

## THE COMPARATIVE MORPHOMETRIC FEATURES OF LIBYAN JIRD (*Meriones libycus* Lichtenschtein, 1823) POPULATIONS IN AZERBAIJAN

 Agil Hakhiyev\*

Institute of Zoology, Ministry of Science and Education, Baku, Azerbaijan

**Abstract.** In the article, in Libyan Jird (*Meriones libycus* Lichtenstein, 1842) populations (Jeyranchol and Aghdara), the results obtained belonging the dimensions of the external body and skull were investigated in a comparative manner. The materials used were collected in different years and different seasons. It was determined from the investigations conducted that there is no statistically reliable or true difference between the populations according to the body mass, body length, paw length and tail length of these animals. There is a real difference in the male individuals of the populations only due to the height of the ear from the exterior signs. There are reliable differences between the populations in signs as the total length of the skull, the width of the brain capsule, the length of the diastema and the length of the brain part from the cranial dimensions. There are no real differences between the condylobasal length of the skull, the length of the palate, the length of the upper tooth level, the length of the lower tooth level, the width of the cheekbone, the width of the skull, the length of the tympanic bone and the width of the tympanic bone.

**Keywords:** Populations, male and female individuals, exterior and cranial measurements, length, width, height.

\***Corresponding Author:** Agil, Hakhiyev, Institute of Zoology, Ministry of Science and Education, Baku, Azerbaijan, Tel.: +994556950050, e-mail: [agilhakhiyev@gmail.com](mailto:agilhakhiyev@gmail.com)

**Received:** 30 October 2024;

**Accepted:** 24 November 2024;

**Published:** 5 December 2024.

### 1. Introduction

The increasing ecological influences causes to the different variations within the species. The complex methods are applied for to study deeply such variations. The rodents, which are important in the farm and other fields, are of greater interest of the researchers as lifestyle change according to the ecological condition. According to the modern theriologists, the ecological, morphological, karyological and other characteristics of many species, as well as Libyan Jird (*Meriones libycus* Lichtenstein, 1842) should be inspected and researched deeply. Libyan Jird is a carrier of a number of the dangerous infectious diseases, as well as constitutes the food of other animals in biogeocenosis. It is possible to determine the age, the inter-population variation and in some cases the taxonomic status of Libyan Jird with the studying the skull dimensions of it. Libyan Jird (*Meriones libycus* Lichtenstein, 1842) lives at different altitudes and in different landscapes of different areas of Azerbaijan (Hakhiyev, 2019; Guliyev *et al.*, 2017). There are three isolated geographical populations (Gazakh-Ajinothur, Garabagh-Mil, Shirvan-Absheron) of this species in the East of the South Caucasus (Vinogradov &

#### How to cite (APA):

Hakhiyev, A. (2024). The comparative morphometric features of Libyan Jird (*Meriones libycus* Lichtenschtein, 1823) populations in Azerbaijan. *Advances in Biology & Earth Sciences*, 9(3), 324-329 <https://doi.org/10.62476/abes93324>

Gromov, 1952). But the comparative morphometry of these populations has not been studied.

During the previous researches, the real differences were revealed during the comparative analysis of the morphological dimensions of Libyan Jird (*Meriones libycus* Lichtenstein, 1842) species obtained from different areas of Azerbaijan (Hakhiyev, 2019).

There are various literature materials about the compatibility of the ages of the male and female individuals of Libyan Jird with the allometric indicators of the skull, about the body and skull dimensions and the variability of the skull shape (Bashenina, 1953; Snedekor, 1961). The cranial signs are considered a more favorable sign in terms of the discriminant function for the diagnostics of Libyan Jird. The length and width of the incisor teeth cavity, the width of the nose level and skull at the nose level belong to the diagnostic signs.

The presented article is devoted to the morphologically comparative studying of the populations of Libyan Jird living in different geographical areas.

## 2. Materials and methods

The article was written on the basis of the collection materials collected from the areas of Jeyranchol and Aghdara in the 1980s and in different seasons by the employees of the Institute of Zoology, stored in the Terrestrial vertebrates laboratory of the Institute of Zoology. During the research, 20 collection materials belong to Libyan Jird (*Meriones libycus* Lichtenstein, 1842) were used. The somato-craniometry was performed according to the known scheme (Vinogradov & Gromov, 1952). For this purpose, 20 old individuals were researched. The morphometric analysis of the materials from different populations of the rodents was performed with the variation-statistical method (Ivanter, 1979). The degree of the correctness differences was analyzed according to t-student criteria. 4 exterior features, mass and 13 craniological indicators were taken for individuals of both populations (Ivanter, 1979). According to this method, if  $P < 0.05$ , the difference between the populations is considered real (Snedecor, 1961).

## 3. Results and discussions

The mass and body dimensions belonging to Libyan Jird populations distributed in the Azerbaijani part of the Lesser Caucasus were researched comparatively (Table 1). As can be seen from the table, the body mass of both male and female individuals differs from each other in separate populations. The body mass of the male and female individuals of the Jeyranchol population is  $95.7 \pm 1.45$  g and  $79.6 \pm 3.3$  g, respectively and  $90.5 \pm 4.9$  g and  $96.5 \pm 7.5$  g, respectively, in Aghdara population. But this difference is not reliable statistically ( $t = 1.2$ ;  $P > 0.05$ ). There was no real difference between the populations in body length, tail length and paw length dimensions ( $P > 0.05$ ). In males, the height of the ear is  $19.3 \pm 0.15$  mm in the Jeyranchol population and  $20.3 \pm 0.2$  mm in the Aghdara population and the difference is reliable statistically ( $t = 4.0$ ;  $P < 0.05$ ).

The dimensions of the skull bones (Figure 1) of the populations were analyzed comparatively (Table 2). In the populations, in the total skull length, there is real difference between the males, but no real difference between the females. There is no reliable statistically (real) difference in the condylobasal length of the skull in male and female individuals from the same area. The palate length does not differ in male and

female individuals from the same area (write the comparable numbers: male  $M \pm m...$ , female  $M \pm m...$ ). There is no real difference according to the palatal length between both male and female individuals between the populations. There is no difference between the male and female individuals of the Jeyranchol population according to the length of the upper tooth level and the length of the lower tooth level. The difference between the female individuals of the population due to the length of the lower tooth level is not real.



**Figure 1.** The measured skull samples of Libyan Jird (*Meriones libycus* Lichtenstein, 1842) populations

**Table 1.** The variability of the mass (g) and body dimensions (mm) of the population of Libyan Jird

Body dimensions	Genus	Jeyranchol			Aghdara			The statistical reliability of the difference	
		n	Min-max	$M \pm m$	n	Min-max	$M \pm m$	t	p
Body mass	♂	5	92-100	$95.7 \pm 1.45$	5	79.1-101.2	$90.5 \pm 4.9$	1.02	>0.05
	♀	5	69-86	$79.6 \pm 3.3$	5	72.1-108	$96.5 \pm 7.5$	2.06	>0.05
Body length	♂	5	118-147	$132.2 \pm 5.4$	5	134.8-151	$142.1 \pm 3.25$	-1.6	>0.05
	♀	5	127-141	$133.4 \pm 2.7$	5	136.8-151.7	$142 \pm 2.9$	-2.1	>0.05
The length of the tail	♂	5	130-134.8	$133 \pm 0.95$	5	118.2-139.6	$131.2 \pm 4.0$	0.4	>0.05
	♀	5	133-135	$134.6 \pm 45.0$	5	133-138	$135.8 \pm 1.3$	-0.8	>0.05
The length of the paw	♂	5	30.5-32	$31.2 \pm 0.25$	5	31-32.7	$32 \pm 0.35$	-2	>0.05
	♀	5	29.4-31.4	$30.6 \pm 0.45$	5	30-32.6	$31.1 \pm 0.55$	-0.7	>0.05
The height of the ear	♂	5	19-19.8	$19.3 \pm 0.15$	5	20-21	$20.3 \pm 0.2$	4.0	<0.05
	♀	5	18.3-20.5	$19.8 \pm 0.4$	5	18.4-20.8	$19.7 \pm 0.5$	0.2	>0.95

**Table 2.** The variation of the skull dimensions (mm) of two populations of Libyan Jird

The dimensions of the skull	Genus	Jeyranchol				Aghdara				The statistical reliability of the difference	
		n	Min-max	M±m		n	Min-max	M± m		t	p
The total length of the skull	♂	5	36.1-37	36.5	0.15	5	37-37.9	37.5	0.15	-5	<0.001
	♀	5	36.8-37	36.9	0.05	5	37.2-39	37.6	0.4	-	>0.05
The condylobasal length of the skull	♂	5	37.3_38.1	37.7	0.15	5	37.38.3	37.6	0.3	0.3	>0.05
	♀	5	37-37.5	37.2	0.1	5	37.5..39.3	38	0.35	-2	>0.05
The length of the palate	♂	5	15.2-15.6	15.4	0.05	5	14.9-15.8	15.6	0.2	-1	>0.05
	♀	5	15-15.2	15.1	0.05	5	15-15.4	15.2	0.1	-1	>0.05
The length of the upper tooth level	♂	5	5.1-5.4	5.3	0.05	5	5.4-5.5	5.4	0.025	-2	>0.05
	♀	5	5.4-5.6	5.5	0.05	5	5.4-5.8	5.6	0.05	-1	>0.05
The length of the lower tooth level	♂	5	5.3-5.5	5.4	0.05	5	5.4-5.6	5.5	0.035	-1	>0.4
	♀	5	5.3-5.6	5.4	0.05	5	5.4-5.7	5.5	0.05	-1	>0.4
The width of the brain capsule	♂	5	17-17.5	17.	0.1	5	17.5-17.7	17.6	0.045	-4	<0.01
	♀	5	17-17.3	17.2	0.05	5	17.2-19.4	17.7	0.45	-	>0.4
The width of the cheekbone	♂	5	20-20.1	20	0.025	5	20-20.5	20.1	0.1	-1	>0.4
	♀	5	20-20.1	20	0.025	5	20-23.5	20.8	0.75	-	>0.4
The length of the diastema	♂	5	9.4-9.6	9.5	0.05	5	9-9.8	9.6	0.15	-1	>0.4
	♀	5	9.1-9.3	9.2	0.05	5	9.1-10	9.5	0.15	-3	<0.025
The width of the skull	♂	5	20-20.2	20.	0.05	5	20-20.5	20.2	0.1	-1	>0.4
	♀	5	20.1-20.2	20.1	0.025	5	19.4-23.3	20.5	0.8	-	>0.5
The length of the facial part	♂	5	24.8-25	24.6	0.2	5	24.8-25.4	25.1	0.1	-	<0.05
	♀	5	24.8-25.1	25	0.05	5	25-26	25.4	0.2	2.5	>0.1
The length of the brain part	♂	5	14.7-15.2	14	0.05	5	15.2-15.4	15.3	0.05	-4	<0.01
	♀	5	14.7-15	14.9	0.05	5	15-15.4	15.2	0.05	-3	<0.025
The length of the tympanic bone	♂	5	13.9-14.1	14	0.05	5	14.1-14.4	14.2	0.05	-2	>0.1
	♀	5	14.1-14.5	14.2	0.1	5	14.3-15	14.5	0.15	-	>0.2
The width of the tympanic bone	♂	5	10-10.4	10.5	0.05	5	10.3-10.6	10.4	0.05	1	>0.4
	♀	5	10-10.2	10.1	0.05	5	10.3-12	10.7	0.35	-2	>0.1

The female individuals of the Aghdara population are predominant according to the width of the brain capsule. The width of the cheekbone is dominant in the female individuals of Aghdara. The difference between the female individuals of the population is real according to the length of the diastema. The male individuals of the populations do not differ according to the width of the skull, but the Aghdara population prevails between the female individuals. Both male and female individuals of the Aghdara

population are dominant according to the length of the face. There is a real difference between the male and female individuals of the population according to the length of the brain part.

There is no difference between the male and female individuals of the populations according to the length of the tympanic bone. The female individuals of the Aghdara population prevail according to the width of the tympanic bone.

#### 4. Conclusion

1. There is no difference between the populations according to the body length, paw length and tail length. At the same time, the real difference between the populations was not determined according to the body mass. There was a real difference between the male ( $t=-3.3$ ;  $p<0.025$ ) individuals of the populations according to the height of the ear, but there was no real difference between the female individuals. The total length of the skull varies accordingly in both male and female individuals of both populations. A real difference was detected between the male ( $t=-5$ ;  $p<0.005$ ) individuals according to the total length of the skull and no real differences between the females between the populations. There is no real difference in the condylobasal length of the skull between neither male nor female individuals of the populations. There are no real differences between the populations according to the length of the palate.

2. The real differences between male and female individuals of the populations are not determined according to the length of the upper and lower tooth rows.

3. The real differences between the male ( $t=-4$ ;  $p<0.01$ ) individuals of the populations were determined according to the width of the brain capsule and there were no real differences between the female individuals.

4. There are no real differences between the populations according to the width of the cheekbone. The real differences between the female ( $t=-3$ ;  $p<0.025$ ) individuals of the population are determined according to the length of the diastema, but no such differences between the male individuals are detected.

5. The difference between the female individuals of the Jeyranchol and Aghdara populations is not real according to the width of the skull. There is no real difference between the male individuals of the populations according to the width of the skull. There is real difference between the male ( $t=-2.5$ ;  $p<0.05$ ) individuals of the population according to the length of the facial part, but no real differences are detected between the female individuals.

6. A real difference between both male ( $t=-4$ ;  $p<0.001$ ) and female ( $t=-3$ ;  $p<0.025$ ) individuals of the Jeyranchol and Aghdara populations is determined according to the length of the brain part.

There is no difference between neither male nor female individuals of the populations according to the length of the tympanic bone. No real difference between the Jeyranchol and Aghdara populations is detected according to the width of the tympanic bone.

As can be seen, the real differences in the chronological skull dimensions more compared to external measurements. In skull dimensions, the multitude of the real differences has created due to the complex ecological influences. The factors related to the nutritional ration also play a role in creating of these differences.

## References

- Bashenina, N.V. (1953). On the question of determining the age of common vole (*Microtus arvalis*). *Zoological Journal*, 32(5), 730-743. (In Russian).
- Guliyev, G.N., Guliyev, S.M., Ibrahimli, A.Sh., Askarov, E.K., Sarukhanova, S.A., Hakhiyev, A.R. & Hasanov, N.A. (2017). The taxonomic spectrum of the mammal animal species (Mammalia L., 1758) in the Azerbaijan fauna. *Proceedings of the Azerbaijan Society of Zoologists of ANAS*, 9(1), 57-74. (In Azerbaijan).
- Hakhiyev, A.R. (2019). The comparative morphometric characteristics of Libyan Jird (*Meriones libycus* Lichtenstein, 1842) populations (Greater and Lesser Caucasus). *News of the Azerbaijan State Pedagogical University*, 67(2), 113-118.
- Hakhiyev, A.R. (2019). The modern status of the mammal species (Mammalia L., 1758) in the mountainous areas of Azerbaijan. *International Conference Mountains: Culture, Landscapes and Biodiversity*, 63-71.
- Ivanter, E.V. (1979). *The Fundamentals of the Practical Biometrics*. Petrozavodsk: Karelia, 93. (In Russian).
- Snedecor, D.U. (1961). *Statistical Methods in Application to the Research in Agriculture and Biology*, fifth edition. Hardcover 1956, 105-117.
- Vinogradov, B.S., Gromov, I.M., (1952). The rodents of the fauna of the USSR. Publishing House of the Academy of Sciences of the USSR, 84-91. (In Russian).