

## **THE ROLE OF FRENCH SCIENTISTS IN THE STUDY OF NATURE AND CLIMATE IN TURKESTAN (EARLY XIX–XX CENTURIES)**

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### **Abstract**

This article describes the contribution of French scientists in the study of the nature and climate of Turkestan. The author gave a detailed interpretation of the flora and fauna of the region by studying the works of tourists and researchers who visited Turkestan.

**Key words:** Turkestan, nature, climate, fauna, flora, tourists and researchers.

### **Introduction**

At the beginning of the 19th-20th centuries, the Turkestan region attracted the attention of the world community with its socio-economic problems, while during this period the natural sciences and medicine of Turkestan were widely studied by Russian and foreign researchers. Because the study of natural sciences has always been important and interesting. In fact, development is observed in a society with natural development, i.e. socio-economic stability. Socio-economic stability is observed only in the absence of problems in the natural sphere. For example, although climate change, irrigation systems, fauna and flora provide biodiversity in nature, the study of subsoil and surface resources is the cornerstone of economic development.

During this period, French explorers and scientists studied the following areas of nature: geology - (study of the earth and its surface), hydrography - (study of bodies of water), mineralogy - (study of minerals), orography - (study of mountains and mountain ranges), climatology. - (study of climate), irrigation - (study of irrigation systems). Studies in this group are conducted on inanimate rocks of nature. They are a product of nature, rocks that have formed as a result of various tectonic and seismic movements, climate change or have changed shape and properties from one state to another.

### **Main part**

Research in these areas has been conducted on the basis of special missions and social orders, based on the principle of "nature study for needs". While the study of wildlife deserves first-rate research, the study of land, mountains and bodies of water is a much older problem and forms the basis of nature's formation.

The second is devoted to the study of wildlife. The wildlife of the Turkestan region is widely described in French studies, and it is appropriate to highlight them by the example of the following areas:

Ornithology - (study of birds), Zoology - (study of animals), Ethnology - (study of insects), Ichthyology - (study of fish), Phytology - (study of plants), Dendrology - study of trees), Vegetation - (study of plant growth period). Research in this field is based on the principle of **"studying nature so as not to violate the laws of nature"**.

The Central Asian region has attracted global attention due to its favourable natural climate, rich natural resources and strategic location. During the nineteenth and early twentieth centuries, the interests of major empires in the region, such as Russia, Britain and China, clashed. Naturally, this process demanded a favourable social environment for the study of the region. As a result, special foreign scientific expeditions and tourist trips were organised. It should be noted that the establishment of warm diplomatic relations between Russia and France opened up great opportunities for French explorers.

The natural areas were explored by explorers based on a variety of interests and needs. Although Russia's economic interests prevailed, French explorers focused on the development of natural sciences, expanding the field of knowledge in this area and studying natural sciences from different angles around the world. Because at that time the French had no geostrategic interests in Central Asia.

This can be proved by the example of A. Humboldt, a research scientist. Although Humboldt organised a scientific expedition to America and discovered it for the second time for the world science, his practical results did not satisfy him. Because the natural climate of America was similar to European nature, which was well known to the explorer. For this reason the aim was to study the natural climate of the region, which was completely different from that of Europe. Asia was chosen as the object of the next scientific expedition because the laws of nature discovered in America and Europe were almost universal. The main aim was to study the Central Asian orography, i.e. the mountain ranges. This shows that the multifaceted intellect of the explorer A. Humboldt was not satisfied with the science of the time [1].

In some cases, the nationality of the researchers may not exactly match the language in which the research was conducted and the results published. Whether Swiss, German or Hungarian, the results were first published in French and communicated to the global scientific community. For this reason, we have the opportunity to study them under the heading "French studies".

**Henry Moser** (1844–1923) was a Swiss tourist. His father was very successful in the manufacture and sale of watches in St. Petersburg from 1827–1848. H. Moser, the only heir of his father, had the opportunity to travel four times to Central Asia in 1868–1869, 1870, 1883–1884, 1889–1890 due to great financial possibilities.

The research of G. Moser on irrigation system of the Central Asian region deserves attention. The results are reflected in the book **"Irrigation Systems in Central Asia: A Study of Geography and Economics"**. This source consists of a preface and Chapter 6 [2]. Of course, G. Moser did not carry out this study alone; naturalists G. Capus (G.Capus), H.Cordier (H.Cordier), M.S. Anderson, who is of Russian origin, actively helped in successful completion of this work.

In addition, G. Moser analyzed specific soil properties, vegetation system, temperature, and wind speed. The irrigation systems of ancient Sogdiana, Margiana, Bactria and Merv, ancient canals of Amu Darya, canals flowing near Syr Darya were also studied. The main lines of the Central Asian irrigation system, such as the lalmi and obi, are explained, and the practice of its management and organization is emphasized. At the same time, the irrigation systems in the Zarafshan Valley and Bukhara Emirate have not escaped the author's attention, and recommendations for future implementation have been developed.

A special place belongs to French ethnographer Jacques Élisée Reclus, one of the great representatives of the geographical school in the study of historical ethnography of the peoples of the world, as well as the history of Central Asia.

In the second half of the 19th century a team of geographers composed of French geographer E. Reclus (1830–1905), Russian scientists L.I. Mechnikov (1832–1888), P.A. Kropatkin (1842–1921) was formed in Western Europe. They were not only partners in science but also ideologically like-minded. E. Reclus participated in the Paris Commune, L. Mechnikov was in the ranks of the Italian garrison, P. Kropatkin - in the ranks of the Russian revolutionaries. Throughout his career E. Reclus was in close friendship with L. Mechnikov and P. Kropatkin, through whom he could read publications of scholars studying the region of Central Asia.

In 1873, in the Bulletin of the Paris Geographic Society, he published an article by E. Reclus entitled **"The History of the Aral Sea"**. E. Reclus formulates the purpose of this study: "The problems of water volume increase or decrease in the Aral Sea, which have been manifested for centuries in the hydrography of Central Asia, can be studied from the practical point of view on the basis of available data and assessments. To this end, I would like to submit some of my comments to the Paris Geographical Society "[3].

In his closing remarks, Elise Reclus states: "The annual loss of ten billion cubic metres of river water to the Aral Sea results in the loss of one tenth of its total volume. In four to five years, the state of the sea will be equal to half of its current state. The waters in its flat and wide part have dried up and are preserved only in two lacustrine depressions: the first in the present centre and the other in the western region. This is not the only problem, as the Syr Darya also crosses the dry plains, the water dwindles, the flow slows down and little water is supplied. As a result, the ancient Aral Sea has disappeared into deserts, leaving only lakes and swamps. As in the days of William Rubruk and Marco Polo, tourists encounter plateaus that were once devalued where there was a sea basin"[4].

Edouard David Levat (1855–1918) graduated from the Paris Polytechnic School (Institut) and the Paris School of Mines (Institut) and was a mining civil engineer by profession. In 1902 he was sent to Turkestan on a special mission to discover gold deposits in Eastern Bukhara [5].

The purpose of the study is stated in the French manuscript of the head of the expedition E. Levat to the editors of *Turkestanskiye Vedomosti*: "The main purpose of the scientific expedition was to identify areas of gold-rich conglomerates in Bukhara and to study their formation, to study their stratification process and to find ways to extract them. I was also instructed to focus on all types of ore deposits in the country and provide an overall report on the data obtained as a result of the survey"[6].

This means that the gold mining industry, which gained world fame in the last quarter of the 19th and early 20th century, was developing in line with its time on the borders of our country. The engineer E. Levat, who had such a well-developed gold mining industry in America, praised our local mining conditions. In his book, *The Gold Industry*, he devoted a separate section titled "**Methods of Sartan Gold Processing**". He describes our local method of sand washing in detail and compares it with the methods used in other countries. For the French-speaking explorers, the nature of the Turkestan region was so interesting that they closely examined any natural processes during the study. For example, they also determined the vegetative state, growth period and growth rate of plants under irrigation. Tree density in forests, tree species, plant species, cultivated melons and fruits, as well as the fauna and flora of desert areas and the desert climate did not escape the attention of the researchers.

**Charles-Eugène Ujfalvy de Mezo-Kövesd** (1842–1904) [7] was the leader of the first scientific expedition sent by the French government. This scientific expedition, organised by the French Ministry of Education, was conducted from 1878 to 1880 and was essentially the first scientific study to focus on Turkestan.

E. Ujfalvy describes the biodiversity of nature through the process of hunting as follows: "The banks of the Syr Darya, which flows into the Aral Sea, are a very convenient and rich basin for hunting. Here you can find wolves, foxes, badgers, wild goats, grey rabbits and tigers in the marsh reeds. The dense forest on the bank is rich in pheasants and in the river there are almost all kinds of waterfowl"[8].

French researchers included natural scientists, anatomists and zoologists. Their research was based directly on the study of the natural field. **Guillaume Capus** (1857–1931) was a naturalist by profession and held a doctorate.

Guillaume Capus was a researcher who studied in depth the climate and vegetation of Turkestan. His findings in these areas are highly commendable. According to the scientist, Central Asian countries are naturally divided into mountainous and steppe areas.

Naturalist G.Kapus divided deserts of the region into the following groups based on the amount of mineral elements in sands, soil and their mixture: soil-desert, sand-desert, soil-sand-desert. Tashkent, Fergana, Samarkand, Karmana, Bukhara, Shakhrisabz and Khiva are the main agricultural centres. Canals dug from large rivers and mountain streams were the reason for the fertility of these places.

Naturally, in such a region with exceptionally favourable climate as Turkestan, the rate of plant growth was high. Observing this in practice, an acknowledged researcher confirmed it with the following ideas: "We measured growth rate of Bignonia (Bignonia), Robinia (Robinia), Aylant (l'Ailanthus)" and other plants in Samarkand and found out that these trees grow 5-6m per year. Even in Tashkent, the growth of the Paulownia tree exceeds 6 metres"[10].

## Conclusion

G. Capus also mentioned some positive aspects of tree growth as well as some shortcomings in his conclusions. According to him, the number of ornamental trees in Turkestan has decreased as a result of the negligence of the local population. However, some of them have survived various massacres and have grown with strange appearance. These old trees were often free from any danger because they were located around holy shrines, mosques. Because pilgrims considered them sacred.

In conclusion it should be noted that nature and climate of Turkestan were studied by French explorers with great interest. In each of their observations and studies one can study innovations in the relevant areas. This, in turn, shows that French-speaking sources are still waiting for their researchers.

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- 10.The name of this researcher, Uyfalvi, in the form of Yujvalvi, is interpreted differently in different literatures. In the most voluminous sources - quoted in the form of Ujfalvi - R.D. [Mazkur tadqiqotchining ismi Uyfalvi, Yujvalvi ko'rinishida, turli adabiyotlarda turlicha talqin qilinadi. Eng ko'p miqordagi manbalarda – Ujfalvi ko'rinishida keltirilgan – R.D.]
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