Sticking with Neanderthals:
Identifying Neanderthal Mastics and their Signatures

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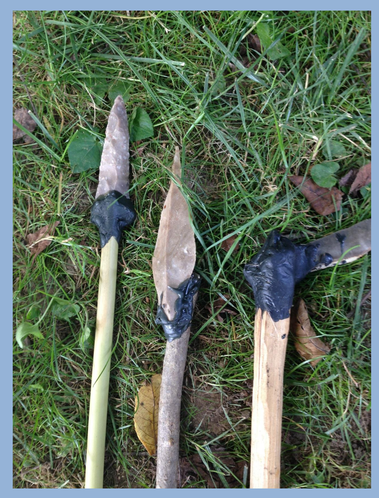


Abstract

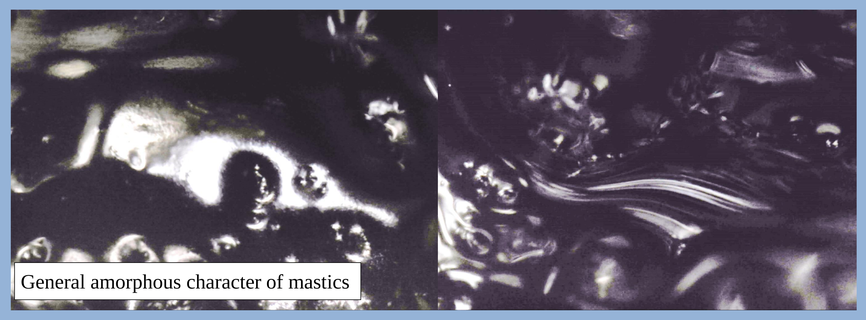
Neanderthals lived between 300,000 and 30,000 years ago. Stone tools dating to this time period have been found at sites like Sesselfelsgrotte and Köigsaue in Germany and Abri du Maras in France. Many of these tools show evidence of being hafted. This means that the tools were attached to a shaft at one point to increase the leverage of the tool. Neanderthals did this by using natural cordage made of plants and animals along with mastics or glues, made from substances like tree resin, beeswax, ochre, and charcoal. I fashioned my own hafted tools, using mastics made of different combinations of beeswax, pine resin, and charcoal. I looked at these three substances under the microscope, as well as different composites of the three substances under the microscope as well. My goal was to identify some microscopic signature of the individual substances in the composites. With these identifications, other researchers will be able to use my research as a comparison. If they found mastic remains on a stone tool, they could use the signatures I came up with to identify the same signatures on Neanderthal tools from 300,000 years ago.

Introduction

Neanderthals lived as far back as 300,000 and disappeared by 30,000 years ago (Papagianni 2013, 73). They were more robust than current day humans, but did share many traits with them. For example, they show evidence of hunting in groups as well as timed mass killing of mammoths and other creatures that require planning and precision. In addition, their tool making abilities show that Neanderthals were more intelligent than we tend to give them credit for (Papagianni 2013, 74). Neanderthals vanished likely due to interaction and interbreeding with modern human ancestors inhabiting the same areas.

Due to the disappearance of Neanderthals so long ago, it is very difficult to find evidence of their existence and their impact. Very little evidence of their daily routine exists today. However, stone tools and animal bones have been located and remain the major evidence of Neanderthal life and existence. Some of the tools even show evidence of being hafted or attached to a handle, probably made of wood. Archaeologists can tell that they have been hafted because they have found residue from substances that are associated with hafting. Various gums, resins, and woods have also been associated with Neanderthal stone tools. For example, birch pitch, a tar-like substance made from birch bark, has been found at Königsaue in Germany (Koller 2001). Archaeologists have also discovered evidence of cordage and bindings at Sesselfelsgrotte in Germany as well (Rots 2009). The association with hafted tools is crucial to current perceptions of Neanderthals and what they were capable of. The modern view continues to be that Neanderthals were brutish and stupid (Papagianni 2013, 74). However, the evidence of hafted armatures shows a very different picture. For a Neanderthal to have the foresight to know which materials to obtain and combine to make a mastic and make a hafted tool, they must have had significant forethought and planning.

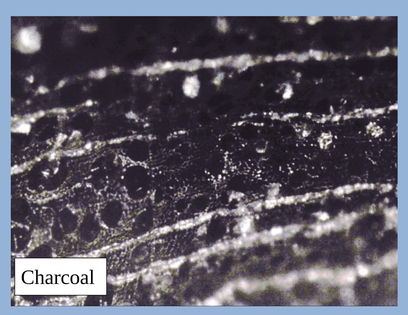
Evidence of hafting is hard to find and even harder to identify. This is largely because most of the evidence is missing due to degradation of the materials over time. Archaeologists need new methods to detect evidence of hafting on stone tools. The purpose of my project was to identify hafting signatures that will allow archaeologists to more easily find and distinguish mastic evidence on stone tools.



General amorphous character of mastics

Methods

Neanderthal mastics and the materials used in them tend to have very little identifiable microscopic signature because of their viscous nature. However, I attempted to see if there was any identifiable signature that might be used to compare with tools found at sites like Sesselfelsgrotte and Königsaue (Rots 2009, Koller 2001). I did this by making my own hafted tools. I used two different kinds of wood and different mastics made up of different combinations of pine resin, beeswax, and charcoal. First, I made sure to familiarize myself with the microscopic signatures of each of these components. I then melted the materials in a cast iron skillet until they were viscous. At the same time, I cut the wood at the top to allow space for the stone tool and then alternated between pouring melted mastic mixtures and wrapping cordage around the haft. Once the mastic hardened and held the stone tool in place, I would break off a piece of the mastic from a few different areas of the haft, some that were in contact with the stone and others that were in contact with the cordage or the wood. I then examined them under the microscope. Specifically, I used Dinocapture software to examine and photograph the mastics. I used two different microscopes that ranged from 20 to 475 times in their magnification. I looked for specific signatures that I had found when examining the individual components of the mastics. This included anything from air bubbles commonly found in the pine resin to signs of charcoal. By comparing the substances before and after heating, I hoped to find identifiable signatures that archaeologists will be able to use to compare and identify materials used in Neanderthal mastics.



Charcoal

Beeswax

Results

Microscopy shows that the mastics are generally amorphous with no clear distinction between melted substances, such as pine resin and beeswax. At times, there are distinguishable shapes, like circles that may be air bubbles as shown in figure 1. In addition, some substances, like charcoal, do keep their form to an extent and are easily identified by their dark coloration and morphology (See figure 2). The mastic can appear to take on a shape that is similar to the cordage it is in contact with, giving it some structure as shown in figure 3. This does not show what substances make up the mastic, but does show the existence of cordage in the hafting process. The majority of the distinguishable materials appear to be modern threads and fibers that have found their way into the mixture. However, more microscopy on my samples and other mastic samples will provide more information on the microscopic signature of mastics and their components. The pictures I have taken can be used to identify and compare with real Neanderthal mastics that are found and will possibly give some sense of their structure or origin. For example, if an archaeologist finds a structure similar to that found in figure 4, which likely came from a plant, then he or she may be able to distinguish what the mastic components could be. This will not only reveal information about the specific mastic and tool, but also the processes that went into collecting making the tools as well.

Pine Resin

Acknowledgements

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Discussions and Conclusions

Further work must be done with microscopy in order to better document and compare different mastics and their components. However, the preliminary work that I have done gives a base from which to start. Ancient mastics made from beeswax, tree resins, charcoal and other similar substances can be compared to identify mastic materials and learn more about them. Other materials that have been used in mastics, such as ochre, amber, birch pitch, and gums, must also be examined in order to come up with a key for identifying mastics more easily (Lombard 2007, Koller 2001). Once a solid key for mastic components and their signatures is made, archaeologists should be better able to recognize prehistoric mastics.

It is clear that because of the amount of forethought and planning that must go into collecting mastic components and making hafts that Neanderthals were much more intelligent than popular culture makes them out to be. As further evidence of their capabilities is discovered, a more realistic picture of their way of life will be revealed. My project and others like it will help to continue this research and make identifying mastics easier. Neanderthals survived and prospered for at least 250,000 years in Europe and western Asia. If we as archaeologists do not accept this fact, then Neanderthals would have gone extinct well before they actually did.

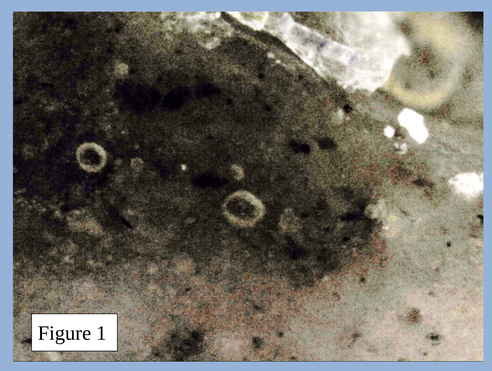

Figure 1

Figure 2

Figure 3a and 3b. Sinew and Mastic side by side

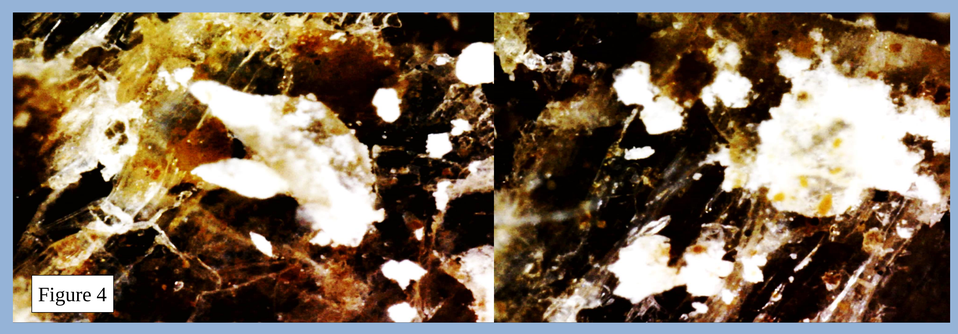

Figure 4

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