

## PALAEOGEOGRAPHIC CONDITIONS IN THE BLACK SEA AREA DURING THE NEOLITHIC AND CHALCOLITHIC AGE

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**ABSTRACT.** The archeological discoveries related to the Durankulak Neolithic-Chalcolithic necropolis and the Varna Chalcolithic necropolis pose a lot of scientific problems. One of them is linked to the destiny of the highly developed Varna civilization, which according to some authors was 'destroyed' by the Black Sea flood in the VI mill BC. A palaeogeographic review of the development of the Black Sea basin during the Neolithic, Chalcolithic and Early Bronze Age has been made. A special attention was paid on the geomorphological processes which have influenced mostly its development. The processes which can cause catastrophic destructions and floods in the area of the Eastern part of the Black Sea basin are also discussed. The geomorphological and archaeological studies suggest a natural catastrophic phenomenon of a local character. The possibility for a disaster on the scale mentioned in the ancient legends can not be verified.

### Comparative analysis of the ancient texts and the hypothesis for the Black Sea "Deluge"

The aspiration of some peoples to prove their ancient origin takes place not only by study of the folklore and legends but also of some Medieval documents. For example, in the "Anonymous Roman Chronograph" from 234 AD the sons of Sim (son of Noah) were listed and the peoples which take their origin from them. In a later variant of the document from 354 AD the name of the Bulgarians has been mentioned as related to the grandson of Noah – Ziezi.

Some researchers of the ancient civilizations have located the Biblical deluge in the area of the Black Sea (see Ryan et al., 1997; 2003; Ryan, Pitman, 1998; Dimitrov, 2005). According to their hypothesis a highly developed Neolithic civilization living along the Black Sea coast has been later affected and destroyed by water flooding about 5600 BC. It has been declared that this hypothesis is "a brilliant connection of scientific arguments from almost all fields of knowledge unified by one geographical centre – the Black Sea" (Dimitrov, 2005, 7). In a matter of fact "the brilliant connection of scientific arguments" turns out to be a fabricated 'historical' scenario, seeking a scientific sensation. In it one can find well known scientific facts which, however, have been presented in non-chronological order. The catastrophic scenario suggests that at the end of the Ice Age (Vurm) the world Ocean raises significantly causing a great transgression, influencing in this respect the Mediterranean Sea as well. The Bosphorus threshold has been broken and a great mass of salty water intrudes the fresh water of the "Black Sea" Lake as a "sea fall". As evidence for this event the biogenic sediments known as sapropels are pointed out – a result product from an ecological catastrophe leading to the death of the plankton biomass and its deposition on the sea's bottom. The negative ecological consequences of the deluge have led to the migration of the

highly developed Black Sea civilization, which is supposed to have left significant traces on the Black Sea shelf.

Comparing the legends about the Noah's Flood one can see that they do not differ significantly one from another. In the Sumerian epic poem about Gilgamesh the deluge has been described in the following manner: "And everything in light became dark, the Earth has cracked as it was a pitcher; at the beginning the Southern wind blew – it pounced quickly upon the mountains which were drowned, and with waves as warriors the people have been overtaken" (*Na Nebeto...*, 1986, part 11, 342). According to the Biblical version of the deluge the earthy and heavenly waters have drowned the world over a period of 40 days.

The natural phenomena in such legends and their sequence fully correspond to the typical manifestation of tropical cyclones with coinciding strong earthquake (causing cracks in the Earth's surface and appearance of new springs). The first indication for a coming cyclone is the appearance of dark thunder-rainfall clouds, which cover the whole sky. Very characteristic is the direction of the wind. After their formation in the ocean, the tropical cyclones move in Northwest direction, therefore in Mesopotamia, for example, they will appear from South-Southwest, and later will change their direction ("pounced quickly upon the mountains"). In the Sumerian legend it has been clearly pointed out that the mountains have been drowned not by a "sea fall" but by the pouring rain bearing winds. In the coastal area the same wind caused the appearance of high tidal waves ("with waves as warriors the people have been overtaken"), resulting in a quick rise of the Sea level to about 2-3 m. There were cases when small islands have entirely disappeared after being exposed to tropical cyclones. Thus the region described in the legends, which has been destroyed by the deluge, should be found near

a Sea basin surrounded by mountains. The authors of the Bible use the term "sea" to definitive aquatories, which are now known as the Mediterranean Sea, the Galilean Sea and the Dead Sea (Woolf, 2003). In the New Testament the Galilean Sea has been mentioned as the Genisaret Lake (the area at its Western shore). In fact it appears to be a big fresh water lake in the Northern part of Palestine. Because of its size and location, severe tempests are possible to occur there similar to those in the ocean. In the Bible, as well as in other literary sources the place of the deluge has not been specified.

According to well known archaeological data, traces of large flood are found at the ancient cities of Ur, Kish, Shuripak and Ereh in the Southern part of Mesopotamia, near the Persian Gulf. From a climatic point of view it is possible that a mighty tropical cyclone have brought great disasters and floods in the region of the Persian Gulf, whole Mesopotamia and even in the regions of the mentioned in the Bible "seas". The nearest zone where a tropical cyclone may originate is the Arab Sea. In the Koran there is an evidence for a deluge probably in that region: "And we open the door of heaven with pouring water, and we made the springs to form the Earth, and the waters met in one direction".

### **Geohistorical development of the Black Sea basin with correlation to the archaeological data**

The changes in the palaeogeographic environment have influenced the development of ancient civilizations, especially of those which have inhabited the big river valleys or the coastal zones of Sea basins. The Sea coast changes permanently and its motion can be traced for a 5000-10000 year period in the rivers' mouth at the contact with the Sea basins (Kanev, 1983, 289). The changes in the Sea level caused by alternating transgressive and regressive phases are marked in the relief in the form of sea terraces on the shelf or on the coast.

One of the most important events in the geohistorical development of the Black Sea is the origin of Bosphorus straight, making a connection with the World Ocean. At the beginning of the Upper Pleistocene (130000 years ago) the sea has been subjected to the so called Karangatian transgression. Several terraces of Karangatian age (Upper Pleistocene) have been proved along the Black Sea coast: at cape Karangat (Kerch Peninsula) with 7-8 m height; at the Caucasus coast (two terraces have been proved 24-26 m and 12-14 m high respectively). At the Turkish coast the terraces are 20 m and 10 m high, and at the Bulgarian Sea shore the Karangatian terraces correspond to the Pomorie and Keremidarska terraces, with 20-25 m and 8-15 m height respectively (Popov, Mishev, 1974, 262). In the region of the towns of Byala and Sozopol the sediments of these terraces contain typical mollusk fauna of the Karangatian age.

During this stage the Black Sea basin had three phases of salt enrichment, with a maximum of over 30 pro mill. The significant degree of salt content is caused by the intrusion of large portions of Mediterranean waters through the Bosphorus as a huge waterfall (the level of the Black Sea has been then about 180 m lower from the present level). The fauna in the Black Sea changes from fresh water to sea water (Baltakov, 2003, 208-215). This natural cataclysm that occurred between 130000-70000 years ago is described in the monograph

*Noah's Flood* (Ryan, Pitman, 1998) where it has been fixed at the time of 5600 BC and mechanically linked to the legends for the World's Flood.

After the Karangat stage of development of the Black Sea basin a regression of the Sea level took place. The contacts with the Mediterranean and the Caspian Seas are broken again and its supply is dominated by waters of the continental glacier. This leads to a new stage of fresh water content causing the death of the seawater fauna and the origin of sulphur hydrogen (H<sub>2</sub>S). About 25000 years ago a new continental glacier has formed. This is the beginning of the last ice period Vurm 3 (for glacier ages and related climate changes see Imbrie, Imbrie, 1979). The glacier is considered stable for about 8000 years, and then its first cede takes place between XIV-XI mill. BC, the second one – between XI-IX mill. BC and the last one – between XI-VI mill. BC. The melting of the ice shield caused the rise of the World Ocean level, i.e. a new post glacial transgression has occurred, known as the Flandrian. The Black Sea level reached 5-6 m above the present one, which has been proved by the height of the formed at that time Old Black Sea (Old Chernomorsk) terrace.

The Flandrian post glacier transgression has a specific behavior in the Black Sea basin. Several reasons can be listed in this respect: the geographical position of the Black Sea; the area of its water supply that is 4 times larger than the basin itself; the declination of the shelf in North-South direction; the direction of the dominating winds; the glacier isostatic movements; climatic changes.

The Black Sea is one of the most isolated Sea basins from the World Ocean, and that is why the post glacier transgression has been less influential in this area. The 16-18 pro mill salt content displays that the transgression has not been of such a large scale (Baltakov, 2003, 215). After the end of the Ice Age the level of the Black Sea rises earlier and more quickly than the level of the Mediterranean Sea. This is caused by the enlarged fresh water volumes of the rivers Danube, Dnester, Dnepr, Bug and others, which have been supplied by the quickly melting continental and mountain glaciers. For example – in Late Medieval time, the high waters of the Volga River in the XVII c. caused the raising of the Caspian Sea level by about 5 m.

The large volume of continental water which proceeded in the Northeastern part of the Black Sea after the end of the Vurm 3 period resulted not only in increased Sea level, but caused a strong near-shore current. East of Varna it joins the Crimea current in the South Current, which turns to the Bosphorus threshold. At the same time the level of the Mediterranean Sea has been raising gradually. According to Aksu et al. (2002) the water of the Mediterranean Sea has fluctuated in different directions throughout many years. The Mediterranean Sea has a larger aquatory than the Black Sea, which means that the time for reaching the Bosphorus threshold is longer, than the time necessary to fill up the Black Sea basin at the same level.

The followers of the "Black Sea Flood" hypothesis do not take into account another factor, which has also influenced the Black Sea basin. These are the glacier isostatic movements of the Earth's crust. A typical example in this respect in the

geomorphological literature is the lifting and lowering of the Bosphorus threshold (Kanev, 1983, 90). During the studied period the Bosphorus threshold lowers slightly, which aids significantly the inrush of the Black Sea waters into the Marmara Sea and not the opposite. As a result of the glacier isostatic movements, after the end of the Ice Age, the weak declination of the Black Sea shelf has been formed with a North-South direction – its depth in the Northern part is 90 m and in the Southern part – 100 m (Popov, Mishev, 1974, 34). The Mediterranean Sea waters, according to the ideas of the catastrophists, cannot reach the higher Northern part of the shelf.

The direction of the dominating strong winds is also significant, as they determinate the direction of the mentioned surface Sea currents. The dominating winds have also influenced the shape of the relief. For example, along the Bulgarian Sea coast the sand strip is narrower in its Northern part and significantly widens in its Southern part. This means that the direction of the dominant strong winds is from North-Northwest, and not from South (Kanev, 1983, 185; Fig. 1).

The listed facts suggest that at the beginning of the Neolithic the connection between the Black Sea and the Mediterranean Sea has been in direction of North to South. The Black Sea waters earlier got over the Bosphorus Doorway and pour into the Marmara Sea basin, thus refreshing its waters to 22 pro mill (the salinity of the Mediterranean Sea is 36-37 pro mill). The formation of a bottom sea current in the opposite direction – from the Marmara Sea to the Black Sea, gradually increases the salinity of the latter up to 16-18 pro mill. The change of the fresh water regime with a sea water regime is considered to have taken place over a period of 500 to 1000 years (Aksu et al., 2002), which also excludes the possibility for an ecological catastrophe and formation of a thick layer of sapropel sediments. The sapropels are part of the terrigenous material (from the land) and deposited at a great depth. They are related to superimposed processes of generation of fuels as oil and natural gas (Kanev, 1983, 197). These terrigenous materials are transported by the so called suspension currents, which are formed in the mouths of the big rivers flowing into the Sea.

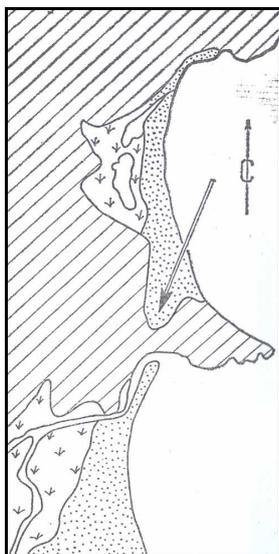


Fig. 1. Dominating wind direction at the sandy sea shore (Kanev, 1983)

If the position of the archaeological complexes near the Black Sea coast is traced from the Mesolithic (in the “Pobitite Kamuni” protected area), the Neolithic-Chalcolithic necropolis at Durankulak, the Chalcolithic necropolis at Varna, the Devnya necropolis, as well as the Lake dwellings in the Varna Lake, it can be suggested that the prehistoric sites have been located near the contemporary coastal line or at higher elevations. This means that the transgressions during the Mesolithic (X-VIII mill. BC) have not influenced at all the dwelling places along the coast (Dolukhanov, Shilik, 2006; Dergacev, Dolukhanov, 2008, 19-42). At the Northern Black Sea region the situation is similar. According to the map of migrations of the prehistoric populations (Yanko-Hombach et al., 2007) the Mesolithic societies have populated territories to the North of the contemporary coastal line (Fig. 2). The migrations are considered to have had a definite seasonal character.

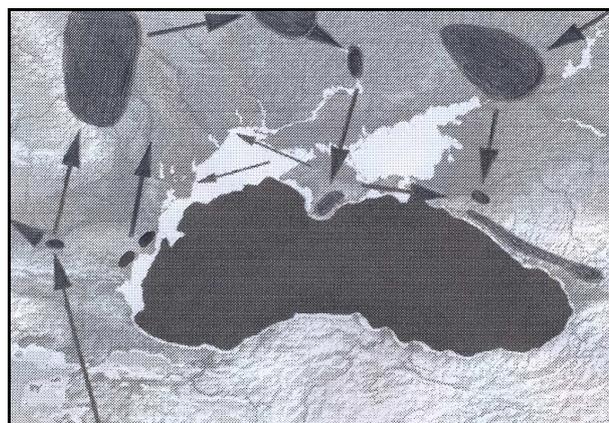


Fig. 2. Population concentrations (gray areas) and migrations (arrows) in the Black Sea Region during and after the last glaciation including the Varna and Durankulak sites (dark gray areas) in Bulgaria (modified after Yanko-Hombach et al., 2007)

### Archaeological data

The archaeological data have displayed processes of intensive cultural, technological and economic links between the different sites. This is proved by the parallels between the Lower Danube culture of Hamangia and the cultures of Boyan, Bug-Dnestr and Cucuteni-Tripolie – to the North, and the cultures of Usoe, Sava and Varna – to the South. During the studies of the archaeological complex Durankulak (located at 5 km from the Sea shore) an early stage of the Neolithization of the Dobrudza region has been found – the first phase of the Hamangia culture (VI-V mill. BC). The area around the Durankulak Lake is an archaeological site with rich information for the development of the whole Northeastern part of the Balkan Peninsula from the beginning of the Neolithic, throughout the Chalcolithic, the Late Bronze Age, the Early Iron Age and the Early Bulgarian period (Todorova, 1989, 6-12). The archaeological complex is indicative as a mark place for the position of the coastal line during the mentioned periods. The significant cultural artefacts from the Neolithic and Chalcolithic point to a long evolutionary development without any interruption.

Early Neolithic sites were found on the plateau near the Turkish coastal line. The gravimetric studies of sediments in the Southwestern part of the Black Sea and carbon dating do not support the idea for a catastrophic increase of the Sea

level during the VII-VI mill. BC (Aksu et al., 2002). The archaeological data for the Mesolithic and Neolithic societies in the Northern, Western and Southern part of the Black Sea region fully correlate with the data for the geohistorical development of the Black Sea basin.

The drowned sites of the Varna Lakes are attributed to the Late Chalcolithic and Early Bronze Age. The Chalcolithic layer is 0.90 m thick, but no settlement horizons are found. This gives the opportunity to suggest that the dwelling places have been drowned suddenly during a quick elevation of the water level and with enough strength to destroy the older cultural layers. The next layer is from the Early Bronze Age with thickness up to 3.5 m, also homogeneous, as the previous one. It is evident that a similar increase of the water level has taken place (Ivanov, 1981).

From a geomorphological point of view the sudden drowning of the dwellings in the Varna Lakes may have been caused by other natural phenomena, which are characteristic for the Northern part of the Bulgarian Black Sea coast. The Varna Lakes are typical limans. The region of their location is drowning. It has been established that during strong storms the sand barrier closes the link between the liman and the sea. Then the level of the liman waters may increase several tenths of meters (Kanev, 1983, 184). Probably the sudden flooding of the dwellings in the Varna Lakes is caused by a similar process.

The Bulgarian Black Sea coast from Cape Kaliakra to the town of Varna is a typical landslide coast. The formation of large landslides with catastrophic consequences leads to a change of the relief and destruction of large areas. The rockslides at the continental slope may evoke local earthquakes (seaquakes) with catastrophic results. An example in this respect is the ancient town of Bizone (today Kavarna), which has drowned in the Black Sea as a result of giant rockslide of the 80 m high steep coast. This has taken place during an earthquake with a strong sea storm.

## Conclusion

The negative vertical movements of the Bulgarian Black Sea coast from the beginning of the Neolithic and the following Holocene ingression (intrusion of the Sea inside the land because of its sinking) must not be mistaken with the so called post glacier transgression. The Ryan-Pitman hypothesis does not correspond to the descriptions in the Sumerian epos, the Bible and other legends related to the so called Noah's deluge.

The study of the Black Sea shelf should take into account, that some of the underwater valleys, underwater canyons and Sea terraces, previously thought as drowned by the sea, are in fact relief forms which have been shaped underwater. Such forms develop and change the underwater relief under the influence of gravitation and water currents (Kanev, 1983, 195).

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