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# ***70 YEARS AFTER DUMITRU BERCIU'S RESEARCH ON THE HAMANGIA NEOLITHIC CULTURE (ROMANIA): A REVIEW***

Laurent Carozza, Laurence Manolakakis, Cristian Micu, Albane Burens, Florian Mihail

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## *Summary:*

In 1952, Dumitru Berciu initiated excavations in the district of Baia, formerly called Hamangia. Between 1952 and 1961, this researcher attached to the Romanian Academy led research on the eponymous sites of the Hamangia Neolithic culture: Baia-Golovița and Ceamurlia de Jos. He also carried out a rescue excavation in 1954 and 1961 on the Baia Boruz tell, threatened by the extension of the village dwellings. In 1966, Dumitru Berciu published the monograph *Cultura Hamangia/Hamangia culture* in which he displayed the main characteristics of this culture, including its chronology.

The origin of Hamangia culture is still open for debate. The new chronometric data shed a new light on Berciu's proposals. The chronological succession between Baia-Golovița (generally considered as older) and Ceamurlia de Jos has not been validated by new radiocarbon dating. The seven dates collected from different parts of Ceamurlia de Jos indicate the existence of at least two stages in the site's occupation.

The first one would place the initial occupation at the beginning of the 5<sup>th</sup> millennium BCE, in a time range between the 50<sup>th</sup> and the beginning of the 48<sup>th</sup> century BCE. Five other dates show that the settlement might be inhabited since the end of the 48<sup>th</sup> century and throughout the first half of the 46<sup>th</sup> century BCE. These new dating establish that Ceamurlia de Jos has been inhabited for an extended period of time, which can be estimated in its largest amplitude between 5000 and 4500 BCE (nearly half a millennium).

In Baia area, these data allow us to reconsider the place of the Hamangia culture in the context of the emergence of the so-called «complex» societies and during the apogee of the KGK culture.

In north Dobruja we observe the direct succession of Hamangia III and Gumelnița cultures, and the absence of Hamangia IV phase. Taking this fact into account, and based on our re-reading of the radiocarbon dates, we can say that a «tipping point» could occur around 4650 BCE. All available evidence suggest that spatial fragmentation may have occurred at the beginning of the European Chalcolithic.

## *Key words:*

Neolithic, Hamangia, Chronology

## **1. Introduction**

There are different ways of approaching an archaeological culture, but all are dependent on the quality of the documentation available, particularly chronological resolutions. When we delve into the Neolithic culture of Hamangia, between the Black Sea and the Danube (Fig. 1), the most emblematic elements stand out, such as the clay figurines of the couple known as *The thinker* and his companion discovered at Cernavodă, Romania (Berciu, Morintz 1959, 105, Fig. 6; Berciu 1960, 423). While these elements describe the exceptional character of this culture, data regarding the economy of these populations or the settlement networks are still lacking. As we shall see throughout this contribution, chronological data are still very limited and dependent on the publication of the contexts of discovery. But what do we really know about the Hamangia culture?

The origins of Hamangia culture are partly based on the study of the eponymous sites excavated in the Baia area, on the shores of the current Razim Lake. In 2019, we initiated a project to review the documentation from the excavations

carried out by Dumitru Berciu at the Golovița site in Baia and at Ceamurlia de Jos. On this occasion, we realised that only a small part of the assemblage from his excavations had been used by Dumitru Berciu in the founding 1966 monograph (Berciu 1966). To fill this gap, we revisited the Berciu collections for the Baia area held at the Academy's Vasile Pârvan Institute, including artefacts collected during the excavation of the Boruz Chalcolithic tell in Baia, with the aim of understanding, at a local level, the Hamangia-Gumelnița transition. Addressing the question of Hamangia culture implicitly raises the question of the Neolithisation of Dobruja and the role played by this culture in the Chalcolithic transition process.

In a previous publication (Carozza, Micu, Burens 2022), we presented a map of Hamangia sites in Romania and Bulgaria (Fig. 1), including both sites and isolated finds. This document, largely based on a bibliographical review, is still being complemented and corrected as new data become available. This rough representation (Fig. 1) highlights areas where data are more abundant, such as along the Black Sea coast in Constanța County, on the southern bank of the Danube, or on the edge of the Razim-Sinoe lagoon complex. However, this map should not be taken to reflect the settlement patterns of the Neolithic period, between 5200 and 4700 BCE.

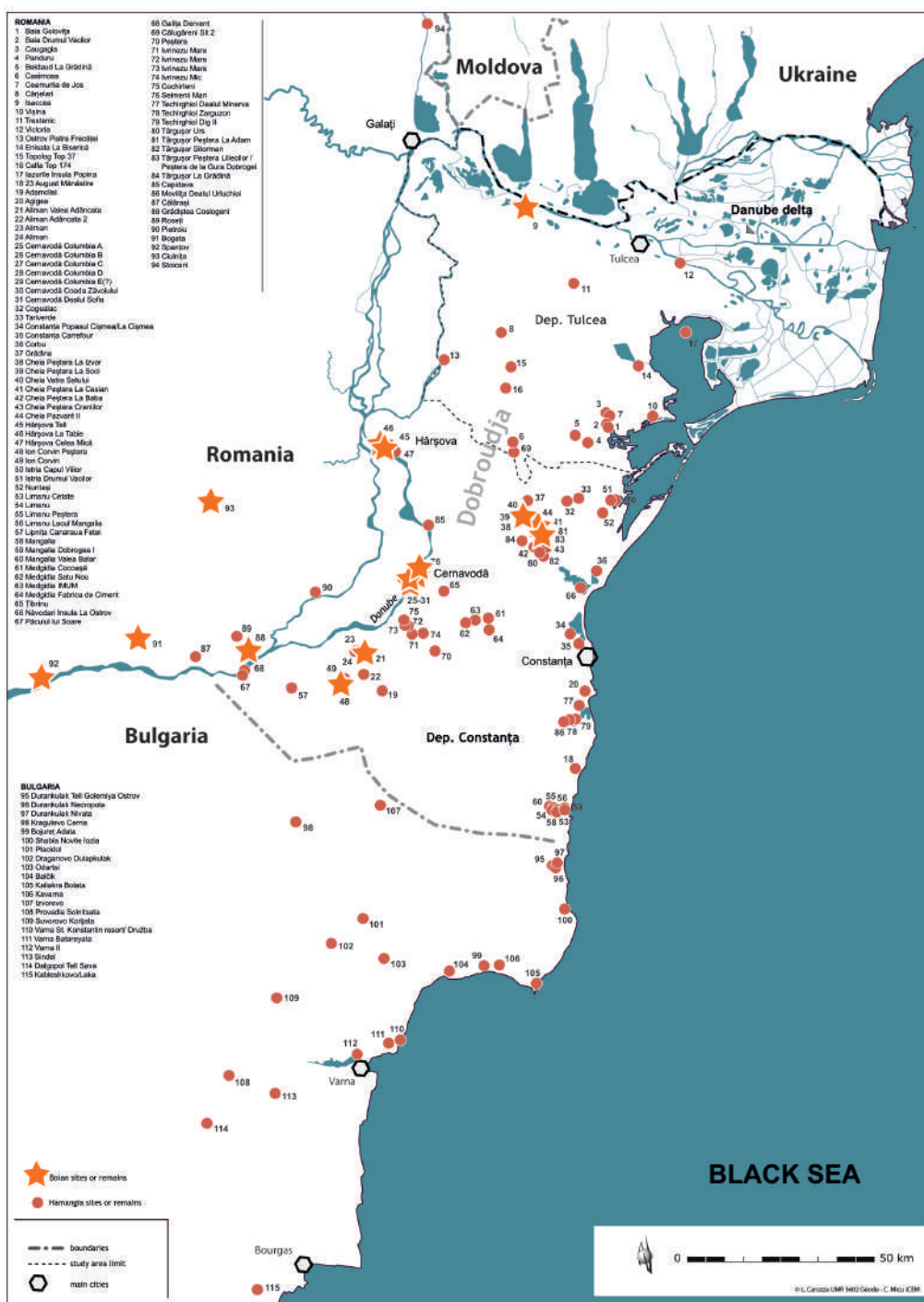


Fig. 1 - Map of sites attributed to the Hamangia culture or containing artefacts attributed to this culture. (© drawing & CAD: L. Carozza, C. Micu - modified 2024).

## 2. Hamangia: an accidental discovery

The first artefacts that can be attributed to the culture that was later called Hamangia were discovered near the railway station of Hamangia (today's village of Baia) in Tulcea County (Romania) during the construction of the Medgidia-Babadag-Tulcea railway line.

The first ceramic remains of the Hamangia culture were unearthed under an eroded tumulus near Ceamurlia de Jos. Vasile Pârvan did not immediately attribute them to a Neolithic culture. Pârvan's emissaries were only able to witness the destruction of the tumulus and brought the unearthed remains to the professor, but without any context (Pârvan 1925).

In his analysis, Vasile Pârvan indicates that the: "saved objects speak a very clear language; they belong to an easily datable period" and points out the innovative characteristics of these objects: "in the midst of a world that is clearly different from theirs (the painted Eneolithic of the lower Danube type)" (Pârvan 1925). At the end of the article, after developing his argument, the author emphasises the cultural links he has been able to establish with northern and western Europe and his certainty that the Hamangia sherds (Fig. 2) belong to a: "rather late period (Early Bronze Age in central Europe) to which we must necessarily date this burial" (Pârvan 1925).

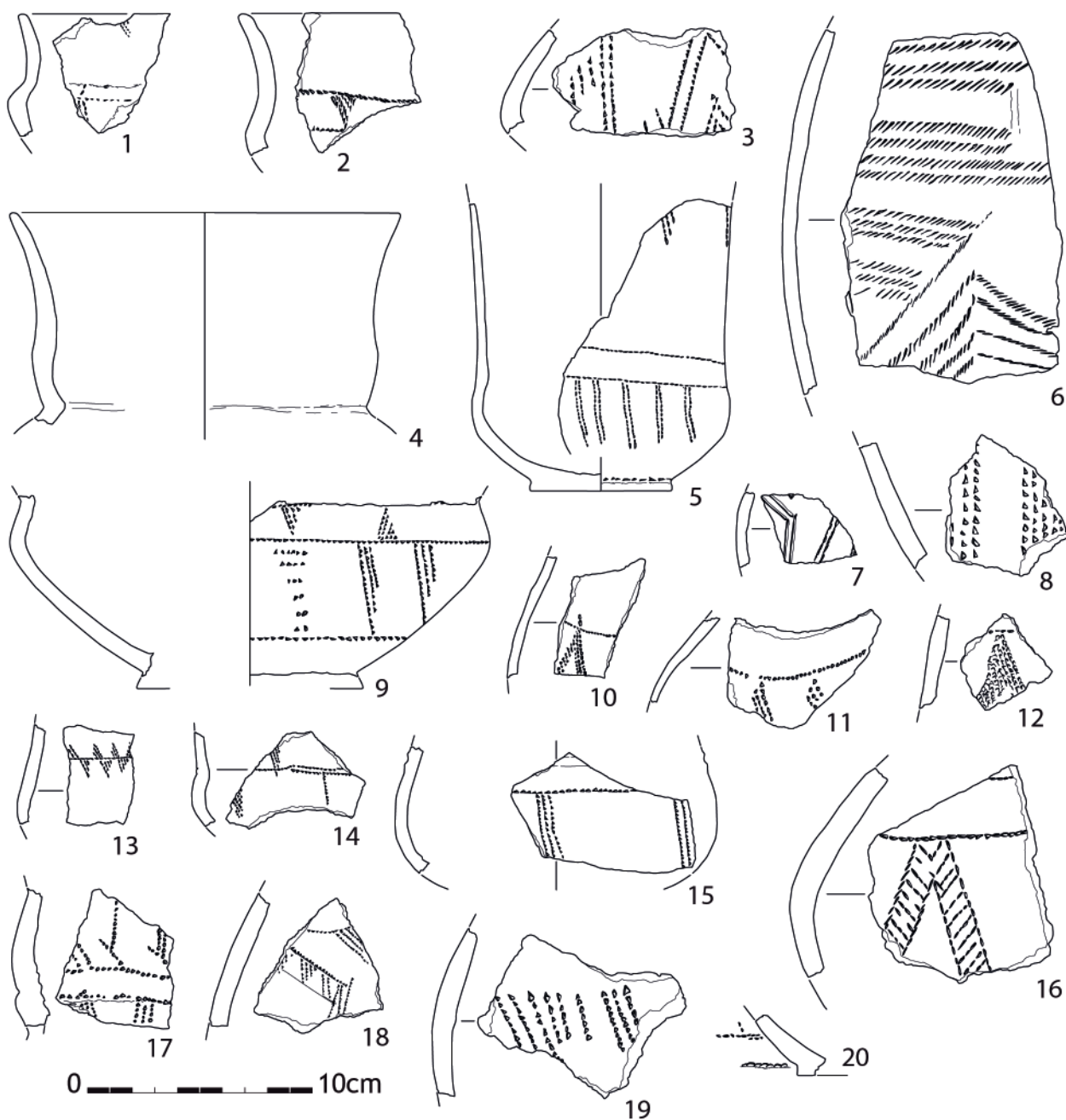


Fig. 2 - Ceramic assemblage unearthed during the discovery of the Ceamurlia de Jos site, Pârvan collection, Institute of archaeology, Bucharest. (© drawing & CAD: L. Carozza).

It was Dumitru Berciu who, after 25 years of neglect, resumed research on the tumulus monuments highlighted by Vasile Pârvan (Berciu 1966). His true motives for pursuing Pârvan's traces remain unknown. A bibliographical survey shows that there is still some confusion in the identification of the Neolithic and Chalcolithic sites in the Baia district, and errors are sometimes found among some authors, particularly in grouping the Ceamurlia de Jos and Baia-Golovița settlements into a single unit. To dispel these doubts, we have revisited the archives and publications and tried to locate the discoveries made by Berciu's team. Dumitru Berciu worked in the Baia-Hamangia area from 1952 to 1961, with an interruption of 5 or 6 years corresponding to the excavations carried out in Cernavodă by the collective to which he belonged (Morintz, Berciu, Diaconu 1955; Berciu 1966, 81; Lazăr 2012). The archives indicate that the Academy Institute organised excavations in Ceamurlia de Jos and Baia-Golovița in 1952-1953 and 1960-1961. The 1954 field campaign is not included in the overall reports (Pippidi, Berciu 1965, 29, note 7), although we have archival material of a field campaign in the same year. Conversely, an excavation campaign from 1955 is sometimes mentioned (Berciu, Barnea 1994, 273), although we have no artefacts and no archives.

### 2.1. 1952 - Return to Ceamurlia de Jos

This year, Dumitru Berciu led the first excavation campaign at the site of Ceamurlia de Jos. The location of the excavations carried out here is known to us. The various plans show the railway line and the excavated burial mounds. Dumitru Berciu also used his presence in the Baia area to carry out investigations to the west of the settlement in the direction of Caugagia. In 1952, his team surveyed an area about 1 km north-west of the excavation where three tumulus were located. Berciu claims to have discovered material in this area that can be attributed to the Hamangia culture (Berciu: notebook 1, p. 32).

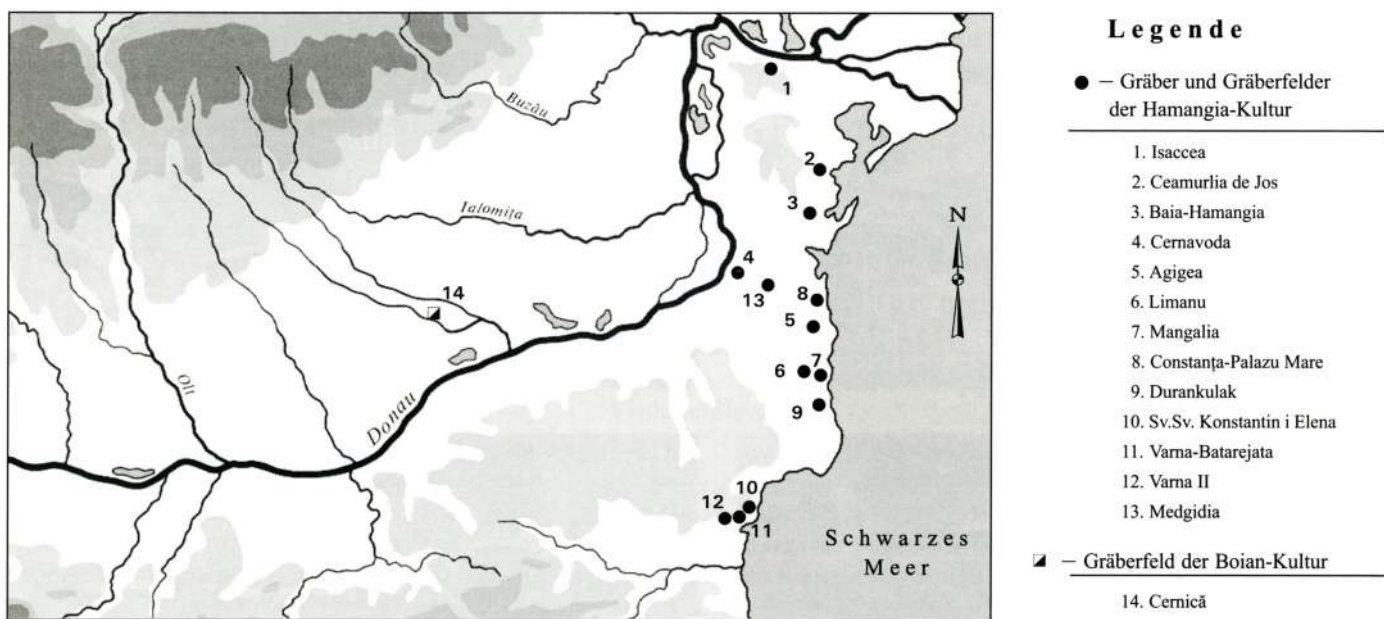
In the same year, Vasile Canarache made survey in Baia and discovered pottery characteristic of the Hamangia culture at a location called Drumul Vacilor (Berciu: notebook 1, p. 86; Berciu 1966, 232, note 1). This is the first mention of the Baia-Golovița settlement, which Dumitru Berciu would begin to excavate in 1953. We do not have a map showing this discovery.

Field notes and artefact collections show that Dumitru Berciu's team also worked in Baia in 1954, on the Boruz tell. It is obvious that three different sites coexisted in Baia and Ceamurlia de Jos during the initial phase of research. At the present time, however, it is not possible to locate the Baia-Golovița and Baia-Boruz settlements, as Dumitru Berciu did not provide any maps.

Field notebooks and archives indicate that Dumitru Berciu carried out 4 excavation campaigns in Baia Golovița: 1953, 1954, 1960, 1961 (Berciu: fieldbook 1; fieldbook 2; Berciu, Moscalu, fieldbook 3; Berciu 1966, 232-233).

### 2.2. 1960 - Return to Baia

In 1960 and 1961, the excavator claims to have explored large areas at the Golovița site, but the excavated zones remain modest. In his monograph, he mentions the excavation of a new trench in 1960 along the so-called Drumul Vacilor road



Karte 9. Gräber und Gräberfelder der Hamangia- und Boian-Kulturen. – Graphik: I. Vajsov, AIM-BAW.

Fig. 3 - Map of tombs and cemeteries attributed to the Hamangia and Boian culture (after Dimov 2002; inTodorova 2002).

(Berciu 1966, 233). But ultimately, nothing allows us to determine the exact location of Dumitru Berciu's excavations in the Baia-Golovița settlement. The toponym Drumul Vacilor corresponds to a long road that led from the village of Baia to Lake Golovița, between two tumuli, in an area where several dozen monuments still stand today.

In 1961, a larger excavation of the Boruz tell was organised in Baia, as buildings had been erected along the road leading to Panduru. The team carried out a rescue excavation on the Chalcolithic tell (Gumelnița A1-A2 culture). The trenches were located in the northern part of the tell due to the extent of the village, the road and the dwellings (Morintz 1962, 280).

After this intensive fieldwork, the Berciu team's research was completed and the excavator focussed on publishing the monograph *Cultura Hamangia* (Berciu 1966). But even then, the exact location of the excavations in Baia Golovița and on the Boruz tell remained unclear.

### 2.3. 1974 - Re-discovery of Drumul Vacilor's, a Hamangia settlement in Baia

The year 1974 marked the beginning of new fieldwork with a rescue excavation carried out by the Tulcea Museum on a tumulus that had been damaged by irrigation works at a site known as Drumul Vacilor (Lăzurcă 1980). On this occasion, a large pit was excavated under a tumulus, in which numerous artefacts were found (Fig. 4). Apart from this particular excavation, research into the Hamangia settlement of eponymous area had been suspended since the mid-1970s.



Figure 4 - Baia Golovița « Drumul Vacilor », view of the E. Lazurcă's excavation of a tumulus and the Neolithic pit it covered (ICEM archives).

### 2.4. 2019 - Return to Berciu collections and new excavations

In 2019, as part of a project led by the Vasile Pârvan Institute, we began to review all the collections coming from the work in the districts of Baia and Ceamurlia de Jos, including the series from the excavations of the Chalcolithic tell of Boruz in Baia, with the aim of producing a monographic publication. Finally, in 2023 we started new fieldwork at the Golovița site. To date, we have new data, both from old research (Berciu and Lăzurcă collections) and from absolute chronology dating, which characterise the transition from the Neolithic to the Chalcolithic in the Baia-Ceamurlia de Jos district on the shores of what is now Lake Golovița.

## 3. Cartographic representation of the Hamangia culture

Instead of critically analysing the hypotheses about the origin and development of the Hamangia culture, we have focussed on various cartographic representations of the Hamangia culture, but the number of different maps remains limited. Paradoxically, in his 1966 monograph, Dumitru Berciu did not provide any representation of the space occupied by the Hamangia culture, not even a map of his excavations, which remains somewhat incomprehensible. Strangely enough, it is Eugen Comșa's work on the Boian culture that will provide an implicit cartography of the extension of the

Hamangia culture (Comşa 1974). The cartographic precision allows a clear visualisation of the distribution of the sites and the chronocultural phasing supported by the author. However, the scale of the work does not allow the consideration of the whole phenomenon, especially in its development in Bulgaria. It is surprising that the monograph dedicated to the Durankulak necropolis in Bulgaria (Todorova 2002) does not include a map of the sites attributed to the Hamangia culture. Only a thematic map of the burials of the Hamangia and Boian cultures (fig. 3) illustrates this volume (Dimov 2002, 295).

Henrietta Todorova, however, provided a global representation of the cultures of the Early Eneolithic in 1978, albeit on a small geographical scale (Map 7: Ethnocultural regions of the Early Eneolithic...) and in the form of area map (Todorova 1978). On this area map, the author shows that the Hamangia culture developed in the entire area between the Black Sea and the Danube (with the exception of the delta), with a mixed area with the Sava cultural group in the south. This method of representation does not take into account the density of the sites assigned to the individual cultural complexes and – in contrast to Haşotti's work – conveys a restrictive picture of the marginal effects. In fact, we owe Puiu Haşotti a map entitled Hamangia Culture - Diffusion from his inventory of finds attributed to the Hamangia culture in Dobruja (Haşotti 1997). Despite the chronological proposals made in this work, the map presented (Haşotti 1997, figure 4) does not provide a dynamic overview, even though it shows the coastal distribution of the sites attributed to the Hamangia culture and, on the other hand, gaps in the central area of northern Dobruja. The title of the map, *Cultura Hamangia – difuziunea*, also prompts us to raise the question of diffusion. Implicitly, the map seems to show that the diffusion of the Hamangia culture began from the coast, the most densely populated area, towards the inland, thus reflecting the Dumitru Berciu's proposal. However, this map does not take into account the chronological phasing – although Haşotti has already published this data (Haşotti 1984) – nor the existence of sites with mixed assemblages (Boian-Hamangia). The very high population density of the coastal strip is also emphasised by the map published by Valentina Voinea and colleagues (Voinea, Caraivan, Florea 2016), who instead adhere to the idea of an in situ evolution of the Hamangia Neolithic communities. For our part, we have attempted to propose a series of phase maps of Hamangia sites or of sites that have given characteristic ceramic or plastic elements, based on a reasoned inventory of bibliographic data (Carozza, Micu, Burens 2022). The difficulty of this endeavour lies in particular in the uncertainty linked to the dating of the sites, which is mainly based on the hypotheses of Dumitru Berciu and the data review published by Haşotti (Haşotti 1997). The scope for interpretation of the phase maps we have drawn up only underlines the fragility of the data on the founding and initial phases of the Hamangia culture, as there are no sites dated with certainty. The coastal distribution, which is essentially documented by settlements attributed to the classical and terminal phases of the Hamangia culture (Hamangia III and IV), gives a distorted picture of a diffusionist settlement dynamic from the coast to the mainland, with a partly exogenous origin. In this respect, maps can be misleading. Apart from the combined phenomena of hybridisation between Hamangia and Boian cultures, and the role of the Danube as a porous boundary for the diffusion of the Hamangia cultural markers, there is nothing to suggest diffusion flows.

## 4. Baia-Goloviţa and Ceamurlia de Jos settlements: contexts, ceramic assemblages, and chronometry

At this stage of reflection, we must return to the source of the available documentation, namely the data from the eponymous area on the shore of Lake Goloviţa, between Ceamurlia de Jos and Baia (Fig. 5). In the following sections, we will present some data on the discovery contexts and the chronological approaches reviewed using radiocarbon dating.

### 4.1 *The settlement of Baia-Goloviţa*

The settlement of Goloviţa-Baia is mainly known through the monograph published by Berciu and his descriptions of the excavation campaigns (Berciu 1966). Unfortunately, this publication contains neither a plan nor information about the location of the fieldwork he carried out. Analysing the notes and fieldbooks preserved at the Romanian Academy provides some additional information. Dumitru Berciu drew up a general plan (unpublished) which shows that the excavation is located between 2 tumuli, along a path named Drumul Vacilor (The Cattle Path). However, the data associated with this plan do not indicate the exact location of the excavation on a general map. Only distances are given: “550 metres from Lake Goloviţa and 2500 metres from the village of Baia” (Lăzurcă 1980). As the Drumul Vacilor path is not marked, it is difficult to locate the excavation precisely on a map. Other data from the excavations led by Elena Lăzurcă on a tumulus at the location Drumul Vacilor revealed a large Hamangia Neolithic pit (Lăzurcă 1980).

#### 4.1.1 *Discovery Context*

The general sketch of Dumitru Berciu's excavations (unpublished document from Berciu's archive) shows 6 trenches (SI, SIa, SII, SIIa, SIII, and SV), and the field notes indicate that most of the data come from an area that developed around Trench I: around this trench, a larger excavation was realised in the form of 3 surfaces named SIa, SIb and SIc.

The data recorded in Goloviţa are simple and come either from archaeological horizons (palaeosols) or from pits (labeled Gr A, D, E, G...), complexes (Cpx 1, 2a and b, 4a, 5, 6a and 6b, 7b), and dwellings (Loc 1). The excavation of

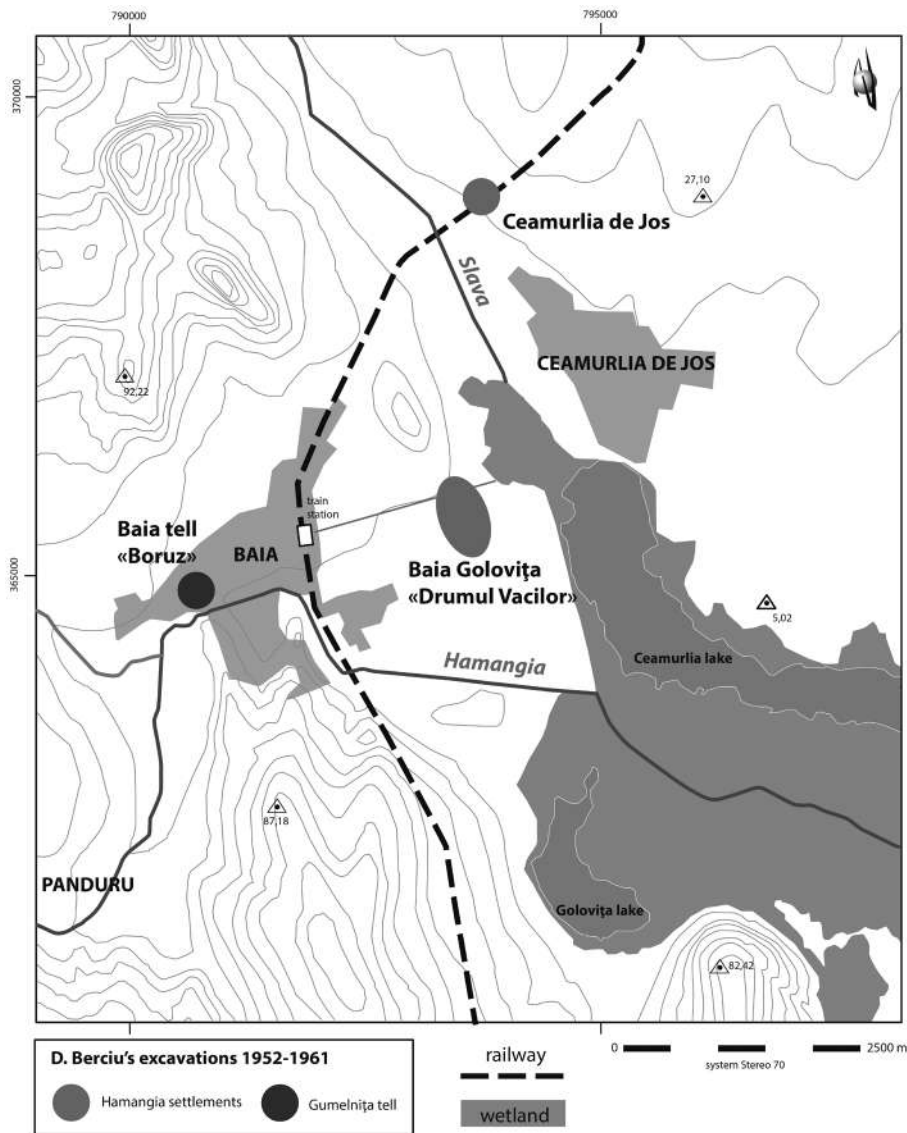


Fig. 5 - Map of the Ceamurlia de Jos and Baia Golovița 'Drumul Vacilor' Neolithic sites and the Baia Boruz tell. The extension of the Golovița 'Drumul Vacilor' site is deduced from the diagnostic campaign carried out in 2023.

soils or archaeological horizons was divided into several ensembles, ranging in altitudes from 0.2 to 0.85 meters, whose stratigraphic links with the archaeological structures are unknown. We have partial plans showing a portion of a burnt house and complexes (pit-silos) in Surface SIa. Also found in the archives (year 1954) is a plan of a longitudinal section of Trench SII (oriented east-west), revealing a stratigraphic sequence of less than 1 metre thick, with a cultural layer of 0.65-0.70 metres thick and two archaeological horizons named levels II and I, at the contact with the substratum. The documents indicate that these two levels may have a cumulative thickness of 0.30 metres. The analysis of this section indicates that the pits (Gr A and B) were dug in level I and belong to the final stage of the occupation.

The exploratory excavations we made in 2023 show that some of this information can be confirmed. In particular, we observe the presence of pits dug into the substrate associated with a palaeosol resulting from domestic waste spread. However, on the basis of our current observations, there is still no evidence to confirm the idea of two settlement layers. The level we observed under the ploughed soil covering the dug structures and the palaeosol cannot yet be classified as a living floor. This unit seems rather to refer to a formation process more closely linked to the evolution of ancient soils, including remobilised Neolithic elements. Our observations show that these palaeosols are discontinuous, and most likely result from a chronological variability linked to successive occupations.

#### 4.1.2 Chronometry

We now have 5 dates to understand the chronology of occupations (Fig. 6 Tab 1). As the faunal remains from previous excavations were not found, we selected bones that had been preserved among the ceramic remains. We thus obtained 4 radiocarbon dates for the ancient excavations: 3 for the assemblages of Dumitru Berciu and 1 for the pit excavated by Lăzurcă at Drumul Vacilor. As we were not satisfied with the first measurement for structure Gr E (5890±50 BP; 4901-4612 BCE) due to a large uncertainty margin of 3 centuries, we performed a second measurement with a different sample. Unfortunately, this fifth date did not prove to be more precise than the previous one.



Golovița SI GcE: 5890±50 BP: 4833-4710 BCE; 4901-4612 BCE, Poz-138299

Golovița GrE: 5864±36 BP: 4826-4709; 4898-4616 BCE, RoAMS-1178.53

Golovița GrC: 6160±50 BP: 5208-5043; 5289-4953 BCE, Poz-138298

Golovița Drumul Vacilor: 5850±35 BP: 4785-4684; 4798-4608 BCE, Poz-140757

Golovița (zone 2 excavation 2023) Done 2007: 5820±30 BP: 4731-4552; 4731-4586 BCE (84.7%), Beta – 677745

In contrast to the hypotheses put forward by Dumitru Berciu, these data show that we are not dealing with a single, narrow occupational period, but more likely with the juxtaposition of several stages of habitat development, with the initial phase dating to the late 6<sup>th</sup> millennium BCE (GrC: 6160±50 BP; 5289-4953 BCE) (Fig. 7). This dating is close to the dates obtained for the Cheia site in Constanța County (6141±29 BP: 5206-5003 BCE and 6138±44 BP 5212-4963 BCE), which are currently the oldest dates for the Hamangia culture.

The other dates pertain to later occupations, dated to the early 5<sup>th</sup> millennium BCE, partly contemporaneous with the occupation of the neighbouring settlement Ceamurlia de Jos. The two dates obtained for pit GrE indicate a maximum time range between 4901-4612 BCE, which can be sharpened to 4850-4750 BCE. This fits well with phase III of the Hamangia culture, the final stage in the development of the culture.

The sample collected to date the pit excavated by E. Lăzurcă follows this trend (5850±35 BP; 4798-4608 cal BCE; 4785-4684 cal BCE with 68.2% probability). Chronologically, this date shows that we can correlate this assemblage with the assemblage dated to phase III of the Hamangia culture at the Ceamurlia de Jos site, indicating a relative contemporaneity of occupation between the two sites.

Finally, the last dating was obtained for pit F 2007, which was excavated in 2023. It is slightly younger (4731-4552 BCE), but close to the date obtained for the pit excavated by Elena Lăzurcă.

The recently acquired radiocarbon dates somewhat contradict the data published by Dumitru Berciu, who speculated about the anteriority of the occupation in Golovița compared to the Ceamurlia de Jos habitat.

Regarding ceramics, the shapes unearthed are all characteristic of the Hamangia culture (Fig. 8). It includes a large carinated bowl (Fig. 8, n° 10) decorated with three rows of horizontal dots; a carinated biconical urn (n° 11) decorated with a pattern of oblique metopes marked out by horizontal lines. The presence of a pot with round body and closed cylindrical neck (n° 6), decorated with interlocking chevrons, is also typical of the Golovița facies of the Hamangia culture.

#### 4.2 Ceamurlia de Jos excavations contexte and chronology

The Neolithic settlement of Ceamurlia de Jos is unique in that it is located in a slightly sloping area where there were several funerary monuments, at least four tumuli. When Dumitru Berciu intervened, Tumulus I/Movila I, located north of the railway line, had been partially exploited as a quarry. The challenge of his excavation led to the identification of a clear stratigraphic sequence. Obviously, the construction of the funerary monument in the Bronze Age facilitated the preservation of the Neolithic layers, which were frozen by the addition of materials. Secondary interventions during Antiquity must also have contributed to the preservation of the burial mound, which has a diameter over 40 metres.

If the construction of the protohistoric monument contributed to the preservation of the Neolithic levels, it is likely that the extraction of material in the vicinity of the tumulus, also mobilised older artefacts, as evidenced by the presence

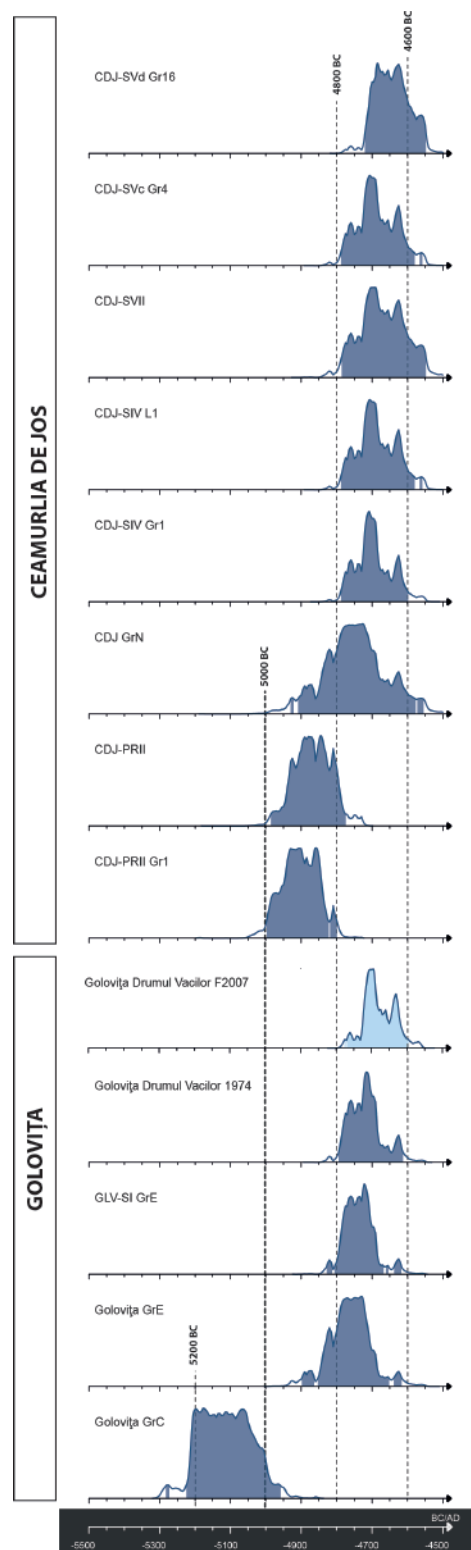


Fig. 6 - Compilation of radiocarbon dates obtained for the Ceamurlia de Jos and Baia Golovița 'Drumul Vacilor' sites (© Chronomodel, DAO L. Carozza).

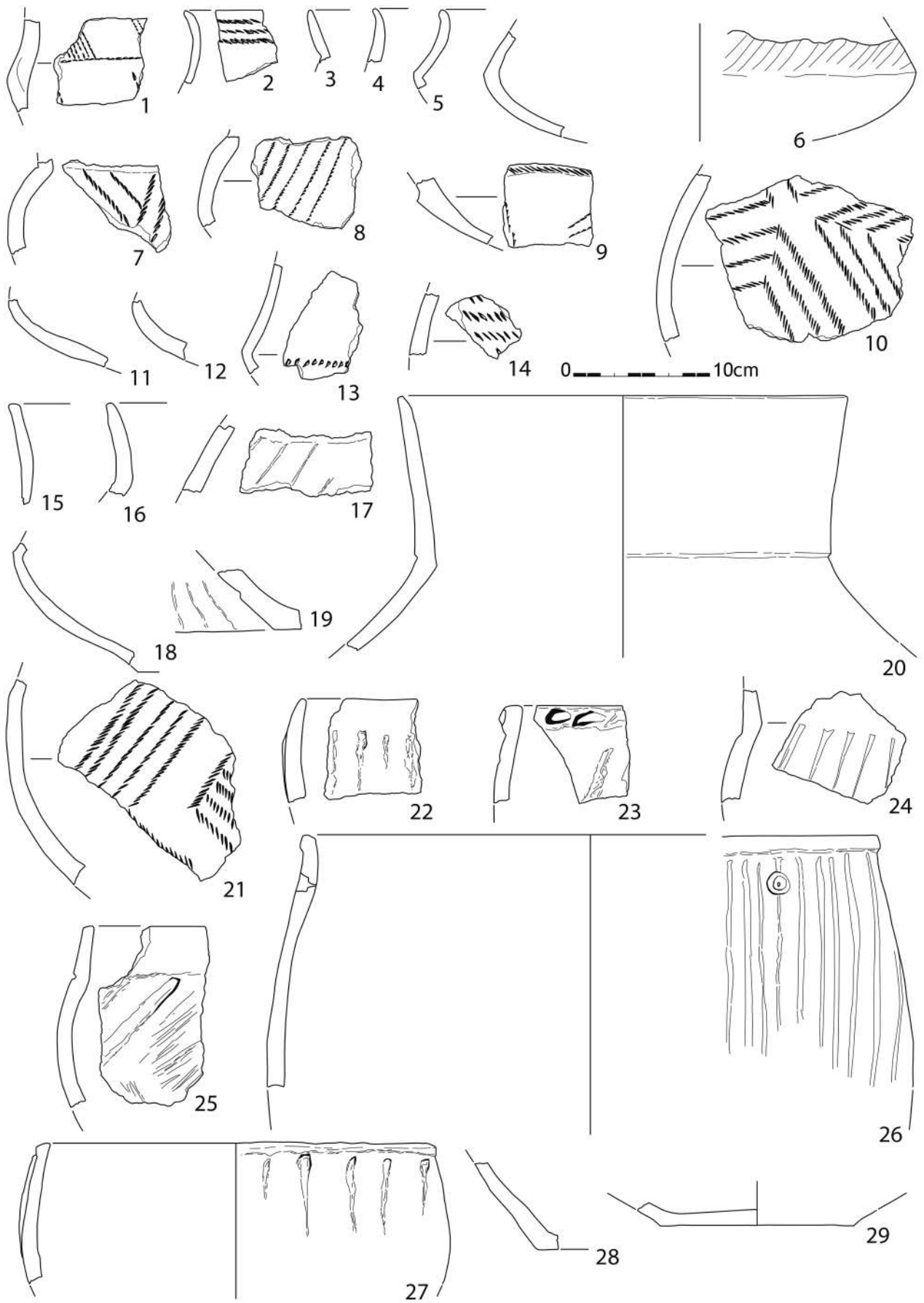


Fig. 7 – Baia Golovița 'Drumul Vacilor' D. Berciu's excavations ; Assemblage from Pit GrC (© drawing and CAD: L. Carozza).

of Neolithic sherds in the tumulus levels or in certain structures, particularly those dating to Antiquity, after the 5<sup>th</sup> millennium BCE.

The settlement was firstly approached by digging long trenches, which helped to delimit the extent of the remains, and then by a more extensive excavation, which revealed the organisation of the settlement. Surface A, the largest, was excavated over an area of almost 300 square metres, while the contiguous Surface B is much smaller. Surface C forms only a small

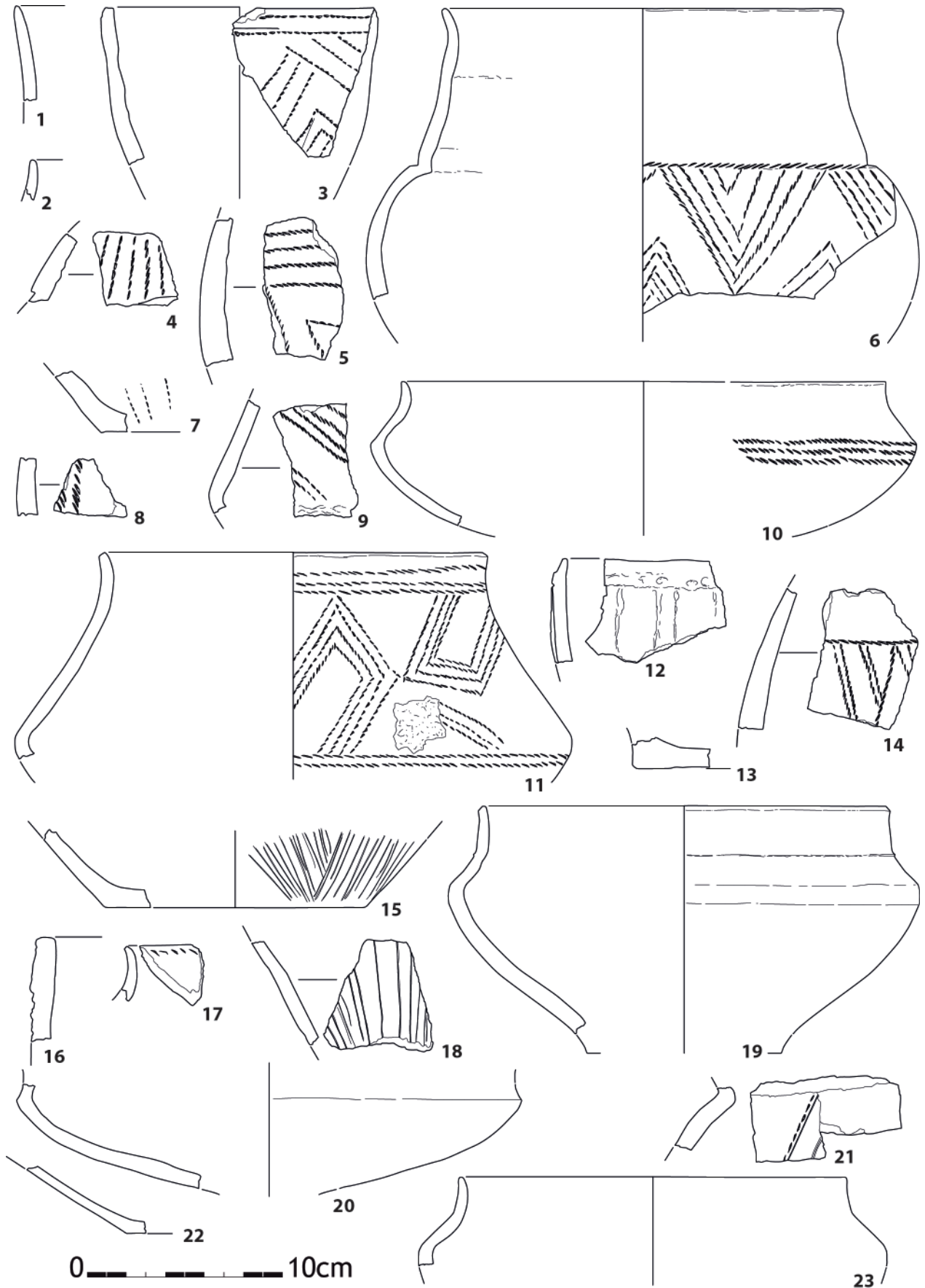


Fig. 8 - Baia Golovița; ceramic assemblage from pit F. 2007 (hole 27), archaeological diagnosis 2023 (© drawing and CAD: L. Carozza).

extension within trench Ş VII (Şanţul VII). We have a general plan and a detailed plan centred on Surface A (Fig. 9) which allow us to reposition all the structures and archaeological facts. Dumitru Berciu's excavations show that we are dealing with an open settlement, with dwellings and numerous excavated structures, mainly silo pits.

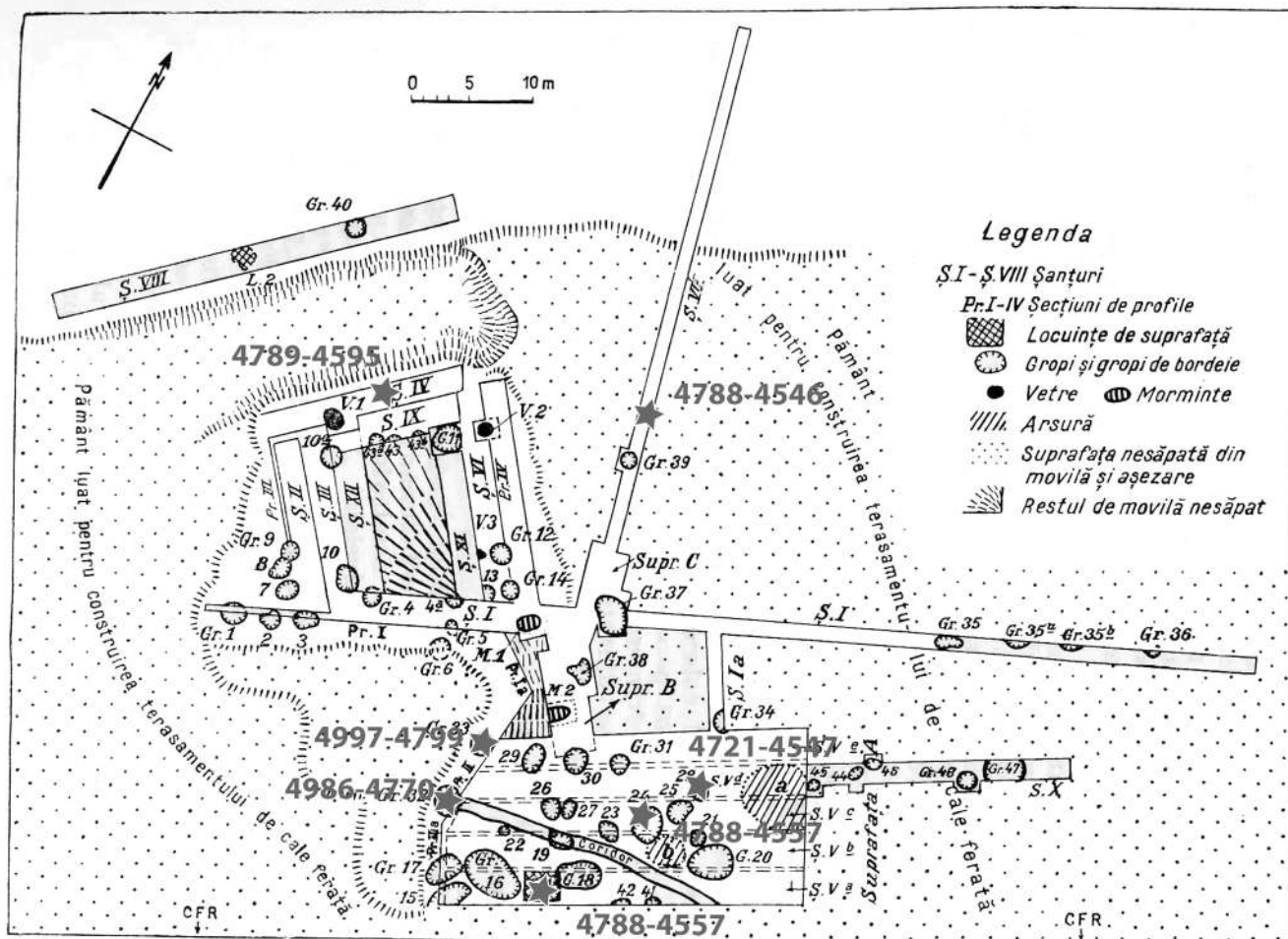


Fig. 60. — Ceamurlia de Jos. Sectorul I, planul general al săpăturilor.

Fig. 9 - Ceamurlia de Jos, Plan of the excavation led by Dumitru Berciu and attempt to position the dated archaeological features.

#### 4.2.1 A simplified stratigraphic model

The data are difficult to organise due to the large number of identified ensembles, and the discrepancies observed between the inventory numbers and the data published by Dumitru Berciu. We have planimetric data, categorised by sections (12 numbered sections). The artefacts were collected on the basis of the stratigraphy observed by the excavator, who identified at least three successive Neolithic levels and sub-levels (levels I, II, IIIa, and IIIb). However, this representation is theoretical and results from a re-evaluation of the field data. This interpretation published in the 1966 monograph (Berciu 1966) remains very opaque as all structures were renumbered and there is no general correspondence table. Even, the lots we analysed rarely indicate the level to which they were later assigned (Level III: 32 sherds; Level II: 38 sherds; Level I: 13 sherds). The majority of the unearthed artefacts are labelled upper level (418 sherds) or lower level (556 sherds). Further analysis of the data requires the creation of a simplified stratigraphic diagram (by major ensembles) to propose a seriation of the artefacts from the pits and archaeological levels.

Field notebooks describe the complete stratigraphic sequence identified in the area called Sectorul I/(Movila I):

- ENS 1: Vegetation and culture layer.
- ENS 2: Recent/modern pits; it is possible that modern developments were identified at the top of the cultural layer, but we have no further descriptions. We can incorporate the 1924 fieldworks (V. Pârvan) into this ensemble.
- ENS 3: An ancient pit (1st century BCE) was identified (groapa 36/Gr. 36) in trench Ş I (Şanţul I). Similarly, ancient remains were identified in trench Ş VII (Şanţul VII) and in trench X (Şanţul X, groapa 47/Gr. 47). These structures can

be related to an ancient occupation that developed more generally on the periphery of the tumulus (Berciu 1966, 169). The excavator also notes the presence of a hearth (Vatra 2) on square a, which belongs to a period after the construction of the burial mound (Berciu 1966, 126, 158-159, fig. 61).

- ENS 4: The analysis of the sections recorded by Dumitru Berciu, whether published (Berciu 1966, fig. 62 to 68) or unpublished (Berciu archives), as well as the data published by S. Morintz (1972) shows the probable existence of three nested tumulus monuments –Tumulus I, Tumulus II and Tumulus III, dated to the beginning of the Bronze Age (Berciu 1966, 130; Motzoi-Chicideanu 2011, 71-72). Tumulus I (the oldest) contained an inhumation called mormântul1/M1; Tumulus II in turn contained an inhumation called mormântul2/M2. Tumulus III was erected above the first two tumuli. It is not excluded that pit 18 c (Groapa 18 c) belongs to the same complex.

- ENS 5: The excavator also points out that the building levels of the tumuli rest on a sterile layer, identified as humusul vechi (old humus), 1.5-2 cm thick, which probably corresponds to a soil that developed on the abandonment level, post-Neolithic.

- ENS 6: The excavator also identified a stratigraphic ensemble attributed entirely to the Neolithic occupation of the Hamangia culture. During the excavation, this ensemble was subdivided on the basis of more or less objective criteria, in particular the presence of structures (pits, silos, ditches, dwellings...). The most recent level was identified as level III (often noted upper level) and the excavator proposes to connect three dwellings at ground level (Locuința 1, Locuința 2 and Locuința 3), at least two pits interpreted as houses dug into pits (Groapa 1a/Gr. 10a and Groapa 11/Gr. 11), two hearths (Vatra 1 and Vatra 3) and pits. Sometimes, the excavator noted the presence of a level IIIa (older) and a level IIIb, of which it is not known whether it is a different level or whether it can be merged with the generic level III. Below this level, the excavator identifies an older layer labelled level II in the field books (often said lower level). D. Berciu attributed to this level dwellings dug into pits, but also a corridor as well as pits and silos. The archives sometimes make it possible to distinguishing two units within level II: IIa (the oldest) and IIb. However, the artefacts assigned to these two sub-ensembles are quantitatively negligible (less than 10 typological elements). Nevertheless, in the analysis of the excavation data, a lower level I is sometimes described and perceived in the sections as the first level of formation of the Hamangia culture settlement. The corresponding artefacts remain erratic, with less than 15 typological elements.

#### 4.2.2. Chronometry

For the Ceamurlia de Jos site, we have 8 dates (Fig. 6 and Tab. 1), 7 of which were obtained by us (Carozza *et al.* 2020).

Two nearby structures, dug into the substratum (according to Berciu’s data) belong to the first stage of the site’s occupation. The first dated ensemble is a pit unearthed in Profile II: Ceamurlia de Jos, excavation 1952 Profile II, Gr 1, Bos taurus (rib), RoAMS-1179.53 - 6013±38 BP, (95.5) 4997-4822 BCE; 4987-4836 BCE (68.2). Ceramics decorated with fine

settlement	context	laboratory			cal. 68,3	cal 95,4	
Ceamurlia de Jos	Svd Gr16	Poz-128249	bone	5795±35 BP	4710-4607	4725-4542	
Ceamurlia de Jos	1952 S VII	Poz-116913	bone	5820±50 BP	4766-4600	4791-4546	
Ceamurlia de Jos	Gr 4 SVc	Poz-128247	bone	5830±40 BP	4777-4614	4792-4552	
Ceamurlia de Jos	SIV L1	Poz-128267	bone	5830±40 BP	4777-4614	4792-4552	
Ceamurlia de Jos	S IV Gr1	Poz-128248	bone	5835±35 BP	4781-4616	4793-4556	
Ceamurlia de Jos	1953 Pr II	Poz-116914	bone	5980±40 BP	4931-4802	4986-4774	
Ceamurlia de Jos	1952 Profil II, Gr 1.	RoAMS-1179.53	bone	6013±38 BP	4946-4843	5000-4800	
Golovița	1960 SI, Cas. 2, Gr. E cane 21-22	RoAMS-1178.53	bone	5864±36 BP	4826-4709	4898-4616	
Golovița	1961 SI, Cas. 2, Gr. E	Poz-138299	bone	5890±50 BP	4833-4710	4901-4612	
Golovița	Cas 21-22 Gr c	Poz-138298	bone	6160±50 BP	5208-5043	5289-4953	
Golovița- Drumul Vacilor	S7 c 0-2, -2,2	Poz-140757	bone	5850±35 BP	4785-4684	4798-4608	
Golovița 2023	Fs 2007	Beta – 677745	bone	5820±30 BP	4784-4744	4731-4586	
<b>bibliography</b>							
Cheia	Us 3010	Ub 7276	Bos	6020±43 BP	4955-4847	5019-4797	Voinea, Neagu 2008
Cheia	Us 3094	Uba 18100	Cervus	6064±26 BP	5004-4936	5046-4854	Balasse et al. 2014
Cheia	Us 3094	Uba 21109	Bos taurus	6093±39 BP	5186-4943	5205-4885	Balasse et al. 2014
Cheia	Us 3074	Uba 18099	Bos	6141±29 BP	5118-5010	5206-5003	Balasse et al.
Cheia	Us 3118	Uba 21110	Bos taurus	6138±44 BP	5205-5003	5212-4963	Balasse et al. 2014
Constanta	inconnu	Pos-52 535	unknow	5850±40 BP	4775-4688	4825-4599	Voinea et al. 2016
Techirghiol	inconnu	unknow	bone	5851±58 BP	4790-4618	4841-4547	Voinea et al. 2016
Cernavodă	CVD 31 Skull 8	Poz-86549	Human, Right temporal	6220±40 BP	5289-5073	5300-5057	Kogalniceanu, Simalscik
Cernavodă	CVD 31 Skull 9	Poz-86550	Human, left temporal	6190±40 BP	5290-5025	5213-5067	Kogalniceanu, Simalscik
Cernavodă	CVD 31 Skeleton 10	Poz-86552	Human, Humeral shaft	6135±35 BP	5205-5000	5210-4987	Kogalniceanu, Simalscik
Cernavodă	unknow	unknow	unknow	5975±35 BP	4906-4799	4957-4745	Lazar, Margariț, Radu 2018
Cernavodă	unknow	unknow	unknow	6350±35 BP	5369-5301	5464 -5225	Lazar, Margariț, Radu 2018
Cernavodă	unknow	unknow	unknow	6310±40 BP	5320-5225	5363 -5215	Lazar, Margariț, Radu 2018

Tab 1 - Radiocarbon dating table.

dots were found in this pit. The forms are characteristic of the Hamangia culture, especially the biconical bowls. The second date also comes from a pit excavated in the same sector: Ceamurlia de Jos, excavation 1953 Profile II, Gr 3, Ovis/Capra (jawbone), Poz-116914 - 5980±40 BP, (95.5) 4986-4774 BCE; 4931-4802 BCE (68.2). The dates obtained for these two structures are consistent and place the occupation of this sector at the beginning of the 5th millennium BCE, within a time span between the 50th and early 48th centuries BCE.

For Section IV, we selected 2 samples. The first comes from a pit, the second from a dwelling unit labelled L1 by the excavator: Section IV, Gr 1 (bone): Poz-128248 - 5835±30 BP, (95.5) 4793-4556 BCE; 4781-4616 BCE (68.2). Section IV, L1 (bone), Poz-128267 - 5830±40 BP, (95.5) 4792-4552 BCE; 4777-4614 BCE (68.2). These two dates are very consistent and show that the structures in this sector date to a period between the late 48th century BCE and the first half of the 46th century BCE. Chronologically, the artefacts from these structures belong to the final phase of the Hamangia culture, said Hamangia III by Dumitru Berciu.

Another date was obtained for Section VII (excavation 1952, bone). The result is very coherent with the dates obtained for Section IV. The measurement, Poz-116913 - 5820±50 BP, (95.5) 4791-4546 BCE; 4766-4600 BCE (68.2) covers a time range between the end of the 48th and the first half of the 46th century BCE.

We have also dated two structures from the excavation of the largest section, Section V. A bone from an ovicaprine in pit 4 (Gr 4) was dated. This structure yielded a significant ceramic assemblage. The measurement, Poz-128247 - 5830±40 BP, (95.5) 4792-4552 BCE; 4777-4614 BCE (68.2) is entirely consistent with the results obtained for the structures in Section VII. It also confirms the contemporaneity with structure 16 (Gr 16) excavated in the same section (Section V travée d). The dated sample, a bone from an ovicaprine, yielded a measurement entirely compatible with the previous results, albeit slightly younger: Poz-128249 - 5795±35 BP, (95.5) 4725-4542 BCE; 4710-4607 BCE (68.2).

In conclusion, the seven dates obtained for different ensembles from Dumitru Berciu's excavation show the existence of at least two stages of occupation of the site. The first would date the initial occupation to the beginning of the 5th millennium BCE, within a time span between the 50th and the early 48th century BCE. Five other dates indicate that the settlement was occupied from the late 48th century to the first half of the 46th century BCE, although we cannot be sure that the dates obtained mark the end of the occupation.

## 5. Diversity of lithic productions in the Hamangia settlements of Golovița and Ceamurlia de Jos

Due to their chronological and spatial proximity, the lithic industries from both sites – Ceamurlia de Jos (52 pieces) and Baia-Golovița (30 pieces) – are presented here altogether. Each piece was analysed from a technological (Inizan et al. 1999) and typological point of view, but without a functional analysis of the microtraces (for the detailed study see Manolakakis, Mihail 2022). Regarding the raw material, the study does not rely solely on the macroscopic description, which has long shown its limits, both by its insufficient discrimination between the flints and by its dependence on individual perceptions, as A. Ciornei shows it very well (Ciornei 2015). Thus, the raw material was subjected to a preliminary petro-archaeological study (mesoscopic scale, ×10 to ×50), based on the principles of the silica evolutionary chain (Fernandes, Raynal 2006; Fernandes 2012) and the terms and reading grid established by P. Fernandes and V. Delvigne (Delvigne et al. 2020). The petro-archaeological observations were then compared with geological samples and their interpretation was discussed with V. Delvigne (CNRS, personal communication).

### 5.1 Raw material

The flint deposits in northern Dobruja are rather well distributed over the area (Păunescu 1998), with flints of mediocre to good aptitude for knapping, but the blocks are of mostly small modules, as our geological surveys in Dobruja have evidenced (Furestier *et al.* 2017). Ceamurlia de Jos and Baia-Golovița show the same type of procurement.

#### 5.1.1 Two-thirds local raw material procurement

Upper Cretaceous flint (Fig. 10: A): This flint, which sometimes has a yellowish patina, varies in colour (yellow, grey-green, green-brown, yellow-brown), is opaque to slightly translucent at the edges, smooth in texture and speckled with numerous white spots. The neocortex is inframillimetric to millimetric thick, lumpy, without subCretaceous limit. Under the binocular, it shows strong cortical wear and strong to very strong cementation, with a weak roughness gradient. The matrix is translucent on mesoscopic examination and contains weak geodic macroporosities; the poronecrosis is weak and clogged by frequent iron oxides. The structure is heterogeneous, with a strong presence of clasts (including possible fragments of glauconia) and especially bioclasts: abundant debris of demosponges, megascleres and microscleres of demosponges, as well as frequent evolute biserials and spirals (possible rotalids and textularids). It is a flint formed in a shallow troubled and heterogeneous marine environment such as the Upper Cretaceous.

This flint is of good quality, available as small to medium sized blocks in the Upper Cretaceous formations (Coniacian limestone with siliceous accidents and Turonian sandstone limestone) in the vicinity of the two sites. It may sometimes look very similar to the Ludogorie flint at the macroscopic scale, but differs significantly from it at the mesoscopic scale (see Ludogorie below), and even more so at the microscopic scale. The most important difference concerns the presence of numerous bioclasts in this flint. It can be compared to the Upper Cretaceous bioclastic cherts described in the petrographic and thin-section analysis by A. Ciornei (2015).



Fig. 10 - Raw materials from Ceamurlia de Jos and Baia-Golovița (photos F. Mihail).

Sandstone silicification (Fig. 10: B): It is completely opaque, has a rough texture, is beige to brown and grey-brown and looks like sandstone, sometimes covered with a whitish patina. Under the binocular, the cortex is millimetric thick, lumpy, with strong wear and cementation, with a diffuse cortex/siliceous zone limit. The matrix is opaque, contains geodic macroporosities of medium intensity, filled with oxides, clays and quartz. The structure is very heterogeneous, with a significant presence of clasts of poor to good grade, frequent intraclasts of good size and an abundance of quartz of all sizes. Bioclasts are very abundant and include whole and fragmented sponge spicules in large quantities, fragments of bryozoans and rare radioles. It is a heterogeneous marine Mesozoic flint from an troubled environment, in a secondary position in the ancient alluvium.

This raw material is of mediocre quality and its knapping is difficult to control, with a slightly conchoidal fracture surface that makes it difficult to read. As for the knapping of certain quartz, a single percussion can cause the simultaneous splitting of several small blocks or blanks. Nevertheless, it is sometimes possible to obtain elongated, thick and irregular blades. The poor quality of this material strongly suggests a purely local supply and exploitation.

### 5.1.2 The remaining third of regional flint procurement:

Ludogorie flint (Fig. 10: C): It appears opaque, has a smooth texture and is found in various shades of yellow-brown, sometimes tending to green or brown, with lighter veins and red spots (iron oxides) on the macroscopic scale. The cortex is inframillimetric thick and has a slightly smooth texture. On the mesoscopic scale, the cortical wear is strong, the cementation gradient is strong and the roughness gradient is weak. The subcortical limit is sharp, with a red-brown line with sharp limits and millimetre thickness. The core of the matrix is very homogeneous, opaque, without macroporosity, with rare punctuations and dendrites of iron oxides and very rare detrital quartz, in which clasts are rarely found. The equally rare bioclasts are very fragmentary debris of megascleres and microscleres of demosponges, rarely accompanied by planktonic foraminifera of radiolar and benthic (textularid) types. These features are exactly those observed by the

author – macro- and mesoscopically – in the Ludogorie samples from the deposits of Kamenovo and Ravno (Bulgaria). It is a marine flint of the outer platform (deep water) from the Lower Cretaceous (mainly Barremian-Aptian).

The Lower Cretaceous is almost absent in this area of Dobruja, with a single small occurrence of Aptian, near Dulgheru, about 40 km west of Baia and Ceamurlia de Jos. But this geological formation is abundant in southern Dobruja and northeastern Bulgaria, on the Ludogorie Plateau (Načev, Kănčev 1984; Gurova, Nachev 2008; Manolakakis 2008; Начев 2009; Pannett 2011). It appears in the literature under the term Balkan flint, which is too ambiguous, as it also includes other high-quality flints from the pre-Balkan platform, which are identical in tone but often studded with white dots and belong to the Upper Cretaceous (Coniacian, Campanian, Maastrichtian). In Ceamurlia de Jos and Baia-Golovița sites, some pieces of Ludogorie still have neocortex, which proves that these flints were collected in a secondary position, e.g. on the banks of rivers, terraces and alluvial deposits connected to the Ludogorie Plateau. However, this is no guarantee that all non-cortical pieces come from secondary deposits. This means that the Ludogorie may come from secondary or primary sources, but in any case on a regional scale, from western or southern Dobruja, or northeastern Bulgaria.

Translucent brown flint (Fig. 10: D): This is a single piece. It has a very smooth and fine texture, is dark brown in colour and translucent. On the mesoscopic scale, the structure is translucent and homogeneous, with few clasts. Some rare iron oxides in punctuation or dendrites are present. The biogenic component is rare and consists of sub-millimetric fragments of megasphere and microsphere debris from demosponges and very rare conchoidal macrofaunal debris. This flint is characteristic of an outer platform (deep water) of marine environment. The absence of cortex or neo-cortex makes it impossible to assess its procurement position. As far as we know, no kind of this flint exists in the locally around the sites. For the moment, the macroscopic features of brown to brown-black colour, transparency and fine, smooth texture are found in the descriptions or photographs of certain Volhynian flint samples (e.g. Skakun, Terekhenia, Mateva 2020, Fig. 11, A) or, closer, of the Prut flint A1 type (Vornicu 2015, Fig. 2 n° 6, 7, 9). Obviously, this level of macroscopic description is unsatisfactory and these comparisons cannot be accepted in the current state of our knowledge.

### 5.2 Debitage and products

Cores of the Upper Cretaceous flint and their products are present in both settlements, indicating that this material was worked there, or in the immediate vicinity. The blocks are knapped by direct percussion with a hard hammer to obtain flakes (Fig. 12: n° 2 and 3), and with a soft hammer to obtain blades and bladelets. The debitage of flakes produces blanks of 2 to 6 cm x 2 to 5 cm, with very variable thicknesses from 0.50 to over 2 cm (Fig. 11). The blade debitage mainly produces small blades, such as the single complete blade (length of 5.10 cm), but some blades may also have been longer, as the distal fragment with a length of 5.10 cm long. The width of the blades varies from 1.40 to 2.50 cm, the thicknesses is between 0.46 and 0.67 cm (Fig. 11).

Ceamurlia de Jos and Baia-Golovița also yield sandstone silicification blocks and cores (Fig. 12: n° 1), most with natural surfaces or neocortex, and coarse flakes. The cores are knapped locally by direct percussion with a hard hammer to produce flakes (Fig. 12: n° 6) and rare blade-like. The flakes are quite massive, wide and thick (about 5 cm long for the complete specimens, 2.35 to 4.55 wide, and 0.90 to 2.60 cm thick), as are the two elongated products that can be considered blades (5.75 x 2.24 x 1.90 and 6.80 x 3,00 x 1.45) (Fig. 11).

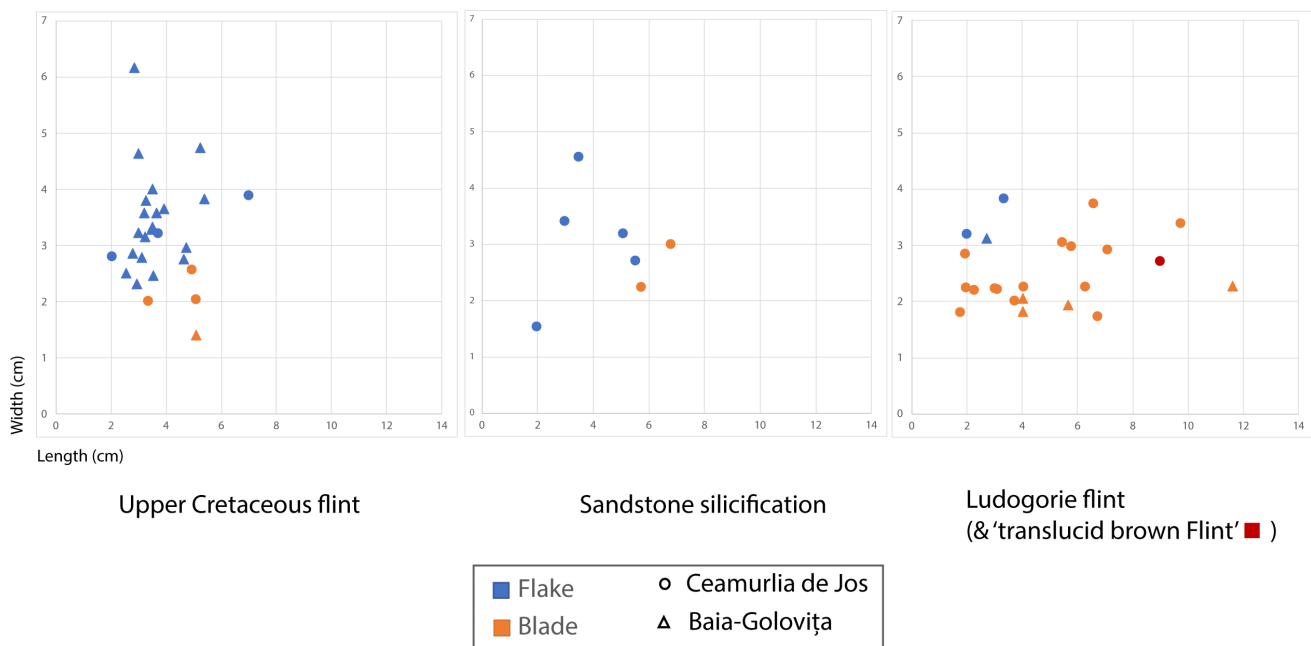


Fig. 11 - Modules (length x width, cm) of lithic products from Ceamurlia de Jos and Baia-Golovița.



The Ludogorie flint only occurs in the form of blades and a few flakes (Fig. 11), without a core or a block. One blade was obtained by direct percussion with a soft hammer (Fig. 12: n° 1; 3.10 x 2.21 x 0.75 cm), and a mesial fragment of a bladelet was possibly obtained by crutch pressure (Fig. 13: n° 9; [6.72] x 1.73 x 0.41 cm; Fig. 11), but the absence of its proximal part doesn't allow to confirm it. All the other blades with their proximal part preserved were knapped by indirect percussion. Although none of them is complete, they are the longest in the corpus, reaching up to 11.62 cm; their width ranges from 1.73 to 3.73 cm and their thickness from 0.37 to 1.10 cm, most of them between 0.43 and 0.96 cm (Fig. 11).

The single piece of translucent brown flint is a blade knapped by indirect percussion (Fig. 13: n° 2), with dimensions comparable to those of Ludogorie flint (9.0 x 2.71 x 0.92 cm, Fig. 11).

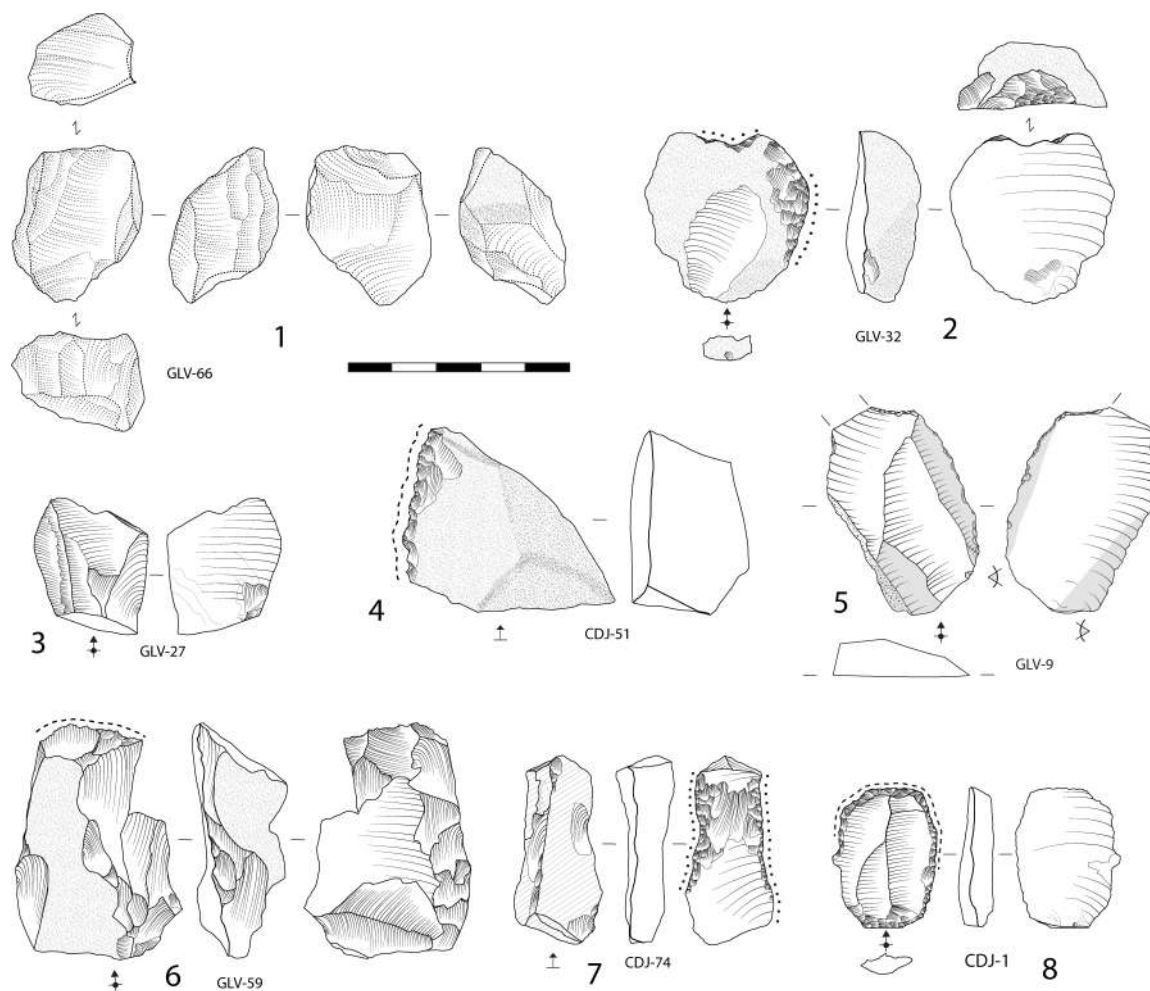


Fig. 12 - Core and flakes representative from Ceamurlia de Jos and Baia-Golovița (drawings L. Manolakis).

The absence of cores and technical pieces related to laminar debitage of Ludogorie and translucent brown flint – direct and indirect percussion productions – suggests that all the blanks made on regional flint were not produced locally, but imported as semi-finished products.

The tools attested in Ceamurlia de Jos (31) and Baia-Golovița (14) (Fig. 14) classically consist of scrapers on flake (Fig. 12: n° 2 and 8) or on blade (Fig. 13: n° 5 and 8), retouched blanks (Fig. 12: n° 5), unretouched used blanks (Fig. 13: n° 1 and 2), sickles (Fig. 12: n° 4; Fig. 13: n° 3 and 7), completed by splintered pieces (Fig. 12: n° 6 and 7), pointed blades (Fig. 13: n° 6) and a burin (Fig. 13: n° 4), to which could be added a burin-spall in Upper Cretaceous flint. Considering the sickle inserts, their gloss runs parallel to the edge on at least one side.

Although without a traceological analysis, macroscopic examination reveals eleven reused tools either in Ludogorie or in Upper Cretaceous flint: a double-angle burin, 2 double-gloss sickle inserts, 2 blades used on both edges, 2 sickle inserts recycled as scrapers, 3 scrapers on one or two-edged retouched blades.

### 5.3 Synthesis of the debitage and comparisons

The documentation does not allow us to assess the differences between Ceamurlia de Jos and Baia-Golovița, either chronologically or diachronically. Only the presence can be considered. The supply of raw materials seems to be very local and concentrated on Upper Cretaceous flint in the form of small blocks, knapped locally for the production of

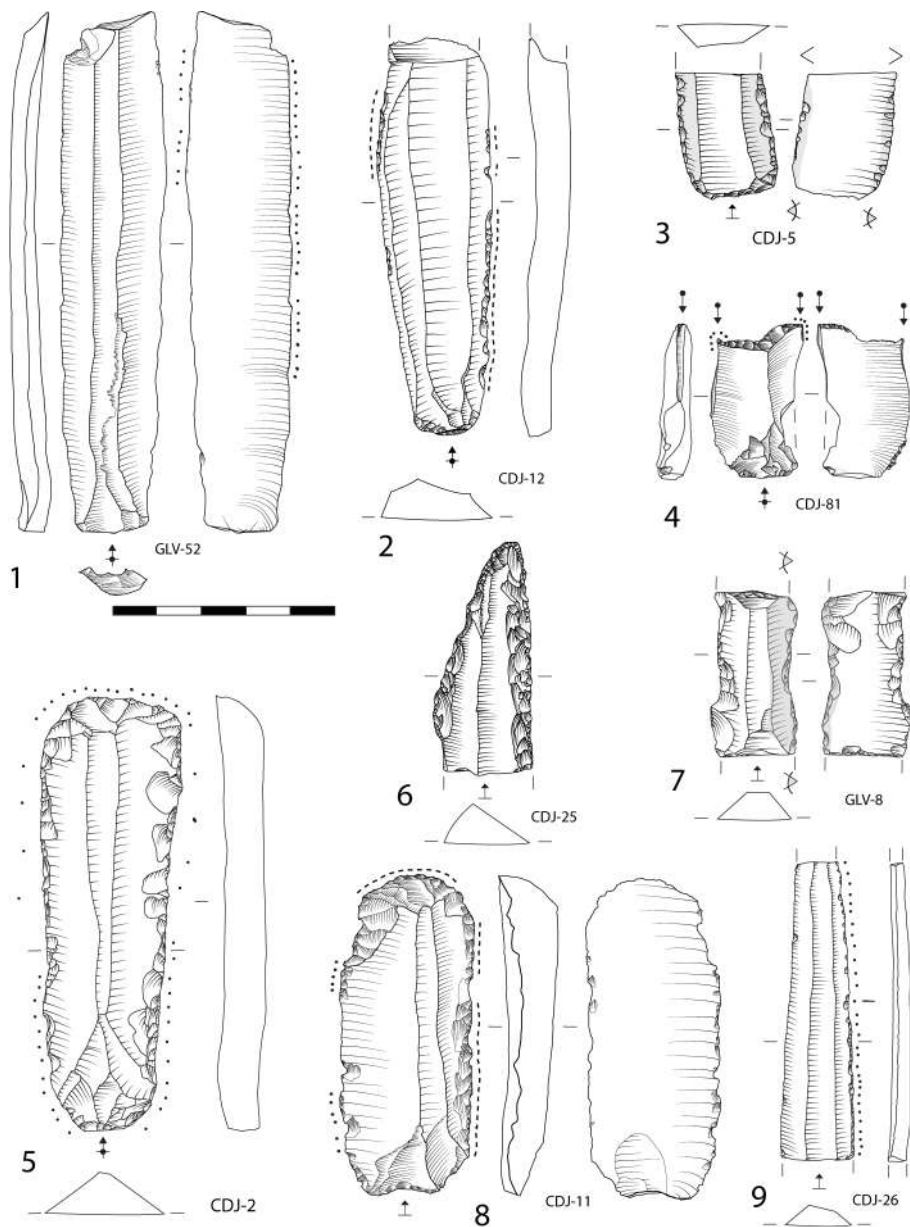


Fig. 13 - Blades representative from Ceamurlia de Jos and Baia-Golovița (drawings L. Manolakakis).

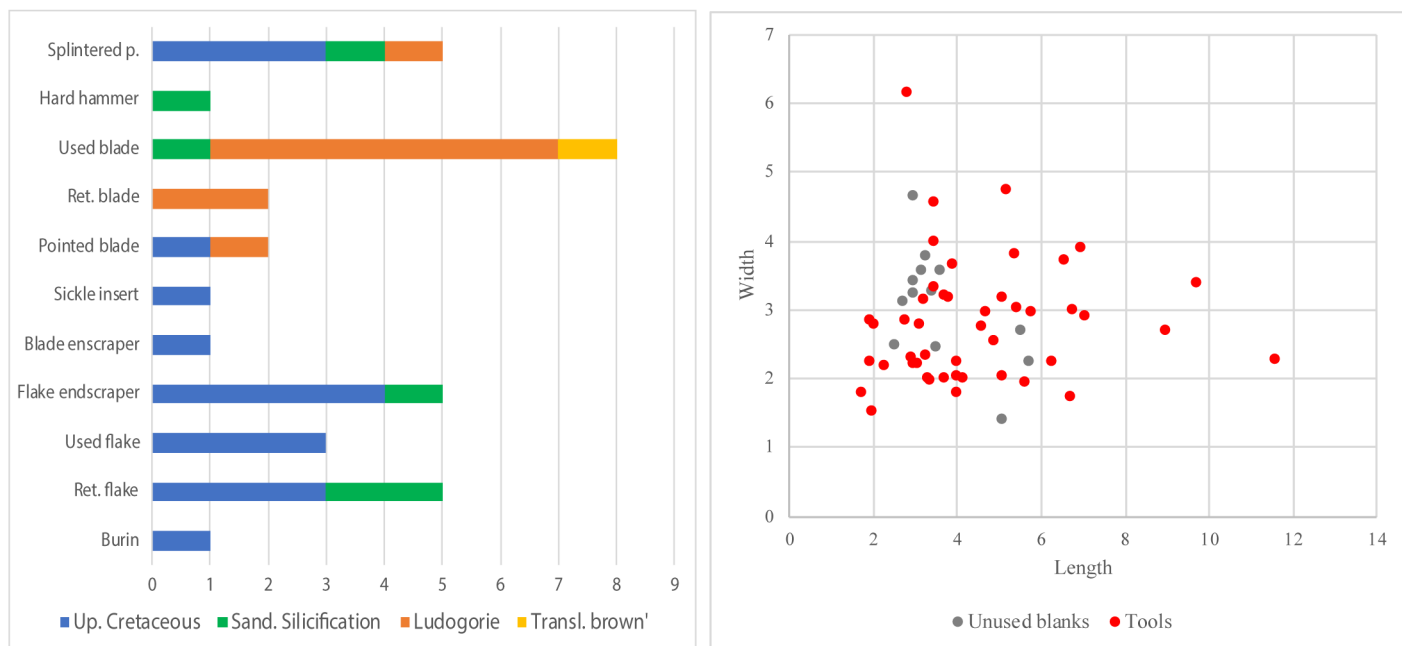


Fig. 14 - Diagram by raw material of the tools cumulated from Ceamurlia de Jos and Baia Golovița.

flakes by direct percussion with a hard hammer, and a small size laminar debitage by direct percussion with soft hammer. There is also a local opportunistic exploitation of lower quality material – sandstone silicification –, knapped by direct percussion with a hard hammer to obtain coarse blanks. Both materials are exploited at the best of their potential, in an expedient way for the sandstone silicification, and in an elaborate way for the Upper Cretaceous flint.

At the same time, blades and a few flakes in Ludogorie flint are imported already knapped, mainly by indirect percussion, but apparently also sometimes by direct soft percussion and perhaps also by crutch pressure. Comparing the use of Ludogorie flint in southern Dobruja, P. Hașotti considers that the flint supply was probably a problem for the communities of Ceamurlia de Jos and Baia-Golovița, visible in the use of lower quality flint and, more rarely, quartzite (Hașotti 1983).

More generally about flint quality, it can be stated that the Ludogorie flint is of good quality, just like the local Upper Cretaceous flint. The main difference lies in the dimensions of the raw material blocks, which are always small for the Upper Cretaceous flint of Dobruja, while the Ludogorie blocks available in southern Dobruja can be much larger, depending on the location.

A comparison in northern Dobruja is currently not possible with other Hamangia sites. Let us only mention the site of Isaccea Suhat on the southern bank of the Danube delta in northern Dobruja. This site shows a settlement attributed to the Boian culture with Hamangia elements and traces of the Gumelnița cultural complex (Micu 2006). As far as our study is concerned, the siliceous raw materials appear to be quite comparable (Upper Cretaceous flint, Ludogorie flint, translucent brown flint). It should be noticed that direct hard percussion is mentioned in Isaccea to obtain blades and flakes (Micu *et al.* 2000, 18-19).

On a larger scale within the Hamangia culture, even without taking chronological phases into account, comparisons stay difficult. Indeed, technological approaches on lithic assemblages remain not so frequent, and material characterisations are limited to macroscopic description.

Thus, in southern Dobruja, in Medgidia-Satu Nou (Constanța County), Balkan flint is cited as the flint used in the assemblage (e.g. Hașotti 1980, 204; 1987, 21-24). As already mentioned, this term includes flint from Upper Cretaceous formations and flint from Lower Cretaceous formations such as the Ludogorie type. It should be noted that Upper Cretaceous and Ludogorie flints occur locally in central and southern Dobruja (Comșa 1975; Nicolăescu-Plopșor *et al.* 1959). In Medgidia-Satu Nou, this Balkan flint is the subject of flake debitage, but also laminar debitage, without precision (Hașotti 1980, 206). The presence of cores, exhausted cores and cortical flakes is considered as local production.

In Cheia (Voinea, Neagu 2008, 12), the local Balkan flint predominates (with the same reservations as for Medgidia), and the production is considered as local, as it is shown by the numerous cores and debitage flakes. It is said that the microlithic pieces are obtained by indirect percussion, but nothing is said about the other productions.

Comparisons are available with the 33 lithic pieces from the Hamangia cemetery of Cernavodă-Columbia D, which have been analysed both from the typo-technological and the material approaches (Kogălniceanu, Nița, Haită 2017, 156-159). The siliceous materials exploited are local to regional. If the Upper Cretaceous flints and Ludogorie flints have been recognised, some siliceous rocks coming from Upper Jurassic deposits are also used. There is no soft percussion for the production of blades. Blades and flakes are obtained by direct hard percussion. In Golovița, hard percussion is also used to knap Upper Cretaceous flakes and in Ceamurlia de Jos, it is used for flakes and blades of silicification and Upper Cretaceous.

Finally, a technological study of the Durankulak necropolis was published by N. Sirakov (Sirakov 2002). Taking into account the funerary context, which cannot adequately reflect lithic production in a domestic context, similarities can nevertheless be identified. The Ludogorie flint, which is available locally and microregionally, predominates in the Hamangia grave goods, in contrast to the settlements studied here. The flint labelled as F7 in the publication seems to correspond to the Upper Cretaceous flint. N. Sirakov states that it is found in secondary position, in the form of small nodules, in the various valleys of the Dobruja between Dobrič and the Danube. Upper Cretaceous flints are very well represented (40%) in the graves dated to Hamangia I to III. On the other hand, no sandstone silicification is mentioned, but the poor quality of this material and the expedient mode of its production could explain its absence in the grave goods. Overall, the same flints (Ludogorie and local Upper Cretaceous) are present.

In terms of production methods, no blades knapped by direct percussion are mentioned in the Durankulak graves, unlike the Upper Cretaceous flint blades and some in Ludogorie of Ceamurlia de Jos and Baia-Golovița.

Some of the blades from the Hamangia I-III graves of Durankulak were obtained by crutch pressure; this supports the possibility that some crutch pressure knapped blades arrived in Ceamurlia de Jos.

The main production method attested in the graves attributed to Hamangia I-III in Durankulak are indirect percussion (totalling 51.2% of the blades in these graves). This debitage of blades and flakes seems to concern both Ludogorie and Upper Cretaceous flints. The published data for settlement contexts do not make possible to determine whether indirect percussion characterises domestic production in southern Dobruja, or whether this region, like the northern

part, is characterised by direct percussion. In other words, the blades in Ludogorie flint knapped by indirectly percussion found at Ceamurlia de Jos and Golovița may have originated in southern Dobruja. If not, they may have originated in northeastern Bulgaria where indirect percussion is well documented as domestic production in the context of the contemporaneous Sava culture, as in the Poljanica culture (and later in all the Kodžadermen-Karanovo VI settlements) (Manolakis 2005).

#### *5.4 A microlithic Tardenoisian tradition in the Hamangia lithic assemblage?*

D. Berciu sees in Ceamurlia de Jos and Baia-Golovița lithic industry “a Late Mesolithic tradition (Tardenoisian tradition), even Late Palaeolithic” (Berciu 1966, 11, 29, 56, 180 etc.), within which he discerns a “rather abundant microlithic toolkit”: particularly, small side-scrapers on flakes, small circular scrapers, bladelets, and borers.

This interpretation enabled D. Berciu to establish the Hamangia culture both locally and chronologically on the long term, at a moment when the data were still scarce. Following Berciu, many authors have now discerned Mesolithic/Tardenoisian origins for the Hamangia lithic industry. It is based on the smallness of the endscrapers, the presence of a small laminar debitage and some transverse arrowheads like trapezes, that is to say, some geometrics.

Thus, the lithic assemblage from Cheia in central Dobruja (Voinea, Neagu 2008) is said microlithic of the Tardenoisian tradition, as are those from Medgidia-Satu Nou or Tîrgușor-Urs (Hașotti 1983, 31). In these sites, the tools are mainly scrapers, and the circular scrapers are considered as typical Tardenoisian tools, such as notched blades (Medgidia), and trapezoids and dihedral burins (Cheia). Photographs or schematic drawings only allow discern a production of small, not very regular blades which seem very comparable to the laminar production by direct percussion on small and medium-sized blocks (as in Voinea, Neagu 2008, 28-29, and in Hașotti 1983, 34, 36-37); some probable broken borer ends (Voinea, Neagu 2008, 28), and circular endscrapers (Voinea, Neagu 2008, 30; Hașotti 1983, 33, 36). The typological synthesis of lithic tools from Hamangia (Hașotti 1983; 1986) repeats the same descriptions, emphasising its Mesolithic character particularly marked in the occupations of the early phase of the Hamangia culture. In 2002, N. Sirakov documents geometric microliths, such as Vielle points and trapezoids, in the grave goods of some Hamangia I-III tombs in Durankulak, with typo-technological study and technical drawings. He considers that they “prove that the Hamangia culture preserves a distinct Mesolithic tradition” (Sirakov 2002, 314).

It seems to us that the hypothesis of a Mesolithic tradition for Hamangia lithic industries is based on a combination of imprecision and uncertainty.

The transition from microlith (to describe a tool with small dimensions) to microlithism (which characterises production as a whole) implies the Mesolithic, since microlithism and the Mesolithic are conceptually associated. Yet microliths, whether geometric or not, were widespread in most industries from the Mesolithic to the Bronze Age, as I. Gatsov and P. Nedelcheva remind (Gatsov, Nedelcheva 2019). For example, small triangular or trapezoidal arrowheads are often found in the context of purely Neolithic settlements, which are in no way related to a Mesolithic tradition.

Furthermore, it is likely that these small geometrics are linked to the use of bows and arrows (Rozoy 1989), particularly as arrowheads or barbs. Bowhunting is an activity that is not only associated with the Mesolithic. In Neolithic times and later periods, hunting in general and bowhunting in particular clearly continued, as the invention of metal did not immediately displace flint and bone points. The presence of microliths cannot therefore be considered a Mesolithic director fossil.

In addition to geometrics, the Hamangia lithic industries would be characterised by microlithism due to the presence of small tools. But several factors are not taken into account, such as wear and resharpening, although they have an impact on tool size (scrapers are particularly affected). These are important reduction factors, especially in a context of raw material scarcity, where each tool is likely to be used exhaustively. Another neglected factor is the size of the blocks of raw material. The size of the knapped product depends firstly on the size of the blocks available, and not just on a cultural choice like microlithism. It seems to us that the modules of the Neolithic lithic industries of northern Dobruja are intrinsically linked to the exploitation of local flint, which consists of small blocks. The same is true in southern Dobruja, where the exploitation of local Upper Cretaceous flints produces necessarily short blanks and tools. However, in the presence of the large blocks of Ludogorie flint found in this area, the pieces produced are much larger. The supposed microlithism is therefore not a traditional characteristic for Hamangia communities, since large blocks does not preclude the production of small blanks and tools (who can do more can do less).

Finally, the characterisation of the Tardenoisian of Romania, is not yet properly defined, as A. Boroneanț emphasises (Boroneanț 2005). Worse still, this author considers that the cultural attribution of certain sites in Dobruja to the Late Mesolithic is problematic, as they could belong to the Hamangia Neolithic... (Boroneanț 2005, 28). To be supported, the hypothesis of Tardenoisian tradition must rely on consistent documentation of Mesolithic sites in the region, take into account the form and quantity of available materials, and perform a critical analysis of typological comparisons.

In the current state of knowledge and given the size of the local flint blocks, the existence of specific microlithic production, apart from usual geometric arrowheads, is not well enough documented to characterise Hamangia. The Mesolithic tradition of the lithic industries of Ceamurlia de Jos and Baia-Golovița and of Hamangia in general, remains a hypothesis to be demonstrated. This question therefore remains open.

## 6. Hamangia: originality, hybridity, cross-cultural interaction?

The newly acquired chronometric data in the northern Dobruja, especially in the framework of the mission Archaeology of the Danube Delta, shed light on the connections of the Hamangia culture with contemporary cultural groups or those that directly follow it. The work carried out as part of the mission, based on a re-evaluation of the material assemblages from the eponymous sites of the Hamangia culture, was extended regionally to the Bulgarian areas along the Black Sea coast.

### 6.1. Chronometric data of the Hamangia culture

Here we propose to compare the radiocarbon dates obtained for the Baia area (Golovița and Ceamurlia de Jos) with other dates obtained for the Hamangia culture in Romania and Bulgaria, especially from the Durankulak necropolis (Fig. 16). To outline the chronological dynamics of this cultural group, we have only 26 validated dates (Annexe 1), which is extremely few. Moreover, some of these dates are subject to uncertainties: the dated contexts may be unknown; the type of material sent to the laboratory is not known (e.g. Cernavodă). Furthermore, when analysing human bones, we have to take into account that the reservoir effect related to diet may have an impact.

The oldest published dates come from the Cernavodă site (Kogălniceanu, Simalcsik 2018; Lazăr et al. 2018). The three dates obtained from human remains cover the interval 5300-5000 BCE. Although these dates are older, they are consistent with some 14C measurements made at the Cheia site (5200-4900 BCE). However, it is possible that the dates obtained for the burials at Cernavodă are somewhat too old. Without a verified context, the other dates are more difficult to use.

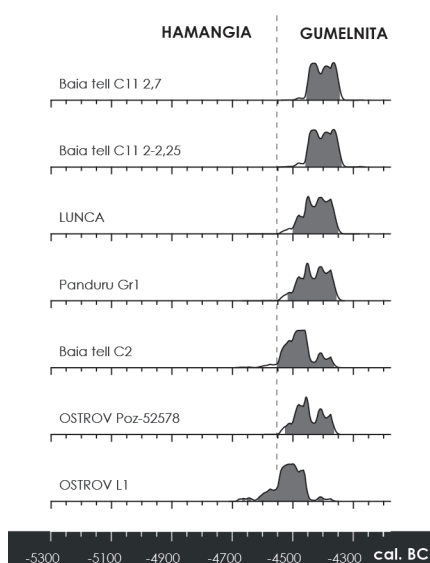


Fig. 15 - Reference 14C dates for the beginning of the Gumelnița culture in the Baia area and on the Black Sea coast in Romanian Dobrogea (© Chronomodel, DAO L. Carozza).

#### 6.1.1. Dating the Hamangia cultural sequence in the eponymous zone

The ancient character of the Hamangia culture is also evident at the Cheia site (Us 3118, 3074 and 3094). These four dates, even if the last one is slightly younger (5005-4937 BCE), indicate that the beginning of the occupation of the Cheia settlement would run between the early 53rd and the late 51st century BCE (Us 3118 and 3074). A fifth date, obtained for Us 3010, differs from the others and corresponds to the early 5th millennium BCE, between the 50th and 48th centuries BCE. This last date, which the excavators attribute to the Hamangia III phase, corresponds to the dates obtained for profile II of the Ceamurlia de Jos site (Fig. 16).

According to Valentina Voinea, the main occupation of Cheia largely belongs to the Hamangia III phase (Voinea, Dobrinescu 2002-2003; Voinea, Neagu 2008). However, the contexts for these dates are lacking (the stratigraphic links remain unpublished). Given this lack of data, we consider that these four dates could characterise the ancient phase of the Hamangia culture prior to the 49th century BCE.

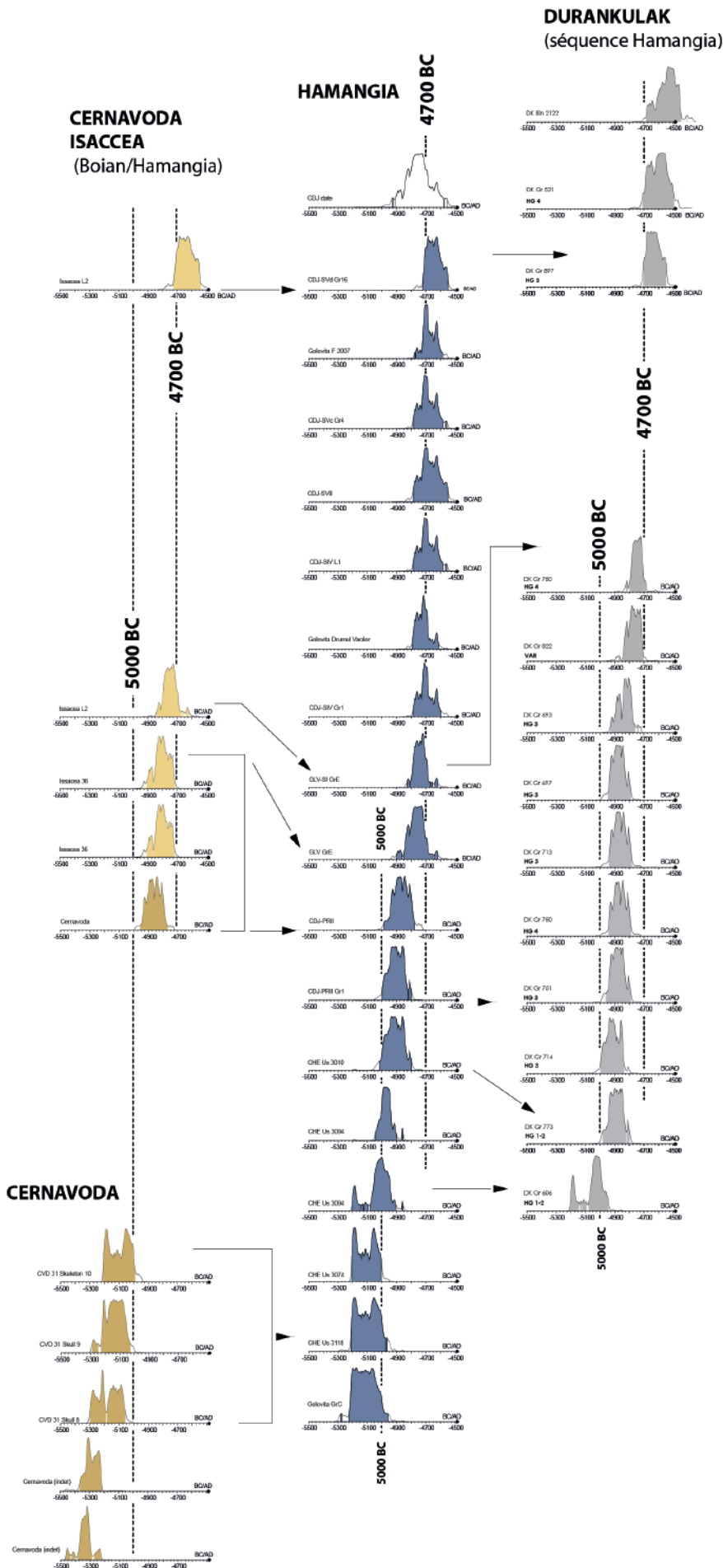


Fig. 16 - Compilation of published radiocarbon dates to understand the dynamics of the Hamangia culture and its interactions with the Boian culture in northern Dobrogea (© Chronomodel, DAO L. Carozza)

A second stage of occupation of the site at Cheia would develop at the beginning of the 5<sup>th</sup> millennium BCE (CHE Us 3010 6020±43 BP, or 4977-4846 BCE; 5020–4797 BCE), between the 50<sup>th</sup> and the early 48<sup>th</sup> century BCE. This stage of occupation would be contemporaneous with the first occupation of the settlement of Ceamurlia de Jos (pits of Profile Pr II) between 5000 and 4800 BCE, which marks the middle stage of the culture.

The other available dates are all after 4800 BCE and fall within a long time range between 4800 and 4550 BCE (Fig. 16). Dates of the occupation of the Techirghiol Dig II and Constanța Carrefour sites, attributed to the Hamangia IV phase, fall in the same segment, around 4800-4700 BCE. They are close to the set E dated at Baia-Golovița, although this site has always been attributed to the Hamangia II phase, which is considered by all authors to be significantly earlier than phase IV. There is every reason to believe that the field situations (adequacy between dated contexts and finds) or the typological indicators used are not relevant for characterising the typo-chronological sequence. It has to be said that the typological elements published for the Techirghiol Dig II site by V. Voinea and colleagues (Voinea, Caraivan, Florea 2016, fig. 4 to 6) share many characteristics with the Ceamurlia de Jos site, a fact that is also reflected in the convergence of radiocarbon dates. For the Constanța Carrefour site, we have no illustrations to evaluate the authors' proposals.

Another result of this sequencing is showing the link between the latest dated sets from the Ceamurlia de Jos site and the Golovița occupation. Although the single date from Golovița is not representative of the entire occupation of the site, it moderates the Berciu hypothesis of a complete chronological precedence of the occupation of this site over that of Ceamurlia de Jos.

From the compilation of these dates, we can also deduce that the end of the occupation of Ceamurlia de Jos at the turn of the 47<sup>th</sup> and 46<sup>th</sup> centuries BCE could correspond to the terminus of the Hamangia III phase, as assumed by most researchers when compiling the bibliography, around 4650-4600 BCE. Does this end point correspond to a local situation specific to this habitat? Or should the date of abandonment of the Ceamurlia de Jos settlement be seen as indicative of a regional chronological model? And what would be the place of the Hamangia IV phase? Answering this question would require all dated sets to be exhaustively published, which is not the case.

The newly obtained data also shed light on the question of Hamangia-Gumelnița succession in northern Dobruja. To address this question at the local scale, we have recently obtained radiocarbon dates for the Baia-Boruz tell and the open settlement of Panduru (Carozza, Micu, Burens 2022; Lungu, Micu 2003).

For the Baia-Boruz tell, three dates were obtained for assemblages dated to the Gumelnița culture phase A1 (Carozza, Micu, Burens 2022). These dates refer to the middle part of the stratigraphy of the tell, not to its base. The oldest date comes from square 2 of sector 1 of the Baia-Boruz tell (5650±40 BP, or 4585–4361 BCE; 4540-4446 BCE.), the two other dates from square 11 of sector 1 are very close to each other (C11 -2.5-2.7 m 5560±35 BP, or 4455–4342 BCE; 4443-4355 BCE; C11 -2-2.25 5560±40 BP, or 4486-4340 BCE; 4444-4355 BCE). These unpublished data fall within a chronological interval between the 46<sup>th</sup> and 44<sup>th</sup> centuries BCE (Fig. 15).

These dates show very well that the development of the Gumelnița culture in the coastal zone of Golovița and on the edge of Lake Razim takes place between the early 46<sup>th</sup> and 45<sup>th</sup> centuries BCE, probably around 4500-4400 BCE.

To grasp the timing of the transition from Hamangia to Gumelnița in the coastal zone, we propose to use two dates obtained at the Năvodari site known as La Ostrov attributed to the Gumelnița culture. The habitat is located on an island in Lake Tașaul, about 40 km south of Baia (Marinescu-Bîlcu *et al.* 2000-2001; Voinea 2004-2005; Voinea, Caraivan, Florea 2016). The first date was obtained for a burnt dwelling (L1): 5680±40 BP, or 4675–4375 BCE; 4542–4461 BCE. The second date, according to the authors, corresponds to: “the last habitation sequence dated to 5625 ± 35 cal BP” (Voinea, Caraivan, Florea 2016), or 4526–4364 BCE; 4496–4373 BCE. The authors attribute the occupation of this site to the end of phase A2 of the Gumelnița culture, or even to the beginning of phase B1. The excavators mention that, in the most recent level, they discovered decorations present on ceramics as from phase A2 as from phase B1 (Voinea 2004-2005, 23). In the absence of a publication, it is difficult to form an opinion based on a few elements extracted from their context (Voinea, Caraivan, Florea 2016, fig. 9). Especially since sherds of the Hamangia III type were discovered at the site (Marinescu-Bîlcu *et al.* 2000-2001, 126, 128).

Sequencing these dates with those of the Hamangia culture in the eponymous zone (Fig. 16) shows, at the local scale, that the cultural transition from Hamangia to Gumelnița would have taken place around 4600-4550 BCE, at the end of phase III. According to the authors, the two dates obtained at the Năvodari La Ostrov site belong to the Gumelnița cultural complex. It can be assumed that the characteristics of this culture emerged at the turn of the 47<sup>th</sup> and 46<sup>th</sup> centuries BCE. According to this model, we can consider two hypotheses: 1/ In the Dobruja coastal zone, there would be a direct transition between the Hamangia III phase – represented in Ceamurlia de Jos – and the development of the Gumelnița cultural complex around 4600-4500 BCE. 2/ As proposed by Valentina Voinea for Romania, there would be a transition phase in the same geographical area, represented by the Hamangia IV phase (P. Hașotti hypothesised a phase IIIc). If we refer to the dates published by Valentina Voinea and her collaborators for the assemblages from Constanța Carrefour and Techirghiol-Dig II, both attributed to this phase IV, there is no chronological precedence of this phase IV over Gumelnița. Phase IV would therefore only be characterised by specific typological features.

For the moment, it seems that the so-called Hamangia IV phase is consistent with the peculiarities of the Bulgarian chronology, in which the authors propose a Hamangia IV-Varna I phase beginning around 4800 BCE with the Hamangia IV component and ending around 4550-4450 BCE with Varna I.

### *6.1.2. Synchronising the Hamangia and Boian sequences in the Lower Danube area*

Given the difficulty of understanding the genesis of the Hamangia culture, many researchers have taken advantage of the existence of mixed assemblages (Boian Giulești and Hamangia). We have carried out dating for selected assemblages in the potential contact zone between these two cultural complexes. For this purpose, we carried out age measurements for the Isaccea Suhat site excavated by Cristian Micu (Micu 2006). The habitat of Isaccea Suhat overlooks the Danube floodplain. We have four datings for two assemblages, pit 36 and house L2 (see Table 1). The compilation of these age measurements and their comparison with the dates obtained for the end of the Hamangia culture (Fig. 16) clearly shows that there is a contemporaneity between the Boian Giulești cultural complexes of Isaccea (pit 36 and dwelling unit L2) and the Hamangia occupations of Ceamurlia de Jos and Golovița. The common time span is between the 49<sup>th</sup> and 48<sup>th</sup> centuries BCE. It can be assumed that the end of the Hamangia and Boian sequences could be synchronous, around 4650-4600 BCE, as shown by the dates from the abandonment levels of House L2 in Isaccea or Section VII in Ceamurlia de Jos.

The beginning of the Gumelnița sequence would start around 4600 BCE. This model is based on the existence of a transitional stage between the Early Chalcolithic cultural complexes and the emergence of the Kodžadermen-Gumelnița-Karanovo VI megacomplex, rather than on a major break between these cultural complexes. This hypothesis must be supported by new data from the coastal area of the Black Sea.

### *6.1.3. Connections with the Bulgarian sequence: the case of the Durankulak necropolis*

Since the Hamangia culture extends beyond the Romanian Dobruja into the Bulgarian Dobruja, and although the focus of our article is on the dating of sites in the eponymous zone of the Hamangia culture, we thought it would be interesting to compare our dating with the chronological data available for the Bulgarian zone. For Bulgaria, we have the syntheses published by Henrieta Todorova, in particular the monograph on the excavations of the Durankulak necropolis (Todorova 2002). Without undertaking a critical review of the sources, we have limited ourselves to compiling the main dating syntheses available (Boyadziev 1995; 1998; 2002; Honch *et al.* 2006; Krauss *et al.* 2017; Todorova 2002). This comparison is limited to the Durankulak site.

Based on the published dates, we have presented the dates for the necropolis of Durankulak without taking into account cultural attributions or archaeological phasing (Fig. 16). N. Honch and his colleagues carried out a Bayesian statistical analysis of the age measurements of the Durankulak necropolis. They made reattributions, in particular for graves 750 and 822, both of which had been assigned to phase Hamangia IV by H. Todorova (Todorova 2002) and are now assigned to phase III (Honch *et al.* 2013). In their paper, the authors concede that the match between the typo-chronological seriation and the chronological model derived from age measurements is very unsatisfactory (35.8% occurrence). The synthesis by Honch and collaborators, which focuses on the diet of the population, does not propose a new reading of the chronological classification, but shows that the Durankulak cemetery was used for at least 470 to 650 years in the middle of the 5<sup>th</sup> millennium BCE (Honch *et al.* 2013, Fig. 7). The authors specify that the: “AMS data suggests that the cemetery was probably used from 5000 BCE, at the end of the Neolithic in Bulgaria, and had ceased to be used around 4450 BCE, at a period attributed to the beginning of the Late Eneolithic in other regions of Bulgaria (Boyadziev, 1995)”. According to this model, the representation of the early Hamangia culture, before 5000 BCE, is questionable.

We attempted to put the Bulgarian and Romanian sequences in perspective. The Durankulak sequence shows that around 4700 BCE there is a possible break between assemblages attributed to Hamangia III and later assemblages that are more likely to belong to phases IV or Varna (Fig. 16). R. Krauß and his colleagues have tried to correlate the data from the Varna and Durankulak necropolises (Krauß *et al.* 2017, fig. 13). In this proposal, they place the Hamangia IV phase of the Durankulak necropolis in the interval 4800-4500 BCE, while the analysis data from Varna I places the occupation in the interval 4600-4340 BCE. In the same table, the authors outline the typological evolution of the ceramic styles in order to emphasise the key characteristics of this evolutionary sequence. The points of convergence with the Romanian sequence remain very weak. Valentina Voinea and collaborators have shown that typological features of the Varna I type are relatively rare and mainly located on the coast (Voinea, Caraivan, Florea 2016, Fig. 8).

## 7. Conclusion

Let us remember that our approach to the Hamangia culture is exploratory. The published documentation is not sufficient to propose a solid model. We will therefore propose hypotheses that could serve as avenues for further research. The first observation we must make is the need to clarify the terminology applied to the specificities of material culture, especially for ceramic forms and decorative techniques.



It is clear from the publications that the assemblages attributed to the early phase of the Hamangia culture (based on the ceramics) are not clearly and uniformly related to this culture. At the Medgidia Cocolașă site, for example, the decorative register and ceramic forms show strong analogies with assemblages attributed to the Boian Bolinteanu culture. We must recognise the foresight of V. Dumitrescu who, in his analysis of the emergence of the Chalcolithic (Dumitrescu 1974), dismissed the archaic characteristics of the decorative techniques, such as barbotine, as unconvincing. Vladimir Dumitrescu emphasised the connections that can be made between the early phase of the Hamangia culture and certain features of Boian ceramics of the Bolinteanu type. This observation seems significant as it provides further support for a partially local genesis of the Hamangia culture, which could share a common foundation with the Bolinteanu phase of Boian culture.

This intuitive approach was complemented by the discoveries of P. Hașotti (Hașotti 1997), which renew the data based on the documents excavated at Medgidia-Cocolașă (for the Hamangia I phase) and Medgidia-Satu Nou (for the Hamangia II phase). If you analyse these documents in the light of the data published by Eugen Comșa (Bucharest Floreasca sites), you can see numerous similarities in form and decoration (Comșa 1955). For example, both Cocolașă and Bucharest Floreasca have biconical carinated bowls decorated with oblique chevron grooves, sometimes with small circular handles (Hașotti 1997, fig. 29; Comșa 1955, fig. 11). Fine decorations, such as dotted patterns or V-shaped incisions forming horizontal or oblique lines, are also found at both sites (Hașotti 1997, fig. 30; Comșa 1955, fig. 4, 5, 7). Similarly, some medium-volume ceramic forms decorated with digitised patterns and barbotine are common with sites from the Bolinteanu phase of Boian culture. One might wonder, however, what in the Medgidia Cocolașă assemblages really belongs to the Hamangia culture? The analogies are so great that the existence of the early phase of Hamangia culture (Hg I and II) can be questioned.

The decorations and forms characteristic of the Hamangia culture (fine dotted decorations, carinated bowls, bottles with necks, pedestal vases, terracotta figurines, etc.) are indeed not present in the assemblage of the Medgidia Cocolașă habitat assemblage. This observation is repeatedly made in the literature. Puiu Hașotti emphasises the analogies observed between the ceramics of the Hamangia II phase and that of the Boian Bolinteanu phase. He mentions that he supposes the contemporaneity of these two phases (Hașotti 1997, p. 39) at the Grădișea Coslogeni site (Călărași County), taking into account the data of R. Lungu (Lungu 1982, 11-23). By deciphering the assumed associations of the ceramic assemblage from different facies within this site, P. Hașotti proposes to link the Grădișea Coslogeni site to the Hamangia IIA stage (Hașotti 1997, 21, 26). This construction also allows him to establish analogies with the oldest level of Golovița and the Medgidia Satu Nou site (*ibid.*, 21). But is this suggestion not related to Dumitru Berciu's thesis of the supposed precedence of the Baia-Golovița habitat over that of Ceamurlia de Jos?

From this point of view, we propose to examine the hypothesis of the existence of a Neolithic cultural group in northern Dobruja, closely linked to or belonging entirely to the Boian culture, the early Bolinteanu phase, in the second half of the 6<sup>th</sup> millennium BCE. The lack of well-dated assemblages makes it difficult to confirm this hypothesis, which is based on the fragmentation of the Boian Bolinteanu block in the 6<sup>th</sup> millennium BCE. This very localised fragmentation within the Boian area would favour the emergence of the Hamangia culture. This fragmentation is characterised by the adoption of new ceramic standards and the emergence of new norms, particularly for statuary. In this context, the emergence of the Hamangia culture could be the result of a local recombination – on a Boian cultural foundation – and external cultural contributions. From this process of fragmentation and fusion, only the classical phase emerges, which is often reduced to the Hamangia III phase. In practise, we can only emphasise the very local character, as can be observed in the area of Baia and Ceamurlia de Jos, where the ceramic stylistic features specific to the Hamangia culture predominate, if not are the only ones. To date, we have not observed any persistent Boian characteristics in the material culture. The further one moves away from the coast and closer to the lower Danube, the Hamangia culture diffuses less intensely within hybrid Boian-Hamangia assemblages.

In Bulgaria, Henrieta Todorova proposed a tripartite division of the Sava culture (Vajsova 1966), which she synchronised with the Hamangia cultural sequence. For the author, the fusion of the two groups (Hamangia III and Sava III) was at the origin of the Varna culture (Тодорова 1984).

On the Black Sea coast there would be a gradual development from the Hamangia culture (Hamangia III-IV) to the Varna culture, while elsewhere the transition to the Chalcolithic was more abrupt under the impulses of the KGK cultural complex. This transition would be accompanied by shifts in polarity, with the coast acting as a factor of social acceleration and the Lower Danube as a growth centre for productive ecosystems.

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