 1761. Cordon Uzynbulak, Konakbaysay Gorge. They inhabit herbaceous, shrub and tree plants. Polyphagous. *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 and 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* Kiritschenko, 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). Nordon Togyzbulak, cordon Uzynbulak Konakbaysay Gorge. They are eurybiont, polyphagous and seriously damage fruits, cereals, legumes, truck crops, alfalfa. *Lygus gemellatus* (Herrich-Schaffer, 1835). Cordon Shygao, 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. Nordon 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 (Salix). *Lygocoris pabulinus* (Linnaeus, 1761). Taigak Gorge, Ili River floodplain, Kyzylauyz valley. They inhabit willows (Salix). *Pilophorus reticula* (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* ssp.

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) *atraxius* 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 (*Salix*).

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 saturejae (Kolenati, 1845). Cordon Mynbulak, Ili River floodplain. They inhabit willows (*Salix*). *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 (*Achillea*). *Kleidocerys resedea* 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 *Cyperaceae* 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 th plants of genus *Phragmites*.

Oxycareus 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 ployphytophages, 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, etc.).

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.

Brachycaremus 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. *Maccevetthus 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 (Kerzhner, 2005; Pericart, 2002). 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.

Aquatic heteroptera: Aquatic Heteroptera were found in all wet habitats: along the banks of the Ili River in wet meadows, along streams and swamps and caught in the light at night.

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 and 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 lauca* 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 saldididae: 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

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



Fig. 1: Field experiments with *Notonecta glauca*



Fig. 2: Field experiments with *Ilyocoris cimicoides*

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 (Yesenbekova, 2006; Childibayev, 1980; Childibayev and 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 researchs (Akhmetbekova, 1973; Akhmetbekova, 2005).

Studies on the detection of mosquitoes (the Culicidae) breeding sites and their bioregulators 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), 2013-2014.

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 (Fig. 1 and 2).

It was found that *Notonecta glauca* sucked on average from 64-69 larvae (III-IV stage) of mosquitoes *Culex* per day, *Ilyocoris cimicoides* on average from 56-63 larvae per day.

As a result of study of certain species of water bugs, it was found that *Ilyocoris cimicoides* suck up to 63 mosquito larvae, and *Notonecta glauca* suck 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 of less than the length of its body. 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

Based on the list given above, it can be concluded that the fauna of the Heteroptera in “Altyn-Emel” national park is rich and diverse. The vast majority of species are typical representatives of desert fauna which spread across the desert zone of the Palearctic.

The studies revealed 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. All abovementioned predatory Heteroptera eating various insects play a role in reducing the number of certain pests.

Among them, the species diversity is represented by families Miridae (63 species), Lygaeidae (30 species), Pentatomidae (17 species), Saldidae (9 species), Rhopalidae and Anthocoridae (7 species each), Tingidae and Corixidae (6 species each), Gerridae (5 species),

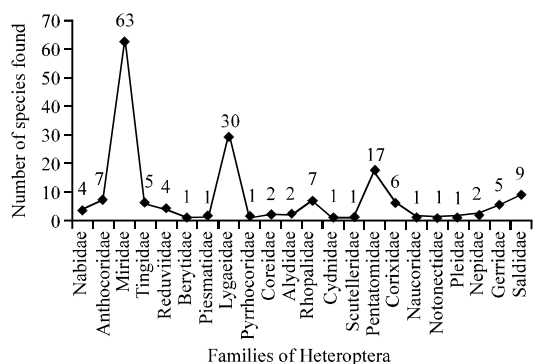


Fig. 3: Distribution of families of Hemiptera

Nabidae and Reduviidae (4 species each), Coreidae, Alydidae, Nepidae (2 species each). The other 8 families are represented only by 1 species each (Fig. 3).

This study describes the results of a study on the detection of blood-sucking Diptera breeding sites and their bioregulators. Expected results may assist in the creation of scientific and technical basis for conservation and sustainable use of animal diversity. Also, the results can be used as the basis of the organization of measures to improve the quality of the living environment human and animals and environmental protection.

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