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Some Data on the Records of Faunal Communities of the Central District of Kyzylkum

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Abstract Epizootological examination was carried out on the areas in the Central District of Kyzylkum, 24 species of animals and birds of 5 species were studied, a total of 43937 specimens, ectoparasites – fleas 245197 specimens, ticks 20502 specimens. There is a tendency of degradation of the prevalence of animal species and fleas. The most adaptive representatives from the order Rodentia are the subfamily Gerbillinae, the family Sciuridae, fleas of the genera Xenopsylla, Nosopsyllus and Coptopsylla, ticks of the genus Hyalomma.

Keywords Central district of Kyzylkum, Degradation of species diversity, Adaptive species

1. Introduction

The purpose of the work is to track the dynamics of the occurrence of fauna representatives in the catches on the territory of the Central District of Kyzylkum in the period from 1991 to 2021. For the analysis, archival epizootological data of field studies were used on the territory of the Central District of the anti-plague department of the city of Zarafshan of the Republican Center for Plague Prevention of the Ministry of Health of the Republic of Uzbekistan and the anti-plague station of the medical and sanitary unit of the regional department "Uchkuduk" of the State Institution "NMMC Fund". The inspection of the Kyzylkum territory supervised by these institutions was carried out on the basis and in accordance with the annual Work Plans approved by the director of the Republican Plague Prevention Center of the Ministry of Health of the Republic of Uzbekistan.

The data presented for analysis are based on the results of a survey of the Central section of the Kyzylkum plague focus in 1991-2021, in the spring-summer and autumn-winter seasons, from 1.2 decades of March to 1 decade of June and from 2.3 decades of September to 2, 3rd decade of November.

The study of the material was carried out in accordance with the methods generally accepted in the anti-plague service.

For the entire analyzed period, based on the available data, 24 species of animals and birds of 5 species, 43937 specimens in total, ectoparasites - fleas 245197 specimens, ticks 20502 specimens were caught and studied [1-6]. The Modern landscape complexes of the Central Kyzylkum are a fragile and less stable formation, where intercomponent relationships are very weak and easily destroyed under the influence of external factors. This is due to the sharp contrast of environments and the peculiar specificity of natural conditions. At the present stage of development of the geosystems of the Central Kyzylkum, their transformation and dynamics are significantly influenced by two groups of factors: natural and anthropogenic. Natural development is formed as a result of the interaction and interdependence of numerous factors, such as geological, geomorphological, geoecological, hydrogeological, climatic, hydrological, soil, plant and zoogenic. Anthropogenic factors mainly include forms of organization of human economic activity: cutting down wood and shrubs for fuel, excessive grazing without taking into account the anthropogenic load on such fragile arid complexes, uncontrolled hunting, mining without subsequent reclamation of technogenic complexes. The region under study is the main center of not only grazing, but also the mining industry, under the influence of which mining landscapes arose. Among the latter, young, mature and old mining landscapes can be distinguished according to the time of occurrence.

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2. Materials and Methods

These geocomplexes - waste heaps, wastelands, tailings, rock dumps, devoid of soil and vegetation cover, contribute to the intensification of the desertification process not only

in the mining areas, but also in the nearby sandy landscapes [8].

In accordance with the scheme of epidemiological zoning of the Kyzylkum, the zone of its Central District, according to the type of economic development, is an interlacing of territories (zones) of livestock breeding, agricultural and livestock breeding and industrial livestock breeding [12].

Biocenotically, the territory of the Central District of the Kyzylkum corresponds to the Turan psammophilous community [7,12].

Animals exist in the conditions of certain landscapes, where the degree of favorable environment depends on many factors, among which abiotic (physical) factors play an important role. At present, the extremely negative impact on the composition of animal populations of global predictors is most clearly manifested - solar activity, the greenhouse effect, as a result, aridity, lowering of groundwater, etc [9].

The complexity of the impact of the above regulators is reflected in the qualitative and quantitative composition of the fauna of the Kyzylkum biocenoses.

For the period from 1991 to 2023, according to the cumulative results of field studies of the territories of the Central District of the Kyzylkum, it was established that the dominant in catches were rodents were the subfamily (family) of gerbils-*Gerbillinae* (94.28%), of which 71.04% were large gerbils- *Rhombomys opimus* (64.1% occurrence index), 18.1% *Meriones meridianus* (18.2% occurrence index) and 10.6% *Meriones erythrourus* (9.4% occurrence index). The genus of ground squirrels of the *Sciuridae* family in catches amounted to 3.3%, where the yellow ground squirrel - *Citellus fulvus* (84.04%) prevailed, the occurrence index was 4.5%, the remaining 15.9% was the fine-toed ground squirrel - *Spermophilopsis leptodactylus* (occurrence index - 0.68%). The jerboa family - *Dipodidae* accounted for 0.76%, where 33.8% was the upland jerboa - *Dipus sagitta* (occurrence index - 0.45%), 32.9% - small jerboa - *Allactaga elater* (occurrence index - 0.4%) , 16.9% - comb-toed jerboa-*Paradipus ctenodactylus* (occurrence index - 0.12%), 12.7% - Severtsov's jerboa - *Allactaga severtzovi* (occurrence index - 0.3%) and 2.06% - jerboa sp-*Jaculus turkmenicus sp* (occurrence index - 0.15%), other species of jerboas - *Allactaga bobrinskii et Jaculus turkmenicus*, amounted to 0.89% and 0.59% each (occurrence index - 0.1 and 0.09%), respectively. It should be noted the percentage ratio in the captures of the brownie-*Mus musculus* mouse with an occurrence index of 1.63%, which is associated with the specialization of the tactics of surveying settlements by anti-plague institutions. Among the birds (occurrence index - 11.7%) in catches, the dancer's Wheatear (*Oenantha isabellina*) dominated - 73.5% (occurrence index - 0.13%).

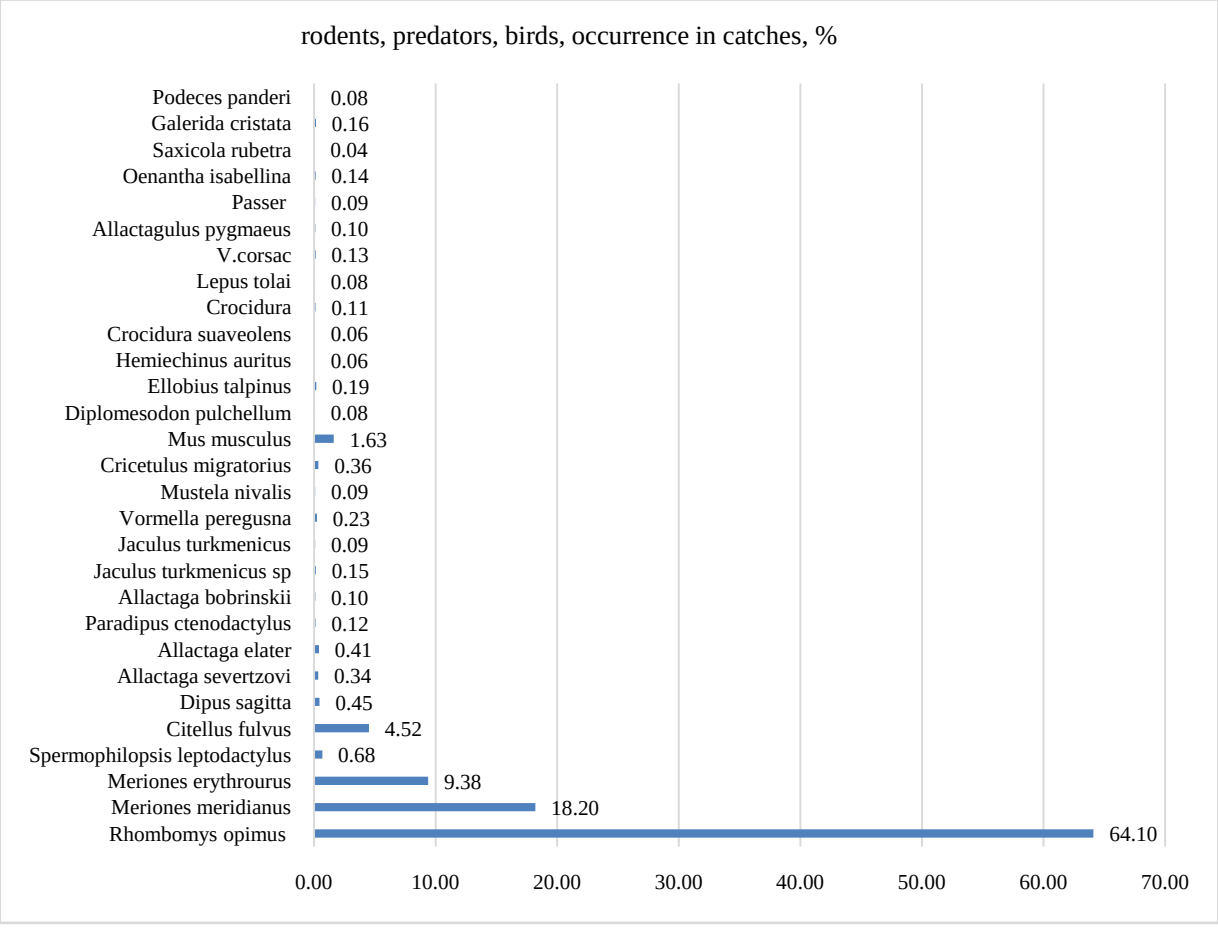
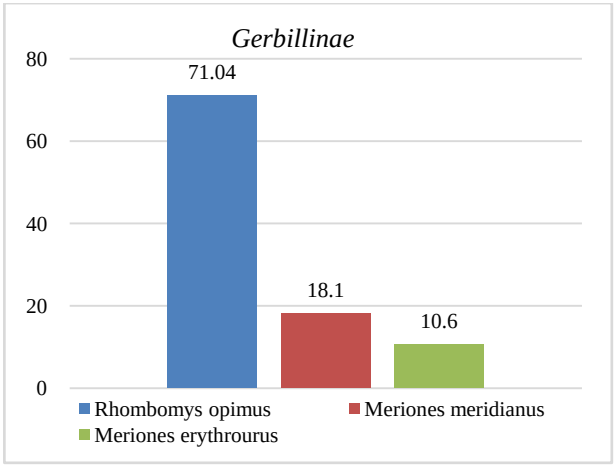


Diagram 1



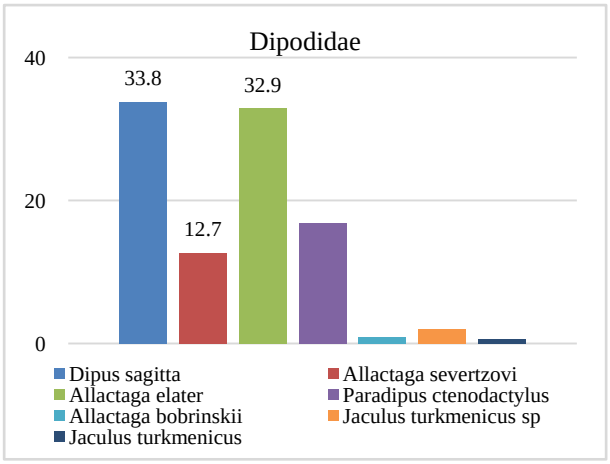


Diagram 2 and 3. Percentage composition of predominance in catches of rodent species of the families of gerbils and jerboas

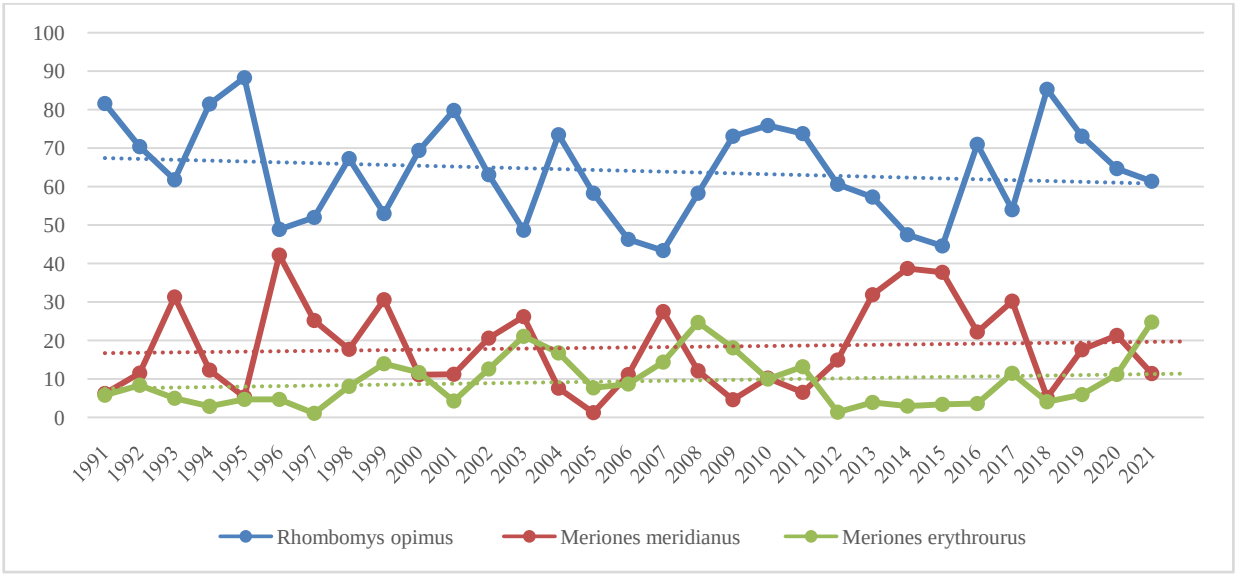


Diagram 4. Dynamics of occurrence of the subfamily *Gerbillinae*

Indicators of trends-vectors of development, relative in terms of values, of the cumulative results of captures in the territory of the Central District of Kyzylkum, based on the quantitative composition of gerbils in catches, indicate a prolongation of the dynamics of a decrease in the occurrence of *Rhombomys opimus* due to an increasing (replacing in nature and total in terms of impact) dynamics on the part of gerbils species *Meriones meridianus* and *Meriones erythrourus.*

For the indicated 30-year period of field research on collections of ectoparasites from the sectors of the geographical region of the Central District of Kyzyl Kum under the supervision of anti-plague institutions, fleas in total amounted to 99.2%, ticks - 7.7%.

The quantitative dominant in the flea landscape in absolute terms is the genus *Xenopsylla* (74.1%), where the proportion of the *gerbilli* species is 79% (occurrence index - 47.8%), the *hirtipes* species - 14% (occurrence index - 12.1%), species *conformis*-6.5% (index of occurrence-7.1%) and species *conformis dipodis* represented by 0.23% (index of occurrence-0.35%); the genus *Coptopsylla* in catches was noted in 11.4% and is represented by species *lamellifer*-78.2% (occurrence index-11.8%), *olgae*-10.1% (occurrence index-4%), as well as species *trispinus*-7.9% (occurrence index-2.4%) and *bairamaliensis*-3.6% (occurrence index-0.9%); the subgenus *Nosopsyllus* makes up 11.07%, and predominantly, in terms of indicators, is represented by the species *tersus*-44.4% (index of occurrence-3.8%), *laeviceps*-32.8% (index of occurrence- 3.9%), *turkmenicus*-22.5% (index of occurrence - 5%) and species *fidus* - 0.06% (index of occurrence - 0.56%);

Fleas of the genera were less expressed quantitatively in the collections: *Paradoxopsylla* (1.2%) is represented by *teretiforons* in 95.5% (index of occurrence - 3.9%) and *repandus* - 4.58% (index of occurrence - 0.32%); *Stenoponia* (0.56%), of which the most represented are *vlasovi*-75.6% (occurrence index-0.52%), *conspekta*-23.6% (occurrence index-0.32%), *Stenoponia Stenoponia* amounted to 0.65 % with an occurrence index of 0.18%; *Synosternus* (0.44%) amounted to 87.6% longispinus (index of occurrence - 1.5%) and pallidus - 12.3% (index of occurrence - 1.57%); *Rhadinopsylla* (0.31%) is represented in 62.6% of *cedestis* (occurrence index-0.66%) and *teretiforons*-37.3% (occurrence

index-0.22%); and the genus *Echidnophaga* at 0.19% and represented by *oschanini* at 66.4% (occurrence index - 0.28%) and *gallinacea* - 33.5% with an occurrence index of 3.23. It should also be noted the occurrence in catches of fleas of the genus *Ctenocephalides felis* (2.1%) and *Rostropsylla daca*-0.74%.

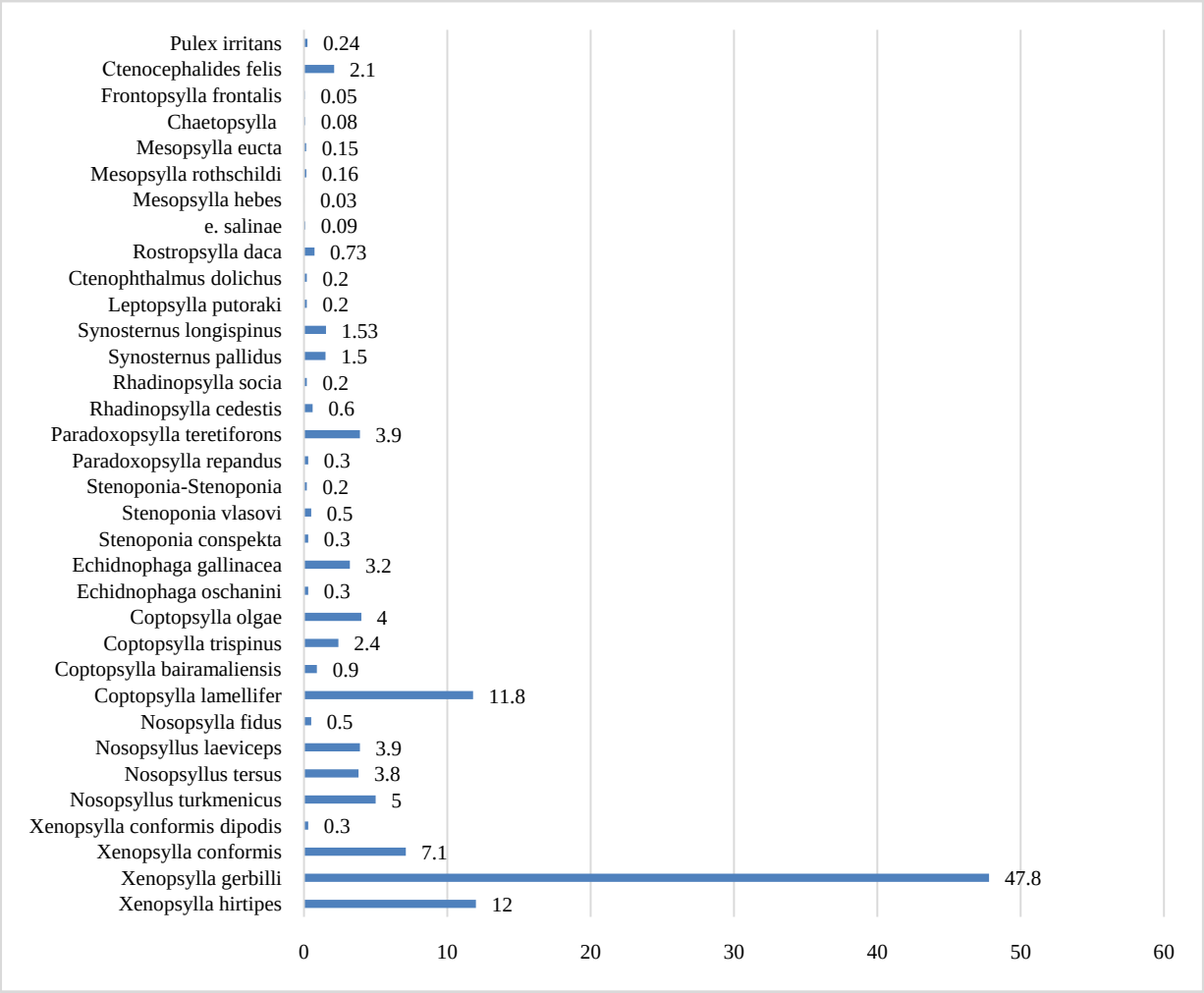


Diagram 5. Aggregate data (%) on occurrence indices among fleas

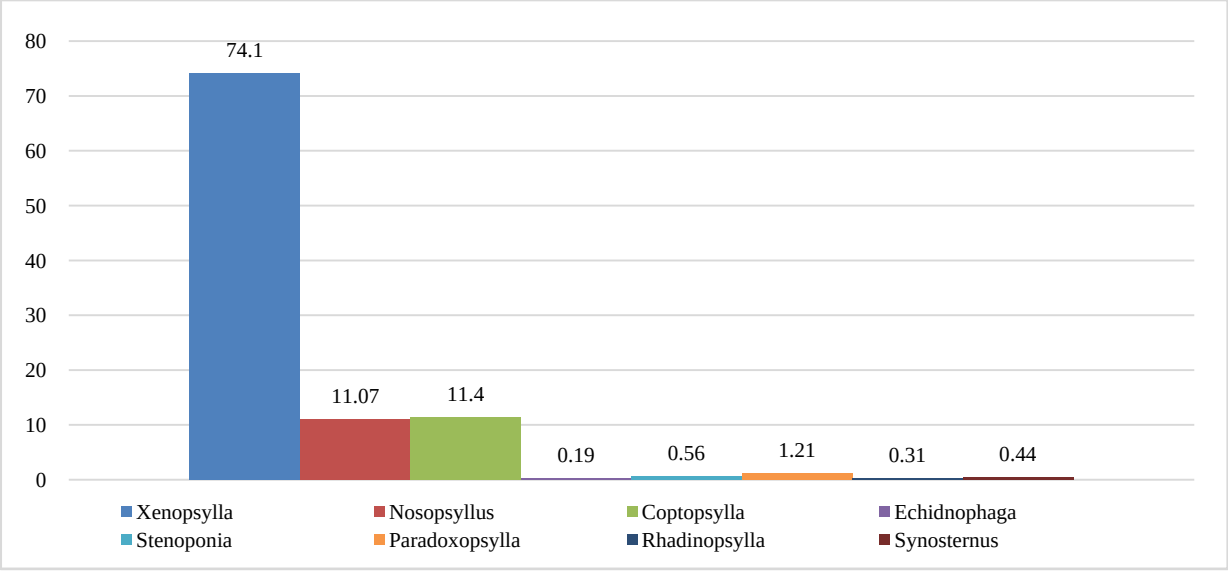


Diagram 6. Distribution of the main genera of fleas by occurrence

Diagrams 7-9 are presented below to analyze the occurrence in catches of fleas of various species from among the most widespread genera and subgenera (*Xenopsylla*, *Coptopsylla*, *Nosopsyllus*).

Chart 7 clearly shows (trend line) a year-on-year decrease in the proportion of the genus *Xenopsylla hirtipes* in flea catches and a dynamic increase in the content of the genera *Xenopsylla gerbilli* et conformis in collections.

From the analysis of the occurrence vectors of species of fleas of the genus *Coptopsylla*, the dynamics of the annual total prevalence in catches of fleas of the genus *Coptopsylla olgae et trispinus* was clearly noted against the background of a gradual decrease in the trend in the occurrence of fleas of the genus *Coptopsylla lamellifer*.

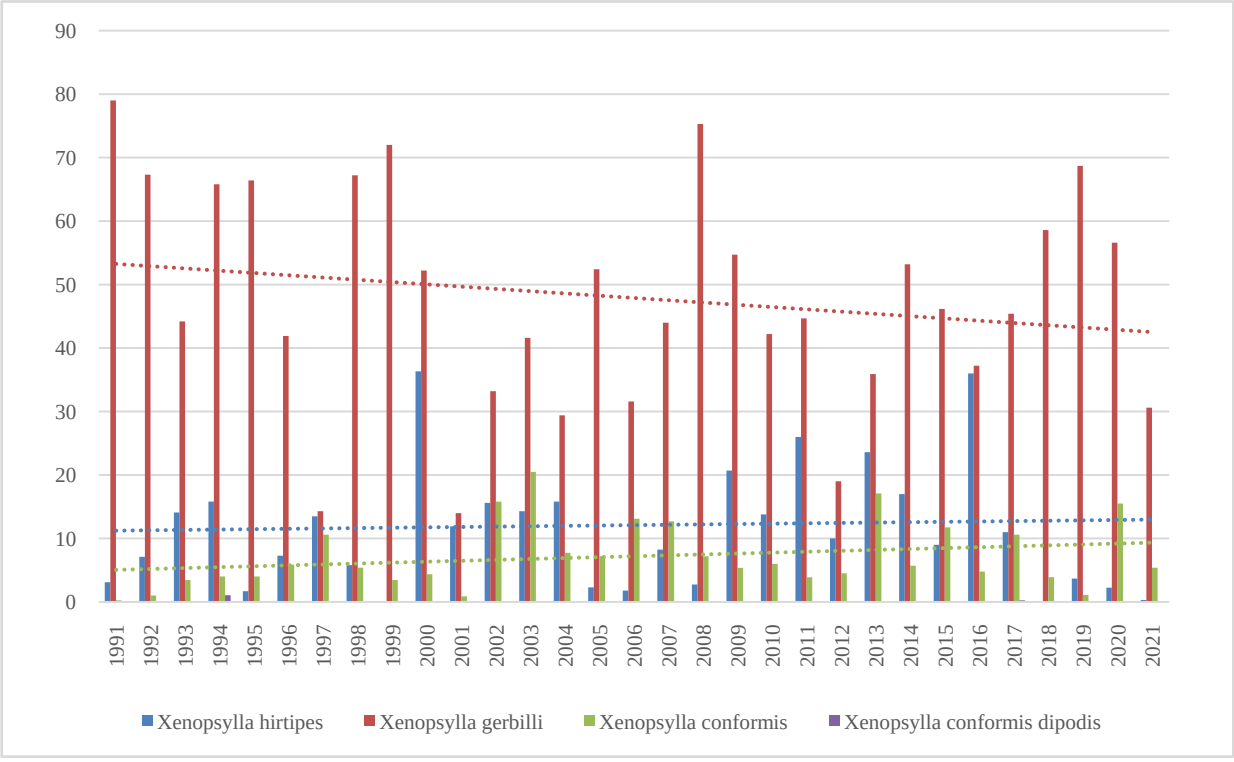


Diagram 7. Dynamics of occurrence (in %) of fleas of the genus *Xenopsylla*

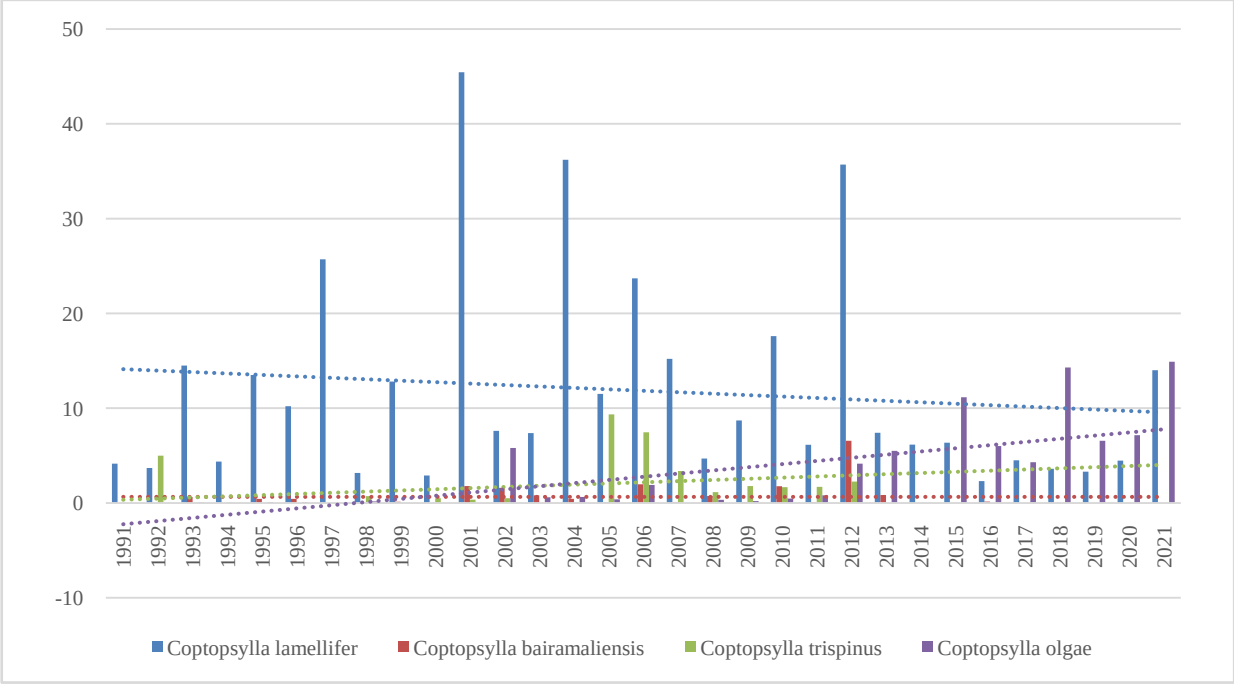


Diagram 8. Dynamics of occurrence (in %) of fleas of the genus *Coptopsylla*

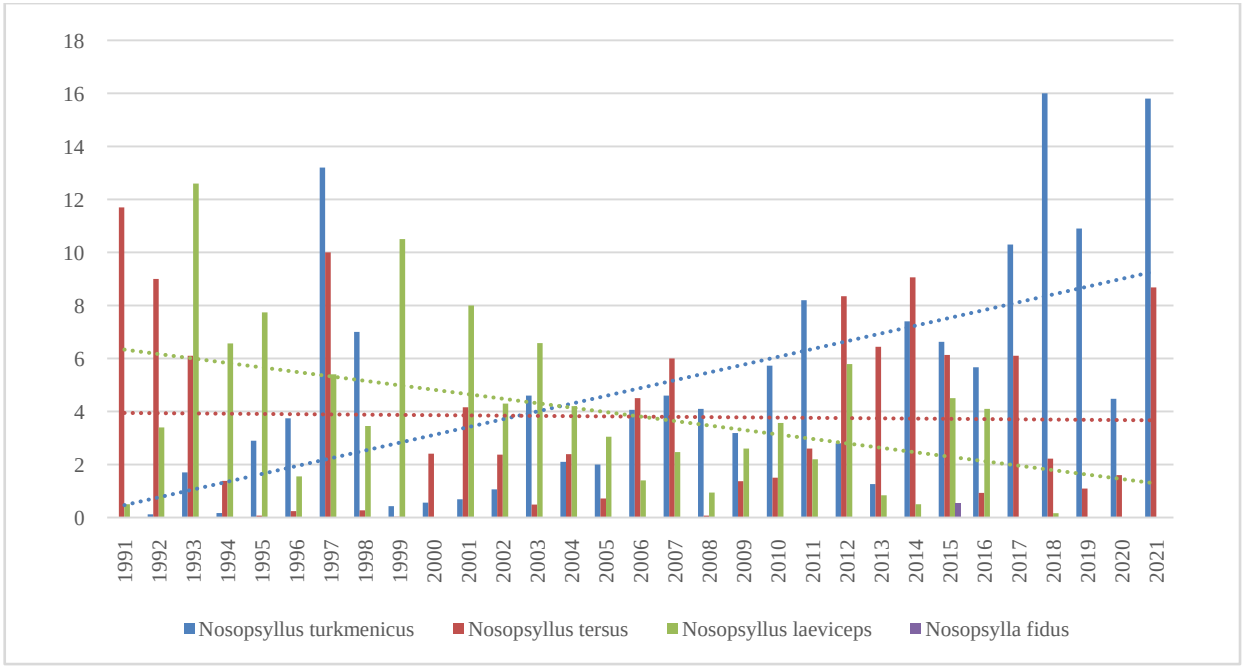


Diagram 9. Dynamics of occurrence (in %) of fleas of the subgenus Nosopsyllus

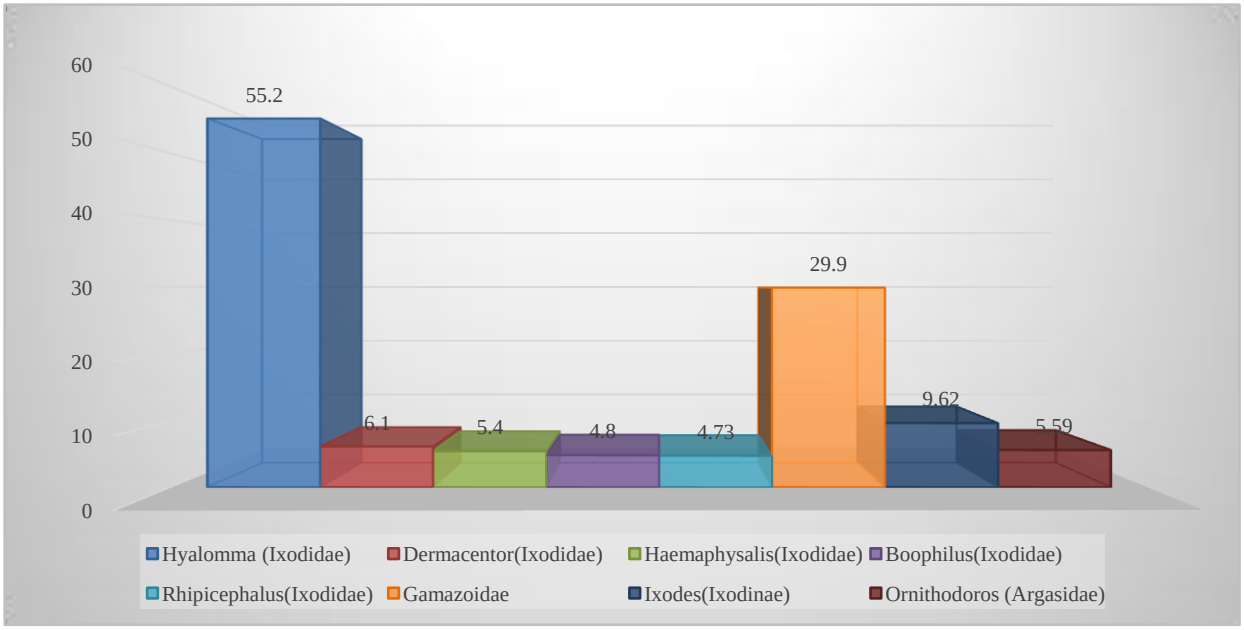


Diagram 10. ticks, occurrence, in %

This diagram characteristically emphasizes the increase in the dynamics of years in the occurrence of fleas of the species *Nosopsyllus turkmenicus* in catches and, similarly, in the dynamics of the decrease in the occurrence of fleas of the species *Nosopsyllus laeviceps*.

The genus *Hyalomm*a of the family *Ixodidae* dominates among ticks in terms of distribution in the territory - 55.2%, after, in 29.9% of cases, the subfamily *Gamazoidae* was found in the collections of ticks, the genus *Ixodes* of the subfamily *Ixodinae* amounted to 9.62%, the genus *Dermacentor* of the family *Ixodidae* amounted to 6,1%, the genus Ornithodoros of the family *Argasidae*-5.6%, the genus *Haemaphysalis* of the family *Ixodidae* -5.4%, and the least common were ticks of the subgenus *Boophilus* of the genus *Rhipicephalus* of the family *Ixodidae* - 4.8% and, in fact, the genus *Rhipicephalus*-4.7%.

Summarizing the presented data, we can conclude that the dominance in the collections according to the total index of occurrence in the collections of ticks of the *Ixodidae* family and less pronounced in total. during the analyzed period of time, the proportion of the presence of ticks of the subfamily *Gamazoidae* in the catches.

This diagram clearly demonstrates the dynamic and pronounced dominance of ticks of the genus *Hyalomma* in the catches, a gradual increase in the share of the presence of ticks of the genera *Ixodes* and *Ornithodoros* and

Haemaphysalis in the collections against the background of a clear decrease in the vector line of occurrence in the collections of ticks of representatives of the genus *Gamazoidae*. Also noteworthy are the data presented below on the frequency of occurrence of various types of fauna orders in the annual dynamics of the analyzed years and their qualitative composition in the quantitative spectrum of the studied years.

It follows from the diagram that the most common species in the chronology of years are representatives of the order *Rodentia* - by the predominance of quantitative accounting: subfamily *Gerbillinae-Rhombomys opimus*, *Meriones meridianus*, *Meriones erythrourus*, family *Sciuridae-Citellus fulvus*, *Spermophilopsis leptodactylus*, from the family *Dipodidae-Dipus sagitta et Allactaga elater* and *Mus musculus*.

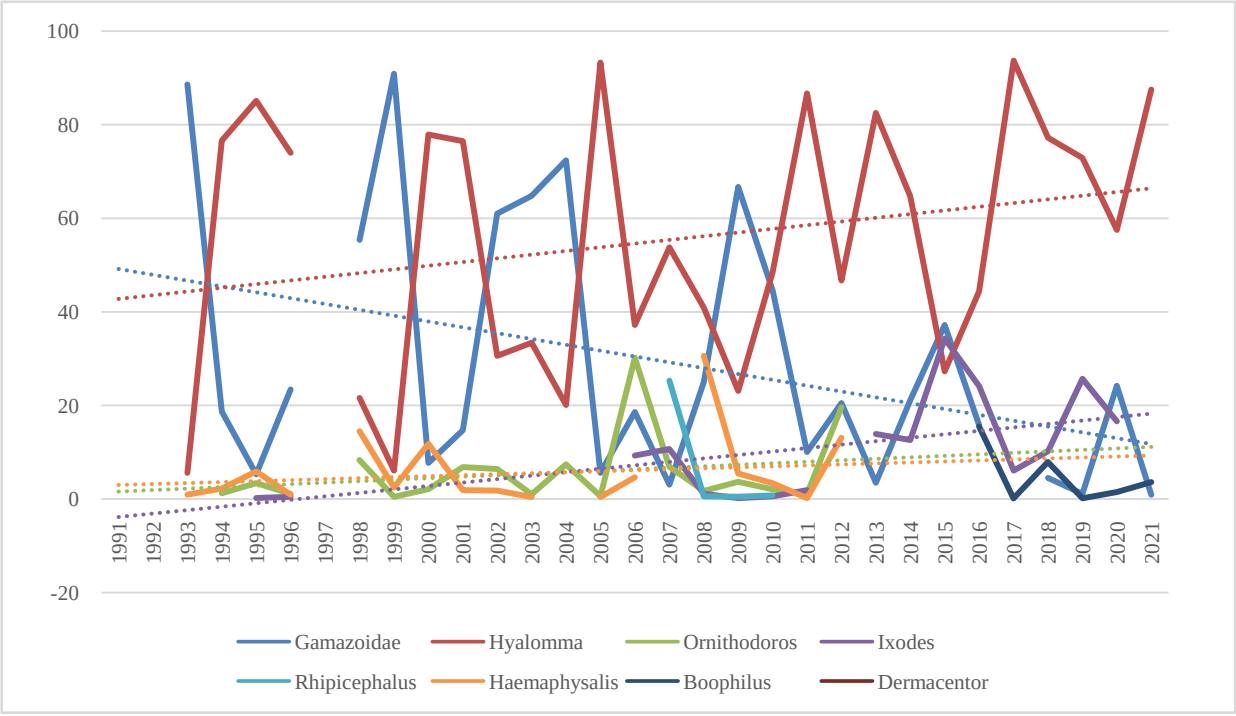


Diagram 11. Dynamics of occurrence (in %) of ticks on the territory of the Central District of Kyzylkum

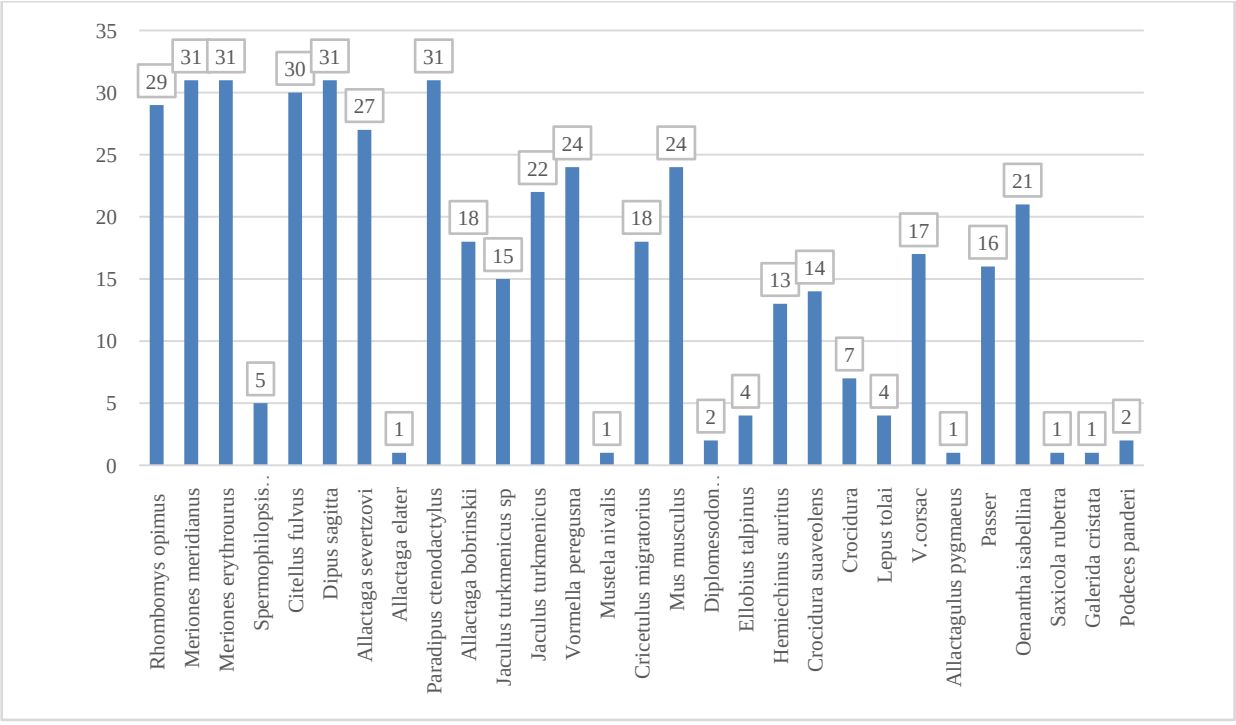


Diagram 12. Frequency of occurrence in catches of various species of rodents, predators, birds in the period 1991-2021

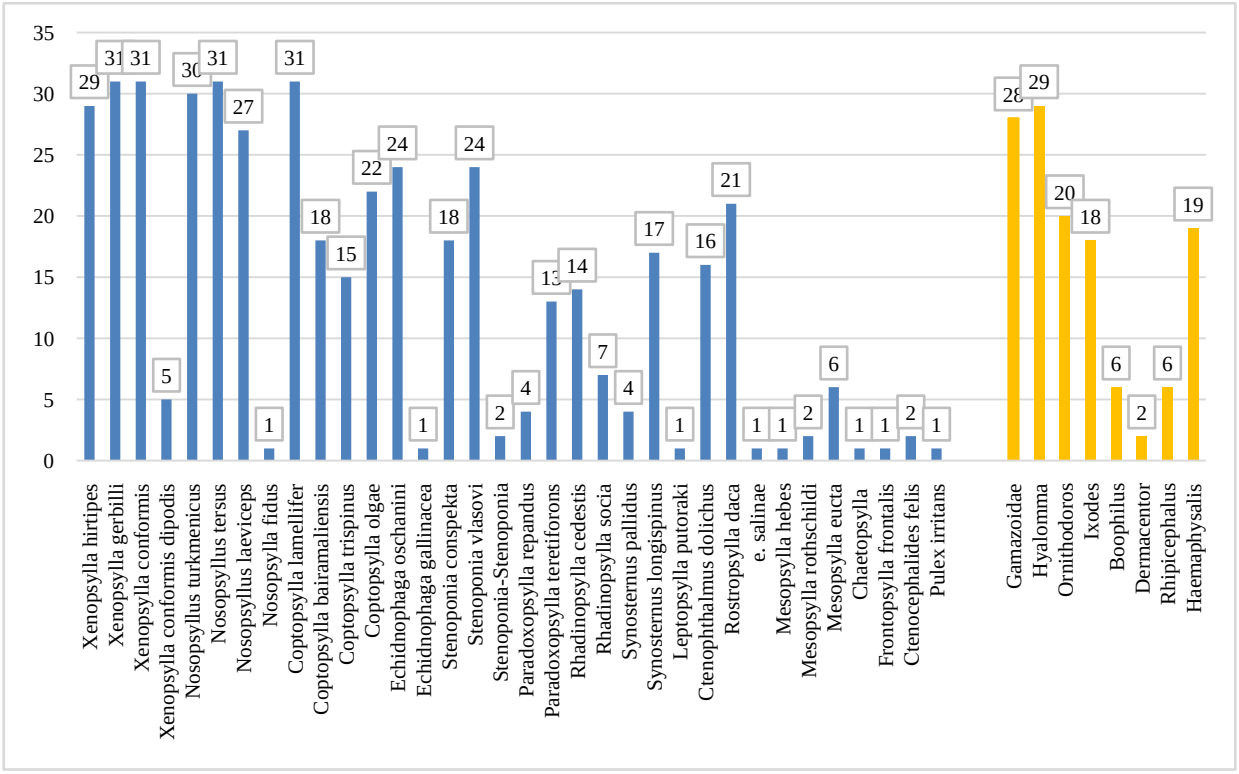


Diagram 13. The frequency of occurrence in collections of ectoparasites of various types of fleas and ticks in the period 1991-2021

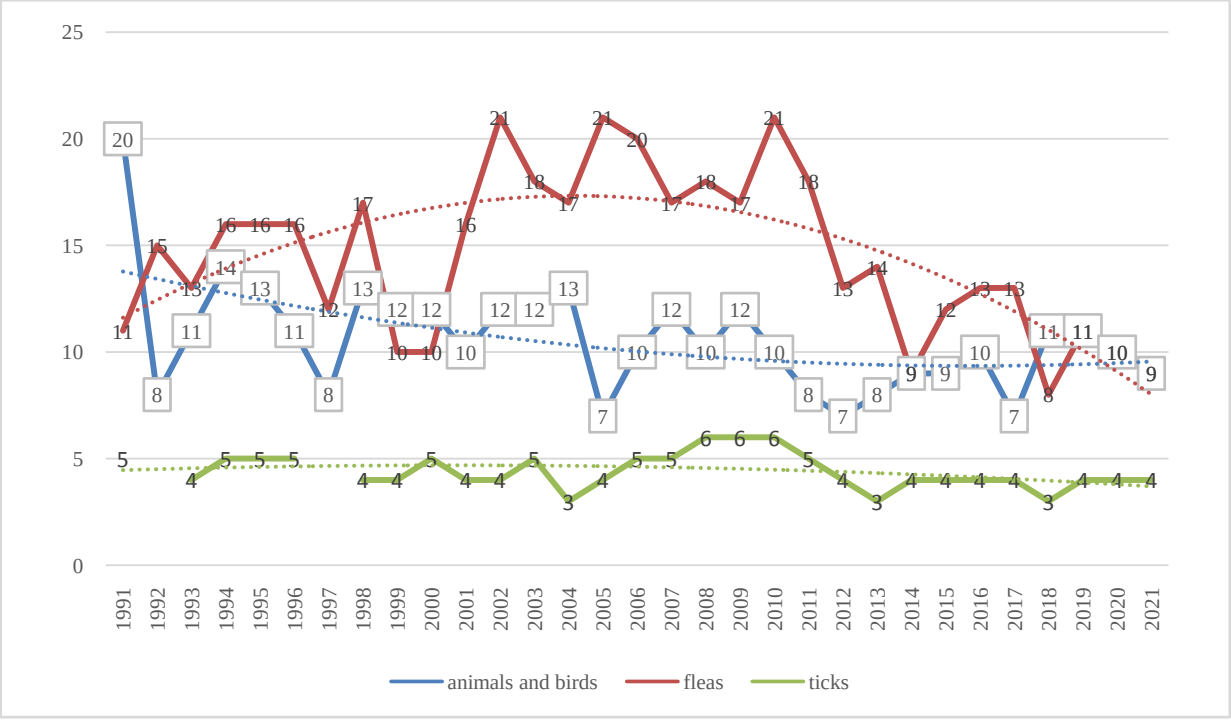


Diagram 14. The frequency of occurrence of animal and bird species, ectoparasites from the entire spectrum of the studied

It follows from the present data that in the dynamics of the occurrence of a line of ectoparasites over a 30-year period until 2021 inclusive, they are most stably encountered, in descending order: from the *Aphaniptera* order, the genus *Xenopsylla-Xenopsylla gerbilli*, *Xenopsylla conformis* and *Xenopsylla hirtipes*; genus *Coptopsylla-Coptopsylla lamellifer* and *Coptopsylla olgae;* subgenus *Nosopsyllus-Nosopsyllus tersus*, *Nosopsyllus turkmenicus* and *Nosopsyllus laeviceps*; as well as fleas of the genus *Echidnophaga oschanini*, *Stenoponia vlasovi* and *Rostropsylla daca*, from among the subclass *Acari* representatives of the genus *Hyalomma* of the family *Ixodidae*, subfamily *Gamazoidae* dominate, less often

- the genus *Haemaphysalis* of the family *Ixodidae*, the genus *Ornithodoros* of the family *Argasidae* and the genus *Ixodes* of the subfamily *Ixodinae*.

3. Results and Discussions

From the assessment of these graphs, a clearly traceable trend of degradation of the prevalence of animal species and fleas within the surveyed area follows, starting from 2009-2010, when the number of species of captured rodents decreased to 9 species out of 29, on average, rodents *Rhombomys opimus*, *Meriones meridianus*, *Meriones erythrourus*, *Citellus fulvus*, *Allactaga elater*, *Mus musculus* and *Cricetulus migratorius*. It should be noted that representatives of the order of birds have not been found in catches since 2009. Among fleas, in this period, it decreased in collections to 11 species, on average, out of 34, among which *Xenopsylla gerbilli*, *Xenopsylla conformis*, *Xenopsylla hirtipes*, *Coptopsylla lamellifer* and *Coptopsylla olgae*, and *Nosopsyllus laeviceps*, *Echidnophaga oschanini*, *Stenoponia vlasovi* were noted for stable dynamics of occurrence.

4. Conclusions

In addition, taking into account the data on the increase in the proportion of some representatives of the order of ectoparasites, we can conclude that the most adaptive representatives, namely, fleas of the genera *Xenopsylla gerbilli et hirtipes*, *Nosopsyllus turkmenicus et tersus*, *Coptopsylla olgae et trispinus*; ticks of the genus *Hyalomma*, less *Ixodes*, *Haemaphysalis*, *Ornithodoros*.

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