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In the eastern Baltic region, studies of the Mesolithic periods settlements were the most intensive in the 20th century. At the moment, they have slowed down a bit, but in some regions their searches and research are still being actively pursued. In the territory of Lithuania, the Mesolithic period is best known from the flint finds of which largest part consists of various microliths in geometric shapes (Ostrauskas 1996; Rimantienė 1996; Rimkus 2016). It is disappointing, however, that the datable Mesolithic organic material was found only in several places of Lithuania – in the Kabeliai 2 settlement (southern Lithuania) and at the Spiginas and Donkalnis Stone Age burial grounds (western Lithuania) (Butrimas 2016; Ostrauskas 2002). The rest of the material is of stray finds origin and still lacks 14C dating. However, one of the most active problem in the Lithuanian Mesolithic has always been the Baltic coastal zone of the country, where almost no research has been carried out on the sites of this period. In 19th and 20th centuries in the material published by the German archaeologists can be noticed that skeletal parts of the Late Palaeolithic reindeer are found here, including tools made from bones and antlers (Gross 1939). The Neolithic period here is represented by the abundance of artefacts and settlements that have been explored for many years by German and Lithuanian archaeologists (Klebs 1882; Rimantienė 1992; 2016). However, there’s always been a question – where is the Mesolithic? For many years, it was tried to search for it along the main rivers of the coastal area of Lithuania – Danė, Minija and Šventoji and former lagoon lakes, but the results were not so successful. At present, in the coastal zone, there are only a few more generous sites with flints, bone and antler material that may belong to the Mesolithic (fig. 1). In 2002 for the first time in underwater archaeo-

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In search of Lithuania coastal Mesolithic
Review of current data and the aims of an ongoing research project

By Tomas Rimkus


This paper presents the latest data on the Mesolithic settlements in the Baltic Sea coast area of Lithuania. For thousands of years changing natural conditions and the development of the Baltic Sea have led to the fact that there are currently only a few Mesolithic sites known in this region. Their material mainly consists of stray finds, however there are some findings which were found during systematical field surveys and excavations. The underwater archaeological research, alongside with already found relict coasts of the Baltic Sea and flooded ancient pine forest suggests that most of the Mesolithic period settlements should be submerged and nowadays can be found at the bed of the sea. The team of archeologists, bioarcheologists and geologists at the University of Klaipėda has launched a scientific project, which will seek to find flooded and existing Mesolithic settlements in the sea bed and in present coastline area of Lithuania.

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Introduction
In the eastern Baltic region, studies of the Mesolithic period settlements were the most intensive in the 20th century. At the moment, they have slowed down a bit, but in some regions their searches and research are still being actively pursued. In the territory of Lithuania, the Mesolithic period is best known from the flint finds of which largest part consists of various microliths in geometric shapes (Ostrauskas 1996; Rimantienė 1996; Rimkus 2016). It is disappointing, however, that the datable Mesolithic organic material was found only in several places of Lithuania – in the Kabeliai 2 settlement (southern Lithuania) and at the Spiginas and Donkalnis Stone Age burial grounds (western Lithuania) (Butrimas 2016; Ostrauskas 2002). The rest of the material is of stray finds origin and still lacks 14C dating. However, one of the most active problem in the Lithuanian Mesolithic has always been the Baltic coastal zone of the country, where almost no research has been carried out on the sites of this period. In 19th and 20th centuries in the material published by the German archaeologists can be noticed that skeletal parts of the Late Palaeolithic reindeer are found here, including tools made from bones and antlers (Gross 1939). The Neolithic period here is represented by the abundance of artefacts and settlements that have been explored for many years by German and Lithuanian archaeologists (Klebs 1882; Rimantienė 1992; 2016). However, there’s always been a question – where is the Mesolithic? For many years, it was tried to search for it along the main rivers of the coastal area of Lithuania – Danė, Minija and Šventoji and former lagoon lakes, but the results were not so successful. At present, in the coastal zone, there are only a few more generous sites with flints, bone and antler material that may belong to the Mesolithic (fig. 1). In 2002 for the first time in underwater archaeo-

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logical research in the Lithuanian Baltic Sea waters, at the depths of 20–30 m near the Juodkrantė (Schwarzort) logs and trunks of Pinus were found, which shows that dry land has been there for many years (Žulkus 2012, p. 401). The first radiocarbon measurements have shown that these trees belonged to the existed Yoldia Sea and Ancylus lake periods (Bitinas et al. 2003). These deposits led to intensive research in the Baltic Sea bed, refining the coastal line of the Baltic Sea development stages and the search for flooded ancient settlements. At present, the Klaipėda University (western Lithuania) is carrying out a scientific project, which is expected to answer the important issues of the development of the Early Holocene settlements and ancient shore displacement in the Lithuanian seaside.

The main Mesolithic sites in the current coastland area

Aukštumala

Aukštumala bog (Augstumaler moor) is located in the southern part of the Lithuanian coastal zone, it falls into the delta of the largest Lithuania river Nemunas. So far, the development of bog has been little explored but it seems that its formation was mostly influenced by the melting glaciers and fluctuations in the level of the Baltic Sea at the end of the Pleistocene. In the 19th century Aukštumala bog has become known throughout Europe, following the details of its formation and plants research (Weber 1902). Archaeological monuments in the area were also known already at the end of the 19th century. The island on the eastern part of the bog was known for a 2,5 m high hill, which was called as a hill fort by the locals. It was investigated by A. Bezzenberger in 1891. His studies revealed that only big boulders (about 1 m in diameter) and fragments of charcoal were found on the hill (Bezzenberger 1892). It became clear that probably there are no any ancient fortifications. About the same time some corings by the aforementioned bog researcher C. A. Weber were conducted on the island. According to him, the island’s base consists of fluvio-glacial sand with large boulders (Weber 1902). It seems that this natural formation could not be a hill fort. Most likely it was a hill of fluvio-glacial origin, but dur-
ing the 20th century, the bogs’ drainage works and the industrial peat extraction process destroyed the hill. On the other hand, the data on this archaeological monument here has survived, and nowadays this place has been included in the list of state protected cultural heritage objects. Only in 2004 new archaeological investigations were launched on the island, aiming at identifying the settlement of a former ‘hill fort’. Researchers excavated an area of over 100 square meters, but they found something else, something not expected. In the separate parts of the island knapped flint material were found, indicating that the settlements were probably established here in the periods of Younger Dryas or Preboreal (Dakanis 2006). A part of the flint finds was attributed to the Ahrensburgian culture. It was attempted to clarify it after a fragment of tanged point and one finding similarities with the zonhoven type microlith of Ahrensburgian (Grigaliunas 2013, p. 185; Slah 2013, p. 192). It seems that previous interpretation of the flint material and some of its technological data has been somewhat incorrectly interpreted and should now be re-examined. The fragment of the tang of the point in its proximal part, still has a visible fragments of flat ventral retouch. This is in line with the technological tradition of the Swiderian culture willow leaf points (Serwatka 2018; Zaliznyak 1999). Also, it can be confirmed that there is no technological correspondence with any of the finding and between microliths of zonhoven type. Other articles – knives, scrapers and burins – from the technological point of view can be homogenous with the fragment of the tanged point (fig. 2). Unfortunately archaeological investigations did not revealed any organics that would allow dating the settlement more accurately and the present settlements technological-based chronology still needs to be confirmed by radiocarbon analysis. There are currently two sites on the island where flint finds were found. It is now called Stone Age settlements I and II, and peatland with
peat extraction in process is operating around the island (fig. 3). Aukštumala Stone Age settlements are currently the most promising archaeological places for knowing the Early Holocene communities that were located near the shores of the Baltic Ice Lake and the Yoldia Sea. In the future, it is useful to expect the presence of Mesolithic organic material in the vicinity of the existing peatland, therefore the research in this area will be continued within the framework of the ongoing project.

**Palanga**
Stone Age settlement of Palanga is located on the left bank of the river Rąžė in Palanga city. It was discovered in 1958, when during the deepening and cleaning of the Rąžė river, the finds of animal bones and rough amber material emerged in the surface (Kulikauskas 1959). The Lithuanian Institute of History was informed about discovered findings and archaeologists have begun their research. Area of 105 square meters was investigated, bone, antler and flint articles were found. The interest in this settlement and the material found there was revived up relatively recently, when the studies of the Neolithic settlements in the coastal area and relics on the Lithuanian seashore began (Girininkas 2011; Piličiauskas et al. 2015, pp. 5-14; Žulkas & Girininkas 2012, pp. 38-40). Unfortunately, over the years the Stone Age settlement has been almost totally destroyed by urbanization and new buildings constructions.

In 2013–2014 in Palanga, six corings were drilled along the shores of the Rąžė river, near the prehistoric settlement. It was found that the settlement was probably located near the mouth of the river in the former lagoon, which is not currently visible on the nowadays ground surface (Piličiauskas et al. 2015, p. 7). This is also evidenced by well preserved organic finds that were found in the gyta layer. Findings inventory consists mainly of articles made from animal bone and antler (mainly elk and deer). Among them are the cone-shaped bone arrowheads, bone dagger, bone chisels and antler adzes, antler T axe. Flint products consist of blade fragments, knives and conical core (Girininkas 2011, fig. 4). According to the findings typology A. Girininkas dated the site to the Late Mesolithic (Girininkas 2011), however, after re-examination of the site’s chronology, dating changed a bit. The radiocarbon dates of the settlement were obtained by analyzing the antler.

![Fig. 3. Current view of Aukštumala settlements. You can see the small birch forest in the background which is the place where two Stone Age settlements can be found. Photo: Tomas Rimkus.](image-url)
T-shaped axe and the axe made of red deer antler. The dates showed the period of 4,440–3,980 cal BC (Piličiauskas et al. 2015, tab. 2). Based on the northeastern European forest zone this periodization would correlate within the Early Neolithic period. However, no pottery was found during excavations.

**Smeltē**

There’s not much information about Smeltē site. It is only known that in 1974 a man from a construction company brought a bunch of bones, antlers and an amber to the local museum (currently known as the History museum of Lithuania Minor). The site is located in the southern part of Klaipėda city, in the area of shipping docks. After the research, it was found that finds were found during the expansion of the southern part of Klaipėda city port. In 1970–1973, the former bog near the port area was excavated, where the mentioned findings were found (Piličiauskas et al. 2015, p. 15). As one can already understand, the place where the Stone Age finds were found is now destroyed.

The sites tool kit mostly consists of awls, axes, adzes, sockets and pressure tools made of elk and red deer bones and antlers. Besides osseous material, amber ornaments was also found. It consists of trapezoidal, circular and cylindrical pendants, several blanks and preforms (Piličiauskas et al. 2015, figs. 10 & 11). The dating of red dear and elk antler axes showed that site belonged to 5,840–5,000 cal BC (Piličiauskas et al. 2015, tab. 2) however the amber findings suggest that site probably could be dated to the later periods as well.

**Find-places with few stray finds**

In addition to the abovementioned sites where more bones, antler and flint concentrations were found, several sites with several stray finds of the possible Mesolithic age were also found in the coastal zone of Lithuania. One of such locations is Būtingė. It is located in the northern part of the Baltic Sea coast of Lithuania, on the right bank of the Šventoji river, near the confluence of Šventoji and Darba rivers. In the course of the archaeological surveys, along with the Neolithic findings, lancets and trapezoidal points, inserts, and truncated blades that technologically are common for the Late Mesolithic were found (Rimantienė 2005, fig. 383). It is important to emphasize that flint materials used for the production of these articles could have been brought from the south eastern Baltic region where high quality flint can be obtained.

Another site where several finds of flint originated is the site of Šilmeižiai. It is located in the southern part of the Baltic Sea coast, on the right bank of the nearby Šyša River. The site is located a few kilometers to the East of the above-mentioned Aukštumala settlements. The locality was found during archaeological surveys in western Lithuania in 2002, at the operating sand quarry (Girininkas & Zabiela 2003, p. 303). Blades and blade core were found in the upper sand layer, and from a technological point of view this material may be dated to the Late Mesolithic. However, the site suffered severe damage from the sand quarry, therefore nowadays it should be considered as totally destroyed.

In 1865 in the city of Klaipėda in the Kalniškiai (also known as the former Bachmann manor), five bone spearheads (Gross 1939, pp. 65–67) were found in the excavation of the marl, and later findings were transmitted to the museum of prehistory and early history in Berlin. According to the researches of the museum, only one of the original spearheads has survived until our days and is kept at the museums archives (Neumayer 2018, p. 43). The 20th century Stone Age explorers of the eastern Baltic region attributed them to the final Palaeolithic Swiederian culture, indicating that the raw material from which they were made were bones and antlers of the reindeer (Rangifer tarandus) (Rimantienė 1996, p. 31). However, it is now believed that the spearheads can be attributed to the Boreal period and are made from bones of the red deer (Cervus elaphus) (Neumayer 2009, p. 27). This hypothesis must be confirmed by radiocarbon studies, but some historiographical facts can partly support this idea (Rimkus 2018, pp. 154–155). First of all, the circumstances of the findings (the first intensive peat formation began around the Preboreal–Boreal period), and well-established analogies in the settlements of the Latvian Lubana Lake microregion and in the Beregovaya 2 Mesolithic settlement of the Ural region of Russia indicates Mesolithic chronology.
Also, in the first half of the 20th century H. Gross, from the pollen found near the spearheads dated it to the 8,500–8,100 BC (Gross 1939). Based on the modern northern Europe Stone Age chronology it would correlate with the already mentioned beginning of the Boreal period. However, as already expressed before, all this still needs to be confirmed by radiocarbon data.

Underwater research

The systematic underwater archaeological research of the Baltic Sea bottom, with the aim of finding historical sunken ships, started in Lithuania in the period of 2001–2002. In those years seamen informed scientists that in the Baltic Sea, about 3–8 km from Juodkrantė coast, anchors of sunken 17th–18th century vessels were pulled out. In addition, information received from commercial fishing vessels indicated that fishing nets are still attaching over something in these areas. In 2002 Klaipėda University carried out the first field survey expedition to fixed areas near the Juodkrantė coast. At first, bottom of the seabed was scanned with a side-scan sonar. Its data showed that there are unclear objects on the bottom that could remind the sunken ships. The researchers, having sunk at a depth of 27 m, found a large pine tree trunk, over which the fishing net was attached (Žulkus 2003, p. 324). Several more remnants of trees were discovered a few meters away from this stump. According to the explorers, the stumps were well preserved, sandy ground was surrounded by them. The side-scan sonar data showed that the bottom can have way more bigger number of tree remnants. It was decided to call this area RF-I (Relict Forest I). In 2003 the first radiocarbon investigation of submerged wood from the RF-I area was accomplished. It showed that trunks falls into the 9,100–8,000 cal BC period and are assigned to the phases of the Yoldia Sea and Ancylus lake (Bitinas et al. 2003). In 2010 investigators returned to this area for more underwater research. This time the aim was to identify more areas with tree remains on the seabed and to take more samples for radiocarbon studies. Surveys continued in 2011 and 2012. At the bottom more several hundred objects were found with side-scan sonar, which were examined by the divers. Most of them were found to be the remains of the same trees, most of them still attached to the soil with roots (Žulkus & Girininkas 2012). The new concentration of submerged tree remains found in RF-I was identified by providing them names using alphabetical letters (for example, RF-I-A). They concentrated at a depth of 24–29 m. Within new investigations not only tree trunks but also large logs were found (fig. 4). In the regions of RF-I-C and RF-I-P small areas of peat with gyttja, up to 25–40 cm in thickness, were found covering the seabed. Their dating showed that they began to form mainly during the Preboreal and Boreal stages, and in these areas could have existed small water bodies (Žulkus &
Fig. 5. All currently known radiocarbon dates of submerged forest and stakes in RF-I, RF-II and RF-III. Dates were calibrated by using OxCal v.4.3.2 (Bronk Ramsey 2017) and IntCal13 atmospheric curve (Reimer et al. 2013).
Girininkas 2014). Pollen analysis has shown that *Pinus* and *Betula* taxa are rich in peat. During the Boreal period they still dominated, with the small *Ulmus, Alnus, Populus*, and *Corylus* impurity (Žulkus et al. 2015, p. 10). Investigated sediments showed that during the Mesolithic there existed a shallow freshwater basin, while diatom analyses added that it was a rather high water temperature water body (Žulkus et al. 2015, p. 11). During the systematic underwater searches, more sunken trees were found. Currently, in addition to the already known RF-I by the Juodkrantė, the RF-II was found near Melnragė and RF-III near the Klaipėda port gates. These areas also contained tree trunks and logs which are datable to the periods of Yoldia Sea and Ancylus lake as well as to the beginning of Lithorrina Sea (fig. 5).

In the western part of the Baltic Sea underwater archaeological research has been used for some time to find submerged Mesolithic settlements. This is especially noticeable on the shores of northern Germany and southern Scandinavia, where relatively small depth prehistoric artefacts were detected (Fischer 2007; Goldhammer & Hartz 2017; Larsson 2017). The remains of the pine, that are found at the depth of approximately 25 m are found at Häno Bay, in the south-eastern part of Sweden (Hansson et al. 2018b). In addition to the tree trunks and logs, human presence has also been found: animal bones with man-made cut-marks, burnt wood and fishing traps (Hansson et al. 2018a, p. 9; Hansson 2018; Nilsson et al. 2018, pp. 336–340). These and the findings found in the territorial waters of Lithuania are one of the oldest indicators that shows ancient coasts and dry land of the Baltic Sea.

**Project ReCoasts & People**

At the end of 2017 the team of archaeologists, bioarchaeologists, geochemists and geologists at Klaipėda University has launched a European Union funded research project *Man and Baltic Sea in Meso-Neolithic: Relict Coasts and Settlements Below and Above Present Sea Level. ReCoasts & People*. One of the goals is to identify Mesolithic settlements in underwater landscapes. So far, the discovery of submerged remains of trees, peat deposits and pollen studies have shown that the former land was very favorable for people to establish their settlements. Unfortunately, data on their existence is still lacking. On the other hand, the Baltic Sea at Klaipėda regularly flushes the various prehistoric artefacts into the shore. In 2015 one such finding was washed between the beaches of Melnragė and Olando kepurė. Its the so called T shape axe made from red deer antler, which was

![Fig. 6. T shape axe made from red deer antler, dated to 5218–5017 cal BC (KIA-53036). Photo: Tomas Rimkus.](image)
dated to 5218–5017 cal BC (KIA-53036) (fig. 6). As previously expressed, RF-II was detected near the Melnragé, so it is likely that somewhere near flooded Mesolithic settlement is being washed by the seawater. Radiocarbon age confirms that submerged tree trunks and axe are contemporaneous in RF-II area (fig. 5). Another important finding that confirms and promotes further searches for submerged prehistoric settlements is in 2016, in the vicinity of the above mentioned RF-III, at the depth of 11 m found wooden stakes driven into the soil (fig. 7). They resemble a clear cuts made by human. They were interpreted as a possible fragments of fishing structure and its cuted fragment was dated between 7610–7462 cal BC (Žulkus & Girininkas 2018, in press). This project will also be aimed at finding and exploring the Mesolithic period settlements located not only at the seabed, but also on the present Lithuania coast. The first investigations were already conducted at the Aukštumala sites and preliminary results shows that currently it is the most earliest Stone Age settlement in the coast area of eastern Baltic (the results will soon be published). From the point of view of Mesolithic, the Lithuanian present coastal area is still very little studied, therefore the research will concentrate on wetlands located near the Curonian lagoon and Nemunas river delta, which, according to geologists, have enormous potential for discovering prehistoric settlements. The research project will be continued until the end of 2021. During this time, it is expected to provide data on the Mesolithic settlements in the present and the former Baltic sea landscapes, and to clarify the displacement of shores of Yoldia and Litorrina Seas and Ancylus lake.

Fig. 7. Wooden piles driven in the soil near the RF-III and dated to the Ancylus lake stage. Photo: Vladas Žulkus.
Conclusions
The current situation of the Mesolithic research on the Lithuanian coast is rather poor and there are only a few places where more archaeological inventory of this period was found. In 2002 the pine remains found in the bed of the Baltic Sea near Juodkrantė, and later in Melnragė and Klaipėda areas, gives hope that the oldest Mesolithic settlements in this area are now flooded by seawater. About their existence speaks archaeological objects (T shape axe) and near the RF-III found wooden stakes dated to the Ancylus lake period. In 2017 started project will seek not only to clarify the ancient Baltic Sea stages coasts, but also to locate and investigate Mesolithic settlements under water and on the present shoreline.

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