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New data on the distribution of the Caspian whipsnake *Dolichophis caspius* (Gmelin, 1789) in the West Kazakhstan region of the Republic of Kazakhstan

Information on the distribution of the Caspian whipsnake *Dolichophis caspius* (Gmelin, 1789) within the West Kazakhstan region of the Republic of Kazakhstan is summarized and possible reasons for its dispersal across the Bokeyorda district in recent decades are discussed. New discoveries of the species have allowed the northeastern boundary of its range to be pushed 20–30 km northward from the previously known habitats of the Caspian snake. The only protected natural area in Kazakhstan where the species is reliably present and, therefore, currently protected is the “Orda” State Nature Reserve of local significance. To ensure the conservation of the species in Kazakhstan, it is desirable to justify and create a new protected natural area — the regional nature monument “Mount Maloe Bogdo”.

Keywords: snakes, Colubridae, Red Book of the Republic of Kazakhstan, Bokeyorda district of West Kazakhstan Region, Maloe Bogdo, Khaki sor, specially protected natural areas, state nature reserve of local importance “Orda”.

Introduction

The Caspian whipsnake (= yellow-bellied whipsnake) is a monotypic species of the colubridae family, the modern scientific name of which is *Dolichophis caspius* (Gmelin, 1789) [1]. It is distributed in South-Eastern Europe and Asia Minor, the north-eastern border of the range passes through Western Kazakhstan (Fig. 1). The northern limit of distribution is located on the right bank of the Volga, in the Kamyshinsky district of the Volgograd region of Russia, on the territory of the Shcherbakovsky Nature Park [2, 3; 162–163].

Punder the name “Yellow-bellied snake *Coluber caspius*” with the status “IV category”. Unstudied species included in the latest edition of the Red Book of the Republic of Kazakhstan. In this edition, the authors of the species essay reported that measures to protect the yellow-bellied snake had not been taken or developed due to the lack of study of the species. As a proposal for its study, it was indicated that it was necessary to determine the boundaries of its distribution in Kazakhstan. The authors of the Red Book essay Z.K. Brushko and Yu.A. Zima [5; 78–79] knew of only one location on the territory of Kazakhstan from the article by Yu.M. Rall [6] — “in the relict steppe of Bes-Chokho in the Volga-Ural interfluve” (Kurmangazy district of Atyrau region). In fact, the *D. caspius* was recorded in Kazakhstan much earlier. The first published information about the *D. caspius* in what is now Atyrau Region dates back to the 18th century [7; 513–514, 8; 111–112, 8; 129], and in West Kazakhstan Region — to the 19th century [9; 73–74, 10; 24, 11; 123]. Our colleagues’ publications with new locations of the species’ occurrence in Kazakhstan mainly contain information territorially related to Atyrau Region [12–16], and information confirming its current habitat in West Kazakhstan Region, on Maloe Bogdo Mountain and its environs [12, 15, 17–19]. *D. caspius* was previously recorded on Maloe Bogdo: in 1854 by I.B. Auerbach; in 1887 by A.N. Kharuzin, in 2004 and 2008 by F.G. Bidashko. F.A. Saraev and co-authors [15; 223] reported a sighting in the interfluve of the Volga and Ural rivers — “Pomoshch settlement (48°08.583'N, 48°50.056'E), June 3, 2017 (Salahatov N.B., personal communication)”. The reference to the only sighting in the left bank of the Ural River, in the northern outskirts of the village of Inderborskiy [13, 15, 17], is based on an oral report by F.G. Bidashko about encountering the species there on June 29, 1998. It is worth noting that the presence of the *D. caspius* in the two latter locations, in the Akzhaik district of the West Kazakhstan region near the border with the Atyrau region, has not been confirmed later.

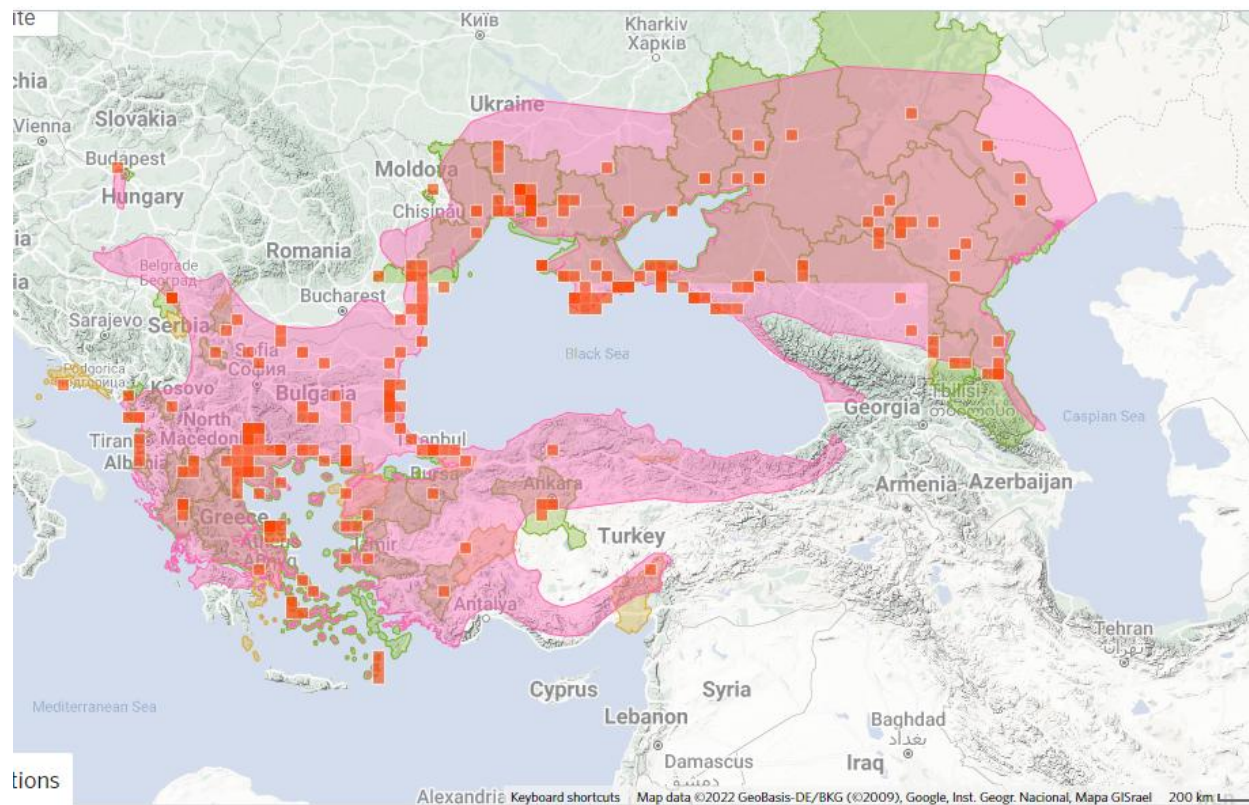


Figure 1. Sites of encounters [4] and range boundaries [1] of *Dolichophis caspius*

The objectives of this article are to clarify the current distribution, assess the state of protection and develop proposals for the protection of the species in the West Kazakhstan Region of the Republic of Kazakhstan (hereinafter WKR).

Experimental

The main material for the article was the authors' field research from 2017–2022 in the Bokeyorda District of the West Kazakhstan Region, partially published [20–25]. Literary sources and personal communications of colleagues related to encounters with the *D. caspius* in the West Kazakhstan region were analysed. Previously published and new data on recorded live and dead individuals, molted worms, were used to clarify the distribution of the species in the study region. Information on the current distribution of the Caspian whipsnake in the study region is presented as a range map with a cadastre including 11 locations. For uniformity, the coordinates of all species encounters are given in the format "DD°MM.mmm". Geographic coordinates were determined using Garmin eTrex H GPS navigators (Garmin Ltd., Taiwan). Photographic surveys of snakes and biotopes were performed using a Nikon D500 digital SLR camera (Nikon, Japan) and a Fujifilm FinePix HS10 digital camera (Fujifilm, Japan). All our Caspian whipsnake locations have been uploaded as part of the West Kazakhstan snake dataset to the Global Biodiversity Information Facility (GBIF) portal [26].

To determine the reasons for the spread of the *D. caspius* in Kazakhstan, an analysis of the long-term dynamics of climate indicators was carried out at the Urda (Khan Ordasy) weather station, which is located closest to the sites of its new finds. The dynamics of air temperature and precipitation in the Bokeyorda district is given according to the data of the branch of the Republican state enterprise on the right of economic management "Kazhydromet" in the West Kazakhstan region.

A significant part of the study area is located below the altitude of 0 m above sea level and occupies a lowland plain freed from the Khvalynsk waters around the vast salt marsh lake Solyonye Gryazy (Sor Khaki), which remained as a closed salt water body after the sea waters retreated [27]. Sor Khaki is one of the largest salt marshes in the world, occupying an area of more than 1000 km². This salt marsh reaches 80 km in length, its width is 15–25 km, and the depth of the depression containing it is more than 15 m [28]. The eastern part is occupied by Naryn Sands, where hummocky and ridge-hummocky sands alternate with flat-plain depressions. In the southwest of the region is Mount Maloe Bogdo, which is the southern wing of

the large Urpek salt uplift. On the surface it is a ridge stretching from west to east, reaching its highest point of 37 m on the eastern slope [29].

The climate is sharply continental. The saline depressions of Sor Khaki and Naryn-Peski are hotbeds of desertification [30].

Results and Discussion

Let's start with previously unpublished data on encounters in WKR. All meetings relate to its Bokeyorda district.

On July 25, 2019, we noted a dismembered carcass of a Caspian snake at the Babay-Sad cemetery near the village of Khan Ordasy (Fig. 2A; Fig. 3, point 1). On July 7, 2020, a 1.6-meter-long moulting snake was found there (Fig. 2B; Fig. 3, point 1).

At the end of March 2021, a *D. caspius* was found dead near a railway embankment near the Ravninny siding (15 km south of the village of Saikhin) of the Volga Railway (Urbach — Verkhniy Baskunchak Line) by a local resident, track fitter of JSC Russian Railways, Yuri Vladimirovich Berezin. The snake is about 1.8 m long (Fig. 2C; Fig. 3, point 3).

On April 19, 2022, during an ecological and local history expedition of the Bokeyorda Center for Tourism and Ecology with the participation of teachers and students of the M. Mametova and Zhangir Khan schools, four Caspian whipsnake were observed on Mount Maloe Bogdo. *D. caspius* were encountered at the southwestern foot of the mountain on the road leading to the quarry (Fig. 2D; Fig. 3, point 10) and at the eastern foot of Mount Maloe Bogdo (Fig. 3, point 11).

On June 12, 2022, in the extreme north-eastern part of the Khaki Sor, a *D. caspius* was observed crushed by a vehicle on a dirt road (Fig. 2E; Fig. 3, point 2).

Of the eleven locations of finds shown in Fig. 3, only one — point 1 — is located in a specially protected natural area (State Nature Reserve of Local Significance “Orda”). The remaining noted habitats do not have territorial protection.

Most of the meeting places of the species in recent years are in WKR (points 4–11 in Fig. 3) are confined to Mount Maloe Bogdo. This mountain, which was previously an island in the retreating Caspian Sea, was possibly a refugium for the Caspian whipsnake. In our opinion, by now it has become the centre of its distribution: the species is moving north in Kazakhstan from there. From Mount Maloe Bogdo, the *D. caspius* has spread more than 20 km to the northwest (point 3 in Fig. 3) and more than 30 km to the northeast (points 1 and 2, Fig. 3).

Let's dwell on the *anthropogenic factor*. At the “Zhaman-Tau” mineral deposit, located near Mount Maloe Bogdo, areas with deposits of sandstone, gypsum, limestone, and crushed stone suitable for construction work have been identified. The spread of the *D. caspius* north of Maloe Bogdo may be linked to the development of this non-metallic mineral deposit that began in 2020. First, snakes are migrating due to disturbance from the mining activities, and secondly, the snakes may be displaced during the transportation of sand-gravel mixtures and crushed stone from the deposit near Mount Maloe Bogdo to be used for the medium repairs of the national road R-56 (transported up to 100 km), as well as for the construction of roads in the villages of Khan Ordas, Shonay, and Saykhin. The presence of the *D. caspius* on Maloe Bogdo was noted as early as the 19th century, but its expansion to neighboring territories apparently began only at the end of the 20th century — beginning of the 21st century. Previously, researchers did not record it in areas north of Maloe Bogdo, which we now indicate.

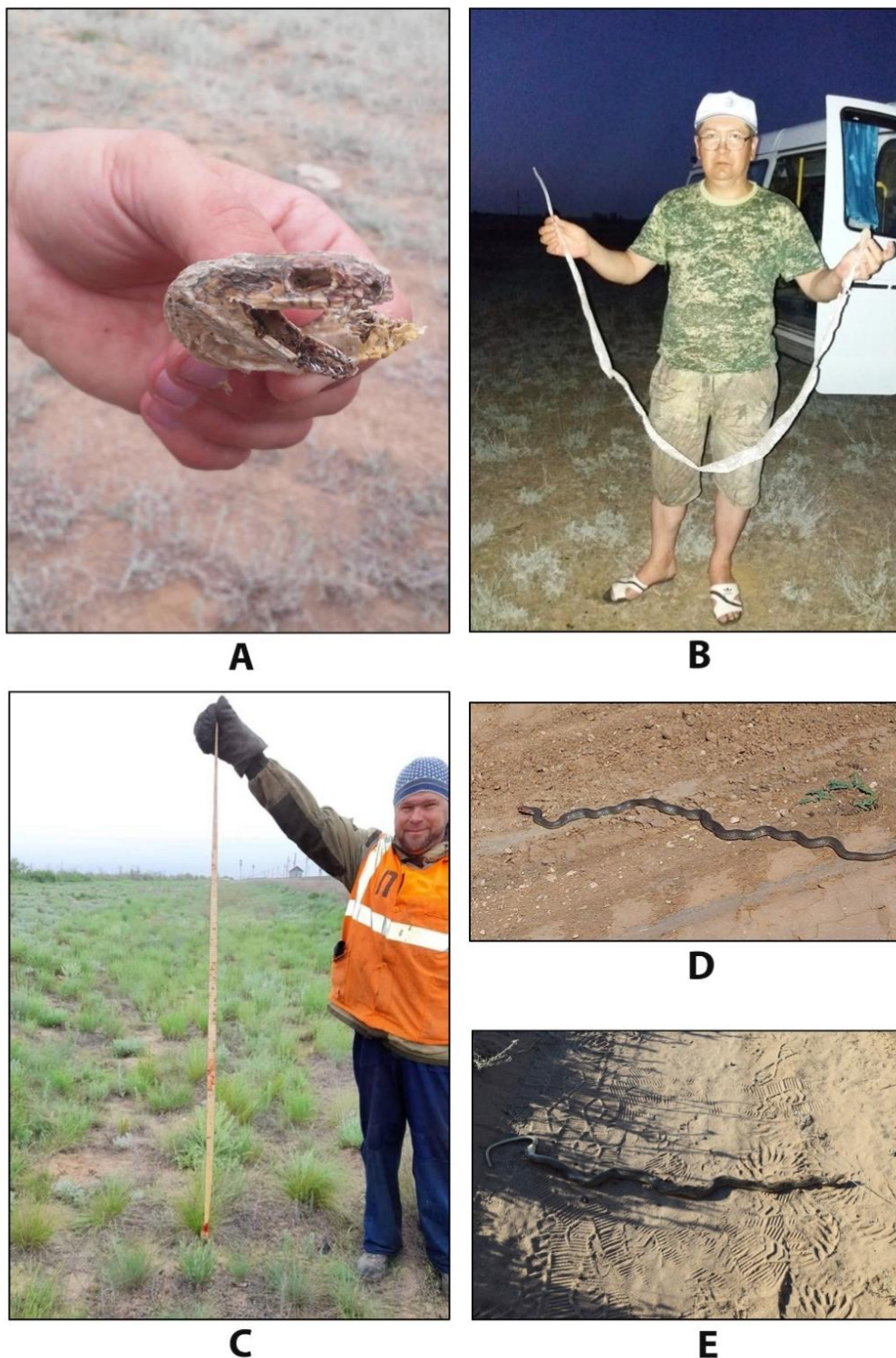


Figure 2. *Dolichophis caspius* encounters in the Bokeyorda District of the West Kazakhstan Region of the Republic of Kazakhstan:

- A — a dismembered Caspian whipsnake at the Babai-Sad cemetery in the vicinity of the village of Khan Ordasy;
- B — a moulting worm, also there;
- C — a crushed specimen at the Ravninny siding of the Privolzhskaya Railway;
- D — a Caspian whipsnake at the south-western foot of the Maloe Bogdo Mountain;
- E — a crushed specimen in the extreme north-eastern part of the Khaki Sor.

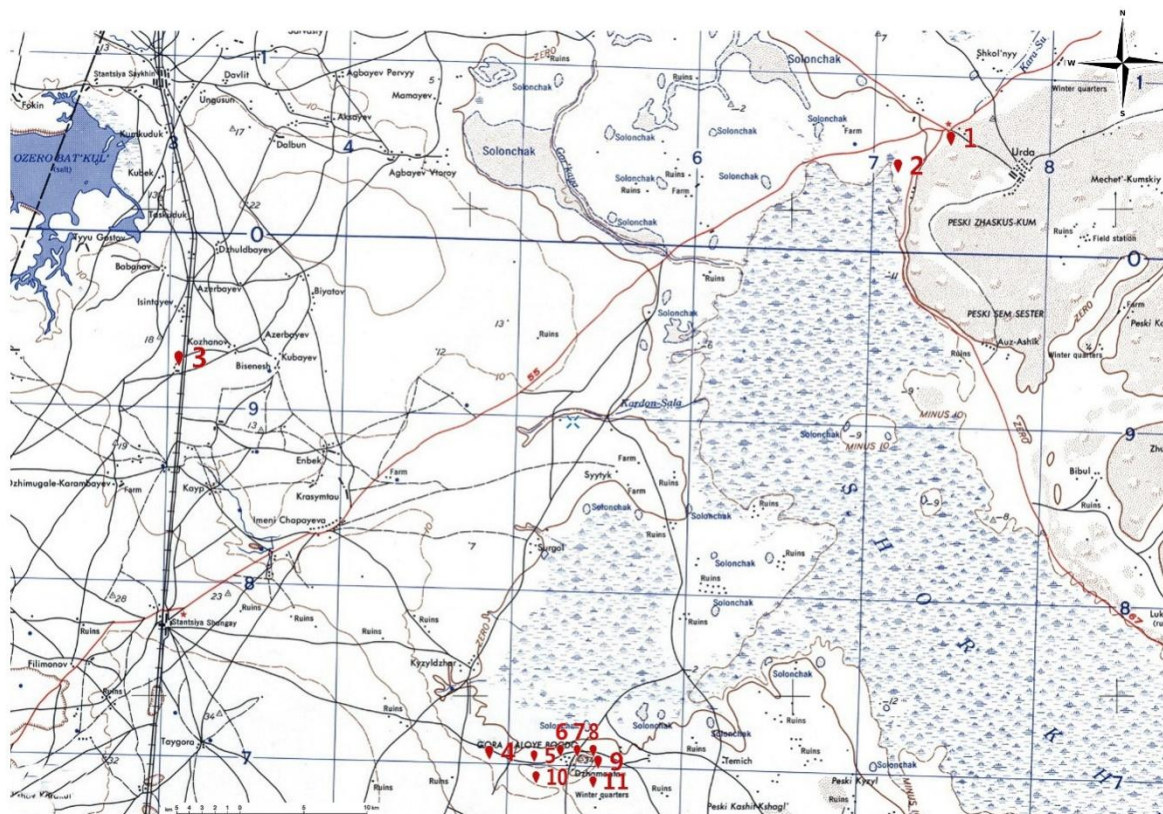


Figure 3. Meeting places with *Dolichophis caspius* in the Bokeyorda district of the West Kazakhstan region of the Republic of Kazakhstan in 2004–2022:

1 — the vicinity of the village of Khan Ordasy, the Babay-sad cemetery ($48^{\circ}47.305'N$, $47^{\circ}22.559'E$), June 13–14, 2018 [25; 89]; July 25, 2019, July 7, 2020 [our data]; 2 — the extreme north-eastern part of the Khaki sor, on a dirt road ($48^{\circ}46.073'N$, $47^{\circ}20.542'E$), June 12, 2022 [our data]; 3 — surroundings Ravninny junction, at the railway embankment ($48^{\circ}40.240'N$, $46^{\circ}46.430'E$), March 2021 [our data]; 4 — dirt road between Mount Maloe Bogdo and the village of Saykhin ($48^{\circ}28.392'N$, $47^{\circ}01.497'E$), April 30, 2018 [20; 288–289]; 5 — Mount Maloe Bogdo ($48^{\circ}28.000'N$, $47^{\circ}03.000'E$), April 21, 2004 and June 15, 2008 [17; 94, 13; 184]; 6 — plain adjacent to the southwestern slope of Mount Maloe Bogdo ($48^{\circ}28.035'N$, $47^{\circ}04.986'E$), May 25, 2017 [21; 137]; 7 — Mount Maloe Bogdo ($48^{\circ}28.048'N$, $47^{\circ}05.326'E$), May 23, 2012 [18; 213, 19; 71]; 8 — summit of Mount Maloe Bogdo, in a crevice ($48^{\circ}28.188'N$, $47^{\circ}05.548'E$), April 29, 2018 [20; 288–289]; 9 — eastern foothill of Mount Maloe Bogdo ($48^{\circ}28.098'N$, $47^{\circ}05.591'E$), May 25, 2017 [21; 137]; 10 — southwestern foothill of Mount Maloe Bogdo ($48^{\circ}27.309'N$, $47^{\circ}02.566'E$), April 19, 2022 [our data]; 11 — eastern foothills of Maloe Bogdo Mountain ($48^{\circ}27.420'N$, $47^{\circ}05.323'E$), April 19, 2022 [our data]

Moving on to *climate change*, climate change and global warming may also be the reason for the *D. caspius* northward expansion in WKR. An increase in climate aridity and an expansion of desertification were noted in the study area [30]. According to the results of studies in southwestern Bulgaria [31], the activity pattern of *D. caspius* shows its thermophilic nature: winter activity was not recorded, it emerges from hibernation relatively late, is active even in the hottest months and only during the day. According to the thermal adaptation index (the ratio of body temperature to external temperature), the Caspian snake is the most thermophilic (0.98 ± 0.03) in comparison with the other 13 studied reptile species of the Volga basin [32]. Ecological niche models predict that, as a result of global warming, the range of *D. caspius* will expand to the north, with a slight decrease in the range at its southern borders [33]. Studies with ecological niche modelling [34] have found a strong influence not only of temperature, but also, first of all, of precipitation on the distribution of the *D. caspius* as a xerophilic species.

The table shows the dynamics of two climate indicators for the Urda (Khan Ordasy) weather station for the period from 1986 to 2024, divided into three equal time intervals of 13 years each: 1986–1998, 1999–2011 and 2012–2024. The figures show that over the past 39 years, the general trend has been toward a decrease in average annual precipitation and an increase in average annual air temperature. The decrease in av-

average annual precipitation in 2012–2024 compared to 1986–1998 was 40.7 mm, and 23.2 mm compared to 1999–2011. The increase in air temperature in 2012–2024 compared to 1986–1998 was 1.5 mm amounted to 1.9 °C, compared to 1999–2011 — 0.7 °C.

Table

Main climate indicators for a long-term period at the Urda (Khan Ordasy) weather station

Years	Average annual precipitation, mm	Average annual air temperature, °C
1986–1998	295.1	8.4
1999–2011	277.6	9.6
2012–2024	254.4	10.3
1986–2024	275.7	9.4

Feeding migrations. The diet of the species includes small mammals (gophers, jerboas, voles, gerbils, hamsters, etc.), birds, lizards and snakes, and less often amphibians, large spiders and insects [35–38].

The increased frequency of encounters in 2016–2018 in the Atyrau region may be explained by the increased activity of the Caspian whipsnake in search of prey against the background of the low numbers of midday and tamarisk sand eels in these years [16]. In the Bokeyorda district of WKR the same situation is noted with the small ground squirrel [39–41]. The movement of the Caspian snake north from the Maloe Bogdo Mountain may be associated with the snakes' search, with an insufficient food supply, for accumulations of rodents and other vertebrates of a size suitable for swallowing.

Recommendations for species conservation

The Malo-Bogdin salt-dome region is a key landscape and biological area that is insufficiently protected by territorial conservation measures. The justification and creation of a protected natural area, such as the regional nature monument “Mount Maloe Bogdo”, has become an urgent issue. Such a protected area would contribute to the preservation not only of the karst formations of the area but also of the rare plant and animal species inhabiting it, including the *D. caspius*.

Direct destruction and mortality on roads are limiting factors for the Caspian snake, as confirmed by studies conducted outside the West Kazakhstan region [16, 24, 34, 42, 43]. Superstitions continue to be a reason for the destruction of rare non-venomous snakes such as *D. caspius*, so it is necessary to carry out educational work with the local population to eliminate false beliefs about snakes and their danger.

Conclusions

1. The northeastern boundary of the global range of the *D. caspius* — a species included in the Red Book of the Republic of Kazakhstan — passes through the territory of the West Kazakhstan region.

2. All sightings of the species in the West Kazakhstan region are geographically within its Bokeyordinsky district, where we define the boundary of its current distribution (from west to east) from the vicinity of the railway station Ravninsky through the northeastern edge of the Hakis sor to the northern outskirts of the village of Khan Ordas. According to the data obtained in 2018–2022, the previously known distribution of the Caspian snake in Kazakhstan has been extended more than 20 km northwest and more than 30 km northeast from Mount Maloe Bogdo.

3. In our opinion, the current distribution of the species was influenced by a complex of factors: global warming, forage migrations, and anthropogenic development of the territory.

4. The species is reliably present only in one protected natural area in Kazakhstan — the “Orda” State Nature Reserve of local significance (Bokeyordinsky district, West Kazakhstan region). To protect the species in Kazakhstan, it is promising to justify and create the regional nature monument “Mount Maloe Bogdo” in the Bokeyordinsky district.

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References

- 1 Large Whip Snake *Dolichophis caspius* // Red List. Version 2024-2. — [Electronic resource]. — Access mode: <https://www.iucnredlist.org/species/157267/746211>
- 2 Гордеев Д.А. Распространение и биолого-морфологическая характеристика каспийского полоза *Hierophis caspius* (Gmelin, 1779) Волгоградской области / Д.А. Гордеев // Вестник ТГУ. Серия: Естественные и технические науки. — 2013. — Т. 18, № 6–1. — С. 2997–2999.
- 3 Бакиев А.Г. Пресмыкающиеся (Reptilia) природного парка «Щербаковский» / А.Г. Бакиев, Д.А. Гордеев // Природный парк «Щербаковский»: история исследований, сохранение биоразнообразия, рекреационный потенциал. — Волгоград: ООО «Издательство Крутон», 2023. — С. 154–167.
- 4 *Dolichophis caspius* // iNaturalist. — 2025. — [Electronic resource]. — Access mode: <https://www.inaturalist.org/observations/255975032>
- 5 Брушко З.К. Сарыкұрсақ абжылан. Желтобрюхий полоз *Coluber caspius* Gmelin, 1779 / З.К. Брушко, Ю.А. Зима // Қазақстан Республикасының Қызыл кітабы. 4-басылым. I том: Жануарлар; 1-бөлім: Омыртқалылар. — Алматы, 2010. — 324 б. / Красная книга Республики Казахстан. Издание 4-е. Том 1: Животные; Часть 1: Позвоночные. — Алматы. — С. 78–79.
- 6 Ралль Ю.М. Древняя степь «Бесъ-Чохо» в Волжско-Уральских песках / Ю.М. Ралль // Природа. — 1935. — № 4. — С. 55–60.
- 7 Лепехин И.И. Дневные записки путешествия доктора и Академии Наук адъюнкта Ивана Лепехина по разным провинциям Российского государства, 1768 и 1769 году / И.И. Лепехин. — СПб., 1771. — [VIII]+538 с.
- 8 Pallas P.S. Bemerkungen auf einer Reise in die südlichen Statthalterschaften des Russischen Reichs in den Jahren 1793 und 1794. — Bd. 1 / P.S. Pallas. — Leipzig: G. Martini, 1799. — 516 s.
- 9 Кесслер К.Ф. Заметки о ящерицах и змеях, собранных И.Б. Ауэрбахом на горе Большой Богдо, во время путешествия 1854 года, составлена К.Ф. Кесслером в Киеве, в 1858 году / К.Ф. Кесслер // Записки Императорского Русского Географического Общ-ва по общей географии. — 1871. — Т. IV. — С. 69–75.
- 10 Кулагин Н.М. Списки и описание коллекции земноводных и пресмыкающихся Музея / Н.М. Кулагин // Изв. Имп. Общ-ва любителей естествознания, антропологии и этнографии. — 1888. — Т. LVI, Вып. 2. — С. 1–39.
- 11 Харузин А.Н. Степные очерки (Киргизская Букеевская орда): странички из записной книги / А.Н. Харузин. — М.: Типография А.А. Левенсон, 1888. — 192 с.
- 12 Островских С.В. К вопросу о распространении каспийского полоза, *Hierophis caspius* (Gmelin, 1789), в Волго-Уральском междуречье / С.В. Островских, М.В. Пестов, А.В. Шапошников // Герпетологические исследования в Казахстане и сопредельных странах. — Алматы: АСБК–СОПК, 2010. — С. 252–254.
- 13 Сараев Ф.А. К кадастру рептилий Северного и Северо-Восточного Прикаспия / Ф.А. Сараев, М.В. Пестов // Герпетологические исследования в Казахстане и сопредельных странах. — Алматы: АСБК–СОПК, 2010. — С. 174–193.
- 14 Пестов М.В. Новые находки рептилий в Северном Прикаспии (Республика Казахстан) / М.В. Пестов, Ф.А. Сараев, В.С. Агеев // Современная герпетология. — 2011. — Т. 11, Вып. 3/4. — С. 192–195.
- 15 Сараев Ф.А. Новые данные по распространению желтобрюхого, или каспийского полоза — *Hierophis caspius* (Gmelin, 1779) в Волго-Уральском междуречье / Ф.А. Сараев, И.Г. Козулина, И.Б. Меллятова // Зоологические и паразитологические исследования в Казахстане и сопредельных странах. Посвящено 85-летию Института зоологии и 100-летию академике НАН РК Евгения Васильевича Гвоздева. — Алматы: РГП «Институт зоологии» КН МОН РК, 2018. — С. 222–225.
- 16 Сараев Ф.А. Желтобрюхий или каспийский полоз — *Hierophis caspius* (Gmelin, 1779) в Атырауской области / Ф.А. Сараев, И.Г. Козулина, И.Б. Меллятова, Н.Б. Салауатов // Карантинные и зоонозные инфекции в Казахстане. — 2019. — Вып. 2 (39). — С. 92–96.
- 17 Дуйсебаева Т.Н. Новые данные о распространении амфибий и рептилий в Казахстане: обзор по первому десятилетию XXI века / Т.Н. Дуйсебаева, М.А. Чирикова, Ю.А. Зима, О.В. Белялов, А.В. Коваленко // Герпетологические исследования в Казахстане и сопредельных странах. — Алматы: АСБК–СОПК, 2010. — С. 84–99.
- 18 Боркин Л.Я. Дорогами Петра Симона Палласа (по западу Казахстана) / Л.Я. Боркин, Б.К. Ганнибал, А.В. Голубев. — СПб.; Уральск: «Евразийский союз учёных», 2014. — 312 с.
- 19 Боркин Л.Я. Герпетологические исследования на западе Казахстана: П.С. Паллас и современность / Л.Я. Боркин, С.Н. Литвинчук // Природа западного Казахстана и Пётр Симон Паллас (полевые исследования 2012 года). — СПб.: Европейский дом, 2015. — С. 53–79.
- 20 Ахмеденов К.М. Дополнения к герпетофауне горы Малое Богдо и его окрестностей / К.М. Ахмеденов, Р.С. Абуова, Г.А. Назарова // Вестн. Зап.-Казахст. гос. ун-та. — 2018. — № 3. — С. 285–296.
- 21 Ахмеденов К.М. К герпетофауне района горы Малое Богдо / К.М. Ахмеденов, А.Г. Бакиев, Р.А. Горелов, О.Г. Калмыкова // Изв. Самар. НЦ РАН. — 2017. — Т. 19, № 5. — С. 134–139.
- 22 Ахмеденов К.М. Герпетофауна гор Большое и Малое Богдо, их окрестностей: история изучения, современный состав и перспективы сохранения / К.М. Ахмеденов, А.Г. Бакиев, Р.А. Горелов, О.Г. Калмыкова, А.А. Клёнина // Охрана природы и региональное развитие: гармония и конфликты (к году экологии в России): материалы Международной научно-практической конференции и школы-семинара молодых ученых-степеведов «Геоэкологические проблемы степных регио-

нов», проведённых в рамках XXI сессии Объединенного научного совета по фундаментальным географическим проблемам при Международной ассоциации академий наук (МАН) и Научного совета РАН по фундаментальным географическим проблемам. — Т. I. — Оренбург: Институт степи УрО РАН, 2017. — С. 113–117.

23 Ахмеденов К.М. Материалы к созданию особо охраняемой природной территории «Гора Малое Богдо» в Западном Казахстане / К.М. Ахмеденов, А.Г. Бакиев, Р.А. Горелов, О.Г. Калмыкова, М.И. Шпигельман, Р.С. Абуова // Астраханский вестник экологического образования. — 2018. — № 5. — С. 18–26.

24 Ахмеденов К.М. Распространение, состояние и перспективы охраны каспийского полоза *Hierophis caspius* (Gmelin, 1789) (Colubridae, Reptilia) в Казахстане / К.М. Ахмеденов, А.Г. Бакиев, Р.А. Горелов, Г.А. Назарова // Современная герпетология. — 2019. — Т. 19, Вып. 1/2. — С. 3–16.

25 Ахмеденов К.М. Индер — перспективный геопарк Приуралья: Дневник международной научно-познавательной экспедиции в рамках программы «Рухани жаңғыру» и 55-летия Западно-Казахстанского аграрно-технического университета имени Жангир хана, 6–15 июня 2018 года / К.М. Ахмеденов, А.Г. Бакиев, В.М. Ефимов, А.Е. Кузовенко, Е.Е. Хайдаров, М.И. Шпигельман. — Уральск: Зап.-Казахст. агр.-техн. ун-т им. Жангир хана, 2018. — 118 с.

26 Klenina A. Snakes of the Western Kazakhstan and surrounding areas / A. Klenina, K. Akhmedenov, A. Bakiev, E. Simonov // GBIF. — 2025. <https://doi.org/10.15468/m2cbtr>

27 Доскач А.Г. Природное районирование Прикаспийской полупустыни / А.Г. Доскач. — М.: Наука, 1979. — 142 с.

28 Глазовский Н.Ф. Некоторые особенности геохимии почв и грунтовых вод Нарынских песков и сора Хаки в Северном Прикаспии / Н.Ф. Глазовский, В.А. Демкин, И.В. Иванов // География, эволюция и исследование легких почв. — Пушкино, 1986. — С. 38–56.

29 Чибилёв А.А. Перспективы развития сети территориальной охраны природы Западного Казахстана / А.А. Чибилёв, К.М. Ахмеденов, С.К. Рамазанов // Бюллетень Оренбургского научного центра УрО РАН. — 2018. — № 4. — С. 1–13.

30 Золотокрылин А.Н. Новый подход к мониторингу очагов опустынивания / А.Н. Золотокрылин, Т.Б. Титкова // Аридные экосистемы. — 2011. — Т. 17, № 3. — С. 14–22.

31 Pulev A.N. Distribution and Activity of Caspian Whip Snake *Dolichophis caspius* (Gmelin, 1789) (Reptilia: Colubridae) in South-Western Bulgaria / A.N. Pulev, B.Y. Naumov, L.D. Domozettski, L.G. Sakelarieva, G.N. Manolev // Ecologia Balkanica. Special Edition 2. — 2019. — P. 116–137.

32 Литвинов Н.А. Принципы оценки термоадаптационных возможностей рептилий / Н.А. Литвинов, Н.А. Четанов, С.В. Ганцук // Вестн. Тамбов. гос. ун-та. Сер.: естеств. и техн. науки. — 2013. — Т. 18. — № 6. — С. 3035–3038.

33 Sahlean T.C. Refining Climate Change Projections for Organisms with Low Dispersal Abilities: A Case Study of the Caspian Whip Snake / T.C. Sahlean, I. Gherghel, M. Papeş, A. Strugariu, Ş.R. Zamfirescu // PLOS One. — 2014. — 9(3), e91994. <https://doi.org/10.1371/journal.pone.0091994>

34 Tytar V.M. Species distribution modeling of the Caspian Whipsnake *Dolichophis caspius* (Squamata: Serpentes): a tool for ranking conservation priorities in the Western Pontic steppe / V.M. Tytar, O.D. Nekrasova // Вестник СПбГУ. — 2016. — Сер. 3. — Вып. 3. — С. 143–148.

35 Банников А.Г. Определитель земноводных и пресмыкающихся фауны СССР / А.Г. Банников, И.С. Даревский, В.Г. Ищенко, А.К. Рустамов, Н.Н. Щербак. — М.: Просвещение, 1977. — 414 с.

36 Киреев В.А. Особенности питания желтобрюхого полоза *Coluber jugularis* (L.) в Калмыкии / В.А. Киреев // Животный мир Калмыкии, его охрана и рациональное использование. Сборник статей. — Элиста, 1977. — С. 82–86.

37 Киреев В.А. Животный мир Калмыкии. Земноводные и пресмыкающиеся / В.А. Киреев. — Элиста: Калмыцкое кн. изд-во, 1983. — 112 с.

38 Glandt D. Die Amphibien und Reptilien Europas. Alle Arten im Porträt. — Wiebelsheim: Quelle & Meyer Verlag, 2015. — 716 p.

39 Танитовский В.А. Малый суслик (*Spermophilus pygmaeus* Pallas, 1778) как биоиндикатор глобального изменения климата / В.А. Танитовский, Т.З. Аязбаев, Н.С. Майканов, К.М. Ахмеденов // Selevinia. — 2016. — Т. 24. — С. 124–126.

40 Танитовский В.А. Причины сокращения численности малого суслика (*Spermophilus pygmaeus* Pallas, 1778) в Северном Прикаспии / В.А. Танитовский, А.К. Гражданов, Т.З. Аязбаев, М.И. Токтаров, С.М. Сатыбаев // Карантинные и зоонозные инфекции в Казахстане. — 2013. — Вып. 2. — С. 61–64.

41 Танитовский В.А. Общее потепление климата — как фактор экологических изменений на территории Северного Прикаспия / В.А. Танитовский, Н.С. Майканов // Степи Северной Евразии: материалы IX Международного симпозиума. — Оренбург: ОГУ, 2021. — С. 776–782.

42 Tok C.V. Road mortality of amphibians and reptiles in the Anatolian part of Turkey / C.V. Tok, D. Ayaz, K. Çiçek // Turkish Journal of Zoology. — 2011. — Vol. 35. — P. 851–857. <https://doi.org/10.3906/zoo-0911-97>

43 Ile G.-A. Dead snakes and their stories: morphological anomalies, asymmetries and scars of road killed *Dolichophis caspius* (Serpentes, Colubridae) from Romania / G.-A. Ile, A.-R. Maier, A.-M. Cadar, S.-D. Covaciu-Marcov, S. Ferenti // Herpetozoa. — 2020. — Vol. 33. — P. 77–85. <https://doi.org/10.3897/herpetozoa.33. e51338>

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Қазақстан Республикасының Батыс Қазақстан облысында *Dolichophis caspius* (Gmelin, 1789) Каспий жыланының таралуы туралы жаңа деректер

Қазақстан Республикасының Батыс Қазақстан облысы шегінде Каспий жыланының таралуы туралы ақпарат жинақталды және оның соңғы онжылдықтарда Бөкей ордасы ауданы бойынша қоныстануының ықтимал себептері талқыланды. Түрдің жаңа табылғандары солтүстік-шығыс шекарасын түрдің ең жақын, бұрын белгілі болған мекендеу орындарынан солтүстікке қарай 20-30 км-ге жылжытуға мүмкіндік берді. Қазіргі уақытта Қазақстанның ерекше қорғалатын табиғи аумақтарында түр тек жергілікті маңызы бар «Орда» мемлекеттік табиғи қорығында ғана өмір сүреді, біз оны 2018-2022 жылдары кездестірдік. Қазақстанда түрді сақтау үшін ерекше қорғалатын табиғи аумақ — «Кіші Богдо тауы» Облыстық маңызы бар табиғат ескерткішін құру және құру перспективасы болып көрінеді. Бұл тауда және оның айналасында рудалы емес пайдалы қазбаларды өндіру басталған жерде өсімдіктер мен жануарлардың сирек кездесетін түрлері, соның ішінде салыстырмалы түрде көп кездесетін Каспий жыланы мекендейді.

Кілт сөздер: жыландар, Colubridae, Қазақстан Республикасының Қызыл кітабы, Батыс Қазақстан облысының Бөкей ордасы ауданы, Кіші Богдо, Хаки соры, ерекше қорғалатын табиғи аумақтар, жергілікті маңызы бар «Орда» мемлекеттік табиғи қорығы.

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Новые данные о распространении каспийского полоза *Dolichophis caspius* (Gmelin, 1789) в Западно-Казахстанской области Республики Казахстан

Обобщена информация о распространении каспийского полоза в пределах Западно-Казахстанской области Республики Казахстан и обсуждены возможные причины его расселения по Бокейординскому району в последние десятилетия. Новые находки вида позволили отодвинуть северо-восточную границу ареала на 20–30 км к северу от ближайших, ранее известных, мест обитания вида. На особо охраняемых природных территориях Казахстана в настоящее время вид достоверно обитает только в государственном природном заказнике местного значения «Орда», где мы встретили его в 2018–2022 гг. Для сохранения вида в Казахстане перспективным представляется обоснование и создание особо охраняемой природной территории — памятника природы областного значения «Гора Малое Богдо». На этой горе и в ее окрестностях, где начата добыча нерудных полезных ископаемых, обитают редкие виды растений и животных, в том числе каспийский полоз с относительно высоким обилием.

Ключевые слова: змеи, Colubridae, Красная книга Республики Казахстан, Бокейординский район Западно-Казахстанской области, Малое Богдо, сор Хаки, особо охраняемые природные территории, государственный природный заказник местного значения «Орда».

References

- 1 (2025). Large Whip Snake *Dolichophis caspius*. Red List. Version 2024-2. Retrieved from <https://www.iucnredlist.org/species/157267/746211>
- 2 Gordeev, D.A. (2013). Rasprostranenie i biologo-morfologicheskaya kharakteristika kaspiskogo poloza *Hierophis caspius* (Gmelin, 1779) Volgogradskoi oblasti [Distribution and biological and morphological characteristics of the Caspian whipsnake *Hierophis caspius* (Gmelin, 1779) of the Volgograd region]. *Vestnik Tambovskogo Gosudarstvennogo Universiteta. Seriya: Estestvennye i tekhnicheskie nauki — Bulletin of Tambov State University. Series: Natural and Technical Sciences*, 18, 6–1, 2997–2999 [in Russian].
- 3 Bakiev, A.G., & Gordeev, D.A. (2023). Presmykaiushchiesia (Reptilia) prirodnogo parka «Shcherbakovskii» [Reptiles (Reptilia) of the natural park “Shcherbakovskii”]. *Prirodnyi park «Shcherbakovskii»: istoriia issledovaniia, sokhranenie bioraznoobraziia, rekreatsionnyi potentsial — Natural Park “Shcherbakovskii”: history of research, biodiversity conservation, recreational potential*, 154–167. Volgograd: LLC “Izdatelstvo Kruton” [in Russian].
- 4 (2025). *Dolichophis caspius*. iNaturalist. Retrieved from <https://www.inaturalist.org/observations/255975032>
- 5 Brushko, Z.K., & Zima, Yu.A. (2010). *Coluber caspius* Gmelin, 1779 — Qazaqstan Respublikasynyn Qyzyl kitaby. 4-basylym. I tom: Zhanuarlar; 1-bolim: Omyrtqalyr / Krasnaia kniga Respubliki Kazakhstan. Izdanie 4-e. Tom 1: Zhivotnyye; Chast' 1: Pozvonochnye [Red Book of the Republic of Kazakhstan. 4th edition. Volume 1: Animals; Part 1: Vertebrates]. Almaty [in Kazakh] [in Russian].

- 6 Rall, Yu.M. (1935). Drevniaia step «Bes-Chokho» v Volzhsko-Uralskikh peskakh [Ancient steppe “Bes-Chokho” in the Volga-Ural sands]. *Priroda — Nature*, 4, 55–50 [in Russian].
- 7 Lepekhin, I.I. (1771). Dnevnye zapiski puteshestviia doktora i Akademii Nauk adiunkta Ivana Lepekhina po raznym provintsiiam Rossiiskogo gosudarstva, 1768 i 1769 godu [Day notes of the travel of doctor and Academy of Sciences adjunct Ivan Lepekhin in different provinces of the Russian state, 1768 and 1769]. Saint Petersburg [in Russian].
- 8 Pallas, P.S. (1799). Bemerkungen auf einer Reise in die südlichen Statthalterschaften des Russischen Reichs in den Jahren 1793 und 1794. Bd. 1. Leipzig: G. Martini [in German].
- 9 Kessler, K.F. (1871). Zametki o yashcheritsakh i zmeiakh, sobrannykh I.B. Auerbachom na gore Bolshoy Bogdo, vo vremia puteshestviia 1854 goda, sostavlena K.F. Kesslerom v Kieve, v 1858 godu [Notes on lizards and snakes collected by I.B. Auerbach on Mount Bolshoi Bogdo, during a trip in 1854, compiled by K.F. Kessler in Kyiv, in 1858]. *Zapiski Imperatorskogo Russkogo Geograficheskogo Obshchestva po obshchei geografii — Notes of the Imperial Russian Geographical Society on general geography*, IV, 69–75 [in Russian].
- 10 Kulagin, N.M. (1888). Spiski i opisanie kolektsii zemnovodnykh i presmykaiushchikhsia Muzeia [Lists and descriptions of the Museum’s collection of amphibians and reptiles]. *Izvestiia Imperatorskogo obshchestvo liubiteli estestvoznania, antropologii i etnografii — News of the Imperial Society of Lovers of Natural History, Anthropology and Ethnography*, LVI, 1–39 [in Russian].
- 11 Kharuzin, A.N. (1888). *Stepnye ocherki (Kirgizskaia Bukevskaia orda): stranichki iz zapisnoi knigi [Steppe Sketches (Kirghiz Bukey Horde): Pages from a Notebook]*. Moscow: Tipografiia A.A. Levenson [in Russian].
- 12 Ostrovskikh, S.V., Pestov, M.V., & Shaposhnikov, A.V. (2010). K voprosu o rasprostraneni kaspiskogo poloza, *Hierophis caspius* (Gmelin, 1789), v Volgo-Uralskom mezhdureche [On the issue of the distribution of the Caspian snake, *Hierophis caspius* (Gmelin, 1789), in the Volga-Ural interfluve]. *Herpetologicheskie issledovaniia v Kazakhstane i sopredelnykh stranakh — Herpetological research in Kazakhstan and neighboring countries*. Almaty: ASBK-SOPC [in Russian].
- 13 Saraev, F.A., & Pestov, M.V. (2010). K kadastru reptilii Severnogo i Severo-Vostochnogo Prikaspiia [To the cadastre of reptiles of the Northern and North-Eastern Caspian region]. *Herpetologicheskie issledovaniia v Kazakhstane i sopredelnykh stranakh — Herpetological research in Kazakhstan and neighboring countries*. Almaty: ASBK-SOPC [in Russian].
- 14 Pestov, M.V., Saraev, F.A., & Ageev, V.S. (2011). Novye nakhodki reptilii v Severnom Prikaspii (Respublika Kazakhstan) [New finds of reptiles in the Northern Caspian region (Republic of Kazakhstan)]. *Sovremennaiia gerpetologia — Modern herpetology*, 11(3/4), 192–195 [in Russian].
- 15 Saraev, F.A., Kazulina, I.G., & Mellyatova, I.B. (2018). Novye dannye po rasprostraneniui zheltobriukhogo, ili kaspiskogo poloza — *Hierophis caspius* (Gmelin, 1779) v Volgo-Uralskom mezhdureche [New data on the distribution of the yellow-bellied or Caspian snake — *Hierophis caspius* (Gmelin, 1779) in the Volga-Ural interfluve]. *Zoologicheskie i parazitologicheskie issledovaniia v Kazakhstane i sopredelnykh stranakh. Posviashcheno 85-letiiu Instituta zoologii i 100-letiiu akademika NAN RK Evgeniia Vasilevicha Gvozdeva — Zoological and parasitological studies in Kazakhstan and neighboring countries. Dedicated to the 85th anniversary of the Institute of Zoology and the 100th anniversary of Academician of the National Academy of Sciences of the Republic of Kazakhstan Evgeny Vasilyevich Gvozdev*. Almaty: RGP “Institut zoologii” KN MON RK [in Russian].
- 16 Saraev, F.A., Kazulina, I.G., Mellyatova, I.B., & Salauatov, N.B. (2018). Zheltobriukhii ili kaspiskii poloz — *Hierophis caspius* (Gmelin, 1779) v Atyrauskoii oblasti [Caspian whipsnake — *Hierophis caspius* (Gmelin, 1779) in the Atyrau region]. *Karantimnye i zoonoznye infektsii v Kazakhstane — Quarantine and zoonotic infections in Kazakhstan*, 2(39), 92–96 [in Russian].
- 17 Duysebaeva, T.N., Chirikova, M.A., Zima, Yu.A., Belyalov, O.V., & Kovalenko, A.V. (2010). Novye dannye o rasprostraneniui amfibii i reptilii v Kazakhstane: obzor po pervomu desiatiletiui XXI veka [New data on the distribution of amphibians and reptiles in Kazakhstan: a review of the first decade of the XXIst century]. *Herpetologicheskie issledovaniia v Kazakhstane i sopredelnykh stranakh — Herpetological research in Kazakhstan and neighboring countries*. Almaty: ASBK-SOPC [in Russian].
- 18 Borkin, L.Ya., Hannibal, B.K., & Golubev, A.V. (2014). *Dorogami Petra Simona Pallasa (po zapadu Kazakhstana) [On the roads of Peter Simon Pallas (in the west of Kazakhstan)]*. Saint Petersburg; Uralsk: “Evrasiiskii soiuz Uchenykh” [in Russian].
- 19 Borkin, L.Ya., & Litvinchuk, S.N. (2015). Gerpetologicheskie issledovaniia na zapade Kazakhstana: P.S. Pallas i sovremennost [Herpetological research in the west of Kazakhstan: P.S. Pallas and modernity]. *Priroda zapadnogo Kazakhstana i Petr Simon Pallas (polevye issledovaniia 2012 goda) — Nature of Western Kazakhstan and Peter Simon Pallas (field research 2012)*. Saint Petersburg: Evropeiskii dom [in Russian].
- 20 Akhmedenov, K.M., Abuova, R.S., & Nazarova, G.A. (2018). Dopolneniia k gerpetofaune gory Maloe Bogdo i ego okrestnostei [Additions to the herpetofauna of Mount Maloye Bogdo and its environ]. *Vestnik Zapadno-Kazakhstanskogo gosudarstvennogo universiteta — Bulletin of West Kazakhstan State University*, 3, 285–296 [in Russian].
- 21 Akhmedenov, K.M., Bakiev, A.G., Gorelov, R.A., & Kalmykova, O.G. (2017). K gerpetofaune raiona gory Maloe Bogdo [On the herpetofauna of the Maloye Bogdo Mountain region]. *Izvestiia Samarskogo Nauchnogo Tsentra Rossiiskoi Akademii Nauk — News of the Samara Scientific Center of the Russian Academy of Sciences*, 19(5), 134–139 [in Russian].
- 22 Akhmedenov, K.M., Bakiev, F.G., Gorelov, R.A., Kalmykova, O.G., & Klenina, A.A. (2017). Gerpetofauna gor Bolshoe i Maloe Bogdo, ikh okrestnostei: istoriia izucheniia, sovremennyi sostav i perspektivy sokhraneniia [Herpetofauna of the Big and Small Bogdo mountains, their surroundings: history of study, modern composition and conservation prospects]. *Okhrana prirody i regionalnoe razvitie: harmoniia i konflikty (k godu ekologii v Rossii): materialy Mezhdunarodnoi nauchno-prakticheskoi konferentsii i shkoly-seminara molodykh uchenykh-stepevedov «Geoekologicheskie problemy stepnykh regionov», provedennykh v ramkakh XXI sessii Obedinennogo nauchnogo soveta po fundamentalnym geograficheskim problemam pri Mezhdunarodnoi assotsiatsii akademii nauk (MAAN) i Nauchnogo soveta RAN po fundamentalnym geograficheskim problemam — Nature conservation and regional development: harmony and conflicts (for the Year of Ecology in Russia): materials of the international scientific-practical conference and school-seminar of young steppe scientists “Geoecological problems of steppe regions”, held within the framework of the XXI session of the Joint Scientific Council on Fundamental Geographical Problems of the International Association of Academies of*

Sciences (IAAS) and the Scientific Council of the Russian Academy of Sciences on Fundamental Geographical Problems, 1 (pp. 113–117). Orenburg: Institut stepi Uralskogo otdeleniia Rossiskoi Akademii nauk [in Russian].

23 Akhmedenov, K.M., Bakiev, A.G., Gorelov, R.A., Kalmykova, O.G., Spiegelman, M.I., & Abuova R.S. (2018). Materialy k sozdaniu osobo okhraniyaemoi prirodnoi territorii «Gora Maloe Bogdo» v Zapadnom Kazakhstane [Materials for the creation of a specially protected natural area “Mount Maloe Bogdo” in Western Kazakhstan]. *Astrakhanskii vestnik ekologicheskogo obrazovaniia — Astrakhan Bulletin of Environmental Education*, 5, 18–26 [in Russian].

24 Akhmedenov, K.M., Bakiev, A.G., Gorelov, R.A., & Nazarova, G.A. (2019). Rasprostranenie, sostoianie i perspektivy okhrany kaspiskogo poloza *Hierophis caspius* (Gmelin, 1789) (Colubridae, Reptilia) v Kazakhstane [Distribution, status and prospects for protection of the Caspian snake *Hierophis caspius* (Gmelin, 1789) (Colubridae, Reptilia) in Kazakhstan]. *Sovremennaiia gerpetologiya — Current Studies in Herpetology*, 19, (1/2), 3–16 [in Russian].

25 Akhmedenov, K.M., Bakiev, A.G., Efimov, V.M., Kuzovenko, A.E., Khaidarov, E.E., & Spiegelman, M.I. (2018). *Inder — perspektivnyi geopark Priuralia: Dnevnik mezhdunarodnoi nauchno-poznavatelnoi ekspeditsii v ramkakh programmy «Rukhani zhangyru» i 55-letii Zapadno-Kazakhstanskogo agrarno-tekhnikeskogo universiteta imeni Zhangir khana, 6–15 iunია 2018 goda* [Inder — a promising geopark of the Urals: Diary of an international scientific and educational expedition within the framework of the “Rukhani Zhangyru” program and the 55th anniversary of the West Kazakhstan Agricultural and Technical University named after Zhangir Khan, June 6–15, 2018]. Uralsk: Zapadno-Kazakhstanskii agrarno-tekhnikeskii universitet imeni Zhangir Khana [in Russian].

26 Klenina, A., Akhmedenov, K., Bakiev, A., & Simonov, E. (2025). Snakes of the Western Kazakhstan and surrounding areas — GBIF. <https://doi.org/10.15468/m2cbrt> accessed via GBIF.org on 2025-02-20

27 Doskach, A.G. (1979). *Prirodnoe raionirovanie Prikaspiiskoi polupustyni* [Natural zoning of the Caspian semi-desert]. Moscow: Nauka [in Russian].

28 Glazovsky, N.F., Demkin, V.A., & Ivanov, I.V. (1986). Nekotorye osobennosti geokhimii pochv i gruntovykh vod Narynskikh peskov i sora Khaki v Severnom Prikaspii [Some features of the geochemistry of soils and groundwater of the Naryn sands and Khaki salt marsh in the Northern Caspian region]. *Geografiia, evoliutsiia i issledovanie legkikh pochv — Geography, evolution and study of light soils*. Pushchino [in Russian].

29 Chibilev, A.A., Akhmedenov, K.M., & Ramazanov, S.K. (2018). Perspektivy razvitiia seti territorialnoi okhrany prirody Zapadnogo Kazakhstana [Prospects for the development of a network of territorial nature protection in Western Kazakhstan]. *Biulleten Orenburgskogo nauchnogo tsentra Uralskogo otdeleniia Rossiskoi Akademii nauk — Bulletin of the Orenburg Scientific Center of the Ural Branch of the Russian Academy of Sciences*, 4, 1–13 [in Russian].

30 Zolotokrylin, A.N., & Titkova, T.B. (2011). Novyi podkhod k monitoringu ochagov opustynivaniia [A new approach to monitoring desertification hotspots]. *Aridnye ekosistemy — Arid Ecosystems*, 17(3), 14–22 [in Russian].

31 Pulev, A.N., Naumov, B.Y., Domozetki, L.D., Sakelarieva, L.G., & Manolev, G.N. (2019). Distribution and Activity of Caspian Whip Snake *Dolichophis caspius* (Gmelin, 1789) (Reptilia: Colubridae) in South-Western Bulgaria. *Ecologia Balkanica, Special Edition 2*, 116–137.

32 Litvinov, N.A., Chetanov, N.A., & Ganshchuk, S.V. (2013). Printsipy otsenki termoadaptatsionnykh vozmozhnostei reptilii [Principles for assessing the thermo-adaptive capabilities of reptiles]. *Vestnik Tambovskogo universiteta. Seriya: Estestvennye i tekhnicheskie nauki — Bulletin of Tambov State University. Series: natural and technical sciences*, 18(6), 3035–3038 [in Russian].

33 Sahlean, T.C., Gherghel, I., Papeş, M., Strugariu A., & Zamfirescu, Ş.R. (2014). Refining Climate Change Projections for Organisms with Low Dispersal Abilities: A Case Study of the Caspian Whip Snake — *PLOS One*, 9(3), e91994. <https://doi.org/10.1371/journal.pone.0091994>

34 Tytar, V.M., & Nekrasova, O.D. (2016). Species distribution modeling of the Caspian Whipsnake *Dolichophis caspius* (Squamata: Serpentes): a tool for ranking conservation priorities in the Western Pontic steppe. *Vestnik Sankt-Peterburgskogo gosudarstvennogo universiteta — Bulletin of Saint Petersburg State University, Series 3, Issue 3*, 143–148.

35 Bannikov, A.G., Darevsky, I.S., Ishchenko, V.G., Rustamov, A.K., & Shcherbak, N.N. (1977). *Opredelitel zemnovodnykh i presmykaiushchikhsia fauny SSSR* [Definer of amphibians and reptiles of the fauna of the USSR]. Moscow [in Russian].

36 Kireev, V.A. (1977). Osobennosti pitaniia zheltobriukhogo poloza *Coluber jugularis* (L.) v Kalmykii [Feeding features of the yellow-bellied snake *Coluber jugularis* (L.) in Kalmykia]. *Zhivotnyi mir Kalmykii, ego okhrana i ratsionalnoe ispolzovanie. Sbornik statei — Fauna of Kalmykia, its protection and rational use. Collection of articles*, 82–86. Elista [in Russian].

37 Kireev, V.A. (1983). *Zhivotnyi mir Kalmykii. Zemnovodnye i presmykaiushchiesia* [Fauna of Kalmykia. Amphibians and reptiles]. Elista: Kalmytskoe knizhnoe izdatelstvo [in Russian].

38 Glandt, D. (2015). *Die Amphibien und Reptilien Europas. Alle Arten im Porträt*. Wiebelsheim: Quelle & Meyer Verlag.

39 Tanitovsky, V.A., Ayazbaev, T.Z., Maikanov, N.S., & Akhmedenov, K.M. (2016). Ardilla terrestre bermeja (*Spermophilus pygmaeus* Pallas, 1778) as a bioindicator of global climate change. *Selevinia*, 24, 124–126 [in Russian].

40 Tanitovsky, V.A., Grazhdanov, A.K., Ayazbaev, T.Z., Toktarov, M.I., & Satybaev, S.M. (2013). Prichiny sokrashcheniia chislennosti malogo suslika (*Spermophilus pygmaeus* Pallas, 1778) v Severnom Prikaspii [Reasons for the decline in the number of the ardilla terrestre bermeja (*Spermophilus pygmaeus* Pallas, 1778) in the Northern Caspian region]. *Karantinnye i zoonoznye infektsii v Kazakhstane — Quarantine and zoonotic infections in Kazakhstan*, 2, 61–64 [in Russian].

41 Tanitovsky, V.A., & Maykanov, N.S. (2021). Obshchee poteplenie klimata — kak faktor ekologicheskikh izmenenii na territorii Severnogo Prikaspiia [General climate warming — as a factor of environmental changes in the Northern Caspian region]. *Stepi Severnoi Evrazii: materialy IX Mezhdunarodnogo simpoziuma — Steppes of Northern Eurasia: materials of the IX international symposium*. Orenburg: Orenburgskii gosudarstvennyi universitet [in Russian].

42 Tok, C.V., Ayaz, D., & Çiçek, K. (2011). Road mortality of amphibians and reptiles in the Anatolian part of Turkey. *Turkish Journal of Zoology*, 35, 851–857. <https://doi.org/10.3906/zoo-0911-97>

43 Ile, G.-A., Maier, A.-R., Cadar, A.-M., Covaciu-Marcov, S.-D., & Ferent, S. (2020). Dead snakes and their stories: morphological anomalies, asymmetries and scars of road killed *Dolichophis caspius* (Serpentes, Colubridae) from Romania. *Herpetozoa*, 33, 77–85. <https://doi.org/10.3897/herpetozoa.33.e51338>

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