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TICKS OF THE GENERA *HYALOMMA* [ACARI: PARASITIFORMES, IXODIDAE] IN UZBEKISTAN: FAUNA, BIOLOGY AND ECOLOGY

S. Kh. Umrkulova*[1] and I. R. Malikiv[2]

[1]Institute of Botany and Zoology, Academy of Sciences of the Republic of Uzbekistan.
[2]Tashkent state Dental Institute 232 Bogishamol Str., Tashkent 100053, Uzbekistan.

***Corresponding Author: S. Kh. Umrkulova**
Institute of Botany and Zoology, Academy of Sciences of the Republic of Uzbekistan.

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ABSTRACT
Ticks of the genera *Hyalomma* [Acari: Parasitiformes, Ixodidae] in Uzbekistan: fauna, biology and ecology. S. Kh. Umrkulova, I. Kh Malikiv. – The team of researchers studied some characteristic features of the fauna of ticks belonging to the genera *Hyalomma* Koch., 1844. Among the issues to be studied were the ticks' distribution, biology and ecology in Uzbekistan. In total, 6 species belonging to genera *Hyalomma*, were discovered in the region. The research group determined the seasonal abundance of the dominating species of the studied ticks infecting domestic animals.

KEYWORDS: *Hyalomma*, ticks, fauna, biology, distribution, ecology.

INTRODUCTION
The influence of the anthropogenic pressures on the structure and functioning of the animal community is increasing year after year. As a result, the populations of certain groups of animals, and particularly blood sucking ticks – ectoparasites infecting vertebrates, including human beings – increase. The tick fauna of Uzbekistan has been studied by many researchers, who have examined quite well the fauna, biology and ecology of a large number of tick species[1, 2, 3, 4, 7, 8, 9, 10, 11]. By the present time these data have become quite outdated, which has led to the necessity of carrying out new research in all regions of Uzbekistan[12].

The wide distribution of a number of ectoparasitic groups from the genera *Hyalomma* is particularly alarming. As this group of arthropoda plays a special part in the transmission and distribution of various human and animal diseases, it is an important task for general parasitology to carry out stage-by-stage and detailed research into their fauna and distribution across Uzbekistan. Parasitic diseases are also being considered in the social and economic context. This work provides the results of field and experimental research into the biology, ecology and distribution of the ticks of the genera *Hyalomma* in Uzbekistan's fauna.

MATERIALS AND METHODS
The ticks were collected from all biomes and administrative districts in 5 regions of Uzbekistan in the period between 2008 and 2017.

The common parasitological methods developed by Japaridze (1960) were used to take samples[5]. The circle of the ticks' hosts was studied through a total collecting of ticks from certain groups of domestic animals (253 cows, 45 calves, 268 sheep, 148 goats, 52 donkeys and 65 horses) once in ten days. While inspecting, the scientists recorded the number of ticks at each stage. To determine the ticks' habitats they inspected constructions for keeping the animals, pastures, drinking places where the animals usually rested, burrows, caves and residential constructions following the method developed by Pospelova and Shtrom[9]. The obtained materials were put into a 5 % formalin solution, in a mixture of formalin with glycerin (1:1) and in a 60-70 % alcohol solution. Alongside the collection of ticks, the temperature and humidity of the areas were measured with the use of a psychrometer or thermometer, while the behavior of the ticks was observed in their habitats. Altogether 15,000 specimens of ticks were collected and studied. In addition, we studied the material kept in the collection of the Institute of Gene Pool of Plants and Animals under Academy of Sciences of the Republic of Uzbekistan

RESULTS AND DISCUSSION
The studied ticks consisted of 6 species belonging to genera *Hyalomma* Koch., 1844 - *H. adromedarii* Kooch., 1844, *H. asiaticum* P.Schulze, et Echl, 1929; *H. detritum* P.Sch., 1919, *H. scupense* P.Sch., 1918, *H. anatolicum* Koch., 1844, *H. plumbeum turanikum* B. Rom, 1946.

The studied ticks inhabit all the regions of Uzbekistan. The country is characterised by highly diverse relief,

climate and fauna. The southern part of Uzbekistan is inhabited by the largest number of the species of ticks belonging to the genera *Hyalomma*, featuring 6 species populating the area. The northeastern part is inhabited by 4 species, the central part – by 5 species, the eastern part – by 3 species and the northwestern part – by 3 species (Table 1).

Table 1: Distribution of the species of ticks from the genera *Hyalomma* across Uzbekistan

Species	Parts				
	Northwestern	Central	Eastern	Northeastern	Southern
Hyalomma dromedarii	-	+	-	-	-
H. asiaticum	+	+	+	+	+
H. detritum	+	+	+	+	+
H. scupense	-	+	-	-	+
H. anatolicum	+	+	+	+	+
H. plumbeum turanikum	-	+	-	+	+
Total:	**3**	**5**	**3**	**4**	**5**

The ticks are known to infect animals at pastures, and most of them inhabit certain stations, such as river valleys, steppes, deserts, mountains and meadows.

Each of these stations is characterised by a specific complex of wild and domestic animals, which are parasitised by the ticks in question.

The qualitative and quantitative composition of the ectoparasites varies depending on the type of the domestic animal, the rate of infection with ticks ranging from 16.5 % to 68.2 % (Table 2).

Table 2: Ticks of the genera *Hyalomma* recorded on the domestic animals of Uzbekistan

Ticks	Infection with ticks, %				
	cattle	sheep	goats	horses	donkeys
H. dromedarii	26.4	29.3	36.5	32	40
H. asiaticum	68.2	58.3	45.5	36	46.7
H. detritum	44.1	43.5	44	28	26.7
H. scupense	32.7	-	-	48	28
H. anatolicum	40	46.6	35.7	32	40
H. plumbeum turanikum	16.5	35.8	-	44	-

According to the table, the most numerous were *Haemaphysalis* According to the table, the most numerous were *H. dromedarii, H. asiaticum, H. detritum, H. scupense, H. anatolicum, H. plumbeum turanikum*

The rate of the infection with ticks also varies depending on the season.

Ticks respond to changes in air temperature, CO_2 concentration, humidity and air movement, which means a dependence of their activity on the environmental factors.

The diagrams given above demonstrate that the largest portion of domestic animals were infected by the species *Hyalomma asiaticum* – 8 % in spring, 32 % in summer, 8 % in autumn and 4 % in winter. The average invasion extensiveness for the five dominating species is the following: 6.2 % in spring, 24.6 % in summer, 6 % in autumn and 2.6 % in winter. The peak of infection of domestic animals with ticks is summer, however, with individual specimens of adult ticks infecting the animals in the winter period, too. Given below is the description of the discovered dominating species from each of the genera.

The ticks are known to infect animals at pastures, and most of them inhabit certain stations, such as river valleys, steppes, deserts, mountains and meadows. Given below is the description of the discovered dominating species from each of the genera *Hyalomma*.

***Hyalomma asiaticum* P.Schulze, et Schl, 1929**

Hosts: adult ticks parasitise cattle, horses, sheep, camels, donkeys, goats, dogs and goitered dazelles. The larvae and nymphs parasitise cattle, sheep and wild mammals.

Location: groin, udder, hind legs, belly, neck, breast and dewlap, sometimes back and thighs.

Geographic distribution: Tashkent, the Fergana Valley, Syrdarya, Navoi, Khorezm, Bukhara, Kashkadarya and Surkhandarya Provinces, Karakalpakstan**.**

Biology: The tick is a three-host type. The time it parasites animals in its distribution area is mostly from March to October, young forms do it in summer; however, some quantity of adult ticks do not leave their

hosts during the whole winter. The maximal weight of females is 1,250 mg, the minimal weight is 1,025 mg (fig.). The period of laying eggs depends on the environmental conditions, the shortest having been recorded taking place at a temperature of 26-35°C. The duration of the egg laying is 20-29 days in spring, 25-33 days in summer (fig.).

Fig. 7. *Hyalomma asiaticum*: front and rear view.

The number of eggs the female lays after feeding ranges between 1,500 and 16,000. The full development cycle, from the beginning of the egg-laying to the adult stage, continues for 60 days.

CONCLUSION

Ticks of the family Ixodidae form a group of invertebrate arthropoda significant from the biological, veterinary and medical aspects. The studying of the ticks, and particularly those of the genera *Hyalomma*, was connected with the practical needs of cattle breeding and health-care branches. Mid-20th-century research discovered 9 species of the genera *Hyalomma* in the biogeocenoses of Uzbekistan, which were referred to the following genera: *Hyalomma* (9). These data were generalised along with other information[10, 6]. The data on the morphology and biology of the studied ticks are fragmentary and quite outdated. This is confirmed by the results of the ecological and faunistic study of the ticks from the genera: *Hyalomma* we carried out in the biogeocenoses of Uzbekistan.

The research recently made demonstrated that the faunistic complexes of the ticks of the genera *Hyalomma* in the country's biogeocenoses consist of 6 species, which differs considerably from the data obtained earlier[10, 6].

In our collection 3 species were missing: *Hyalomma aegyptium*, including two subspecies, *H.anatolicum excavatum* and *H.plumbeum impessum.* Here we deal with the unification of the fauna of the studied ticks in Uzbekistan's natural conditions. Probably, this is connected with the economic development of new areas and man's influence on the current natural processes. Therefore, this factor impacts negatively almost all components of the biodiversity, and the communities of the studied ticks are not an exception.

From the facts given above it is obvious that the primary task in this field is to study the species diversity of blood sucking ticks using contemporary methods, including all the stages of their development, in both the natural and urban areas of our country. We should pay special attention to the role certain species of ticks of the genera *Hyalomma* play in the transmission of animal and human diseases.

In conclusion it should be stressed that to study ticks of the the genera is highly important for the theoretical and practical parasitology and epizootology, as well as for the reconstruction of the tick fauna genesis.

Thus, on the basis of the given materials the following conclusions can be made:

- There are 6 species of ticks of the genera: *Hyalomma* living in the wild in Uzbekistan: they belong to species *H. dromedarii, H. asiaticum, H. detritum, H. scupense, H. anatolicum, H. plumbeum turanikum.*
- They can parasitise various species of mammals. Cattle, sheep and goats are highly infected with these types of ticks, while the infection rate among horses and donkeys is a little lower.
- The qualitative and quantitative composition of the studied ticks varies greatly depending on the type of the domestic animal, with the infection rate ranging from 16.5 % to 68.2 %.
- The results of the study of the *Hyalomma* fauna in the territory of Uzbekistan do not correspond with the data obtained earlier. In our collection 3 species of the above mentioned genera were missing.
- *Hyalomma asiaticum* were represented by the largest number of *Hyalomma* species in the territory of Uzbekistan. These ticks considerably reduce the productivity of agricultural animals.

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