ISSN NO: 2770-8608
Date of Publication: 11-01-2023

Paleogeographic Methods For Studying the Development of the Nature of the Fergana Region in the Stratigraphic Sequence

Konstantin Andreevich Krakhmal
Chirchik State Pedagogical University
Associate Professor, Candidate of Historical Sciences

Annotation. The article presents some results of studying the features of the paleogeographic development of the natural environment during the Anthropogenic periods in the stratigraphic sequence on the territory of the **Tien Shan Mountain** structures and the Fergana depression, the largest in Central Asia. As a result of local and regional constructions of stratigraphic schemes, a complex of monuments "Khanobad" was discovered in the eastern zone of the Chatkal ridge. The research results include an analysis of international trends in the development of modern trends and paradigms to determine the dynamics of geotectonic development, paleogeographic formation of landscape zonality, facies feature of sedimentation of the lithological substrate, biogeocenoses and biocommunities. Particular attention is paid to the definition of the evolution of ancient ecosystems, and humanity as an integral part of the biosphere as a whole.
Some results of correlation comparisons of stratigraphic definitions of the cultural horizons of the early anthropogen Selungur, Sokh, Chashma and a newly discovered complex of sites in the eastern part of the Chatkal Range - Khanobad with the International Stratigraphic Scale are presented. A special place is given to the problems of detailing the chronostratigraphic stages, as well as paleogeographic reconstructions of the development of the natural environment, against which the formation of the most ancient cultures of mankind took place.

Key words: Ferghana region, Khanobad, Selungur, Sokh, Chashma, stratigraphy, paleogeography, chronology, anthropogen, Paleolithic, sedimentation of lithological substrate, biogeocenosis, biocommunities, evolution of ancient ecosystems

Introduction and problem statement. Based on paleogeographic definitions and constantly growing information based on "non-template" scientific methods for studying the history of the paleogeographic development of nature, in recent years, results have been obtained that are considered as one of the first steps in solving problems on the history of the early habitation of the Fergana region. Along with the historical monuments of the early anthropogenic Selungur, Chashma, Sokh, Sarykurgan, known to date in South Fergana, in recent years in the zone of the eastern part of the Chatkal ridge, a complex of objects of the ancient history of mankind and nature, Khanobad, has been discovered.

At present, there is an urgent need to develop modern methods for studying chronostratigraphy in the local, regional plan, which will make it possible to conduct correlation comparisons with actual data on an interregional scale and determine the logic of their interpretation.

In the process of chronostratigraphic determinations of the time stages of the paleogeographic development of nature, against which the formation of the most ancient history of mankind took place in the zone of the Fergana region, modern research directions were used. The complex of interdisciplinary areas includes methods of facies lithology, biostratigraphy, climatology, paleomagnetic and radioactive study of deposits of cultural horizons, in a stratigraphic sequence. On the basis of changes in the International Stratigraphic Scale (ISS), amendments were made to local stratigraphic schemes, and taken into account in the process of studying the history of the early anthropogen in the zone of the northern slopes of High Asia and the Fergana region in particular.

Goals and objectives of the study. In recent years, the study of individual stratigraphic categories was also carried out on the basis of a separate methodology. In modern studies of the history of the paleogeographic development of the nature of the Fergana region, the goals and objectives of a much more important and interesting direction are defined - the synthesis of already accumulated materials that allow us to determine the unity of the surrounding world on the scale of High Asia.

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In this regard, the goal is determined to study the main trends in the paleogeographic development of nature, which include the development of new methods for improving stratigraphic constructions on the reference monuments of the ancient history of mankind. Synthesize the best practices of international research and, on this basis, conduct a comprehensive, interdisciplinary paleogeographic study of the history of the formation of nature on the territory of the Fergana region. The main attention should be focused on the supporting monuments of South Fergana and on the newly discovered objects of the history of the early anthropogen Khanobad - East Fergana.

In this regard, the main objectives of the study include: 1. Conducting a historiographic analysis of the results of studying local and regional paleogeographic conditions for the formation of the natural environment in accordance with the relevant requirements of the International Stratigraphic Scale. 2. Determination of methods for detailing local and regional stratigraphic schemes and deciphering the temporal stages of the paleogeographic development of nature on the territory of the Fergana region and, at the final stages of the study, to conduct correlation comparisons in the interregional plan.

The main practical result of the study is to create stratigraphic schemes for the history of the paleogeographic development of nature during the early Anthropogenic periods of the Ferghana region and to correlate the main paleogeographic events on the scale of High Asia, based on the International Stratigraphic Scale.

Study of the problem. Theoretical and practical problems of the stratigraphy of the Fergana region have received much attention since the second half of the 19th century. It is no coincidence that prominent scientists V.I. Mushketov, G.D. Romanovsky and others who made a huge contribution to the study of the paleogeographic stages in the development of the nature of the Fergana region.

Created in 1878 at the 1st International Geological Congress, the International Commission on Stratigraphy has always played a huge role in the development of this branch of geology. As a result, based on the achievements of 19th century stratigraphy, a “geological-historical paradigm” has developed. The paradigm includes the concept of relative geological time, which built the geochronological scale based on the time stages of the paleogeographic and paleoecological history of the Earth. A biostratigraphic direction has been developed, expressed in the division of ancient strata on the basis of a change in non-repeating paleontological characteristics in sections.

Over the past decades, in various areas of historical geology, there has been a certain change in paradigms - conceptual models for posing and solving scientific problems that have prevailed over a certain historical period. In a number of cases, this phenomenon significantly changed the direction of research for many years. So the appearance in geology of the ideas of a new global tectonics and its application on the territory of modern Uzbekistan. Stratigraphy in this respect has not experienced cardinal changes in view of the properties of a more evolutionary path of development. Perhaps stratigraphy, with its geological-historical concept, rests on a foundation that cannot change dramatically.

The theory and practice of stratigraphy developed under the influence of the ideas of scientific trends - uniformitarianism, catastrophism and evolutionism, which can be considered as paradigms of geology. At the same time, the use of only certain provisions of scientific paradigms leads to a certain eclecticism of theoretical constructions in stratigraphy.

In modern research on the territory of the Fergana region, complex methods are used, since a single direction cannot explain the empirically identified features of the structure and development of the biosphere and its individual ecosystems.

The main directions of stratigraphic study are relevant to the present time, causing practical and scientific interest of the international community of scientists. Thus, during the 21st century, International Geological Congresses were devoted to the problems of stratigraphic definitions, in particular, in Rio de Janeiro (2000), Florence (2004), Oslo (2008) and Brisbane (2012). Methods of stratigraphic studies were actively discussed at many symposiums. Many issues of stratigraphy became the subject of special discussion at working international meetings in Italy (Urbino, 2002), Austria (Siggau, 2006) and the Czech Republic (Prague, 2010).

The main directions of stratigraphic research were developed in the process of creating the International Stratigraphic Scale (ISS). The international stratigraphic scale is the most significant empirical generalization of the history of the paleogeographic development of the earth's surface during the

ISSN NO: 2770-8608
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Proterozoic, Paleozoic, Mesozoic and Cenozoic.

The ISC summarizes major achievements in stratigraphy and provides a common understanding between researchers on an international scale. Constantly improving, the International Stratigraphic Scale is used in almost all countries of the world, including in the process of paleogeographic research in the zone of the northern slopes of High Asia and the Fergana region in particular.

It is very important to note that extensive discussions were organized at international forums, which determined the main methods of research in different countries. It is clear that it is stratigraphy and its detailing of the regional features of the paleogeographic formation of the natural environment, against which the development of the most ancient cultures of mankind took place, that determine the scientific concept of the history of the early anthropogen. In other words, without stratigraphy at the present stage of the development of Stone Age archeology, Ferghana would have remained in the category of descriptive disciplines.

Conservatism in the methods of stratigraphic division and the specificity of outdated methods, which are incomprehensible to most archaeologists to this day, predetermined the fact that in recent times stratigraphy has come to be presented as a “modest application”, serving the “more important” areas of typology and “material reference” stone artifacts. Meanwhile, stratigraphy has been and remains one of the most important scientific areas, and the culture of research in any country is determined, first of all, by the level of its stratigraphic study of an archaeological site.

In addition, a reliable stratigraphic basis developed on the reference monuments of the Fergana region allows for inter-regional correlation. Lack of understanding of this circumstance, which is reflected in the reduction of stratigraphic work, the truncation of the corresponding programs in teaching students of historians, in practice leads not only to significant material costs, but also causes enormous damage to fundamental research in general.

Stratigraphic areas of research in the history of the paleogeographic development of nature on the territory of the Fergana region have significantly expanded their ideological and methodological arsenal in recent decades. In the studies of the oldest monuments in Central Asia, Selungur, Chashma, Sokh, Sarykurgan and the newly discovered complex - Khanobad, complex interdisciplinary methods of stratigraphic study of cultural deposits of the early Anthropogene epochs were used. Based on the potassium-argon method, the accuracy of chronostratigraphic determination was achieved, which became the actual norm in the process of studying the complex of Khanobad sites discovered in the zone of Eastern Fergana.

The range of tasks of stratigraphy of the reference monuments of Ferghana includes major problems of paleogeographic features of the formation of the earth's surface. This is, first of all, the natural periodization of the geological history of the mountain systems and intermountain depressions of High Asia, including the biosphere. It is the connection with the problem of periodization of the paleogeographic history of the development of nature throughout the Proterozoic, Paleozoic, Mesozoic and Cenozoic that gives complex, interdisciplinary research in the specifically identified Ferghana region the significance of an independent stratigraphic section. As regards paleogeographic mapping of early Anthropogene sites, it is the most striking practical expression of stratigraphy.

The end of the 20th and the beginning of the 21st century can be considered an important stage in the development of the stratigraphy of the paleogeographical history of the early Anthropogen of the Fergana region. Comprehensive, interdisciplinary studies include further refinement of stratigraphic scales, which originated from numerous researchers of the 19th and 20th centuries. Along with traditional paleontological, paleoecological methods, a wide introduction into the chronostratigraphic practice of research, paleogeographic, new methods of event stratigraphy, magneto-stratigraphic and other areas is being carried out.

At present, in stratigraphic research, more and more attention is paid to worldview issues of historical science - primarily to deciphering the history of the development of the Earth and its biosphere. This direction can be called strategic from the general geological point of view.

Results and its discussion. Among the achieved results of stratigraphic studies in the zone of the Fergana region, it should be noted that in recent years correlation comparisons of the Precambrian, Phanerozoic and Quaternary systems with the International Stratigraphic Scale have been carried out. The

ISSN NO: 2770-8608
Date of Publication: 11-01-2023

uniqueness of the Phanerozoic scale is shown, which determined the methodological and ideological foundations of stratigraphy in general and reached the stage and zonal division. It has been established that from the arsenal of stratigraphy methods, the biostratigraphic method was of the greatest importance. The stratigraphic classification and nomenclature were improved, complex methods were developed for the chronostratigraphic subdivision of sections.

The scale of the history of the paleogeographic development of nature for South Fergana has reached great accuracy and the importance of compiling local and regional scales has been shown. Stratigraphic scales and schemes began to be considered as a reflection of sequences of paleogeographic, including biospheric, events. The detailing of the scales has become one of the general trends in the development of stratigraphy, including the identification of stages, zones, and infrazonal units.

To date, in the stratigraphy of the late Cenozoic of Ferghana, a whole arsenal of methods is used, which together create a kind of "orchestra" that ensures the sound of not only each "instrument" (method), but also the volumetric performance of the entire "work". In the process of stratigraphic studies, a number of methods are applied in the process of correlating paleogeographic events on a subglobal and regional scale.

At different stages of stratigraphic research, first of all, methods that successfully “work” under certain local conditions are used. The most objective results in stratigraphic studies were obtained with the conjugated, complex application of interdisciplinary methods, which ensures their mutual control, and introduces real signs into the characterization of stratigraphic units.

It should also be noted here that important information about the time stages is provided by the results of the study of irreversible paleogeographic and historical-geological processes, including isotope and paleontological and biostratigraphic methods. The first of them is based on radioactive decay, the second - on the irreversible development of the organic world. On this basis, a framework of the geochronological scale is created. Complex methods, essential for local stratigraphy and regional correlations, provide them with benchmarks that play a real role when they are attached to a real time scale.

In this regard, the stratigraphic definitions of the paleogeographic development of the natural environment of the Fergana region have now necessitated the determination of time benchmarks, their correlation and clarification with the requirements of the International Stratigraphic Scale, as a unique geological document that has existed for more than a hundred years. This also affected the Pliocene - Quaternary period.

In the 80s of the last century, in connection with the need for more accurate tracking of the ISC stratigraphic units in different regions, the leadership of the International Commission on Stratigraphy (ISS) called for special studies to be focused on fixing reference points or “golden” points in stratotype sections. nails" that would serve as generally accepted level and system boundaries (GSSP). It was assumed that after this procedure, the corresponding chrons should receive reliable reference points in the sections of different countries.

However, certain difficulties arose in the practice of stratigraphic determinations of the stages of the paleogeographic development of nature in the zone of the Fergana depression. It was noted that the stage boundaries of the stratigraphic units were in many cases “approximate”, which, in general, was acceptable up to a certain point, but with the creation of zonal schemes, it became incorrect.

In addition, it was found that the results of stratigraphic determinations of the Selungur multi-layered cave monument showed the invalidity of the unified definitions built for the territory of Western and Northern Europe, based on the climatic variations of the Ice Age, and required replacement.

At the initial stage of the stratigraphic study of the cave deposits of the Selungur multilayer site, the results of biostratigraphic studies of the territory of South Fergana were taken into account. The criteria of a complex of archaeological, lithofacies, geochemical, paleomagnetic and a number of other research methods were used.

In the process of stratigraphic study of the paleogeographical features of the development of nature in the Fergana region at the end of the 20th and the beginning of the 21st century, important changes that occurred in the upper part of the International Stratigraphic Scale were taken into account. After the approval by the International Union of Geological Sciences of the new lower boundary of the Quaternary period at the level of 2.58 million years in 2009, by the decision of the Interdepartmental Stratigraphic Committee, it was brought into line with the boundary of the General Stratigraphic Scale. A step along this

ISSN NO: 2770-8608
Date of Publication: 11-01-2023

path was the ratification of the Calabrian stage in 2011. New was the proposal to single out the centuries of technological development of mankind in a special department of the Quaternary period - the Anthropocene.

The intense discussion of recent years about the status and scope of the Quaternary period formally ended on June 29, 2009, when the Executive Committee of the International Union of Geological Sciences (IUGS) ratified the recommendation of the International Commission on Stratigraphy (ISS) to reduce

bases of the Pleistocene to the lower boundary of the gelasian stage.

It was decided that the base of the Quaternary system, as well as the boundary of the Neogene and Anthropogen, are determined by the Global Stratotype Point of the boundary in the Monte San Nicolò section, in Italy, and coincides with the base of the Pleistocene and Gelasian.

The gelasian stage is transferred from the Pliocene to the Pleistocene. The new position of the lower boundary of the Quaternary period was the third in recent years.

Until 1991, the lower chronostratigraphic boundary was at the level of 0.8 million years, from 1991 to 2012 - 1.8 million years, from 2012 - 2.6 million years. Every scientist familiar with the stratigraphic literature has had to deal with the diversity of stratigraphic terminology for the Quaternary interval.

The new boundary at the level of 2.58 Ma at the base of the gelasian is compared with the Gauss-Matuyama paleomagnetic reversal. Of course, this is one of the important frontiers, which has long been discussed as a possible frontier. However, its connection with the beginning of the glaciation of the Northern Hemisphere is clearly based on the principle of convenience and the use of the nearest ratified stratotype at the base of the gelasium.

Judging by the data on changes in the concentration of oxygen isotopes in benthic foraminifers, a much clearer, “geosystemic” boundary is located in the lower part of the Piacentium, at a level of about 3.5 million years. In the classical and reference stratigraphy of the Plio-Pleistocene of the Ponto-Caspian region, the boundary at the base of the gelasium is the least convenient, since it passes within the large geosystemic regional stages of Akchagyl and Kuyalnik.

The standardization of the internal units of the Quaternary period and the typification of their boundaries is one of the important tasks of the Subcommittee on Stratigraphy of the International Commission on Stratigraphy. Traditionally, the reference region for the allocation of such subdivisions is considered to be the classical region of southern Italy.

The most developed and included in the geological practice is the Calabrian stage. The base of the Calabrian is determined by the already ratified Global Stratotype Point of the boundary in the Vrika section in Italy.

The Vrika section, a former stratotype of the Neogene-Quaternary boundary, remains one of the few Late Cenozoic sections studied using a large number of physical and biotic stratigraphic methods, and its value as a type section of the base of the Calabrian is beyond doubt.

The Calabrian stage with the stratotype of its lower boundary in the Vrika section was finally ratified by the Executive Committee of the International Union of Geological Sciences (IUGS), the recommendation of the International Commission on Stratigraphy (ISS) to lower the base of the Pleistocene to the lower boundary of the IUGS stage on December 5, 2011. Calabrian corresponds in volume to the Eopleistocene. The next tier on the scale of the Quaternary system is ionium. In terms of volume, this tier should cover the entire Middle Pleistocene of the International Scale, which corresponds to the early and middle Pleistocene.

The Montalbano-Ionico section in southern Italy was chosen as the ionium stratotype. The perfectly studied biostratigraphic section, however, does not have a paleomagnetic characteristic - the rocks are remagnetized.

It is important to note that, according to the ISS decision, the lower boundary of the ionium is aligned with the Matuyama-Brunhes paleomagnetic inversion. Previously, the boundary between the early and middle Pleistocene was drawn between the Kharamillo episode and the base of the Brunhes epoch at a level of ~ 0.9 million years. This level corresponds to the level of restructuring of the global orbital cyclicity and was a natural "event" option for drawing the boundary. It is on this boundary that important rearrangements of the continental biota are also recorded. The uppermost planned tier - tarantium - tyrrhenian, with a volume corresponding to the late Pleistocene.

Findings. The approval of a new lower boundary and work to substantiate the internal structure of the Quaternary system of the International Stratigraphic Scale are in the center of attention of stratigraphic

ISSN NO: 2770-8608
Date of Publication: 11-01-2023

researchers. A positive event must be recognized as the approval of the status of the Quaternary period as a system of the International Stratigraphic Scale, which radically changes and supplements the appearance of stratigraphic scales and schemes in the Fergana region.

Modern complex, interdisciplinary paleogeographic research on the territory of the Fergana region in the general international cooperation in the development of stratigraphic problems brings great results and is a command both of the present and future decades. Without international cooperation, it is difficult to exchange experience and ideas, as well as to develop general rules for the stratigraphic classification of temporal events in the history of the paleogeographic development of the natural environment in the Fergana region.

In 1996, there were revised rules for setting global chronostratigraphic standards. It is in this document that the expediency of studying and identifying the boundaries of stratotypes is substantiated. First of all, stage categories, based on the concept of "golden nails" (GSSP) with the establishment of the lower boundaries of chronostratigraphic subdivisions along the bottom of subdivisions. Certain requirements were formulated for the identification of "golden nails", in particular, the stratotype section of the boundary should contain the best possible evidence of marking events.

Among the geological requirements, in particular, the following were noted: the stratotype section must be characterized by sediments of the required thickness. There should be no breaks in the cut. The rate of sedimentation in this interval should be sufficient to separate successive events. In this regard, the reference objects of the Fergana region contain a complex of stratotype marker paleogeographic events and fully comply with certain requirements for the selection of "golden nails".

Biostratigraphic requirements include the abundance and diversity of well-preserved fossils in the studied interval; no facies changes near the boundary. The best facies is the fa¬tion of the open marine environment.

It is extremely important to use a complex of interdisciplinary methods when choosing "golden nails" - magnetostratigraphy, lithostratigraphy, climatostratigraphy, analysis of stable isotopes. If you have to make a choice between sections with the same stratigraphic properties, you should prefer the one in which the complex of biostratigraphic methods is more effectively used. At the same time, magnetostratigraphy is a mandatory requirement for determining the position of the GSSP in the section. It is extremely important to indicate that the cuts with "golden nails" should be available for study.

In this regard, in the stratigraphy of the paleogeographic history of the development of the nature of the Fergana region, rocks are presented from Precambrian crystalline schists to modern loose clastic Quaternary formations. Precambrian and Paleozoic formations form mainly the mountainous frame of Fergana. Rigid rocks of the Precambrian and Paleozoic within the Ferghana Depression and mountain framing are represented by deposits of the Proterozoic, Cambrian, Ordovician, Silurian, Devonian, Carboniferous and Permian.

The stratigraphy of the Precambrian is represented by the most ancient rocks, including various gneisses and crystalline schists that make up the southern slopes of the Mogoltau mountains, large areas along the valley of the river. Kassan and its tributaries. Metamorphic deposits are widespread in the eastern and northeastern slopes of the Atoynak Range. The total thickness of the rocks of the Proterozoic suites reaches 3000 m.

The Paleozoic group on the territory of the Fergana region forms mainly mountainous and, to a lesser extent, foothill regions. They are represented by deposits of all five systems - from the Cambrian to the Permian. Among them there are metamorphic and sedimentary-volcanogenic varieties.

The Mesozoic deposits are comparatively well exposed in the south and east of the Ferghana depression and in many places of the adyr zone, in addition, they have been exposed by boreholes. They are represented by Triassic, Jurassic and Cretaceous accumulations.

The Paleogene deposits of Fergana differ sharply from earlier geological and lithofacies formations by the comparative constancy of the composition of their stratigraphic units. Paleogene rocks overlie Cretaceous sediments transgressively and are represented from bottom to top by several layers.

Bukhara layers (Paleocene). At their base almost everywhere, including Northern and Northeastern Fergana, gypsum is located; due to changes in anhydrites, they are secondary. In the north and northeast of the depression, they correspond to red clastolites.

ISSN NO: 2770-8608
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Suzak layers (Lower Eocene). Their lithological composition is inconsistent. They are composed of clays, sands and gypsum, in addition, red-colored clastoliths with limestone layers containing Ostrea hemiglobosa Rom., Gryphaea errar Vial.

Alai layers. Usually in the lower part are represented by greenish marls. Often with bentonite clays or clay-sandstone reds, and in the upper one - with one or more layers of carbonate deposits separated by clays. Quite often there are Ostrea turkestanensis Rom.

The Turkestan layers (Middle + Upper Eocene) begin, as a rule, with an oyster bank overlain by greenish-gray clays and marls with a large amount of Gryphaea Esterhazyi Pav., Gr. Boymi Vial., et al. Stratigraphically higher are layers of carbonate rocks, which are replaced by clays.

The Rishtan layers usually have coarse-grained sands with gravel at the base, passing up the section into sandstones or marls with Ostrea simplex Desh. At horizon n, tobacco-coloured clays with one or more layers containing Platygena asiatica Rom are observed. Upper Eocene.

Isfara layers. composed of gray tripoliform clays with characteristic weathered crispy ballasts, including Isocarida elchwaldi Rom. Upper Eocene.

Khanabad layers. composed of green clays with Ostrea tianschanensis Rom. Upper Eocene.

The Sumsar layers begin with a phosphorite horizon of fine clastic rocks with gravel and contain Gryphaea sewerzowi Rom. "shark". Raspberry clays with Exogyra galeata Rom., Ex. ferganensis Rom. and others, often with one or more layers of pink sandstones. Lower Oligocene age.

Cenozoic continental molasses began to accumulate in Fergana from the middle Oligocene. Presented are mainly products of the destruction of rapidly rising ridges framing the depression, which formed a complex geological formation and are known in the literature as Cenozoic continental molasses, which are stratigraphically subdivided from bottom to top into: 1. Massagetoka Series. 2. Bactrian series. 3. Sokh suite and younger Quaternary accumulations.

The Massageta series combines the brick-red - the lower Massageta and the upper Massageta pale pink parts. Analogues of the brick-red formation in the North-Western Fergana are accumulations of salt-bearing deposits. This makes it possible to determine the paleogeographic conditions during the periods of accumulation on the reference sections of Northwestern Fergana. The Nizhnemassagetskaya suite is represented in Fergana by layers of brick-red clays, strongly calcareous, often layered. Clays are replaced by sandstones and conglomerates towards the framing of the depression. In the southern side of the depression, north of the strip passing through Karatau, Northern Rishtan, Palvantash and Andijan, gypsum and rock salt appear in clays, the role of which increases in the stratigraphic section towards the middle part of the depression. As hydrochemical deposits appear, clays become chocolate and dark brown, i.e., their color changes from aeromorphic to hydromorphic towards the center of Fergana.

The accumulation of sediments of the Cenozoic molasses of Fergana took place under terrestrial conditions and in the water basin remaining from the Paleogene time (Lake Massageta). The maximum distribution area of this basin probably coincided with the maximum occupied territory of gypsum-bearing sediments. During the accumulation of sediments of the suite outside the lake, there was a coastal alluvial plain with clastic sediments, the widest in the southeast of Fergana.

The Verkhnemassagetskaya suite in stratigraphic constructions up the section is replaced by a suite of sediments, consisting, as a rule, of pale pink sandstones with interlayers of siltstones and clays of the same tones. In the direction to the periphery of Fergana, sandstones are enriched in conglomerates. Towards its middle part, corresponding mainly to the Kokand synclinal zone, they are facially replaced by siltstones, clays of chocolate and brown tones, and hydrochemical accumulations. In North-Western Fergana, they are answered by the formation of a gypsum-bearing stratum. Deposits of the Upper Massaget Formation may occur with angular unconformity.

The lower age limit of the accumulations of the Massaget series is dated as the middle Oligocene, although in some places it drops to the Eocene. According to the Decision of the Conference on the development of unified stratigraphic schemes for Central Asia, Tashkent, 1959, the upper age limit of these deposits is set as the Lower Pliocene.

The Bactrian Series consists mainly of terrigenous deposits, usually light gray and pale yellow, which are piedmont-fan and plain-valley accumulations. They often lie with a sharp angular unconformity, often overlying older rocks at the periphery of the depression. Petrographically, they are formed by unequal

ISSN NO: 2770-8608
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varieties - from coarse clastic rocks to clays and marls. Their composition is characterized by rapid variability.

In the center of the Fergana depression, the lower most part of the deposits of the Bactrian series is composed of finely elutriated and layered clays. They accumulated, most likely, in the lake, which, apparently, was the residual of the Massagetae lake. A generally accepted regional stratigraphic scheme for deposits of the Bactrian series has not yet been developed, although a number of attempts have been made in this direction.

The deposits of the Bactrian Series in South Fergana occur in many places with a sharp angular unconformity. At their base there is a basal conglomerate. Stratigraphically, a light-brown suite of siltstones, sandstones, and rarely gravels follows above, becoming more and more saturated with sandstones and conglomerates up the section.

The Sokh Formation in the south of Ferghana is most often represented by conglomerates with interlayers of sandstones and rarely siltstones. In a number of places in Fergana, the deposits of the Sokh Formation are unconformably overlain by dislocated clastolites.

On the whole, along the margins of the Fergana Depression, the deposits of the Sokh Formation are represented by gray conglomerates, intensively dislocated in places. They are alluvial, less often - temporary flows, often composed of conglomerates, sandstones, dense loams of gray or brownish-gray color. In South Fergana, the described deposits are considered to be the Sokh Formation. In Northern Fergana, they correspond to the Kassan conglomerates. In Northern Fergana, pale gray marl clays with lenses of pebbles with granite pebbles (Nizhnyeadyrnaya, Chust-Papskaya, Namanganskaya and Kassansayskaya anticlines) should probably be attributed to the Sokh complex. To the west, the described sediments compose the Naukat and Digmai uplands in the Syrdarya valley and a series of brachianticlinal folds in the southern margin of the Hungry Steppe.

In Central Fergana, the sediments of the suite, predominantly alluvial (pebbles, sands), sink to a depth of 800 - 900 meters.

The Tashkent Formation is usually represented by gray conglomerates with a thick cover of loess. They differ from the ancient Quaternary conglomerates in that they are less dislocated, and also in that they often perform independent erosion incisions in older deposits.

Towards the periphery of the Fergana depression, these accumulations are replaced by loess-like fine-earth and rubble accumulations that form the periphery of ancient alluvial fans. To the tops of the cones, they consist exclusively of boulder-pebble rocks.

In South Fergana, ancient Quaternary deposits correspond to conglomerates of one of the ancient alluvial fans of the river. Sokh participating in the formation of the Akturpak anticline. They enjoy a wide areal development in the basins of Shakhimardan and Isfara, where they merge, apparently, with the corresponding formations of these rivers. In South-Eastern Fergana, the Adyr Formation, which is widespread at the latitude of the city of Osh, belongs to the deposits of this age.

In Central Fergana, the rocks of this suite, as well as the Sokh suite, are buried under younger deposits and reach a thickness of 250-300 m. Here they are mainly represented by alluvial deposits: pebbles, conglomerates and sands with interlayers of loams.

In the direction of the mountains, especially to the south and southeast, river deposits give way to proluvial and deluvial loams and fine earths with interlayers of sands, pebbles, and conglomerates of ancient alluvial fans. On the top sections of these cones, they are mainly represented by coarse boulder-pebble conglomerates. It is characteristic that in South Fergana there is less development of the loess cover, and in some places, in particular, on conglomerates of ancient alluvial fans of the river. Soh, it's missing altogether. Deposits of the Tashkent Formation are involved in the formation of adyr folds that cross diagonally Southeast Fergana from the lower reaches of the Sokh to Andijan. In the valleys of the mountainous frame of Fergana, the rocks of this suite form three or four high erosion-accumulation terraces, sometimes rising to a height of 500-600 m above the river level.

The Golodno-Steppe Formation in Ferghana includes deposits of the third terrace of the Syr Darya and its tributaries, as well as young alluvial fans of tributaries. In the foothills and mountains, older terraces also correspond to them, which experienced submergence towards the center of the depression and formed a single thickness of sediments up to 100–125 m thick. as well as I and II terraces.

ISSN NO: 2770-8608
Date of Publication: 11-01-2023

Thus, the reference objects of the Ferghana region contain a complex of stratotype marker paleogeographic events and fully comply with certain requirements for the selection of "golden nails".

Biostratigraphic requirements include the abundance and diversity of well-preserved fossils of continental facies and open marine environments. In the stratigraphy of the paleogeographic history of the development of the nature of the Fergana region, rocks are presented from Precambrian crystalline schists to modern loose clastic Quaternary formations.

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