

PROSPECTS FOR THE DEVELOPMENT OF GEOLOGICAL TOURISM IN WEST KAZAKHSTAN

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Abstract: Paleontology is an important and integral branch of geology and is an important scientific discipline that helps to better understand the history of life on Earth. The popularization of paleontology is currently based on fossil finds. The purpose of this work was to identify potential locations for paleontological tourism in Western Kazakhstan. The materials were studied using the experience and techniques used in classical paleontology. The article discusses the possibility of developing paleontological tourism in Western Kazakhstan. A description of the main locations of natural locations of fossils of invertebrate and vertebrate organisms is given, such as the village of Pogodaevo, the Aktolagai Cretaceous Plateau, Akkegershin, the Kara Bala-Kan Temir necropolis, the Koi-Kara, Iman-Kara mountains, the Sululy Kapy gorge, the tracts of the Mangistau region, and places are given storage of fossils, inspection and study of paleontological finds. A model of paleontological tourism is proposed. The role of paleotourism among the population has been determined by conducting sociological research. In general, Western Kazakhstan has the prospect of developing paleontological tourism of an excursion and educational nature. For this purpose, the region has a large number of resources and various local history and environmental museums containing paleontological materials.

Keywords: Western Kazakhstan, palaeontology, fossils, marine reptiles, phanerozoic, museum, tourism, collections, fauna

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INTRODUCTION

Paleontological tourism is one of the directions of cultural and educational tourism, which is the most promising in foreign countries. In the Republic of Kazakhstan, palaeontological tourism is a relatively new and little-studied area in the tourism industry. This work will allow us to study the topic in the context of Kazakhstan, which contributes to the tourism sector. Paleontology according to Poplavskaya (1982), translated from Greek, means "the science of ancient beings" (palaios – ancient, former, on (tos) – being, logos – teaching). The objects of paleontology are fossils – the preserved remains of prehistoric flora and fauna, as well as traces of the activity of organisms". According to O'Connor and Wearing (2018), paleontology is now an important scientific discipline that helps to better understand the history of life on Earth.

The definition of tourism and tourist activity is described in the work of Kvartalnov (2003). Cultural tourism, as Richards (2003) notes, is when "people move to cultural attractions away from their place of residence, thematic routes and opportunities for innovation with the intention of gathering information and experiences to meet their cultural needs. Paleontological tourism is the most impressive, cultural products aimed at visitors with high emotional needs" (Staneva, 2019). According to Ignatieva (2015), "tourism affects all spheres of modern society, including the economy, culture, and social life. The tourism business stimulates the development of such sectors of the economy as construction, trade, agriculture, production of consumer goods, transport, communications." The development of tourism in the country depends on several reasons, such as the availability of tourist and recreational resources, developed infrastructure of the region, trained personnel, state support for tourism, risk factors, political and economic factors, traditions (Ignatieva, 2015).

Dublyansky (2000), referring to the opinion of domestic researchers, notes that knowledge about paleontology in the field of "tourism can be used in the context of realizing the cognitive goals of tourists. This is possible only with a certain scientific paleontological base in the territory hosting tourists."

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Goroshko and Yemelyanova (2019) in their work consider the possibility of developing paleontological tourism in the Novosibirsk region, which describes the main locations of natural locations of fossil remains of organisms and traces of their vital activity, in order to directly search and research, storage sites, inspection and study of paleontological finds.

Antczak (2020) notes that fossils have long been of interest to both scientists and the public, and the finds of local fossils can become a good basis for the development of local tourism. He also notes that the protection of objects of great scientific value was more effective (and profitable), they should be combined with educational programs and elements of entertainment infrastructure. The aim of this work is to study the potential locations of Western Kazakhstan for the development of paleotourism and to determine its role among the population.

MATERIALS AND METHODS

The objects of the study were paleontological collections of local history museums, natural locations of fossil remains. Field collection methods, methods of taking bones and parts of the skeleton in the form of a monolith and as separate samples, autopsy and processing in laboratory conditions, determination of species and fixation of detection sites, and questionnaires were used. The method of collecting and processing paleontological and stratigraphic material was carried out according to Krymgolts (1954). The locations and paleontological specimens were captured with a Canon EOS 70D BODY digital camera. The survey performed for the purpose of this study pertained to the importance of additional infrastructure for fossil sites. The survey was anonymous, conducted via an Internet form. The respondents were non-specialists (non-palaeontologists). 123 respondents of different ages took part in the survey.

The respondents were to answer the following questions:

1. Do you have an interest in paleontological research?
2. Do you have an interest in paleontological sites?
3. Is there any experience of participating in paleontological excursions?
4. What information would you like to receive before a paleontological tour?
5. What actions in relation to paleontological finds are you interested in?

The survey also allowed for some additional comments and included metrics (sex and age of the respondent).

RESULTS DISCUSSIONS

The range of resources in Western Kazakhstan is wide enough to attract tourists to travel. Paleontological finds and knowledge about them are of particular interest. From the paleontological collection of the Department of Nature of the Uralsk Museum of Ecology, only samples from Cenozoic deposits can be found. Mammoth fauna is represented by the largest number of exhibits. This is, first of all, a collection of mammoth mandibles, among which there is a unique specimen – the lower jaw of a mammoth with a visible change of teeth. In addition, there is a large collection of mammoth teeth at different periods of its life, tusks, vertebrae, ribs, femurs, humerus, pelvic and scapula bones. The branch of the West Kazakhstan Regional Center for Children and Youth Tourism and Ecology in the village of Peremetnoye in the Bayterek district (West Kazakhstan Regional Center for Youth Tourism and Ecology) has impressive paleontological collections for the village. Invertebrate and vertebrate fossils found from these territories are presented here.



Figure 1. Geographical position of the assessed geological objects: P1 – Pogodaevo, P2 – Sululy Kapu gorge, P3 – Iman-Kara mountains, P4 – Koi-Kara mountains, P5 – Aktolagai Cretaceous Plateau, P6 – Akkegershin, P7 – Belaya Gorka chalk deposit, P8 – Kara Bala-Kan Temir necropolis

There are significant paleontological collections in every museum of local lore in the region. Among them we can note the Museum of Nature and Ecology, a branch of the West Kazakhstan Museum of History and Local Lore, the Aktobe Regional Museum of History and Local Lore, the Atyrau Regional Museum of History and Local Lore, and the Mangistau Regional Museum of History and Local Lore named after A. Kekilbayev.

Among the most significant is the Paleontological Museum of the Historical and Local Lore Museum of Atyrau Region. There are fossil sponges, corals, mollusks, bivalves, ammonites, belemnites, sea lilies, sea urchins. The museum also features shark teeth, stingrays, fossilized plesiosaur vertebrae, and mollusks. All of them were found on the Aktolagai Cretaceous plateau, located 60-70 km from the city of Kulsary on the Akkegershin Cretaceous plateau, on the border with the Aktobe region. The geographical locations are shown in Figure 1.

The most significant exhibits of the Mangistau Museum of History and Local Lore include the skeletons of a plesiosaur and an ichthyosaur, which existed in the Cretaceous period of the Mesozoic era. In the Western region, one of the paleontological sites of finds is the floodplain of the Talovaya River in the Shchuchkino settlement of the Bayterek district of the West Kazakhstan region (Figure 2), where schoolchildren under the guidance of O.V. Subbotina found a fossil skeleton from the reptile class (Fomin and Gatauov, 2019). The find was assigned to the family Undorosauridae from the Volga tier, the ammonite zone *Dorsoplanites panderi* (Efimov et al., 2019) and is stored at Nazarbayev University.



Figure 2. Shchuchkino settlement of Baiterek district of West Kazakhstan region, 2023

Of the natural locations of the fossil remains, the village of Pogodaevo in the Bayterek district of the West Kazakhstan region can be noted. Invertebrates such as ammonites, belemnites, and sea urchins can be found here. They can be seen in the collections of the Pogodaevo School Museum. A fragmentary skeleton of ichthyosaurs, described in the work of Yakupova D.B. as *Nannopterygius yasykovi* V. Efimov, 1999 (Yakupova, 2021), originates from the Volga region of the Middle Titonian sublayer of the *Epivirgatites nikitini* zone. There is also a chalk deposit "Belaya Gorka" near the village of Chalk Hills, located on the right bank of the Ural River, 14 km southeast of the city of Uralsk. This deposit is a sedimentary rock of the ancient Khvalyn Sea, which covered the territory of Western Kazakhstan millions of years ago. Tectonically, the Belaya Gorka chalk deposit is confined to the Sandy-Marov uplift, where Upper Cretaceous deposits crumpled into gentle folds of the latitudinal direction appear on the daytime surface. The angles of incidence of the folds do not exceed 7° . The relief of the deposit is a relatively flat, slightly hilly surface with a slight slope toward the Ural River. The altitude of the area above sea level varies between 35m–90m (Lazareva, 1978).

Geomorphologically, the deposit is an almost horizontally overlying stratiform deposit with a limited area of distribution of Cretaceous rocks of the Maastrichtian stage. The Maastrichtian stage is evidenced by the encountered cephalopods *Belemnitella lanceolata* Schloth (Kalinin, 1963). The Maastrichtian deposits are the oldest deposits composing the deposit and are represented by two lithological varieties. Below there are marls of greenish and bluish colors, dense relatively homogeneous, above there are layers of white writing chalk. The full capacity of the Maastricht tier is 125 m. The useful thickness of the deposit, represented by chalk, is confined to the upper part of the Maastricht. The chalk surface is strongly eroded by post-Cretaceous denudation, which continued throughout the Paleogene, and sometimes forms steep slopes going under Neogene deposits. The average geological and lithological section for the deposit is as follows:

1. At the base of the useful strata, marl is greenish-gray, bluish, dense, strong, homogeneous, opened by wells in the western part of the deposit.

2. Above the section lies white writing chalk with fragments of the rostrum (conical parts of the inner shells) of the cephalopods *Belemnitella lanceolata* Schloth. and the remains of sea urchins of the genus *Echinocorys* of the family *Holasteridae*, which represents a productive stratum in the deposit (Figure 3, 4). Sea urchins of the genus *Plegiocidaris* have also been found. (Figure 5).



Figure 3. Rostrum of cephalopods *Belemnitella lanceolata* Schloth.: a - view from the dorsal side; b - with a split in the dorso-abdominal direction



Figure 4. Fragments of the shell of a sea urchin in breed from the lateral side



Figure 5. Remains of the sea urchin *Plegiocidaris* sp.

In spring, meltwater and rainwater fill almost the entire lowland of the mining quarry annually in the area of the chalk hills, forming a lake with turquoise water color. The emerald-colored meltwater has become a place of pilgrimage for citizens and guests of the city of Uralsk. In June 2023, the lake area was reduced to about 50 m², but has not lost its beauty (Figure 6).



Figure 6. Melt waters of the Belaya Goroka deposit: a – April 2023; b – April 2024

The location also serves as a venue for such types of practices as geological, meteorological, topographic, for students of the Faculty of Natural Geography of the M. Utemisov West Kazakhstan University (Figure 7).

According to Tengritravel, along with other attractions in Kazakhstan, the chalk hills location in Uralsk is included in the top for photo shoots. According to photographer Z. Alpanova, "The Chalk Hills are a unique place among the green area of the city. The most interesting thing is that the location always changes: either large blocks, then mountains of chalk or small white stones collected in slides. The location is gorgeous at sunset. Photo shoots on Chalk Slides are never similar to each other."



Figure 7. Excursion of 2nd year students on the geological practice of the educational program "Geography-History"

Efimov and Akhmedenov (2018) note that the Indersky salt dome area of the Indersky district belongs to a system of geological formations that were formed as a result of salt tectogenesis. Under the influence of strong pressure, saline deposits from the subsalt bed of the Caspian depression were pushed to the surface, tearing rocks of the Mesozoic era behind them. Important places of paleontological research in this area are the location of the Kara Bala-Kan Temir necropolis on the lake Inder (Figure 8), the Koi-kara, Iman-kara Mountains, (Figure 9), where belemnites, sea urchins, scleractinium corals are found. This fauna is also well represented in the collections of local history museums in the region.



Figure 8. Kara Bala-Kan Temir Necropolis



Figure 9. Mountain Iman-kara

Fragments of the skeleton of fossil amphibians - labyrinthodont *Plagioscutum caspiensis* Shishkin (2018) from Triassic deposits were found in the area of the Kara Bala-Kan Temir necropolis (Efimov and Akhmedenov, 2018).

In the Mangystau region, the most significant locations include the village Shetpe, where the skeleton of a Lower Cretaceous plesiosaur from the reptile class (2018) was discovered by employees during excavation work and the village of Tushybek (15 km west of the village of Shetpe) in the Sululy Kapy gorge, where amateur paleontologist V.Yartsev discovered an Ichthyosaur (2019) from the Lower Cretaceous (Efimov et al., 2020). The finds were attributed to the order of fossil reptiles of the genus *Platypterygius*, which lived from the Triassic to the Cretaceous periods and are kept in the Mangystau Regional Museum of Local Lore named after A. Kekilbayev. Places such as Akmysh, Bozzyra, Bokty, Zhygylgan, Karakia, Tuzbair, Shokpak Ata, Sherkala, Ybykty Sai tract are of great interest for paleontological excursions in the Mangystau region. Geotourism, as Dowling and Newsom (2017) notes, through the concept of a geopark, is a champion of sustainable development by creating advantages for the preservation and protection of geoculture.

Figure 10 shows a model of paleontological tourism in Western Kazakhstan with all its components. Paleontological tourism, depending on the types of resources, performs cognitive, informational, regulatory, accumulative, economic functions, depending on the components – recreational, cognitive-educational, value-oriented, educational, cultural and creative functions. An integral part of paleontological tourism is visiting the locations of fossil remains and places of their storage and study, i.e. local history and environmental museums. Visiting parks and exhibitions of fossil reconstructions is also an integral part of paleotourism.

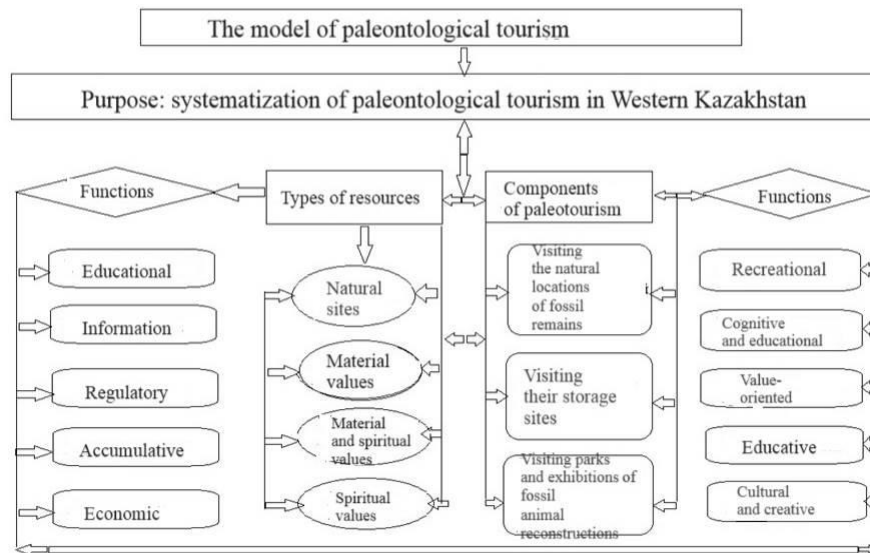


Figure 10. Model of paleontological tourism

Due to paleontological tourism, tourists get the opportunity to see the fossils of this territory, participate in traditional holidays, foreigners will have the opportunity to taste national cuisine from natural foods, buy various items as souvenirs, where jobs will be created for local residents and residents of adjacent territories. In Kazakhstan, many fauna remains are found in remote and hard-to-reach places. This means that access to the found sites may be limited or difficult for tourists, especially for those who do not have special equipment or experience in searching and excavating remains. There are also problems with infrastructure and equipment for paleontological tourism. For example, in many places there are no facilities for tourists, such as hotels, snack bars, canteens, toilets. An important factor is also the lack of government support and development of the paleontological tourism industry in Kazakhstan. This may be due to the lack of sufficient funding and resources for the development of this industry, as well as the lack of a strategy and plans for the development of tourism in general. In order to determine the role of paleontological tourism among the population and the demand for it, a sociological survey was conducted in the form of a questionnaire. The survey was conducted on an online platform on the Internet, respondents were asked 7 questions. 123 respondents of different ages took part in the survey. The distribution of respondents by gender is shown in Figure 11. The figure 12 shows that the majority of the survey participants were women (69.9%), men – 30.1%. As can be seen from Figure 12, the vast majority of respondents are young people aged 17-25 years, which amounted to 83.7% of the total number of respondents, 10.6% were aged 26-34, and only 3.3% were aged 44-52.

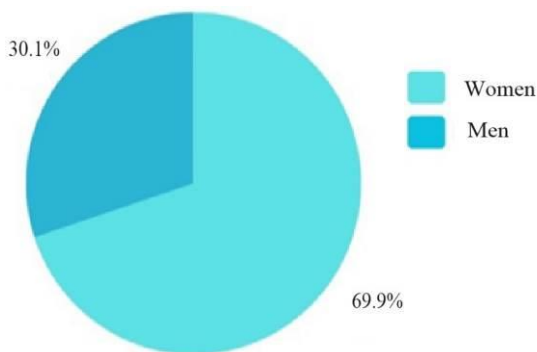


Figure 11. Distribution of respondents by gender

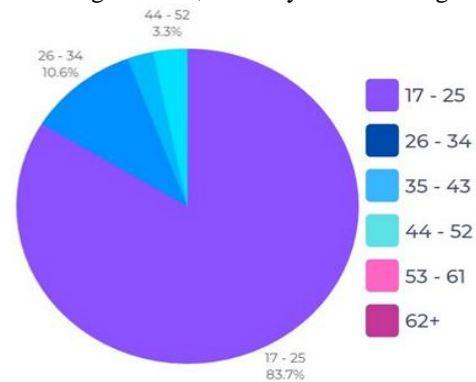


Figure 12. Age of the respondents

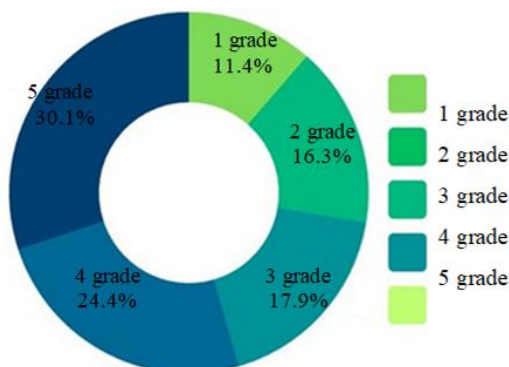


Figure 13. Interest in research and paleontological sites on a scale of

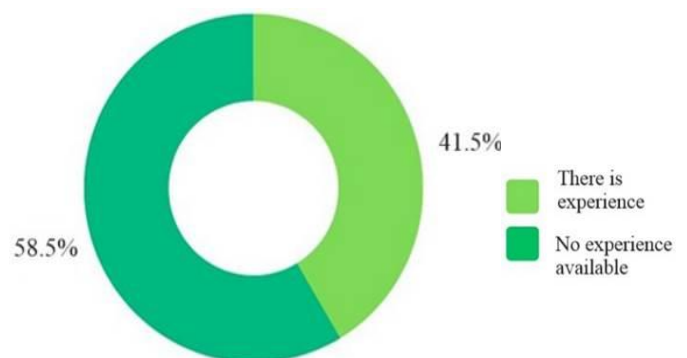


Figure 14. Experience of participation in paleontological excursions

As shown in Figure 13, respondents scored a high interest in paleontological sites and research on a scale from 1 to 5. 54% of the total number of respondents scored 4 and 5 points. An average response was collected among the respondents for two options. Almost 40% of the respondents have experience of participating in paleontological excursions (Figure 15).

Among the respondents, a large number of answers were chosen in the direction of attractions and their location options. Because before the tour, it is important to get information about where the intended place of the tour is located. The second most chosen option was infrastructure and convenience (Figure 15).

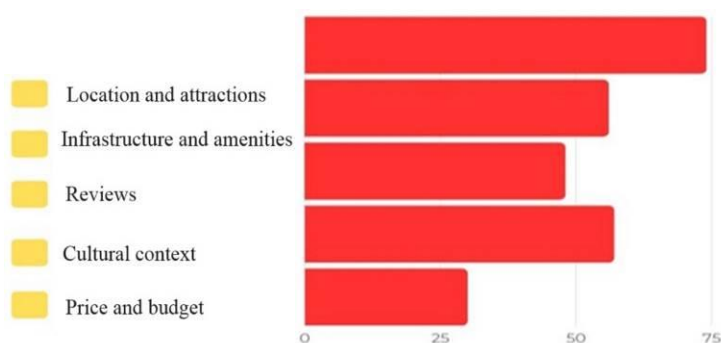


Figure 15. What information would you like to receive before a paleontological tour

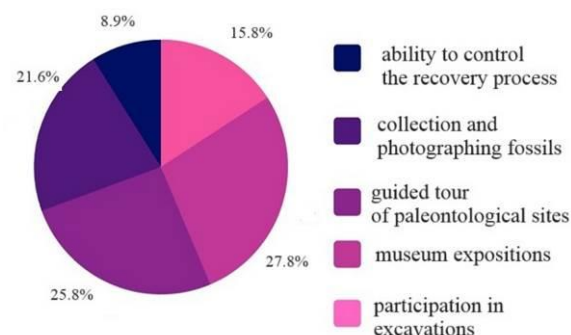


Figure 16. What actions in relation to paleontological finds are you interested in?

Based on Figure 16, respondents were more interested in: museum expositions, a tour of paleontological sites and collecting, photographing fossils, and less interested in the ability to control the restoration process and participate in excavations, i.e. what requires certain efforts. The results of the survey on paleontological tourism and its promotion show that most participants agree that good advertising is necessary for the development of this sector. The main conclusions of the survey: The importance of advertising: more than 80% of respondents said that good advertising plays an important role in attracting tourists to paleontological sites and their awareness of the available opportunities.

The results of the survey showed that a significant part of the respondents are curious about tourism. More than 80% of the respondents expressed interest in visiting paleontological sites and studying ancient fossils and the history of life on Earth. The main interest of respondents in paleotourism include:

- scientific and cultural value: more than 70% of respondents expressed a desire to learn more about the science of paleontology and its contribution to understanding the evolution of life on earth. They are interested in the historical significance of the fossils, and they want to see them from the point of view of their origin and development.

- Natural beauty: about 65% of respondents noted the natural attractiveness of paleontological sites in Kazakhstan. They want to see unique landscapes, mountains, deserts or canyons where fossils can be found.

- Unique experience: more than half (55%) of the respondents indicated that paleontological tourism provides a unique experience, different from traditional tourist routes. The opportunity to observe and study fossils, as well as participate in paleontological excavations, is especially impressive.

About 45% of the respondents were interested in the educational aspects of paleontological tourism. They see this as an opportunity to expand their knowledge of ancient history and geology, as well as to understand the importance of preserving fossils and their importance to science.

CONCLUSION

In this work, the main potential locations for the development of paleotourism in Western Kazakhstan were studied. Descriptions of the main locations of the natural sites of fossils of invertebrates and vertebrates, such as the village, have been carried out. Pogodaevo, Shchuchkino, the Aktolagai Cretaceous plateau, Akkegershin, the Kara bala-Kan Temir necropolis, the Koi-Kara, Iman-kara mountain, Sululy Kapa gorge, tracts of the Mangystau region, the places of storage of fossils are given. A model of paleontological tourism is proposed, where paleotourism, depending on the types of resources, performs cognitive, informational, regulatory, accumulative, economic functions, depending on the components – recreational, cognitive-educational, value-oriented, educational, cultural and creative functions.

The role of paleotourism among the population has been determined by conducting sociological research. Based on the results of the sociological survey, it can be concluded that paleontological tourism is of interest to respondents seeking to expand their knowledge, experience new experiences and get a unique natural and aesthetic pleasure.

Thus, the Western region of the Republic of Kazakhstan has the opportunity to develop paleontological tourism of an excursion and educational nature. For this, the region has a large number of necessary resources and various museums containing paleontological remains.

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