

BULGARIAN BLACK SEA DEEP WATER ARCHAEOLOGY*

Preslav PEEV*

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Abstract: *The exploration of cultural remains on the seabed has always been among the most fascinating topics in the mind of marine researchers. Nowadays a huge part of humanity cultural-historical heritage is focused there. The milestones of human history and development like displacement of people, recolonization of areas exempt of Pleistocene glaciers, the spread of agriculture during the Neolithic have occurred in places nowadays underwater. The shelf zone of the Black Sea is subject of intense economic activity which causes irreversible damage to cultural heritage. Working principles and criteria for discovery, study and preservation are in urgent need to be developed. The in situ conservation of underwater archaeological heritage is a highly stimulating subject for planning and experimenting new methods to open new possibilities for conservation, protection and scientific research.*

Rezumat: *Explorarea patrimoniului cultural submers s-a numărat întotdeauna printre cele mai fascinante subiecte pentru cercetătorii spațiului subacvatic. O mare parte a patrimoniului cultura-istoric al umanității se conservă astăzi în mediul submarin. Evenimente importante precum dislocarea de comunități umane, recolonizarea ariilor în care ghețarii din Pleistocen se topiseră, răspândirea agriculturii în Neolitic, s-au petrecut în zone situate în prezent sub apă. Platforma continentală a Mării Negre este supusă unei activități economice intense, care provoacă distrugerii ireversibile la nivelul patrimoniului cultural submers. Se impune urgent elaborarea de principii de cercetare și de criterii pentru descoperire, studiu și conservare. Conservarea in situ a patrimoniului arheologic submers reprezintă un subiect deosebit de stimulant pentru elaborarea și experimentarea*

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**Preslav PEEV, Bulgarian Academy of Sciences, "Fridtjof Nansen" Institute for Oceanology, First May Street 40, P.O.Box 152, Varna 9000, Bulgaria; e-mail: peev@io-bas.bg.

de noi metode pentru deschiderea de noi posibilități de conservare, protejare și cercetare științifică.

The first underwater archaeological expedition in Bulgaria took place in 1959 at the aquatory of Cape Kalliakra¹. In the same year, a few months later a second expedition at the aquatory of Cape Maslen nos was organized by the Archaeological Institute of the Bulgarian Academy of Sciences².

Between 1960 and the end of the 1980-ies dozens of underwater archaeological expeditions took place to many sites in Bulgaria³. The most popular institutions for underwater archaeological investigations during this period are the Archaeological Museum in Varna, the Archaeological Museum – Burgas, the History Museum in Kavarna. The Thracology Institute of the Bulgarian Academy of Sciences and the Center for underwater archaeology in Sozopol of the Ministry of Culture were founded in the 70-ies.

Bulgarian underwater archaeology had hard days during the 1990-ies. Only episodic surveys of submerged prehistoric settlements (at Varna Lake, at the mouth of Ropotamo River and Sozopol) or wrecks (bay of Kiten – first half of the 19th century wreck) have been carried out⁴.

At the beginning of the 21st century, in 2001, the first deep water archaeological expedition in Bulgaria took place⁵. The main institution for deep sea archaeology in Bulgaria is the Institute of Oceanology of the Bulgarian Academy of Sciences. A great underwater expedition has been held a year ago, in Turkey, off Sinope, where a few deep sea wrecks from Antiquity to the Early Byzantine time have been found⁶.

Archaeologists have been using SCUBA and related techniques to work in relatively shallow depths as early as the end of the 1950-ies and the beginning of the 1960-ies⁷. Yet they have just recently been able to use deep submergence vehicles, originally developed for military and oceanographic implementation. The discovery of “Titanic” (by the Institute for Exploration of Dr. Robert Ballard and the French institute IFREMER) in 1985, buried under approximately 4000 m

¹ This investigation was accomplished by the Naval Museum – Varna. The results are not yet published.

² GALABOV 1960, p. 19-22.

³ Some of the articles which have relation with underwater archaeological exploration along the Bulgarian shallow water are cited here. It is impossible to mention all the papers regarding the theme (VENEDIKOV 1960, p. 9-11; VELKOV & KEHLIBAROV 1961, p. 5-7; MARGOS & TONCHEVA 1962, p. 1-16; BOEV 1966, p. 27-30; TONCHEVA 1968, p. 28-29; TONCHEVA 1973, p.17-24; LAZAROV 1975; LAZAROV 1988, p. 33-42; LAZAROV 1993, p. 7-18; OGNENOVA-MARINOVA 1975, p. 43-48; OGNENOVA-MARINOVA 1980, p. 26-29; DIMITROV & STOYCHEV 1976, p. 81-83; DIMITROV & ORACHEV 1982, p. 1-11; DIMITROV, ORACHEV, POROJANOV 1982, p. 438-458; RODEV 1985; KARAYOTOV 1987, p. 357-360; IVANOV 1993, p. 19-26; DRAGANOV 1995, p. 225-241; SALKIN 2009 etc.).

⁴ IVANOV 1987, p. 281-283; LAZAROV 1996, p. 51, 53; POROZHANOV 2000, p. 149-154; ANGELOVA & DRAGANOV 2003, p. 9-22; DRAGANOV 1995, p. 233-239.

⁵ PEEV 2004, p. 295-299.

⁶ BALLARD *et alii* 2001, p. 607-624.

⁷As we know, George Bass used for the first time a scientific submarine during excavations along the Turkish Aegean coast. It is apparatus “Asherah” (BASS 1982; DELGADO 1997).

depth, brought the deep-water wrecks to the knowledge of public and made it a major issue for the public consciousness.

During the past decade the autonomous underwater vehicles (AUV) matured and became highly useful and applicable for a variety of scientific and military operations. During the same period AUVs and ROVs reached a high degree of development, alongside with the advance of deep sea archaeology.

Some of the recent deep water archaeological projects at Skerki Bank in the Tyrrhenian Sea, off the coast of Ashkelon (Israel/Egypt), in the Aegean Sea and in the Black Sea (Turkey, Bulgaria/Romania and Ukraine) demonstrated that underwater archaeology can be accomplished with advanced techniques⁸.

Among the principal aims of deep water archaeological investigations in the Black Sea are the discovery and registration of submerged wooden vessels in the anoxic zone and the marking of targets on the continental shelf that might eventually represent traces of submerged prehistoric settlements. This environment is exceptionally suitable for natural conservation of wood because anoxic waters are not suitable for existence of microorganisms decomposing wood, unlike in basins containing other kinds of water. There (in the Black Sea) some very good prospects for such investigations exist. The expeditions in the period 2001-20012 provided a good basis for deep sea archaeology.

The archaeological research in deep sea waters poses a range of difficulties. These include but are not limited to sonar survey, target identification, precision survey and excavation⁹. Below we will discuss sonar survey, target identification and precision survey in a sequence and their relationships to AUV design and implementation¹⁰.

The first step in deep water archaeological research requires the discovery of human cultural remains presenting interest to marine archaeologists, primarily shipwrecks and submerged settlements. The search is guided by a "research design" that specifies questions about the human past to be investigated and explored, and makes use of existing data (historical, archaeological, geological, meteorological, etc.) to determine the search area. Archaeological remains are irregularly distributed across the seafloor necessitating the covering of very large areas. Existing underwater vehicles (AUV and ROV) have proven useful and applicable for this task.

During the summer of 2001 the first deep water archaeological expedition was held on the Western Black Sea shelf, called "Black Sea – Noah 2001". The main purpose of the sonar survey was registration of bottom-located sites, such as ancient shipwrecks and eventual submerged settlements. It was wrought on the five polygons existing on the territory of Bulgaria and Romania in depth between 70 and 350 m. During the "Black Sea – Noah 2001" more than 100 targets were registered.

For the sonar records the apparatus ECHO was used, equipped with

⁸ BALLARD *et alii* 2000, p. 1591-1620; BALLARD *et alii* 2002, p. 151-168; PEEV 2004, p. 295-299; DELAPORTA, YASINSKI, SØREIDE 2006, p. 79-87.

⁹ PEEV 2007, p. 524-527

¹⁰ The remote excavation, even from ROVs is still in its infancy and remains outside the range of current underwater technology. So it will not be discussed here.

depressor, side scan sonar, sub-bottom profile and CTD sensor. The maximum work depth of the ECHO is 3000 m. Its above water weight is 190 kg and the weight of the depressor is 650 kg. The side-scan frequencies range is 100 kHz and 400 kHz.

Sonar search is just the beginning of deep sea archaeology. When AUVs and ROVs return to the surface engineers and archaeologists interpret the sonar records and locate targets, requiring further examination to become properly identified. Archaeological sites have subtle acoustic signatures, often not dramatically differing from geological or other seafloor features. Because of that even the current high-resolution sonar scans cannot always distinguish between natural objects and artifacts.

The suitable example for this is the target 19 from 2001 off the Bulgarian coast. During the "Black Sea 2002" expedition target 19 was investigated, which looked like a shipwreck. Actually it is an ancient shell bank of *Mytilus galloprovincialis* at a depth 155 m.

There are several options for collecting data. Traditionally, sonar surveys have been followed up by ROV operations for target identification. In rare cases, as with the United State Navy's NR-1 nuclear research submersible, sonar search and optical identification can be accomplished during one and the same drive.

How can an AUV collect sufficient data for adequate target identification? Furthermore, this raises the question what kind of information is needed to identify an archaeological site. It must correspond to several requirements. First and one of the most important, is the feature/target natural or anthropogenic? Second, if anthropogenic, what are the size and its three-dimensional character? Third, what is the approximate date of the site? For more present time wrecks, this can often be evaluated by observing and examining hull shapes and materials. For ancient wrecks, the hull is often buried and/or decayed, and the dating is accomplished by surveying the cargo. It is often consisting of ceramic vessels (amphorae) and jars. The shape and size of the amphorae is roughly indicative for the date and origin of a ship.

Archaeological survey represents the careful, comprehensive documentation of a site. In shallow water, this usually involves SCUBA divers and tape-measures, using specially constructed grids and manual recording of a large number of points. However, it appears inapplicable for deep sea archaeology. To this end we use remotely operated and/or autonomous apparatuses.

During the Bulgarian – American expedition "Black Sea 2002", carried out within the framework of project "Black Sea - Noah", eight of the selected 36 targets were explored. The participants in this expedition are Institute of Oceanology at the BAS and the Institute for Exploration, USA. Diagnostics and study made by manned submersible (AUV) PC-8B, equipped with round scan sonar showed that the sites represented shipwrecks. The research vessel is again "Akademik".

A preserved wooden wreck discovered at a depth of 171 m in the anoxic zone of the Black Sea is regarded as particularly intriguing from scientific point of view. This is the first time that remains of ancient and medieval shipwrecks are registered at such depth in the Bulgarian Black Sea continental shelf. The site is

located East of Cape Cherni nos in the Bulgarian economic zone at a distance of 68 km from the shore. The excellently preserved wooden vessel is covered by sediments up to the board line.

The wooden ship is 13x5 meters in size. Because of impossibility to examine the cargo of the ship, a sample extracted from the hull was used for radiocarbon C14 dating. The analysis showed that this is a very well-preserved wooden vessel from the end of the 16th century. The C14 dating of vessel is 410 BP.

A comparatively large wooden ship with a preserved length of 15 m was discovered at a depth of 81 m. The wreck is situated about 12 miles South-East of Cape Kalliakra on the Varna parallel.

The most ancient wreck during the 2002 expedition was found at depth 81 m east of Varna. The target is 13x4 m in size. The site is the amphorae cargo of an ancient ship. The amphorae accumulation has a length of 7 to 8 m and a width of 1 m. Occurrences of amphorae are not rare in the Black sea region.

An amphora lying on the bottom was taken out with the mechanical hand of the submersible. The amphora is made of yellow – brown to pink clay with a height of 101 cm and width 53 cm. This type of amphorae is distinctive for its outstanding height varying from 100 to 110 cm. The body is slim, set as a cone on a thick, high cylindrical foot. The mouth is also cylindrical and proportional to the size of the vessel. The crown is angularly building out. The handles are massive and oval in their cross-section. Chronologically this type of amphorae is referred to the 2nd-3rd century AD.

The last one of the wrecks was discovered at depth of 103 m. The site is located east of the Varna littoral. The wooden ship is 28x6 m in size.

In October 2011 a survey has been held with the main aim to observe shipwrecks in the area north of Varna Gulf and south of Cape Kaliakra¹¹. The site is located southeast of Cape Kaliakra on the parallel of Varna. The depth of the wreck is 86 m. It presents an excellently preserved wooden sailing boat with 52 m length and 8 m width. The ship is sunk on her keel.

The most likely reason for the sinking of the vessel is a very strong storm. During the visual observation not a trace of fire or shot damage of gun shots was seen. It could be assumed that the wheelhouse, the rudder and the masts have been affected by the pelagic trawl.

At this research stage we could not determine accurately how many ship masts there were, but the most probable number is two. On one of the masts a semicircular watch platform is visible, which was mounted on the grotte-mast and was used for observation by the watch sailor. On the broken mast are visible spars shall and over the watch platform is a spar which served for sail fastening.

The bowsprit was projecting to the bow and close under it the contours of the figurehead (probably female) could be seen. Such figures are fitted on almost all European ships from the 16th century. The tradition figureheads to decorate vessels disappeared at the end of the sailing ships era at the end of the 19th and the beginning of 20th century.

¹¹ During the expedition the use of deep-diving equipment and hyperbaric chambers was intended, but due to poor hydro meteorological conditions the deep water dives were canceled.

On the upper deck damages have been observed that are most likely caused by the storm in which the ship sank and/or by pelagic trawl. This may be the reason not to observe superstructure. At the aft the rudder is broken and now is leaning on the railing. On the deck aft a key that had fallen on the wooden door could be seen, probably of the wheelhouse.

The ship has two "Admiralty" type anchors. The first one is on the bottom on the left board. The second one is hanging on the right board. Around the site, maybe because of poor visibility, no objects fallen from the ship can be seen.

The site presents a two mast schooner. This type of ships is widespread in the 19th c. including the Black Sea region. At this moment a more precise dating of the ship is impossible, but according to the anchor type and ship structure it could be referred to the second half of the 19th c. The presence of a female figure suggests that the origin of the ship is Western European.

During the scanning of the same expedition the aquatory southeast of Cape Kaliakra has been observed. Extremely interesting and great promising targets have been located. A sunken ship with approximately 30 m length and 4-5 m width at 80 m depth is present on the site. Although nothing specific can be said for the site, it is most probably a small sailing ship. The presumable date is 18th – 19th c. The vessel is lying on board.

In the last decade of June 2012 two expeditions using RV "Akademik" (June 23rd-26th and June 29th-30th) have been carried out. The scientific crew has been composed of archaeologists and ocean engineers from the Regional Historical Museum - Varna and the Institute of Oceanology – BAS. The main aim of exploration has been sonar survey, localization and identification of underwater targets in the area between the parallels of Cape Kaliakra and Cape Sveti Atanas.

The target has been found on the 25 of June 2012. For the first time this site has been registered as a sonar record in 2001 during the Bulgarian - American expedition using apparatus ECHO¹². It has been localized over again during the 2012 expedition. The depth of the site is 137 m.

A wooden sailing boat is present with 35 m length and 6 m width. The site is up to 6 m high over the surrounding relief. The shipwreck is lying on keel and there is no heel.

The most probable reason for the sinking of the vessel is a strong sea storm, because during the visual inspection no traces of fire or shot damage of gun shots could be seen. Defeats have been observed on the upper deck, most likely caused by the storm during which the ship sank. Around the site there are many scattered large and small objects, which confirm the assumption that the ship sank during a gale. The iron anchor of the so called "Admiralty type" has been observed in the bow part. This type of anchors chronologically belongs to the 18th – 19th c. when it was widespread and practically shifted the earlier types.

At this stage of investigation the wreck is impossible to be more precisely dated but according to the structure of some ship elements and the shape of the anchor one can make the assumption that the ship sank sometimes in the 19th century. Again it should be noted that at this phase of research the dating is

¹² PEEV 2004, p. 295

entirely working.

Conclusion.

The sites are located in an area of intensive fishing vessels trawling for hunting Rapana and turbot. Therefore it is necessary the sites to be studied prior to damage being caused to their integrity. The dangers of destruction or injury to the sunken ancient ships are quite real.

The outcome of the conducted research shows that the Bulgarian Black Sea region has a high potential for marine deepwater archaeological investigations. The use of contemporary underwater technology and equipment (ROVs and AUVs, sonar scans, etc.) enables the collection of a large amount of data sufficiently adequate for the layout and chartering of the archaeological map of the deep sea part of the Black Sea.

BIBLIOGRAPHY

ANGELOVA & DRAGANOV 2003 – Hr. Angelova, V. Draganov, *Underwater archaeological excavations of submerged Late Eneolithic and Early Bronze Age settlements in Kiten Sozopol (South Bulgarian Black Sea coast)*, Thracia Pontica 6.2. In Honorem Minaili Lazarov, Sofia, 2003, p. 9-22.

BALLARD *et alii* 2000 – R. Ballard, A. McCann, D. Yoerger, L. Whitcomb, D. Mindell, J. Oleson, H. Singh, B. Foley, J. Adams, D. Piechota, G. Giangrande, *The Discovery of Ancient History in the Deep Sea Using Advanced Deep Submergence Technology*, Deep-Sea Research Part 1 47.9 (2000), p. 1591-1620.

BALLARD *et alii* 2001 – R. Ballard, F. Hiebert, D. Coleman, Ch. Ward, J. Smith, K. Willis, B. Foley, K. Croff, C. Major, Fr. Torre, *Deepwater Archaeology of the Black Sea: The season 2000 at Sinope, Turkey*, AJA 105 (2001), 4, p. 607-624.

BALLARD *et alii* 2002 – R. Ballard, L. Stager, D. Master, D. Yoerger, D. Mindell, L. Whitcomb, H. Singh, D. Piechota, *Iron Age Shipwrecks in Deep Water off Ashkelon, Israel*, AJA 106 (2002), 2, p. 151-168.

BASS 1982 – G. Bass, *Arheologia na morskoto duno*, Varna, 1982.

BOEV 1966 – R. Boev, *Ekspeditsia za podvodni arheologicheski prouchvania v raiona na nos Kaliakra*, Korabostroene i koraboplavane 1 (1966), p. 27-30.

DELAPORTA, YASINSKI & SØREIDE 2006 - Katerina Delaporta, M. E. Yasinski, F. Søreide, *The Greek-Norwegian Deep-Water Archaeological Survey*, IJNA 35 (2006), 1, p. 79-87.

DELGADO 1997 – J. Delgado, *Encyclopedia of Underwater and Maritime Archaeology*, New Haven (1997).

DIMITROV & ORACHEV 1982 – B. Dimitrov & At. Orachev, *Pristanishtnata sistema po Zapadnopontiiskoto krajbrejje (sredata na II – I holiadoletie pr. n. e.)*, Arheologia 1 (1982), p. 1-11.

DIMITROV, POROJANOV & ORACHEV 1982 – B. Dimitrov, K. Porojanov, At. Orachev, *Pristanishtata na Apolonia i Mesambria*, Trakiiski pametnitsi vol. III. Megalitie v Trakia 2 (1982), p. 438-458.

DIMITROV & STOYCHEV 1976 – B. Dimitrov & K. Stoychev, *Stone Anchors from Sozopol Bay*, INA 5 (1976), 1, p. 81-83.

DRAGANOV 1995 – V. Draganov, *Submerged Coastal Settlements from the Final Eneolithic and the Early Bronze Age in the Sea around Sozopol and Urdoviza Bay near Kiten*, in D.W. Bailey, I. Panayotov (eds.), *Prehistoric Bulgaria*, Madison, 1995, p. 225-241.

GALABOV 1960 – I. Galabaov, *Ekspeditsia Maslennos*, Podvoden sport 7-8 (1960), p.

19-22.

IVANOV 1987 – I. Ivanov, *Podvodni arheologicheski prouchvania na selishte "Arsenala"*, Arheologicheski otkritia i razkopki prez 1986 g., Razgrad, 1987, p. 281-283.

IVANOV 1993 – I. Ivanov, *À la question de la localisation et des études des sites submergés dans les lacs de Varna*, Pontica 26 (1993), p. 19-26.

KARAYOTOV 1987 – I. Karayotov, *Podvodni prouchvania v zaliva pred ustieto na reka Ropotamo*, Strandzhansko-Sakarski sbornik 4 (1987), 5, Sozopol, p. 357-360.

LAZAROV 1975 – M. Lazarov, *Potunalata flotilia*, Varna, 1975.

LAZAROV 1988 – M. Lazarov, *Zagadachnoto kraiisko pristanishte*, Far'88 (1988), p. 33-42.

LAZAROV 1993 – M. Lazarov, *Les sites submergés le long du Port Ouest dans le contexte de l'histoire pontique et méditerranéenne*, Pontica 26 (1993), p. 7-18.

LAZAROV 1996 – M. Lazarov, *Potunalite selishta po zapadnoto chernomorie v konteksta na pontiiskata i sredizemnomorskata istoria*, Istoria 1 (1996), p. 48-61.

MARGOS & TONCHEVA 1962 – A. Margos & G. Toncheva, *Praistoricheskoto nakolno selishte pri s. Ezerovo, Varnensko*, Izvestia na varnenskoto arheologicheskoto drujestvo 13 (1962), p. 1-16.

OGNEENOVA-MARINOVA 1975 – L. Ognenova-Marinova, *Podvodni prouchvania v Nesebar*, Vekove 3 (1975), p. 43-48.

OGNEENOVA-MARINOVA 1980 – L. Ognenova-Marinova, *Podvodni prouchvania v Nesebar*, Muzei i pamtnitsi na kulturata 3 (1980), p. 26-29.

PEEV 2004 – P. Peev, *Bulgarsko-amerikanskadulbokovodna ekspeditsia Cherno more 2001*, Cherno more mezhdurazdvo iztoka i zapada. IX Pontiiski chetenia, 2004, p. 295-299.

PEEV 2007 – P. Peev, *Advanced Technology in Deep-sea Archaeology Applied in the Black Sea Region*, Ancient Civilisations and the Sea. Acta Musei Varnensis 5 (2007), p. 523-530.

POROZHANOV 2000 – K. Porozhanov, *Potunaliat korab pri Urdoviza (predvaritelni belezhki)*, Studia in memoriam Ivani Galabov, Izvestia na Narodnia muzei Burgas 3 (2000), p. 149-154.

RODEV 1985 – Ts. Rodev, *Otvoud sinia prag*, Varna (1985).

SALKIN 2009 – A. Salkin, *Podvodni prouchvania v zaliva na Kavarna, 50 godini podvodna arheologia v Bulgaria*, 2009.

TONCHEVA 1968 – G. Toncheva, *Podvodna arheologicheska ekspeditsia "Cherni nos"*, Korabostroene i koraboplavane 9 (1968), p. 28-29

TONCHEVA 1973 – G. Toncheva, *Novi dannii za targoviata po chernomorskoto kraibrejie prez XVI-XIV v. pr. n. e.*, Vekove 3 (1973), p. 17-24

VELKOV & KEHLIBAROV 1961 – V. Velkov & T. Kehlibarov, *Podvodna ekspeditsia "Nesebar"*, Podvoden sport 9 (1961), p. 5-7

VENEDIKOV 1960 – I. Venedikov, *Ekspeditsia Nesebar*, Podvoden sport 11-12 (1960), p. 9-11