

THE INTERNATIONAL ARCHAEOLOGISTS' WORKSHOP IN APUOLĖ

GINTAUTAS ZABIELA

From 4 to 6 April 2011, the archaeologist Timo Ibsen (Zentrum für Baltische und Skandinavische Archäologie in der Stiftung Schleswig-Holsteinische Landesmuseen Schloß Gottorf), the geophysicists Dr Harald Stümpel and Christina Klein (Christian-Albrechts-Universität zu Kiel, Institut für Geowissenschaften), and three students from Kiel University in Germany visited Lithuania.

The purpose of their stay was to introduce to students of history and landscape archaeology at the Faculty of Humanities of Klaipėda University the essence and achievements of non-destructive research methods, and to test these methods under conditions in Lithuania. They also brought the necessary equipment. The intensive three-day programme consisted of two parts: theoretical lectures and a practical training session.

The workshop started with the theoretical part, in other words, lectures in the Faculty of Humanities at Klaipėda University. During the lectures, Dr Stümpel presented non-destructive methods of archaeological research, the principles of their functioning, and achievements gained in the course of their application in surveying valuable archaeological features. C. Klein briefed listeners on the application of these methods in a survey of the site of a village dating from the Viking period in Suzdal (in the Russian Federation). Johannes Frenzel discussed geophysical surveys conducted over the last two years in Lithuania (Kernavė) and Latvia (Grobiņa). Timo Ibsen presented the application of non-destructive methods at a joint German-Russian archaeological expedition in Kaup (now Mokhovoye) in the Kaliningrad region of the Russian Federation from 2009 to 2011.

For the practical work, Apuolė hill-fort (near Aleksandrija in the Skuodas district, its unique code in the Register of the Cultural Heritage is 24505), its hill foot settlement and the area surrounding the hill-fort were selected as a famous and suitable site. Besides a geophysical survey, the practical work included a visual survey of the environs of Apuolė, mostly along the

River Luoba, for the purpose of finding yet unknown valuable archaeological features. Before the practical part of the workshop, participants were taken on a short excursion to the old part of Klaipėda, and also to the hill-forts of Įpiltis (in the Kretinga district) and Puodkaliai (in the Skuodas district).

Klaipėda University's Institute of Baltic Sea Region History and Archaeology was represented at the workshop by the author of this article, Dr Romas Jaročkis, Roman Širouchov (PhD student), Egidijus Abromavičius, Daiva Jazbutytė, Agnė Jocaitė, Raimonda Nabažaitė and Edvinas Ubis (MA students), and Aleksandra Arbuzova, Gvidas Slach and Eglė Stankevičiūtė (holders of BA degrees). Also on the first day were Vėta Bukantaitė and Karolina Geštautaitė, and from the German side, the already mentioned experts and the students Martin Proksch, Kristin Burmeister and Johannes Frenzel (Fig. 1).

The expedition stayed in Mosėdis (in the Skuodas district). From the point of view of organisation, R. Nabažaitė made a significant contribution to the expedition's work. Participants in the expedition travelled to the site in a minibus provided by Klaipėda University, while the guests drove there in their own car. The author of this report, who also managed the survey works in Apuolė, recorded the workshop and the survey work on a Sony camera in HD format. The initial version of the documentary 'Apuolė. Theoretical Seminar and Workshop', based on the footage, was made by Aušra Zabielenė.

Today, the hill-fort at Apuolė is probably the archaeological object in Lithuania that European historians and Viking period archaeologists know best. Apuolė became famous at the end of the 19th century thanks to a mention of it in *The Life of St Ansgar*, written in the second half of the ninth century by St Rimbart, Archbishop of Hamburg and Bremen (St Ansgar [801–865] was also Archbishop of Hamburg and Bremen). This literary source describes the Vikings' campaign in Courland, the defeat of the Curonians, and the siege

I

PEOPLE AT THE CROSSROADS OF SPACE AND TIME: A NEW PROJECTS IN THE BALTIC REGION



Fig. 1. Participants in the expedition. First row, left to right: E. Abromavičius, A. Arbuzova, E. Stankevičiūtė; second row: A. Jocaītė, C. Klein, D. Jazbutytė, R. Shirouchov, M. Proksch, H. Stümpel; third row: T. Ibsen, J. Frenzel, R. Nabažaitė, G. Slach, E. Ubis, K. Burmeister, G. Zabiela.



Fig. 2. Apuolė hill-fort seen from the southwest (photograph by G. Zabiela).



Fig. 3. The top of Apuolė hill-fort seen from the east (photograph by G. Zabiela).

of Apuolė (Mickevičius 2004, pp.17, 81-82). The campaign has been dated to the year 853. It is the oldest mention of a definite place in the present-day Republic of Lithuania. The Lithuanian historian Simonas Daukantas (1793–1864) was the first to indicate the site of Apuolė hill-fort, in around 1837, whereas it was located exactly by Eduard Wolter (1856–1941) and Juliusz Döring (1818–1898) in 1887.

The hill-fort is on a promontory on the left bank of the Luoba, a right tributary of the River Bartuva, at the confluence with the Brukis, and on the latter's right bank (Fig. 2). The hill top is an irregular quadrangle, oblong in an east-west direction, and 100 by 80 metres in size (Fig. 3). It used to be surrounded by a rampart on all sides; the rampart is best preserved on the eastern and the southern sides for a length of about 160 metres, whereas in other places it has been destroyed by slippage. On the eastern side, there is a rampart 75 metres long, eight metres high, and 38 metres wide at its base (often called the 'large rampart'), the descending southern edge of which surrounds the hill top from the southern side (this part of the rampart is often called the 'small rampart'). At this point, the rampart is 1.5 metres high and 16 metres wide at the base. At the junction of both ramparts in the southeast corner of the hill top, there used to be an entry to the hill top (a depression can still be seen). East of the large (eastern) rampart, there used to be a ditch ten metres wide and three metres deep, which is now nearly completely filled in. The bailey is situated to the east of this ditch.

The bailey is a trapezium in shape, oriented in an east-west direction, 24 metres long, 40 metres wide on the western side, and 60 metres wide on the eastern side. On the side of the bailey, there is a rampart one metre high, and six metres wide at the base, whereas on the other side of the rampart there is a ditch 4.5 metres wide and 0.3 metres deep, which has turned into a ravine in the northern part (Baubonis, Zabiela 2005, t. II, pp.362-365).

The sides of the hill-fort facing the streams are steep, and nine to ten metres high. The western and the northern sides have been destroyed by erosion, the western side was restored when tidying up the hill-fort in 1988. From the material of the excavations carried out in 1931, we know that there was a village cemetery on the large rampart in the 17th century (ten graves have been excavated on the site of the rampart section). The hill-fort is thinly covered with deciduous trees (mostly oaks), whereas the outer part of the large rampart and the bailey are overgrown with bushes. Since August 2004, an annual festival of live archaeology has been held at the hill-fort on the second last weekend in August (Fig. 4).

The hill-fort was excavated by E. Wolter from 1928 to 1930, by Birger Nerman (1888–1971) in 1931, and by Vladas Nagevičius (1881–1954) in 1931 and 1932. The total area excavated on the hill top and both ramparts was 1,561 square metres. The excavation material was published in 2009 (Lamm 2009). The material from the excavations carried out by Nerman and Wolter was published in detail, whereas the data of the excavations carried out by Nagevičius has been published only in part. When the publication was ready for printing, draft plans for the excavations of both ramparts were found at the Vytautas the Great War Museum. A documentary on the 1931 excavations of the large rampart, a poor copy of which has survived to this day, was not used for the publication either. In the future the documentary should be digitised, as it is the first footage of archaeological excavations in Lithuania.

Next to Apuolė hill-fort are its hill foot settlement and a burial site. Consequently, we have here an entire complex of valuable archaeological features dating from the fourth to the 13th century. The hill foot settlement is to the east and south of the hill-fort, and covers an area of at least ten hectares. Nobody has ever made an attempt to determine its limits accurately. In 1931, Birger Nerman dug three survey pits in the southern part of the hill foot settlement, which he called a town (*Stadt*). In these survey pits, he found some smooth-surface pottery, clay plaster and slag. Only later on was it stated that this part of the hill foot settlement was ploughed. In 1996, R. Jarockis drilled boreholes in this part of the settlement, and found that the cultural layer was up to 35 centimetres in thickness. When boreholes were drilled to the east of the hill-fort, no cultural layer was found (Jarockis 1998, p.69). In the aerial photographs of the environs of the hill-fort taken by the famous Swedish aerial photographer Jan Norrman in May 1996, the area covered by the hill foot settlement can be seen quite clearly; however, despite this, of the entire large area, only the southwest edge next to the access road to the hill-fort, approximately one hectare in area, is currently protected.

At 300 metres north of the hill-fort, on the other side of the Luoba valley, on a hill situated on the right bank of the river and in the fields of the village of Šarkė, is Apuolė burial site, dating from the second to the 13th century. The burial site was excavated by E. Wolter in 1928, by B. Nerman in 1931, and by Zenonas Baubonis in 2001. The 1928 excavations included the site of Šarkė village cemetery, called Markapiai (or 'plague cemetery'). An area of 24 square metres was excavated, and the finds included late (18th–19th century?) inhumation graves with bodies placed in coffins, and individual grave goods (bronze ornaments, drinking horn mounts, and pieces of horse equipment) from



Fig. 4. A festival in Apuolė hill-fort on 27 August 2011 (photograph by G. Zabiela).

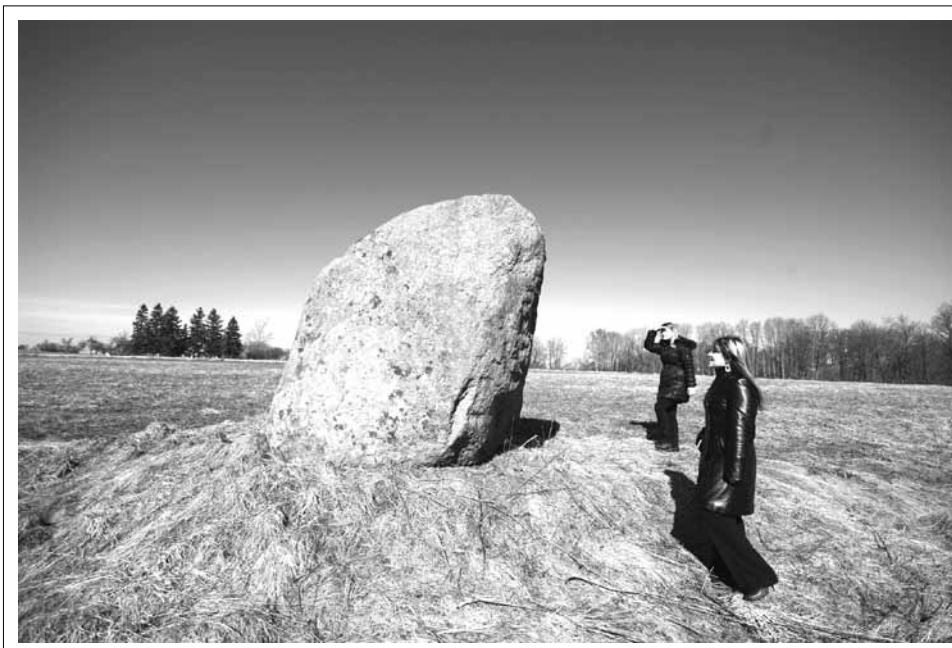


Fig. 5. K. Geštaitaitė and V. Bukantaitė inspect the Apuolė boulder, with its small pits, from its eastern side (photograph by G. Zabiela).



Fig. 6. The magnetometer is ready for work, with G. Slach and K. Burmeister (photograph by G. Zabiela).

earlier disturbed cremation graves. In 1931, B. Nerman excavated the ancient cemetery at three points; he found eight individual graves, and quite a large number of finds from undisturbed or disturbed cremation graves.

The purpose of the excavations carried out in 2001 was to determine more precisely the boundaries of the protected burial site. The total area excavated was 85 square metres, where seven graves and four offering (?) pits containing 131 various bronze and iron artefacts or pieces of them, as well as postherds of 41 pieces of handmade pottery, were found. All the artefacts date from the tenth century. Another 290 different metal artefacts or pieces of them were found during the survey of an area of 3.7 hectares west and north of the protected burial site area. They have been dated to a broader chronological range, the period between the tenth and the 14th century (Baubonis, Kliaugaitė 2002, pp.109-113).

The burial site at Apuolė hit the headlines once more in 2009, when two 'poachers' were caught red-handed in the area of the burial site using illegal metal detectors. They caused immense damage to the burial site by picking up metal artefacts from an area of 0.3 hectares (61 pit-holes were found). Criminal charges were filed against 'poachers', and the court proceedings are not over yet.

Another archaeological object that is apparently not directly related to Apuolė hill-fort is situated 320 metres southeast of the hill-fort. This is the Apuolė boulder, with 24 pieces of small dishes, three to nine centimetres in diameter and 1.2 to 2.5 centimetres in depth, and the carved inscription 'ML 1818' (Fig. 5). The boulder consists of reddish granite, 2.8 by 2.3 by 2.3 metres in size, and it was put in its present-day site by land reclamation workers in the 1970s (the original location was 270 metres to the south) (Dakanis *et al.* 1988, p.182).

During the practical part of the workshop in Apuolė, the application of non-destructive survey methods was focused on the hill-fort and the foot settlement south of the hill-fort. The very limited time (two days, of which the second was unfavourable due to heavy rain) narrowed the scope of the work that was actually carried out. Nevertheless, a large amount of work was done. The survey work was carried out in parallel at three locations. At the hill-fort foot settlement, a magnetic survey image was obtained first (H. Stümpel), and then a piercing probe was used to take samples from individual anomalies (T. Ibsen, J. Frenzel). At the hill-fort, a geoelectric profile of the large rampart was obtained first, followed by a georadar profile of the large rampart, a georadar and geoelectric profile of the small rampart, and a georadar survey image of part of the

hill top (C. Klein), from which two samples were taken (T. Ibsen). A visual surface survey was carried out in the east and southwest parts of the hill foot settlement (G. Zabiela). The coordinates required for marking the points of the application of non-destructive methods were obtained by using a Lieca GPS station (magnetic survey image) and a tacheometer (georadar survey image and geoelectric sections; in this case the trees growing on the hill-fort blocked the GPS signals). For the same reason (the forest), the coordinates could not be linked to the stationary geodetic benchmark situated closest to Apuolė hill-fort at a distance of 900 metres to the south (H_{abs} 71.30 m). The eventual minimum tolerance of such measurements is two centimetres, whereas in the presence of signal interference the tolerance did not exceed 20 centimetres.

Attention was focused on using the magnetometer. Six Fluxgate type (Ferrex DLG 4.032.82) magnetic transducers manufactured by Dr Förster's company were mounted at 50-centimetre intervals on a push trolley (Fig. 6). This way, the field works, simultaneously and in parallel profiles, covered a lane three metres in width. Each transducer consists of two such magnetometric sensors, mounted vertically at a distance of 65 centimetres from each other. The sensor resolution is approximately 0.5 nT. The range of magnetic permeability depends on the size of the object being searched for. Larger anomalies are better localised at greater depths too. As the magnetometer is pushed, the average working speed is 0.6 to 1.2 m/s. The magnetometer data is recorded ten times per second in the direction of the profile as the difference between two signals with a resolution of 0,0238 nT, and entered once a second into an eight-channel digital data storage. This data is synchronised with the data transmitted to the computer from the GPS antenna mounted on the magnetometer trolley in real-time at a speed of five coordinates per second.

By employing this technology, a magnetometer survey of an area of about 350 by 100 metres (3.5 hectares) was carried out (two persons in two working days). A final black-and-white survey image of the surveyed territory was obtained, the resolution of which is 20 by 20 centimetres (Fig. 7). In the survey image, the lowest nT values are the brightest, and the highest values are the darkest. The magnetic survey image contains a large number of different recorded anomalies, a more detailed interpretation of which is a matter for special studies and field surveys. However, some work was done just after the survey. A piercing probe one metre long was used to take 11 samples from five detected anomalies (in clearer anomalies, several [up to four] samples were taken, in order to obtain contrastive results identifying the anomaly) (Fig. 8). The samples



Fig. 7. The magnetic survey image of the surveyed southern part of the hill-foot settlement (by H. Stümpel).



Fig. 8. Taking samples in hill-foot settlement. From left to right: R. Jarockis, T. Ibsen (drawing out the probe) and J. Frenzel (photograph by G. Zabiela).



Fig. 9. Georadar probing of an area on the top of the hill-fort, with G. Slach carrying the cable and R. Nabažaitė drawing the radar (photograph by G. Zabiela).

were taken by first driving the piercing probe into the soil, and then by turning and pulling it out; a special groove would contain a soil sample that represented the stratigraphy very well. The probe and the soil contained in it would be documented on site by filling in a special form and taking photographs, and finally by taking the necessary samples for further analysis (the latter material is still being processed). In anomalies 1, 3, 4, 5 and 7, under the top 12 to 32-centimetre layer of ploughed soil, a cultural layer 15 to 42 centimetres in thickness, and dark grey in colour, containing charcoal and tiny pieces of clay plaster, was found, whereas in anomaly 4 the remains of a hearth (?) were also found (at a depth of 40 centimetres within the cultural layer, there was a four-centimetre-thick layer of reddish sand with tiny pieces of clay plaster).

In view of the probing results, the magnetic survey image of the hill-fort foot settlement of Apuolė hill-fort makes it possible to record reliably different anomalies, a large part of which are related to human activity (such as hearths or large iron artefacts). The anomalies are quite contrastive and have defined shapes. Relevant experience in deciphering magnetic survey images allows us to distinguish, with a rather high level of reliability, these anomalies from natural structures (such as stones). In the magnetic survey image, we can see clearly the locations of drainage trenches from the Soviet period, whereas the locations of drainage trenches from the first half of the 20th century are not so clear. The disadvantage of this method is that a magnetometer cannot be used in urbanised (in the case of Apuolė, next to a farmstead) and overgrown areas. The example of Apuolė shows that we can use a magnetometer to determine, on the basis of the arrangement of anomalies, the areas of Iron Age settlements, at least in western Lithuania.

The georadar was tested in the hill-fort. Here, it was used for obtaining profiles of the large rampart and the small rampart (1 and 4 respectively). It was also used to survey an area of approximately 20 by 12 metres (240 square metres) in the northeast part of the hill top (Fig. 9). The best vertical resolution of the layers is obtained by using a ground penetrating radar (GPR). Short-time reflections of high-frequency (200 and 400 MHz) electromagnetic pulses are recorded in real-time. The assessment of the duration of a reflection is important when the exact signal propagation speed in the respective type of soil (the average electromagnetic wave propagation speed is 8–12 cm/ns) is known. At Apuolė hill-fort, hand-towed GSSI 2-channel measuring equipment (SIR-20) was used. The antenna frequency was 200 MHz at the rampart, and 400 MHz on the hill top. A lower-frequency antenna ensures better penetration to the depths, whereas a higher-frequency

antenna renders a more accurate image of surface layers. Georadar-processed data is produced as radiograms, or longitudinal profiles.

In terms of the surveyed area, the capacity of the georadar used in Apuolė is several times lower than that of a magnetometer. Also, it has not yet been mastered as far as the interpretation of recorded structures is concerned. Since the georadar profile in the large rampart was made north of the location of the rampart's cross-section made by V. Nagevičius in 1931, certain stratigraphic data was already available for the interpretation of the radiogram. In it, we can single out the surface of an earlier rampart (Fig. 10). Meanwhile, in the profile of the small rampart, we can only trace the former surface of the hill. On processing the radiograms obtained during the survey of the hill top of the hill-fort, some vague anomalies could be seen; at the locations of two of these anomalies, samples were taken using a piercing probe. There, under a brownish layer of formerly tilled land 16 to 22 centimetres thick, a brown cultural layer 20 to 24 centimetres thick and containing individual charcoal pieces was found, and only in the second sample, at a depth of 13 centimetres, was a layer eight centimetres thick, and of a more intense brown that contained a large number of charcoal pieces, found.

This was the second time that the non-destructive geoelectric (electric resistance) survey method was employed for surveying hill-fort ramparts in Lithuania (the first time was in 2009 for determining the location of a palaeolake next to the village of Netiesos in the Alytus district [information from G. Piličiauskas]; however, that did not produce archaeological results [Marcinkevičiūtė 2010, p.501]). In the large rampart and outside it, an electric profile 80 metres long was taken, whereas another electric profile 45 metres in length was taken in the small rampart and in the southern part of the hill top. Cable multi-electrode RESECS equipment with 16 contact electrodes manufactured by GeoServe was used for the survey. Six additional electrodes were connected for taking the long profile across the large rampart (Fig. 11). Barker RES2DInv. software was used for the analysis of the data. During geoelectric surveys, soil resistance is measured, which depends mostly on the liquids contained in the soil (normally water). Clay also has an influence on resistance. An electric current is supplied to the ground via two electrodes, and the potential difference between the electrodes is assessed. Since the current value is known, parameters such as resistance, potential difference and geometric factor are calculated, and then a depth profile is produced through inversion and computer modelling. In the depth profile, higher-resistance areas are shown in red, and lower-resistance ones are

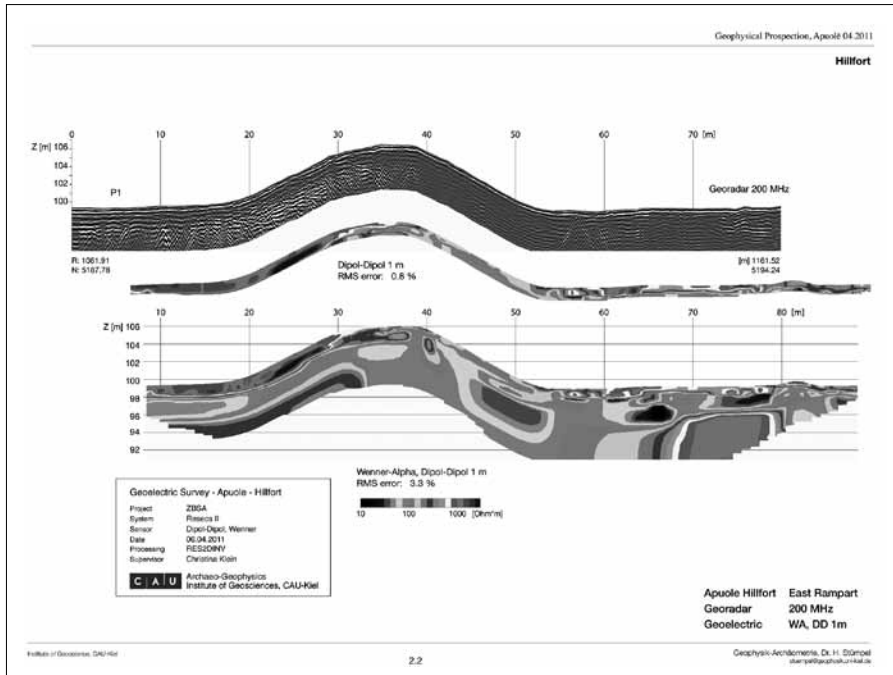


Fig. 10. Georadar and geoelectric profiles of the hill-fort's main rampart (by C. Klein).



Fig. 11. Laying the electric resistance measuring cable on the outer side of the hill-fort's main rampart. From left to right: D. Jazbutytė, A. Jocaitė, R. Jarockis (photograph by G. Zabiela).



Fig. 12. The survey of the ploughed hill-fort foot settlement east of the hill-fort. From left to right: E. Ubis, R. Jarockis, E. Abromavičius (photograph by G. Zabiela).

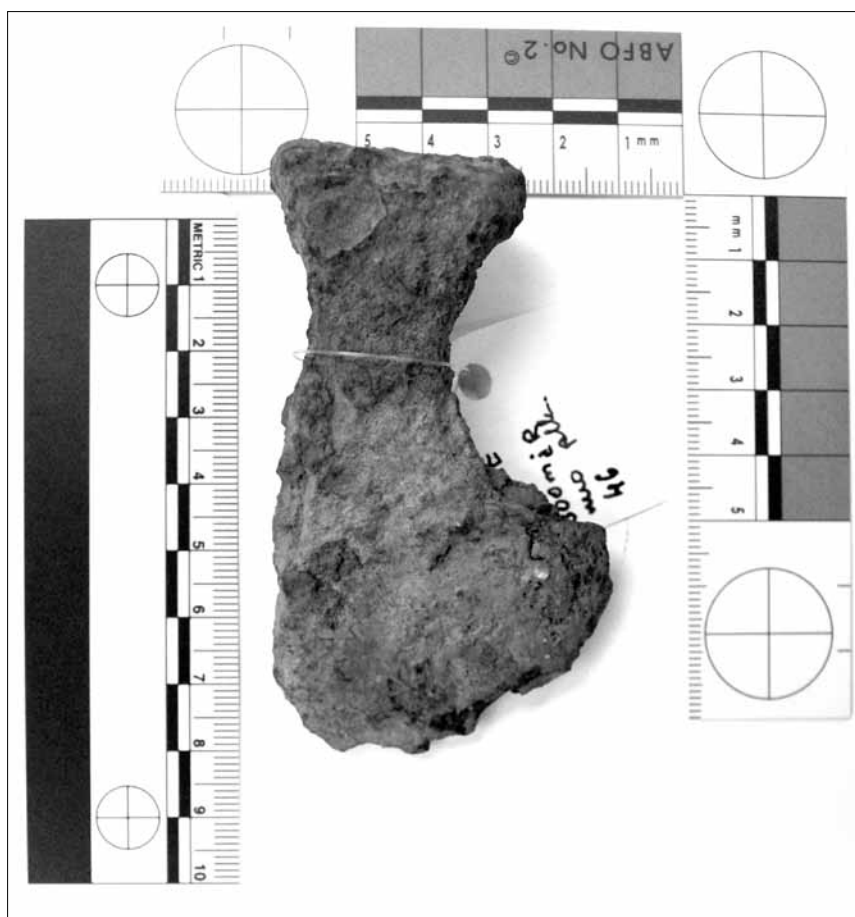


Fig. 13. An iron axe from the hill-fort foot settlement located to the east of the hill-fort (photograph by E. Ubis).

shown in blue (Fig. 10). With a large number of parallel profiles available, we can create a data 3D array. In Apuolė, different measuring configurations were used: Dipol–Dipol for improved lateral resolution, and Werner alpha for deeper penetration into the ground.

The geomagnetic method produces data that is most difficult to interpret; besides, it is a slow-paced method, which is preferably employed for surveying large mounds. It produces more geological data, whereas the interpretation of anomalies recorded by employing this method is still unclear, even if archaeological excavation data is available, as was the case with the large rampart in Apuolė. The accuracy of its data is lower than that of a georadar, too. Geoelectric measuring is most often carried out in cases where georadar is not quite efficient (for instance, because of a too high clay content in the soil), or when the device does not ensure satisfactory penetration to the depths. In the case of Apuolė, the geoelectric survey did not make it possible to determine the structure of the ramparts, but perhaps only to state that the structure was not uniform. In this case, more information can be obtained by comparing the geoelectric profile with the georadar profiles, and that is exactly what was done in Apuolė. However, this

test also needs further interpretational insights, and verification by carrying out excavations.

During the visual survey of the environs of the hill-fort, most attention was focused on the ploughed areas to the east and southwest of the hill-fort, where the probability of finding something was highest. The area of the settlement south of the hill-fort was fallow; therefore, a more detailed visual survey was not conducted there.

The visual surface survey produced excellent results. For a long time, the land in the hill-fort's hill foot settlement east of the hill-fort, beyond its bailey and the protected territory, has been ploughed. On the surface of the ploughed soil, in its depressions, we can see soil of a more intense grey colour, which is a disturbed cultural layer (Fig. 12). The unprotected part of the hill foot settlement covers an area of approximately six hectares. The finds from the soil surface of this area include a miniature iron blunt-ended axe 8.9 centimetres long with a blade 5.2 centimetres wide (Fig. 13), a piece of a quadrangular clay weight belonging to a loom (such whole weights were found in Apuolė hill-fort during excavations) measuring 7.5 by 3.9 by 2.7 centimetres, three whetstone fragments (3.9 by 3.2 by



Fig. 14. Clay plaster *in situ* in the northeast part of the ploughed hill-fort foot settlement (photograph by G. Zabiela).

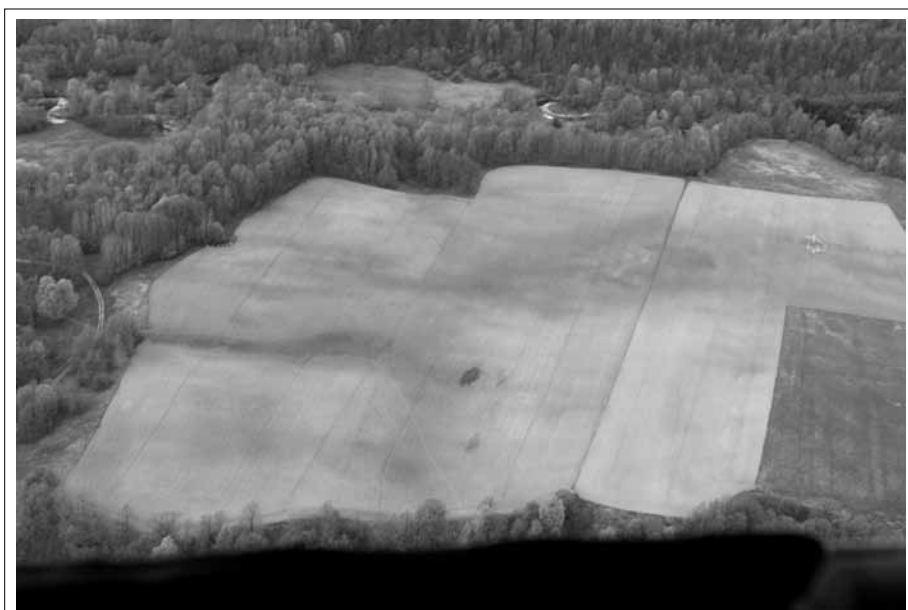


Fig. 15. An aerial view (from the south) of the eastern part of the hill-fort foot settlement of Apulè hill-fort (photograph by G. Zabiela).



Fig. 16. An exposure of the cultural layer to the southwest of the hill-fort seen from the south (photograph by G. Zabiela).

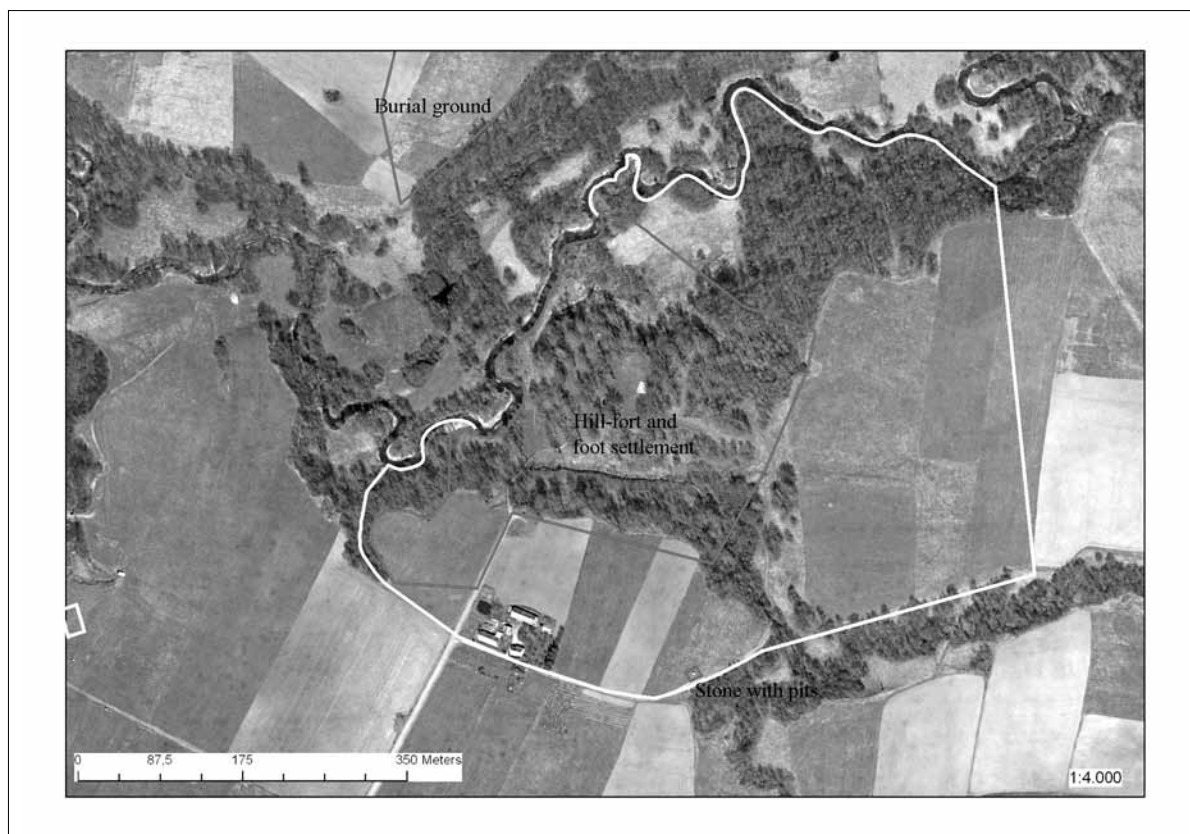


Fig. 17. A plan of Apuolė complex of valuable archaeological features. The white line marks the area under protection; the dark grey line marks the boundaries of the hill-fort foot settlement, as updated in 2011 (by A. Janonytė).

3.1, 6.1 by 5.1 by 3.7, and 5.1 by 3.5 by three centimetres in size), and ten potsherds (mostly side sherds measuring 2.2 to 5.7 centimetres and weighing three to 25 grams) of handmade and partially wheel-thrown pottery (wheel-throwing grooves can be seen). The larger part of the finds consists of pieces of clay plaster 2.6 by 2.1 by 1.3 to 9.2 by 6.2 by 4.8 centimetres in size (a total of 103 recorded pieces), the total weight of which is 2.7 kilograms. They mark the sites of former buildings (Fig. 14). Other finds collected in the area of the settlement include handmade potsherds and iron artefacts dated to the end of the 18th and the 19th century (?), which belonged to the farmsteads that were once situated there.

The settlement continues for approximately 250 metres east of the boundary of the now protected settlement. Its dark cultural layer has been preserved in the lower areas, whereas in the higher areas the light subsoil (geological soils) can be seen on its ploughed surface. Since the land was improved during the Soviet period (like all the environs of the hill-fort), spots of deeper grey can be found further to the east of the newly discovered hill foot settlement, in lower soil areas; however, these are areas of meadow turned into tilled fields. Based on the surface survey data, the eastern boundary of the newly discovered hill foot settlement

runs across the fields between the Luoba and Brukis streams, in roughly a north-south direction 200 to 300 metres east of the boundaries of the settlement area now under protection. In an aerial photograph taken on 4 May 2011, no significant differences between the hill foot settlement and the improved meadow areas can be seen, although darker soil spots can be seen quite distinctly (Fig. 15).

Another surveyed area of disturbed soil was situated 350 metres southwest of the northwest edge of the protected hill-fort's hill foot settlement and 550 metres southwest of the hill-fort. A local resident dug a pond here and piled up the soil on its shores. During the survey of the pond's shores, a dark-grey lens of the cultural layer was spotted on the northern shore (Fig. 16). Other finds include burnt stones, four handmade postsherds, of which three are small, 2.2 to 3.3 centimetres in size, and the fourth is a wheel-thrown pot rim bent outwards. Nothing was found in the dug soil due to its large volume. The area is situated very far from the southwest boundary of the known hill foot settlement, and thus it can be seen as an individual non-fortified settlement or a farmstead site. A more detailed survey of this find spot was impossible, due to rain. All the material collected in the foot settlement of Apuolė hill-fort is preliminarily dated to the early

second millennium, and most likely belongs to the latest stage in the development of the Apuolė complex, which ended in the 13th century. The finds are now in the collection of the Vytautas the Great War Museum in Kaunas, where finds from the earlier excavations of the hill-fort are kept.

The international archaeologists' workshop in Apuolė produced new and diverse results for studies of this complex of archaeological features. It turned out that the area covered by the old settlements was far larger than had been supposed (Fig. 17). The surroundings contain individual buildings or farmsteads contemporaneous with the hill-fort. In all of them, at least structures at the subsoil level have been preserved, whereas in lower areas undisturbed cultural layers have been preserved too. All this can be recorded perfectly by applying non-destructive remote probing methods, especially by using a magnetometer. The application of these methods in the Apuolė complex of valuable archaeological features, including its environs, is very promising. It would allow for the updating of the boundaries of the areas occupied by the old settlements and other structures from the hill-fort's times, and would also contribute to revealing features of the application of very non-destructive methods under conditions in Lithuania.

I would like to extend my sincere thanks to all the participants in this short expedition intended to survey the Apuolė complex of valuable archaeological features, and who contributed to the successful results of the expedition. My special thanks go to our colleagues from Germany, Timo Ibsen, Harald Stümpel and Christina Klein, who brought non-remote survey equipment that is still unavailable to Lithuanian archaeologists, and who were kind enough to share their experience of operating this equipment. I would also like to thank them for their interpretational insights into the material obtained, which make up a large part of this article.

Literature

- BAUBONIS, Z., ZABIELA, G. (eds.), 2005. Lietuvos piliakalniai. Atlasas. t. II. Vilnius: Lietuvos Krašto Apsaugos Ministerija, Kultūros vertybių apsaugos departamentas, Kultūros paveldo išsaugojimo pajėgos.
- BAUBONIS, Z., KLIAUGAITĖ, V. 2002. Apuolės kapynas. In: Archeologiniai tyrinėjimai Lietuvoje 2001 metais. Vilnius: Diemedžio leidykla, 109-113.
- DAKANIS, B., MERKEVIEČIUS, A., ZABIELA, G., 1988. Skuodo rajono archeologijos paminklų žvalgymas. In: Archeologiniai tyrinėjimai Lietuvoje 1986 ir 1987 metais. Vilnius: Lietuvos istorijos institutas, 179-182.
- JAROCKIS, R. 1998. Šiaurės vakarų Lietuvos piliakalnių ir jų papėdžių gyvenviečių žvalgomieji tyrimai. In: Archeologiniai tyrinėjimai Lietuvoje 1996 ir 1997 metais. Vilnius: Lietuvos istorijos institutas, 66-70.
- LAMM, J.P. (ed.), 2009. Apuolė. Ausgrabungen und Funde. 1928–1932. Klaipėda: Klaipėdos universitetas, Baltijos regiono istorijos ir archeologijos institutas, Statens Historiska Museum.
- MARCINKEVIČIŪTĖ, E., 2010. Mažai informatyvūs archeologiniai kasinėjimai. In: Archeologiniai tyrinėjimai Lietuvoje 2009 metais, Vilnius: Lietuvos archeologijos draugija, 501 (Nr.62).
- MICKEVIČIUS, A., 2004. Normanai ir baltai IX–XII a. Vilnius: Versus Aureus.

TARPTAUTINIS PRAKTINIS ARCHEOLOGŲ SEMINARAS APUOLĖJE

GINAUTAS ZABIELA

2011 m. balandžio 4–6 dienomis Lietuvoje viešėjo archeologas Timo Ibsen (Zentrum für Baltische und Skandinavische Archäologie in der Stiftung Schleswig – Holsteinische Landesmuseen Schloß Gottorf), geofizikai dr. Harald Stümpel, Christin Klein (Christian-Albrechts-Universität zu Kiel, Institut für Geowissenschaften) ir 3 studentai iš Kilio universiteto (Vokietija). Jų lankymosi tikslas buvo supažindinti Klaipėdos universiteto Humanitarinių mokslų fakulteto istorijos ir kraštovaizdžio archeologijos specialybių studentus su nedestrukciniais tyrimų metodais esme bei pasiekimais ir juos išbandyti Lietuvos sąlygomis. Trijų dienų intensyvi vizito programa susidėjo iš dviejų dalių: teorinių paskaitų ir praktinio užsiėmimo. Seminaras prasidėjo nuo teorinės dalies – paskaitų, kurios vyko Klaipėdos universiteto Humanitarinių mokslų fakultete. Jų metu H. Stümpel pristatė nedestrukcinis archeologinių tyrimų metodus, jų veikimo principus ir taikymo žvalgant archeologijos vertybės pasiekimus, Ch. Klein – šių metodų naudojimą žvalgant Suzdalės (Rusijos Federacija) vikingų laikotarpio kaimo vietą, J. Frenzel – paskutinių dviejų metų geofizinius žvalgymus Lietuvoje (Kernavė) ir Latvijoje (Gruobinia), T. Ibsen – nedestrukcinis metodų panaudojimą Kauopo (dabar Mochovoje) bendros Vokietijos – Rusijos archeologinės ekspedicijos metu Kaliningrado srityje (Rusijos Federacija) 2009–2011 m. Praktiniams darbams kaip garsi ir tinkama vieta buvo pasirinktas Apuolės (Skuodo r., Aleksandrijos sen.) piliakalnis

(unikalus kodas kultūros paveldo registre 24505), jos papėdės gyvenvietė bei artimiausia piliakalnio aplinka. Jų metu be geofizinių tyrimų buvo vizualiai žvalgomos Apuolės apylinkės, daugumoje palei Luobos upę siekiant aptikti nežinomas archeologijos vertybes.

Tarptautinis praktinis archeologų seminaras Apuolėje pateikė naujų ir įvairių rezultatų šiam archeologijos paminklų kompleksui pažinti (1-17 pav.). Paaiškėjo, kad senųjų gyvenviečių apimamas plotas yra žymiai didesnis negu buvo manoma iki šiol. Aplinkoje yra ir atskirų pastatų ar sodybų, vienalaikių piliakalniui, vietų. Visose jose yra išlikę bent jau struktūrų įžemio lygyje, o žemesnės vietose – ir nesuardyti kultūriniai sluoksniai. Visa tai gerai fiksuojama nedestruktyviais distancinio zondavimo metodais, ypač magnetometru. Šių metodų taikymas Apuolės archeologinių vertybių komplekse įskaitant ir jų aplinką yra labai perspektyvus. Jis leistų ne tik patikslinti senųjų gyvenviečių ir kitokių piliakalnio laikų struktūrų užimamas teritorijas, tačiau prisidėtų ir prie pačių nedestruktyvinių metodų taikymo Lietuvos sąlygomis specifikos atskleidimo.