



UDC: 599.323.4

# THE GREAT GERBIL (*Rhombomys opimus*) AS A RESERVOIR OF CUTANEOUS LEISHMANIASIS IN THE NORTH REGIONS OF KARAKALPAKSTAN

Asenov G.A.<sup>1</sup>, Jumanov M.A.<sup>1</sup>, Allaniyazov N.P.<sup>2</sup>, Matrasulov G.J.<sup>1</sup>

<sup>1</sup>Karakalpak State University, <sup>2</sup>Republic of Chuma revention Center Karakalpakstan Branch Takhtakupir Department  
Ministry of Health of Uzbekistan

## SUMMARY

*In the article, it is shown that the burrows of the giant sand mouse in the Eshki olgen and Mautam sand massif in the western part of the Beltau Height of North West Kyzylkum are the natural endemic foci of cutaneous leishmaniasis.*

**KEY WORDS:** Great gerbil, dynamic changes, ecological, epizootic, epidemic, prevention.

## INTRODUCTION

According to the location of the territory of the Beltau Heights, Takhtakupir, Karaozek, Shymbai districts are located together, and the complex alluvial plains in the distance from the Zhaltyrbas river, Kuskanatau, Akunbaba herds, bordering Kazakdarya, are the endemic foci of cutaneous leishmaniasis.

It seems that the Beltau highlands have been overpopulated (harvested) during the last (50-60) years and are becoming a dangerous epidemiological focus. This is proof that in the last 2 years (2021-2022) cutaneous leishmaniasis has spread among people in Takhtakupir, Karaozek, and Shymbai districts, which are adjacent to this territory. Cutaneous leishmaniasis epizootics were recorded from great gerbil in the examination of all regions of the North western Kyzylkum (Dubrovsky, Asenov, 1970; Konshina, 1972), in the Central Kyzylkum (Bolshakova, 1973), in the eastern desert region of North (Eliseev, Sidorova, 1958; Bolshakova, 1973, etc.).

In all these territories, there were a number of points with less than 20% damage, more than 50% damage, and in some cases more than 100% damage. Leishmaniasis in the form of a natural outbreak in Uzbekistan, which was reported in the Karshi territory which is a territory under epidemiologic surveillance.

The territory of Beltau is in direct connection with the densely settled agricultural zone, starting from Eshki Olgen sand. The area of people living in the farm is considered to be a densely populated area throughout the year. Mainly for the development of grazing livestock pastures, Karakol herding, breeding, and horse breeding. In the mentioned consular district, the role of the fishermen in food production is huge.

The presence of a large number of birds, rabbits, and fishing is considered a very favorable situation. Beltau height, starting from Borshetau district in the east and extending to Kuskhanatau, Shahaman, Kazakdarya in the west, causes skin leishmaniasis in all territories. Animals that cause cutaneous leishmaniasis include hares, fox, vulpes corsac jackals, wolf and other species are calculated. And many different parasites

in the burrows above them are ticks, fleas, and mosquitoes that bring disease from illness to health. Large gerbil burrows are considered to be used as a source of food for ungulates.

Researchers of the USSR determined that the causative agent of skin leishmaniasis is the great gerbil, and the carrier is flies. Y. P. Vlasova and P. A. Petrishevoy (1932). These flies have determined that a large number of small animals, such as gerbils and small-toed bats, can be found all the time. N. I. Latyshev and Kryukova received the first information about the causative agent of the disease in the fall of 1937 and diagnosed cutaneous leishmaniasis from the skin of the injured ear of a gerbil. The role of rodents as a causative agent (reservoir) of cutaneous leishmaniasis was determined, and deep epidemiological studies were conducted in 1939-1

## MATERIAL AND METHODS

The materials for the research work were studied in the territories close to Daukara and Karaoy areas of Takhtakupir district of Karakalpakstan during 2017-2022 (Fig. 1). In places close to this point, in the piled sands in the area near man-made houses, in the relief elements close to the sands, the large number of sand mice, distribution in natural conditions was studied. This is because the number of people infected with cutaneous leishmaniasis in the rural health centers in the area near this biotope has increased in the last two years, according to the cordic sanitation epidemiology information (Fig. 2).

It was determined that most of the people affected by cutaneous leishmaniasis are farmers, fishermen, livestock keepers and field workers. For that, endemic foci of cutaneous leishmaniasis, suitable habitat types, boundaries and population distribution of large gerbil nests, number indicators per hectare on the breeding front were determined. In order to determine the abundance and number of the big sand mouse, the linear route and the nests counting (colonial) methods were used. In the specified direction, the method of counting the nests is calculated in the same way as for counting the number of large gerbils.



Colonies with a length of 5 km and a width of 20 meters to the right are considered to determine the density of colonies in the studied territory. Every year, in every season, 40-50 mice from each sector are caught in a row in 5-10 squares, and the materials that come to the laboratory are spread over them, the condition of their fur is checked, the condition of their internal organs, cleanliness, age, sex, condition of generative organs, similarity, constriction, accommodation of embryos in the fallopian tubes, counting the number of embryos in the developmental stage, presence of blood-like black spots in the fallopian tubes, and cases of miscarriage were determined. The methods of determining and analyzing the reproduction of rodents were based on the indications of (Saratov, 1978).

### THE RESULTS

When we analyzed the data on the reproduction of the great gerbil in the years 2017-2022 from the Mautam and Eshki Olgen lake sectors of the Belta massif, we analyzed it starting from the period when 2017 came out of the depression. When we determined the potential for the spread and reproduction of the big sand mouse in these biotopes in a short period of time, the number of colonies in the sand dunes near the settlements increased in 2021-2022.

According to our material, in the case of goat-grown goats in Beltau region, the number of living colonies in 2017 is 24.4%, the number of living colonies per 1 hectare is 1.3 mice in 2017, and the average number of colonies in 2021-2022 is 29.5%, per 1 hectare. the number increased by an average of 2.4 mice. Table 1. 2.

**Table 1**  
**Beltau height, Eshki olgen and Mautam sectors Differences in the number of gerbils**

| Years | Average number of sand mice per 1 hectare | The breeding place of the great gerbil sand mouse by month is in % (I – XII) |      |      |      |      |      |      |      |      |      |      |     |
|-------|---|--|------|------|------|------|------|------|------|------|------|------|-----|
|       |   | I  | II   | III  | IV   | V    | VI   | VII  | VIII | IX   | X    | XI   | XII |
| 2017  | 1.3                                       | -  | -    | 21.9 | 23.7 | -    | -    | -    | 25.0 | -    | 27.3 | -    | -   |
| 2018  | 1.5                                       | -  | 23.3 | -    | 25.0 | 26.6 | -    | 24.2 | -    | 27.5 | 29.1 | 22.7 | -   |
| 2019  | 1.4                                       | -  | -    | 22.7 | 24.3 | 26.0 | -    | -    | 27.1 | -    | 28.8 | -    | -   |
| 2020  | 1.6                                       | 21.9   | -    | 24.8 | -    | 27.1 | 28,7 | -    | -    | 30.1 | -    | -    | -   |
| 2021  | 2.7                                       | -  | 23.3 | -    | 26.0 | 31.6 | -    | -    | 28,3 | 34.6 | 31,1 | -    | -   |
| 2022  | 2.4                                       | 18.4   | -    | 23.8 | 24.6 | 27.1 | -    | -    | -    | 32.3 | 34.0 | 29.7 | -   |

**Table 2**  
**Eshki olgen and Mautam sectors of Beltau Heights**  
**Breeding potential of the great gerbil**

| Years | Amount of rain in the interval X-V | Reproductive rate is the number of embryos per 100 females | The number of births per female per year | At the expense of chronic hangover | The average number of embryos that come to one pregnant tumor | Adult males were females on the basis of % |
|-------|------------------------------------|--|--|------------------------------------|---|--|
| 2015  | 282,2                              | 647,8  | 0,7                                      | 198,9                              | 3,7   | 63,9                                       |
| 2016  | 296,0                              | 181,6  | 0,2                                      | 72,4                               | 1,1   | 73,1                                       |
| 2017  | 184,2                              | 169,3  | 0,1                                      | 67,9                               | 1,1   | 81,3                                       |
| 2018  | 251,2                              | 318,0  | 1,2                                      | 121,7                              | 2,1   | 61,8                                       |
| 2019  | 199,6                              | 824,9  | 1,6                                      | 341,5                              | 5,8   | 61,4                                       |
| 2020  | 169,4                              | 593,6  | 1,1                                      | 237,2                              | 4,0   | 59,3                                       |
| 2021  | 50,2                               | 2600,8   | 2,4                                      | 991,3                              | 13,4  | 57,6                                       |

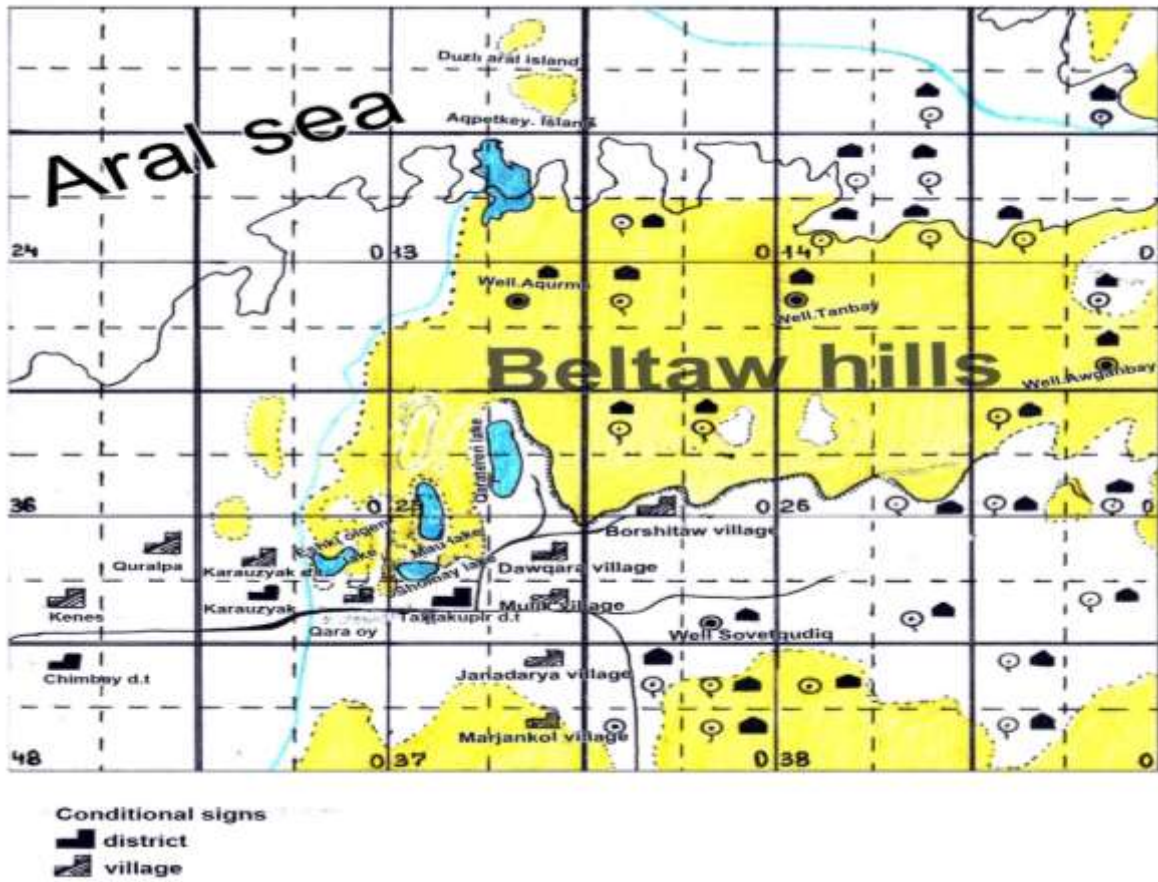


Fig.1. Territories of activity of the Takhtakupur Anti-Plague Department

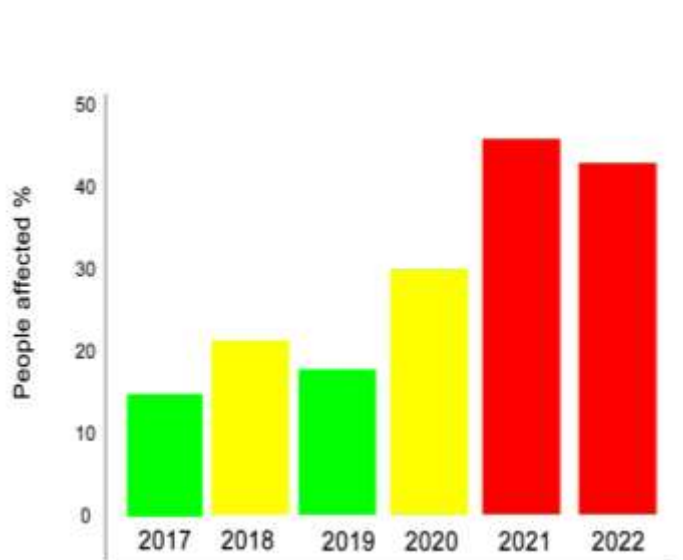
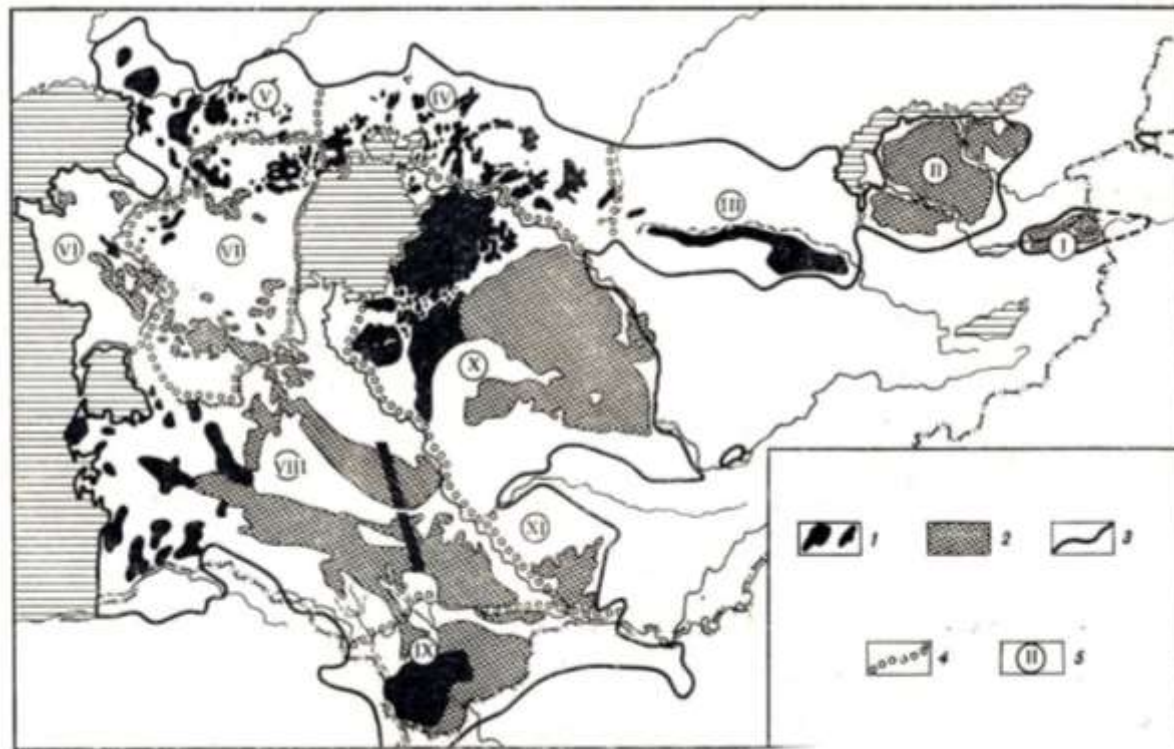


Fig. 2. Sanitation epidemiological information, changes in the number of people affected by skin leishmaniasis in some areas of Takhtakupur



**Fig. 3. Spatial structure of the Turan part of the range of the great gerbil (location of gerbils and division of the range into regional complexes of autonomous population groups).**

1-dense settlements of large gerbils (more than 1 burrow per 1 ha or more than 2.5 burrows per 1 km of the route).

2-proposed contours of dense settlements (vegetation communities, to which, as a rule, dense settlements of great gerbils are confined).

3-boundary of the range of the great gerbil.

4-boundary of regional complexes of autonomous population groups

5-numbers of regional complexes of population groups

## CONCLUSION

Based on the materials cited in the literature and our own observations, we had the opportunity to make the following summaries.

1. In the last 2 years (2021-2022) in the Kyzylkum plague center and in the territories related to it, we were the source of many cases of leishmaniasis in North district.

2. It was determined that the source and spreader of cutaneous leishmaniasis is a great gerbil in nature, and the territory of its active distribution.

3. Leishmania, the causative agent of some skin leishmaniasis, has not yet been identified, so effective preventive measures have not yet been implemented.

4. The role of the gerbil in spreading cutaneous leishmaniasis of other species has not yet been determined. It is considered as a basis for future research.

## REFERENCES

1. Adler S. *Immunology of leishmaniasis* *Isr J. Med. Sci.* 1968. 9-12.
2. Aliyev E.I., Safyanova V.M., Balabas I.G., and others. *Comparative serological study of *Leyshmaniya tropica major* I *Leyshmaniya tropica minor* – Med parasitology 1972 With 531-535.*
3. Baroyan O.V. 1967 *Essays on the worldwide spread of the most important infectious human diseases. Medicine.*
3. Borovsky P.F. *About Saratov ulcers military.medicine.journal.* 1898, 195, 11, pp. 925-941.
4. Bray R.S. *Leyshmania – Annu. Rev. Micro bio* 1974. 28. 189-217.
5. Dubrovsky Yu.A. *Gerbils and the natural foci of cutaneous leishmaniasis. Mosca* 1978. p. 183.
6. Dubrovsky Yu.A., Asenov G.A. *On the prevalence of cutaneous leishmaniasis among large gerbils in some areas of the northern desert subzone – zoologich. Journal* 1970 49. pp. 1256-1968. P. 144,145,154.
7. Dyatlov A.I. *Natural foci of cutaneous leishmaniasis and prospects for their improvement between the rivers Amudari and Syrdarii auth.ref cand dis. Toshkent* 1967 w
8. Horn K. 1971 *Lettdaden der Zooantroponozen/ Berlin/*
9. Isaev L.M. *The problem of combating cutaneous leishmaniasis in Uzbekistan: In the book; A meeting on leishmaniasis and masked fever. M 1962 From 11-14.*
10. Konshina L.N. *Natural foci of zoonotic cutaneous leishmaniasis in the Karakalpak ASSR. Auth-ref. Cand.disser Samarkand* 1972
11. Kozhevnikov P.V. *Two types of cutaneous leishmaniasis – In the book: Problems of cutaneous leishmaniasis. Ashgabat, 1941, pp.127-162.*
12. Matrasulov G.J., Asenov G.A., Allaniyazov N.P. *O redkom yavlenii otmechennom v polovozrastnom sostave*



*populyatsii bol'shix peschanok na territorii Severo-Zapadnix Kizilkumov. II Mejdunarodnoy nauchno-prakticheskoy konferentsii «Biologicheskoe raznoobrazie prirodnix i antropogennix landshaftov: izuchenie i oxrana» Astraxan 2021 4 iyun', 152-154 st.*

13. Matrasulov G.J., Bakhieva L.A., Abdullaeva N.U. *Biologicheskiye osobennosti bolshoy peschanki (Rhombomys opimus Licht) v usloviyax Yujnogo Priaralya. The Way of Science International scientific journal, № 12 (82), 2020 Volgograd, 2020 23-24 б.*
14. Petrishcheva P.A., Safyanova V.M., Vyukov V.N. *He states and prospects of development of the problem of leishmaniasis. In book III meeting on leishmaniasis and other tropical diseases of people in Central Asia and Transcaucasia. M. 1969, pp.140-146.*
15. Petrishcheva P.A. *Natural focal diseases and their prevention Moscow 1965 From p. 30.35.*
16. Seytnazarov S.K., Matrasulov G.J., Nurekeeva G.N., Kutlimuratov M.S. *Economic significance of Rhombomys opimus in the desert ecosystems of the Southern Aral Sea region. Science and Education in Karakalpakstan. Nukus 2021 №1 ISSN 2181-9203, 9-10 б.*
17. Strelkova M.V. *Duration and nature of the course of cutaneous leishmaniasis in the midday gerbil – Parasitology 1975 9,6. From 532-533.*