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The Role of Culture in Early Expansions of Humans (ROCEEH)

Ngebung Site in Sangiran, Central Java. Photo: Mika Puspaningrum.

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THE ROLE OF CULTURE IN EARLY EXPANSIONS OF HUMANS

Editorial

In this 20th newsletter, ROCEEH takes you on a little trip around the world. We tell the story of stone technologies in southern Italy at the transition from Middle to Upper Paleolithic, the paleoenvironment of *Homo erectus* in Indonesia, and a unique eyed needle from the Armenian Highlands. We hope you enjoy!

Technological behavior of the last Neanderthal and first Sapiens in Italy

Tools and technology at the Middle to Upper Paleolithic transition

Stone tools represent material traces of past behaviors and bear witness to our most ancient past. These artifacts not only preserve information about their final form, but also inform us about the way people produced them. Moreover, by reconstructing the process of production–which archaeologists call the reduction sequence–we gain insights into the most complex and intriguing part of our distant past: the cognitive capacities of our ancient relatives.

A crucial point in our evolutionary history occurred when tools and technology started to allow *Homo sapiens* (also known as anatomically modern humans) to adapt to and spread into different environments, and thereby outperform the other species of hominins who inhabited our planet in the past. In prehistoric archaeology, the transition between the Middle and Upper Paleolithic occurred approximately 50,000-40,000 years ago. This period represents a crucial stage in human prehistory because it corresponds to the demise of the Neanderthals and the dispersal of *Homo sapiens* across the world, as humans established themselves as a global species.

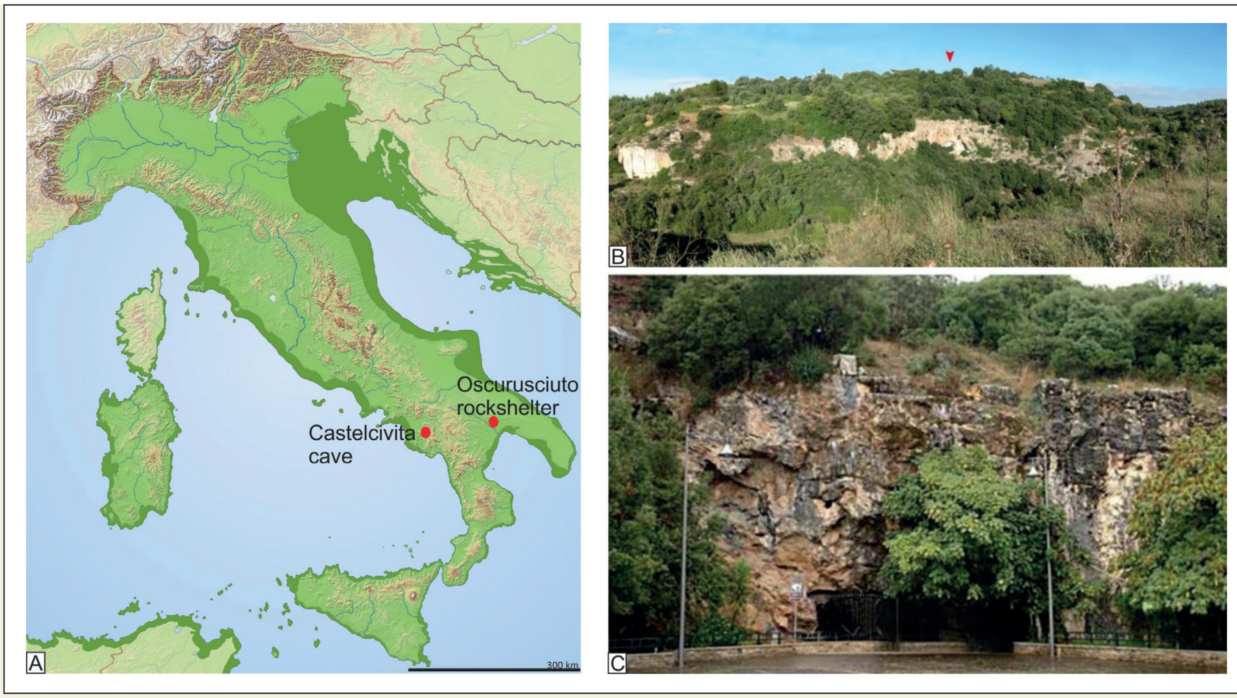
One of the main objectives of the ERC-SUCCESS project, of which I am part, is to study the bio-cultural, adaptive, and ecological characteristics that make our species successful and unique. My objectives are to understand the role that technology played, and directly compare the technological behaviors related to the production of stone tools made by the two different species (Neanderthals and Sapiens) at some key sites in Italy.

Cognigrams of the tool behavior of the last Neanderthals and first Sapiens in Italy

Directly comparing datasets is the greatest challenge in the study of stone artifacts. Information collected from different contexts and influenced by different approaches of study results in diverse sets of data, which are sometimes impossible to compare. Another challenge is how to compare activities such as flaking procedures related to the production of stone tools. To meet these challenges, we need to establish an architectural framework that allows a comparison on both large temporal and geographical scales, as well as between different behaviors and species. The ROCEEH research center has addressed such challenges for more than a decade. As a visiting researcher, I worked with the ROCEEH team, especially Miriam Haidle and Andrew Kandel, to learn about cognigrams and the ROAD database.

The aims of my visit were twofold. First, I wanted to evaluate the expression of tool behavior from an organizational and cognitive point of view by applying the meta-tool of cognigrams to the archaeological toolkit of the last Neanderthals and the first modern humans of the Italian peninsula. Second, I wanted to learn about the structure and potentials of the ROAD database. My month at the ROCEEH center gave me the unique opportunity to learn about cognigrams and the ROAD database and discuss their applications in the place where these tools were developed.

Cognigrams are a flowchart used to code and compare different behavioural performances. Miriam Haidle developed them in 2005 as a method of reverse engineering. Since then, researchers have used cognigrams effectively in cognitive archaeology for well over a decade as tools to ‘think-through’ technologies.



▲ Figure 1. A) Map with location of the key sites (modified after Moroni et al. 2018). B) The ravine of Ginosa and Oscurusciuto rockshelter (modified after Marciani et al. 2020). C) The cave of Castelcivita (modified after Arrighi et al. 2020). The Research Unit Prehistory and Anthropology of the University of Siena carried out research at Oscurusciuto and Castelcivita.

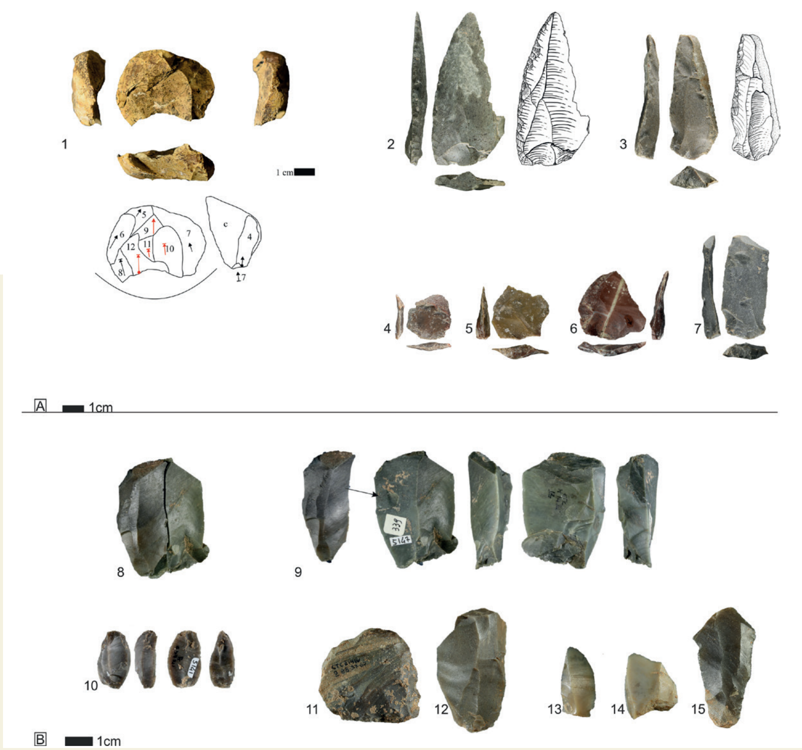
They allow us to compare activities from different contexts and actors, using perception-and-action sequences for tool behavior, and provide a contextualized scheme of the developmental procedure. This makes them a valuable meta-tool to standardize and compare the degree of complexity related to different activities coming from different contexts and performed by different species.

Cognigrams allows us to approach technical behavior with a different and innovative perspective. The focus moves from the stone tool to the actions of the knapper, meaning the decisions made behind the technical procedure of flaking. In my project, I was interested in directly comparing and understanding the similarities and differences related to the production of stone tools. I examined two key sites for the Middle to Upper Paleolithic transition in Italy: Oscurusciuto and Castelcivita, both located in southern Italy (Fig. 1A). Specifically, I wanted to encode through the cognigrams the behavioral architectures of the Levallois reduction sequence at the Mousterian site of Oscurusciuto (Fig. 1B) (considered to be made by Neanderthals) and of the Uluzzian reduction sequence of the cave of Castelcivita (Fig. 1C) (considered to be made by Sapiens). By encoding these two behaviors in a comparative framework, I wanted to gain a better understanding of the two modes of technology and their relative complexity. I created cognigrams on each module of the reduction sequences for both assemblages. This process considered the acquisition of raw material, core reduction, anvil procurement and preparation. I compared and described the cognigrams related to each module of the reduction sequences and the final diagram at both sites, in order to understand the two ways of perceiving technology.

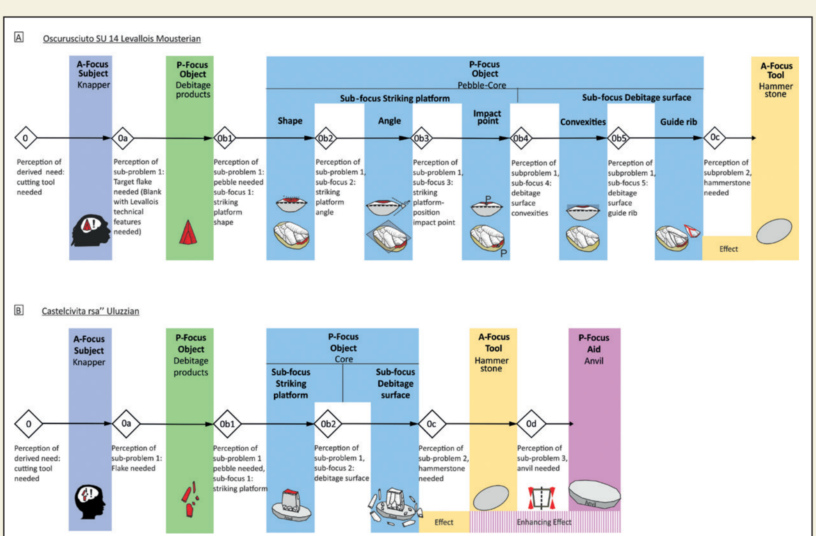
The first site, Oscurusciuto rock shelter, is characterized by a rich Mousterian sequence, and the occupation level selected is called SU 14. This stratigraphic unit represents a short-term occupation within a layer of tephra (volcanic ash) called the Green Tuff of Mount Epomeo (Ischia) dated to 55,000 years before present. Production in this layer is characterized first by the local procurement of raw materials in the form of pebbles. Core reduction is represented mainly by the Levallois concept (Fig. 2A). A feature of Oscurusciuto is that Neanderthals selected pebbles which already possessed the convexities suited to the extraction of Levallois target objects. In other words, we see a careful choice starting already with the acquisition of raw material. To obtain target objects with predetermined traits, Neanderthals applied the Levallois method, which is a mode of production that requires the control of several factors (sub-foci) during reduction. These factors may include the shape of the striking platform, the angle, the point of impact, the convexities of the debitage surface, and the guiding ridge (Fig. 3A). Consequently, by paying greater attention to the management of the core, Neanderthals could pursue a wide variety of standardized target objects. The retouched tools are mainly scrapers made on Levallois blanks or cortical flakes, suggesting that Neanderthals selected the waste of debitage to retouch.

The second site, Castelcivita, is a cave which preserves evidence of an important cultural sequence, encompassing Late Mousterian, Uluzzian, and Protoaurignacian stone industries. In the Uluzzian lithic assemblage of the layer rsa'', knappers selected angular blocks and fragments as raw material. The debitage is characterized by a low degree of preparation of lateral and distal convexities and reflects mainly a unidirectional mode of flaking which exploits one, two, or more debitage surfaces. The debitage is much simpler when compared to the Levallois at Oscurusciuto. The desired target objects are less standardized, and consequently require less control. Core reduction was achieved mainly through the bipolar technique on anvil, which permits the production of several target objects in an easier and faster way (Figs. 2B and 3B). At Castelcivita some unstandardized flakes and even fragments were selected for retouch. Certain classes of retouched tools were used for specific uses: end scrapers for hide processing, and lunates to arm projectile weapons.

If we compare only the cognigrams related to the module of core reduction, it is clear that the Levallois at Oscurusciuto is much more complex than the Uluzzian reduction sequence. This is based on the degree of predetermination of the target objects. More standardized Levallois objectives require a higher degree of attention in core management. Thus, we observe the opening of several sub-foci in the cognigrams (Fig. 3A).



◀ Figure 2. A) Mousterian lithic materials from Oscurusciuto SU 14 (modified after Marciani et al. 2020): (1) convergent Levallois core; (2-3) side scrapers; Levallois debitage products; (4-5) flakes; (6) convergent flake; (7) blade. B) Uluzzian lithic materials from Castelcivita rsa'': (8-9) refitting set of a bipolar core and a blade; (10) bipolar core; (11-12) end scrapers; debitage products: (13-14) flakes; (15) blade. Photos (8-15): Giulia Marciani.



◀ Figure 3. Simplified scheme of the cognigrams: A) Production of Levallois convergent flake in the Mousterian from Oscurusciuto SU 14. B) Production of an unstandardized flake using bipolar technique on anvil in the Uluzzian from Castelcivita rsa''. Graphic: Giulia Marciani.

On the other hand, in the Uluzzian, the module of core reduction is much simpler because the objectives are less standardized, implying a less managed reduction (Fig. 3B).

However, the production of lithic tools reflects only one module of the entire technological behavior of this group. By comparing the entire technological system at each site (Fig. 4), we note several modules related to the production of complementary tools and projectile weapons in the Uluzzian. These interpretations are also based on the evidence from other Uluzzian sites, e.g., Grotta del Cavallo. Activities such as hafting, gluing, and fletching are present at Castelcivita but absent at Oscurusciuto. These modules can be broken up into several cognigrams related to the realization of each component and the way they come together. This more nuanced view adds a greater degree of complexity to the entire technological system of the site. While the Uluzzian tool-making of Sapiens seems more straightforward than the Neanderthal choice, the entire architecture in which it developed is much more complex. Specifically, it requires the combination of several components and incremental growth of modules, actions, and intricacy. The application of cognigrams allows us to explore the lithic technological data further, so that we obtain a novel perspective on the technological behavior. We become aware how stone artifacts produced by Neanderthals and Sapiens are differently embedded within the broader context of planning, actions, and decisions. This consequently allows further insights into the different aspects of the relationship between humans and technology which occurred in the past, regardless of whether the humans were Neanderthals or Sapiens.

Using the ROAD Database to disentangle the Middle to Upper Paleolithic transition

In order to frame the technological evidence of the Mousterian of Oscurusciuto and the Uluzzian of Castelcivita, and other Italian sites, in the broader and complex context of the Middle to Upper Paleolithic transition in Eurasia, I made use of the ROAD database. To make this comparative analysis, I needed access to a significant amount of organized and standardized chronological, stratigraphical, and contextual data from a wide geographical and chronological scale, especially with reference to lithic assemblages. Using this information, I further plan to address the theme of technology during the Middle to Upper Paleolithic transition. I want to search for similarities and dissimilarities in lithic production, and assess whether the rise of new technical ideas results from dispersion and interaction between populations, or rather, independent parallel innovation. Finally, I plan to tackle the possible role that technology played to give *Homo sapiens* an advantage, which could have directly or indirectly caused the extinction of the Neanderthals.

Giulia Marciani

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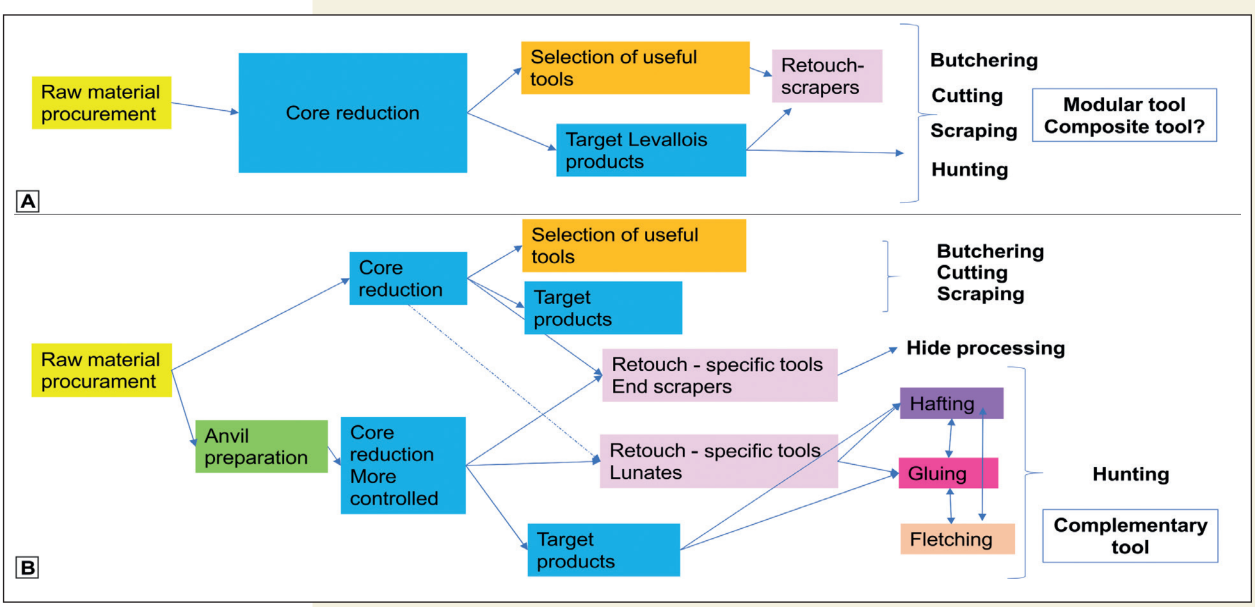

▲ Figure 4. Modular scheme of the Mousterian from Oscurusciuto SU 14 and the Uluzzian from Castelcivita rsa''. Graphic: Giulia Marciani.

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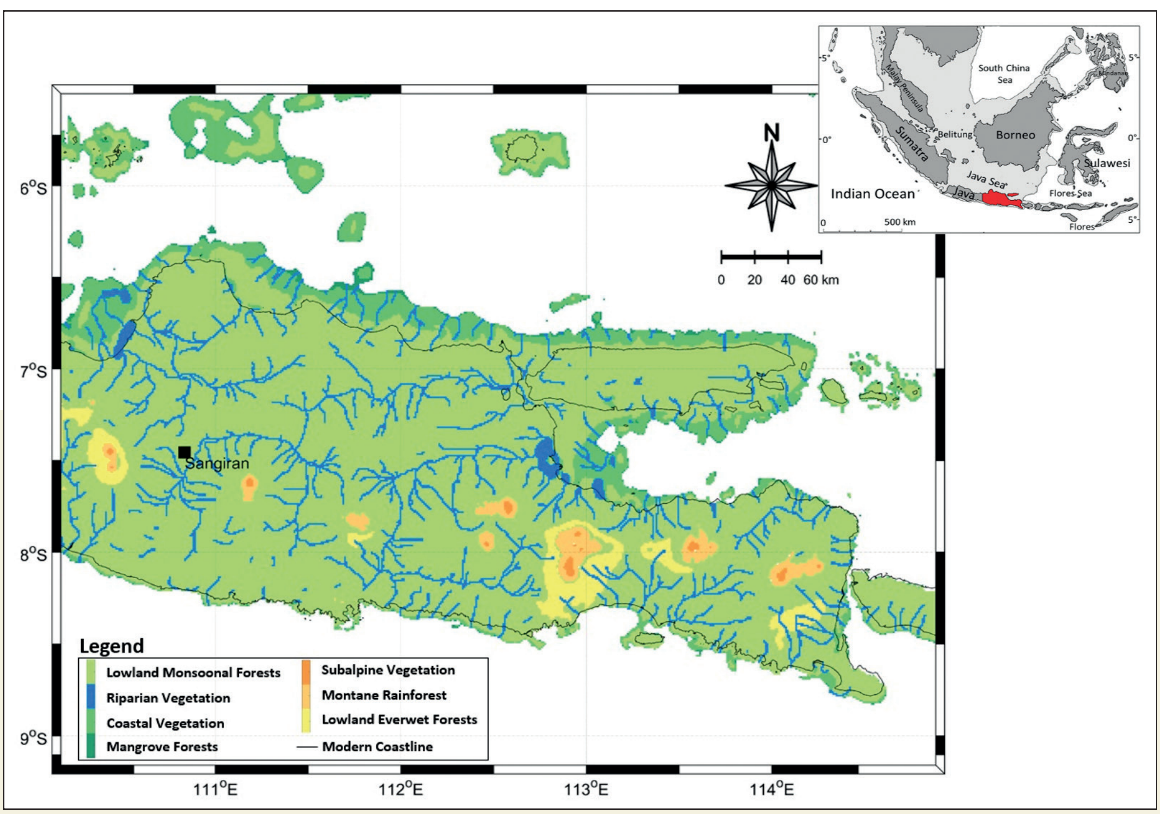
Living in Sangiran one million years ago

Hominins in Sangiran, Central Java, have been known since the early 20th century. The locality provides the most extensive record of Early to Middle Pleistocene hominins in Southeast Asia, with the chronological distribution covering at least 600,000 years of the history of early human occupation.

Unlike other localities, Sangiran provides an almost continuous record of lithological sections without major interruptions. An enormous quantity and diversity of paleontological and archaeological discoveries found in continuous stratigraphic layers allow for various interpretations of changes in the surrounding environment, hominin morphology, and technology applied by *Homo erectus*. However, how *Homo erectus* lived and interacted with the respective environment is still an open question. Of course, we cannot directly observe their daily activities or examine their strategies to adapt to changes in the environment.

This project was funded within the framework of the von Koenigswald research fellowship at the Senckenberg, funded jointly by the Reimers Foundation, the Daimler Foundation, and the Johanna Quandt Foundation. Our goal was to reconstruct the paleoenvironment and resource base of *Homo erectus* in Sangiran. Using Agent-Based Modeling (ABM), we also attempted to identify the ways in which they managed to survive and supply themselves with food, freshwater, and other resources. The time about one million years ago is particularly suitable for this study for two main reasons. First, *Homo erectus* was firmly settled in Java at that point in time. Moreover, this time corresponds to the Grenzbank zone in the lithological



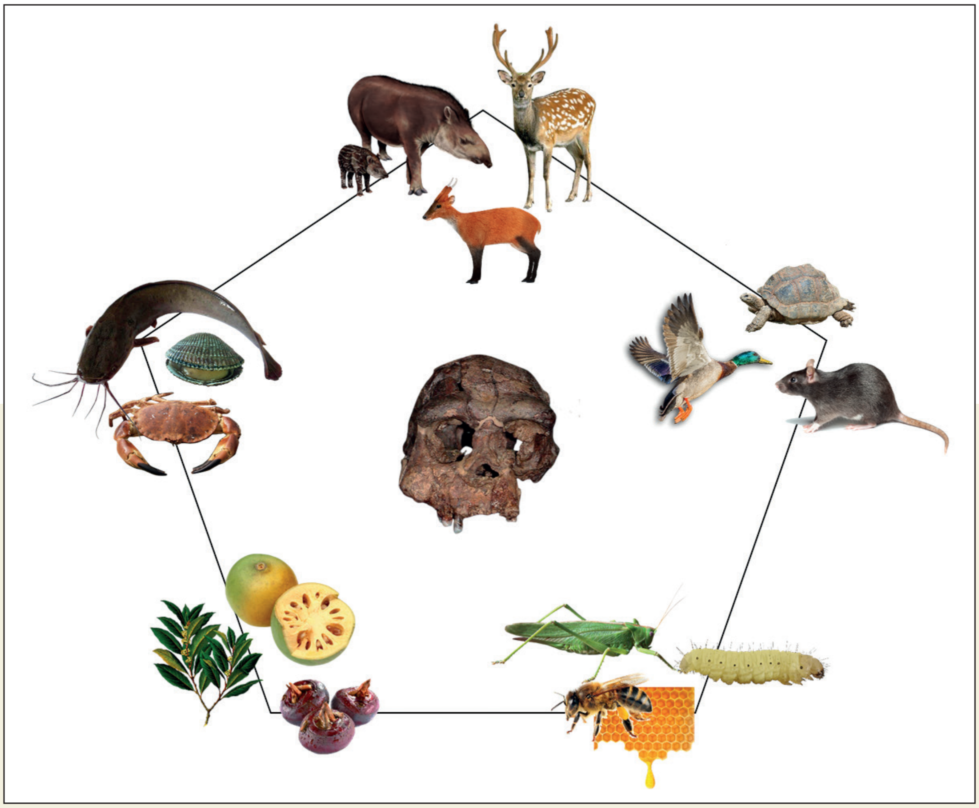
▲ Figure 5. Map of paleovegetation covering eastern Java at 1 Ma. Each vegetation unit was defined by elevation (as the result of paleotopographic reconstruction), drought category (based on paleoclimatic reconstruction) and/or other geomorphologic features such as rivers and lakes. Maps: Mika Puspaningrum et al. forthcoming.

record of Sangiran. The Grenzbank zone is a geological horizon rich in fossils, easily recognizable, and widely distributed across the Sangiran dome. It represents a formidable marker bed that relates the sites scattered across an area of over 50 square kilometers. We assessed the paleoenvironment as well as its seasonal dynamics in a series of steps. To begin, we reconstructed the landscape as realistically as possible. Available maps displaying land-sea distribution needed improvement. Usually, base maps rely solely on present bathymetry. While sea level changes are certainly an important factor for shoreline reconstruction, tectonic factors such as subsidence and uplift are frequently neglected. Combining both of these factors, our map shows a considerable extension of East Java (Fig. 5). Moreover, our hydrological reconstruction allows us to identify tributaries of the Bengawan (River) Solo. The Solo originates on the slopes of Mt. Lawu, passing Sangiran and then turning eastward on its long course across eastern Java before discharging into the Madura Strait between Java and Madura. The Solo River connects the majority of the hominin sites in East Java.

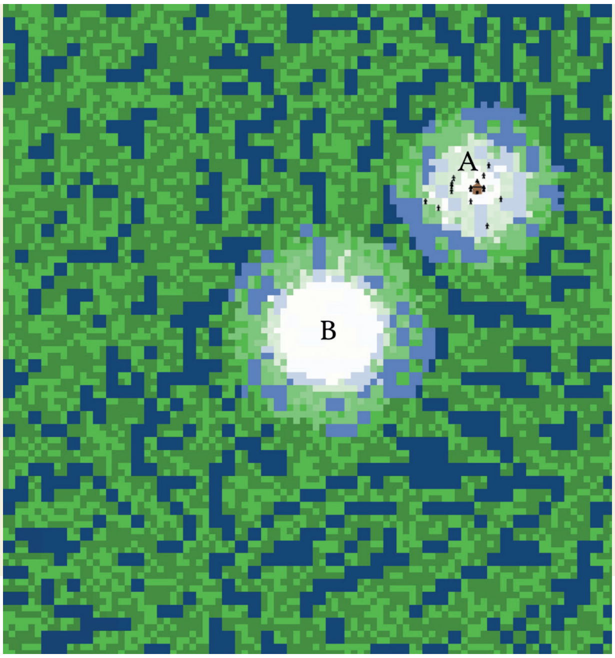
Based on the reconstructed topography, we inferred features of climate and its seasonal dynamics by extrapolating modern patterns of monthly precipitation. The paleoclimate is then translated into drought categories. The map presents six categories of tropical climate regimes, ranging from ever-wet to semi-dry arid. Distinct dry and severe dry monsoon climatic regimes cover at least 80% of the area, while ever-wet to slightly dry monsoon regimes are restricted mainly to the slopes of volcanoes. Seasonal shifts are driven mainly by patterns of the monsoon.

According to our reconstructions, the major portion of eastern Java is covered by lowland monsoonal forest, characterized by deciduous plants and significant seasonal shifts. Such a vegetation unit also dominated the Sangiran dome. On the slopes of the volcanoes, Mount Merapi and Mount Lawu, to the west and east of Sangiran respectively, the monsoonal forest is replaced by ever-wet forests; and at higher elevations, by montane rainforests and even subalpine vegetation. Mangrove forests occur along the coast in the north, while the southern coastline hardly shifted. Riparian types of vegetation occur along the rivers and lakes.

These vegetation units offered ample opportunities for hominins in Sangiran to supply themselves with food resources. In order to identify the potential resource spectrum and its seasonal dynamics, we distinguish five categories of food resources, each of which we address separately: 1) plants and



▲ Figure 6. The spectrum of food resources available for *Homo erectus* in Sangiran. Graphic: Susanne Krüger.



◀ Figure 7. The gathering ABM of hominins in Sangiran designed by Jan-Olaf Reschke. The lighter the green color, the lower the amount of resources; blue indicates water: A) the present location of the camp; B) a recently abandoned location. Graphic: Jan-Olaf Reschke.

plant parts including fruits, roots, and tubers; 2) insects; 3) freshwater resources including fish and shellfish such as crayfish and mussels; 4) small vertebrates; and 5) large vertebrates. Each category of resources requires specific methods of acquisition and preparation. Moreover, improved technology and skills lead to differential increases in return, and finally, the effort required to obtain them characterizes each category in a specific way. We addressed all three vegetation units relevant for the area within a radius of 50 km around the Sangiran dome: lowland monsoonal rainforest, riparian vegetation, and lowland ever-wet forest. Coastal ecosystems like mangroves and coastal vegetation only occur at a distance of 100 km. Thus, we did not consider them as a decisive part of the regular supply strategies within the framework of this study.

For the category of plants, we consider edible fruits, seeds, greens (leaves, stems, flowers), and underground storage organs. The spectrum of potential food plants and plant parts available in the lowland monsoonal rainforest is particularly subject to seasonal shifts. Depending on the technological skills, like fire use, the number of exploitable plant parts generally increases. The category of insects includes edible adults, larvae and/or pupae, and honey. Adult crickets, beetles, or bees, and larvae of moths, dragonflies or palm weevils are a rich source of protein, which can easily be gathered. Honey with its high sugar content represents a popular resource among primates. However, because neither plants, nor insects are preserved in the fossil record of the Grenzbank layer, we inferred the available resources from recent taxon lists of similar vegetation units. Freshwater resources encompass fish, molluscs, and crustaceans, like crabs and prawns. The resources can be caught by hand, and therefore represent an easily accessible source of protein. Animals with a body mass of less than 10 kg are considered in the category of smaller vertebrates, including birds, lizards, and smaller mammals like squirrels and rats. Because these can be caught even without sophisticated technology, they may have contributed a larger part of the diet. However, they are rarely preserved in the fossil record. In order to complete the list of food resources, we supplemented the fossil record with the record in recent ecosystems. The return of resources which need to be caught increases significantly when aided by appropriate technologies.

Monkeys, apes, and other forest-dwelling large mammals are restricted to the lowland ever-wet forests, which may be why their fossil record in Sangiran is extremely limited. Instead, large bovids, like the water buffalo, which are the fossil precursors of Banteng (cattle), as well as large and small deer species, are well represented in the fossil record. This suggests a rather open vegetation, for example, a monsoonal forest. Bovids and cervids are not expected to display a pronounced seasonality, unless their representatives can be demonstrated to perform seasonal migrations. Susanne Krüger established a semi-quantitative method to rate the availability of the resources in each category according to the season.

Direct indicators of interactions between hominins and their potential resources are absent from the archaeological and fossil records at Sangiran. Neither cutmarks on bones, nor remains of camps are preserved. Yet several types of stone artifacts are known, including flakes, bolas, and polyhedrons as well as organic tools made of shell or bone. These tools certainly had an impact on the efficiency with which hominins exploited the different categories of resources. We are currently conducting semi-quantitative analyses that consider resource abundances and seasonal availability. These studies may open up the perspective of how such tools may have increased returns among the different categories.

Because the available empirical data is patchy, Jan-Olaf Reschke designed an agent-based model (ABM) to simulate gathering strategies of hominins in Sangiran. An ABM permits us to test and compare various scenarios. In this way, we can examine a variety of gathering strategies or different technological sets by monitoring differences in the rates of return. In this model, a group of foragers subsists by gathering different types of resources in the vicinity of a camp site. When the foragers deplete the resources, they move the camp site to a new location, e.g. from position B to position A (Fig. 7). To meet their demand and gather resources, the foragers may adopt one of two strategies. They either move in a random direction until they encounter exploitable resources, or they plan their foraging trips based on their knowledge of the environment and target specific resources. After they obtain resources, they carry them back to the camp and prepare them for consumption. When resources deplete, the group moves together into a new area, resulting in a specific mobility pattern controlled by environmental and technological factors. Our experiments show how collaborative strategies, like sharing knowledge about the location of resources, improve the return. Interestingly, specific combinations of targeting and opportunistic foraging seem to yield the highest return rates. Resource densities are derived from net primary productivity and change on a monthly basis with the seasons. As plant parts grow anew, some resources are replenished on a monthly basis; others, like fish, show annual dynamics. The gathering ABM can be expanded, for example, to include catching and hunting strategies, and the design of a variety of technological and behavioral scenarios.

Through our joint efforts, we approach the life of hominins at Sangiran from a variety of perspectives and by integrating diverse methods. The interdisciplinary and fertile environment in ROCEEH is key to the success of such an ambitious enterprise.

Mika Rizki Puspaningrum and Christine Hertler

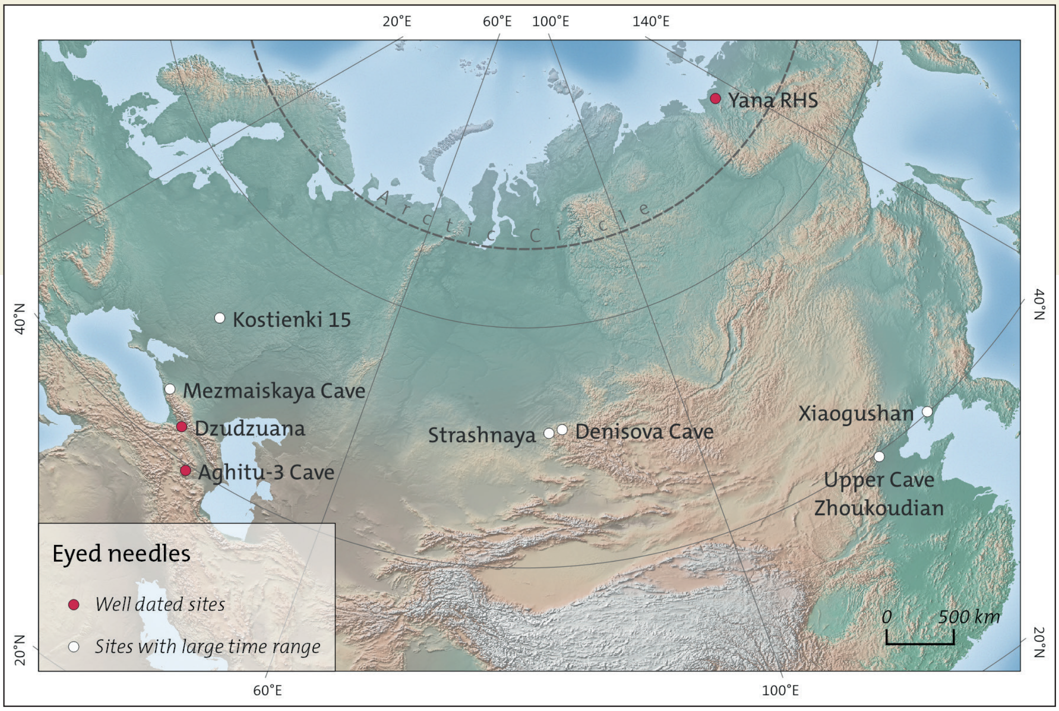
The Material and Social Macrocosm of an Eyed Needle

One of the aims of the ROCEEH project is to study finds from archaeological sites and place them within a wider theoretical framework. In this article, we examine a single find from Aghitu-3 Cave in the Armenian Highlands and expand it within a broader behavioral context. This exercise in inference helps us to understand the ways in which the first modern humans of this region adapted to their environment. The research results from a collaborative effort between the Institute of Archaeology and Ethnography of the National Academy of Science of Armenia and ROCEEH begun in 2008 (see Newsletters 19-2021, 5-2011, 1-2009).

We narrow our focus on a single artifact, an eyed bone needle about 18.5 mm in length and 2 mm in width, with an eye less than 1 mm in diameter (Fig. 8). It truly represents the proverbial needle in a haystack, found through meticulous sieving and sorting of each bucket of excavated sediment. Even though the needle's eye and its point are broken, we can learn about past human behavior from this exceptional artifact.

▶ Figure 8. The eyed bone needle from Aghitu-3 Cave, layer IIId. Scale 1 cm. Photo: Dmitri Arakelyan.

▼ Figure 9. Map of Asia showing the distribution of nine sites that yielded eyed bone needles dating between 45,000 and 25,000 years old. The sites with a red dot have narrow dating ranges, while the sites with a white dot are less precisely dated. Map: Chris Sommer/ROCEEH.



The needle was found in archaeological horizon (AH) IIId, and the radiocarbon dating of charcoal and animal bones around it suggests that the find is 29-28,000 years old.

Thousands of stone artifacts made of obsidian and chert, hundreds of animal bones mainly of horse and wild goat, and perforated shell beads come from the same cultural layer. Evidence of burning in complex combustion features is also present (Kandel et al. 2017).

The archaeological evidence for eyed needles is extremely rare. Only nine examples are known from the period from 45,000 to 25,000 years ago, and all of them come from sites scattered across the Asian continent (Fig. 9). Four come from the region around the Caucasus and Russian Plain, two from the Far East of China, two from Central Asia and one from far Northern Asia. Only after about 25,000 years ago do needles start to become more frequent in the archaeological record during the Solutrean (25-20,000 years) of Europe, and only during the Magdalenian and Late Paleolithic (18-14,000 years ago) of Eurasia do they become common.

By examining the ideas that stand behind the needle, we start to understand how a simple artifact can open up an entire world of intertwined behaviors. To make a needle, a person has to collect an animal bone from a carcass; perhaps hunted, perhaps scavenged. Usually people selected bones from the legs of animals. Favored were tibias (lower legs) and metapodials (long hand and foot bones) because these bones are straight and solid. Since needles are quite small, it is usually not possible

▶ Figure 10. Example of an experimental bone needle made from the tibia of a juvenile pig. Scale 5 cm. Experiment: Mohamad Khodabakhshi Parizi; Photo: Hildegard Jensen.

to identify the type of animal. However, recently improved methods such as ancient DNA and ZooMS (Zooarchaeology by Mass Spectrometry) analysis may even make it possible to determine the species. Still, it is not customary to subject such small and rare objects to destructive forms of testing.

Sharp stone tools called burins were needed to carve out parallel grooves in the bone and prepare the basic elongated pre-form of the needle (Fig. 10). Once the pre-form was freed from the bone, stone scrapers or pieces with notches on their edges were used to carve the bone into the desired shape. The blank was then smoothed, perhaps on a flat hard surface using sand or grit as an abrasive, until the desired roundness and smoothness were achieved. The tip also needed to be sharpened, and the eyed end thinned through abrasion. Finally, a pointy stone drill was needed to pierce the bone from both sides to create the eye. All of these types of stone tools are present among the finds of AH IIId. Most were made from rocks such as obsidian and chert present in the surrounding region up to 40 km away. However, about 8% of the obsidian came from surprising distances as much as 250 km away.

Thus, by thinking back, we see that people would have needed a variety of materials and tools just to make a needle, even before it could be used. So what could people do with a needle? By analogy, we assume that sewing was the likeliest activity. However, we do not rule out related activities such as weaving, net-making or attaching ornaments. In any case, the eye of the needle points to the complementary use of some kind of thread, which is constrained to a large degree by the diameter of the needle's eye. Potential materials could include plant components, such as blades of grass and fiber, or animal products such as thinly cut strips of hide and prepared sinews.

We know from the southern German site of Hohle Fels that people were making rope about 40,000 years ago (Conard & Malina 2016), and from the Georgian site of Dzudzuana we see evidence for twisted and dyed flax fibers about 29,000 years ago (Kvavadze et al. 2009). Both of these examples suggest that people could make rope and thread. But of course people had to procure and assemble the various materials, and as we saw above, each material, tool and product provides its own evidence for the chain of manufacturing activities coupled with it.

Why would a needle be advantageous? The climate of the Late Pleistocene (130-12,000 years ago) is especially marked by fluctuations in temperature. In large parts of Asia, life without clothing would be difficult to imagine, certainly requiring some kind of garments. At least in winter and especially in northern latitudes and at high elevations, clothing would provide people with a great advantage. During glacial phases, when the climate was much colder than today, clothing would be an absolute prerequisite. Simple types of open clothing like a cape could be made without an eyed needle. A cape would require just an animal skin and the means to pierce it, such as with a large, robust awl. In fact, we also have such evidence from AH IIId at Aghitu (Fig. 11). Yet simple clothing does not insulate its wearer as well as tailored or multi-layered clothing, which require more delicate tools such as eyed needles.

▶ Figure 11. Example of a long pointed awl from AH IIId. Scale 5 cm. Photo: Dmitri Arakelyan.

Clearly the possibility to make complex clothing would be extremely beneficial in the harsh climate of vast parts of Asia.

Finally, the acquisition and use of the materials mentioned above is carefully predicated upon the ability of a group to maintain the knowledge necessary to perform all of these very specific behaviors in conjunction with one another. If knowledge and skills are not passed on to the next generation, such traditions can easily disappear. Thus, the ability to teach, learn and maintain these diverse skills is tied to advanced transfer of knowledge, and its practice through generations and even across group boundaries. Thus we can observe how these types of material engagement lead to greater social engagement as well.

We hope this article has succeeded in illustrating how a simple needle can open up a much larger web of understanding about Paleolithic life. Through this exercise, we hope we have shown how the world of a single object can open up a whole realm of possibilities, revealing the hidden macrocosm of the needle.

Andrew Kandel, Boris Gasparyan, Ani Adigyozalyan, Miriam Haidle

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Forthcoming

- Eighth Biennial Conference of the Eastern African Association of Palaeoanthropology and Palaeontology (EAAPP)

31 July-7 August 2022, Arusha, Tanzania

co-organized and supported by ROCEEH.

- International Conference "Modes – Forms – Structures"

14-16 September 2022, Karlsruhe, Germany

co-organized by ROCEEH together with philosophers from the Karlsruhe Institute of Technology and historians from the Technical University in Darmstadt.

- NECLIME Annual Conference 2022

will be held online at the end of this year,

organized by Eliso Kvavadze, Maia Bukhsianidze and Angela Bruch.

For more details see:
https://www.neclime.de/conferences.html

- 12th Annual Meeting of the European Society for the Study of Human Evolution

21-25 September 2022, Tübingen, Germany

Meeting co-organized by Andrew Kandel and ROCEEH, with ROAD database workshop on 21 Sept. 2022. Contact a.kandel@uni-tuebingen.de to register for the workshop.

For more details see:
https://www.eshe.eu/meetings/

- 22nd Congress of the Indo-Pacific Prehistory Association

6-12 November 2022, Chiang Mai, Thailand

Session S 16 „Exploring Distant Shores: Simulating Dispersal Across Archipelagos", organized by Mika Rizki Puspaningrum and Christine Hertler. ROCEEH will organize an introductory ROAD workshop to expand the ROAD community in Southeast Asia.

For more details see:
https://www.ippasecretariat.org/22nd-ippa-congress

▲ Figure 12. Participants of the workshop in Abidjan, Ivory Coast. Photo: Ahmed Sangaré.

Report on the CfAS Workshop in Abidjan, Côte d'Ivoire from 4-8 April 2022

With a grant provided by the Wenner-Gren Foundation, the working group on migration of the Coalition for Archaeological Synthesis sponsored a workshop at the Pôle Scientifique de Bingerville of the Université Félix-Houphouët-Boigny in Abidjan, Côte d'Ivoire from 4-8 April 2022. The local organizing team was directed by Prof. Timpoko Helène Kiérnon-Kaboré. Andrew Kandel of ROCEEH was one of the six founding members of the working group, which obtained funding and organized the scientific content of the meeting. The workshop dealt with a very current topic, "Modelling a Collaborative Archaeological Synthesis of Human Migration for a Long-Term, Global Perspective." Over 50 researchers and students attended, coming from the Côte d'Ivoire, Senegal, Spain, England, Germany and the USA. The goal of the meeting was to synthesize past archaeological data from diverse periods and regions to inform migration policy in the present and future. The four final recommendations centered around key issues discussed during the workshop:

1) *Cultural diversity and the concept of identity:* As archaeologists, we recognize the value of cultural diversity. Equality between different cultural groups is vital for the establishment of equilibrium between migrants and local populations in the long term.

2) *Migration is a multi-generational process, not a single event:* We identify the importance of family networks in the success of migration. Successful social engagement and transitions for mobile citizens and residents often rely on multi-generational mobility networks connecting points of origin with points of destination.

3) *Urbanization and economic opportunity:* We note a tendency for migrants to move disproportionately to urban centers. This trend is consistent over time and will continue to be a challenge in the future. Decentralization efforts outside major cities and the wider distribution of economic opportunities are essential.

4) *Learning and access to information necessary to integrate:* For tens of thousands of years, the exchange of knowledge and culture has been essential to human success. In the context of modern migration, access to information and education is necessary for successful integration, but remains a major challenge.

In sum, the meeting provided a forum for researchers to present their results and fostered lively discussion about the essence of migration in a global context.

Andrew Kandel

Who’s who?

This issue: Giulia Marciani

Since receiving her Master’s and Ph.D. degrees in Quaternary Science and Prehistory, Giulia’s primary research interest has focused on disentangling the role of technology–especially of stone artifacts–in prehistoric societies.

Currently, she is a post-doctoral researcher in the ERC project FIRSTSEPS (led by Katerina Harvati) which is based at the Department of Cultural Heritage, University of Bologna, and also a collaborator at the Research Unit of Prehistory and Anthropology, University of Siena. Since 2018 she has been working in an ERC project named SUCCESS about “The Earliest Migration of *Homo sapiens* in Southern Europe” under the direction of Stefano Benazzi. Her objectives are to interpret variations in the stone tools produced by the last Neanderthals and the first *Homo sapiens,* and in doing so, to understand the role of technological behaviors in the dynamics related to the Middle to Upper Paleolithic transition in Italy.

In October 2021, Giulia visited ROCEEH in Tübingen to conduct research related to a project called “Cognigrams of the last Neanderthals’ and first Sapiens’ tool behavior in Italy”. This trip was funded by iNEAL–Integrating Neandertal Legacy: from past to present (COST CA19141) as a Short Term Scientific Mission.

Who's who?

This issue: Mika Rizki Puspaningrum

Between 2019 and 2022 Mika Rizki Puspaningrum held the newly founded von Koenigswald scholarship as a visiting researcher at the Department of Paleoanthropology at the Senckenberg Research Institute, Frankfurt am Main. Mika received her academic training as a paleontologist at the Bandung Institute of Technology in Indonesia. With her doctoral thesis she entered the field of paleobiology and studied the ecology of stegodonts in the Pleistocene of Indonesia at the University of Wollongong in Australia supervised by Gert van den Bergh.

In her present research projects, Mika has turned towards the prehistory of humans, reconstructing early dispersals of hominins in island environments between two and one million years ago. Together with colleagues at the ROCEEH research center she reconstructed the paleoclimate and paleoenvironments of early hominins, as well as their dynamics, in order to identify potential food resources. She simulates and examines dispersal patterns by means of agent-based modeling.

The von Koenigswald scholarship is based at the Senckenberg Research Institute to support young academics from Indonesia. The grant is jointly funded by the Werner Reimers Foundation (Bad Homburg), the Daimler and Benz Foundation (Ladenburg), and the Johanna-Quandt Foundation (Bad Homburg).

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