Neanderthal Documentary

January 2022-2023

Introduction = “Part I - Origins”

Neanderthals, our closest extinct relatives, have long fascinated us with their enigmatic presence in our evolutionary history.
They roamed from the frozen tundra of northern europe to the arid deserts of the middle east for hundreds of thousands of years.
They left behind extensive records of their complex tools and way of life.
Then in a relatively short amount of time, they vanished from the fossil record.
In this documentary, we delve deeper into the world of Neanderthals, exploring the latest scientific discoveries and theories about their biology, behavior, and interactions with modern humans.
With the help of scientific literature and the interview of a paleoanthropologist, we will seek to answer some of the most intriguing questions about our distant cousins.
Who were the Neanderthals? What kind of world did they inhabit? What made them different from us and what did we have in common? And ultimately, what led to their extinction?
Join us as we unravel the mysteries of the Neanderthals, and discover what their story can teach us about our own origins and place in the world.

Evolutionary Origins = “Part I - Origins”

“Winter noise playing with neanderthal walking through snow”

The story of the neanderthals is inseparable with the larger picture of human evolution.
Neanderthals, modern humans, and another dozen species, make up our genus, homo.
A genus which first appeared in africa, nearly 3 million years ago.
These distant hominins descend from australopithecines.
Australopithecines were a quite successful genus of bipedal ape that lived in eastern and southern africa.
They were entirely bipedal with an upright posture, and made the first stone tools ever found this planet.
3.3 million years ago, australopithecines were creating modified stone tools at the site of lomekwi 3.
(Harmand, S., Lewis, J., Feibel, C. et al. 3.3-million-year-old stone tools from Lomekwi 3, West Turkana, Kenya. Nature 521, 310–315 (2015). https://doi.org/10.1038/nature14464)
This is a much more complex behavior than simply using a rock.
They had to select stone capable of fracturing conchoidally, and they they had to hit it in just the right way to create a sharp edge.
These tools were most likely used for butchering scavenged carcasses but other uses such as shaping wood or defence must be considered.
Though some australopithecines did use stone tools, many of them did not.
Our genus almost certainly descends from the ones that did.
The oldest evidence of our genus comes from a 2.8 million year old specimen.
Villmoare, B.; Kimbel, W. H.; Seyoum, C.; et al. (2015). "Early Homo at 2.8 Ma from Ledi-Geraru, Afar, Ethiopia". Science. 347 (6228): 1352–1355. doi:10.1126/science.aaa1343
2.6 million years ago, the first oldowan tools were being made.

Semaw, S.; Rogers, M. J.; Quade, J.; Renne, P. R.; Butler, R. F.; Domínguez-Rodrigo, M.; Stout, D.; Hart, W. S.; Pickering, T.; et al. (2003). "2.6-Million-year-old stone tools and associated bones from OGS-6 and OGS-7, Gona, Afar, Ethiopia". Journal of Human Evolution. 45 (2): 169–177. doi:10.1016/S0047-2484(03)00093-9
Oldowan tools consist of stones with a few flakes taken off to create a sharp robust edge.
Our genus was certainly around during the inception of these tools, and it is very likely that they were the creators.
Homo habilis, one of the earliest members of our genus appeared over 2.3 million years ago and was using oldowan tools.
Simpson, Scott. (2015). Early Pleistocene Homo. Basics in Human Evolution. 143-161. 10.1016/B978-0-12-802652-6.00011-6.
Susman, R. L. (July 1991). "Who Made the Oldowan Tools? Fossil Evidence for Tool Behavior in Plio-Pleistocene Hominids". Journal of Anthropological Research. 47 (2): 129–151. doi:10.1086/jar.47.2.363032
Homo erectus, often considered the first human, would evolve around 2 million years ago and would eventually would pioneer a new stone technology called the achulean.
Spoor F, Leakey MG, Gathogo PN, Brown FH, Antón SC, McDougall I, et al. (August 2007). "Implications of new early Homo fossils from Ileret, east of Lake Turkana, Kenya". Nature. 448 (7154): 688–691. Bibcode:2007Natur.448..688S
Zhu Z, Dennell R, Huang W, Wu Y, Qiu S, Yang S, et al. (July 2018). "Hominin occupation of the Chinese Loess Plateau since about 2.1 million years ago". Nature. 559 (7715): 608–612. Bibcode:2018Natur.559..608Z
Herries AI, Martin JM, Leece AB, Adams JW, Boschian G, Joannes-Boyau R, et al. (April 2020). "Contemporaneity of Australopithecus, Paranthropus, and early Homo erectus in South Africa"
These handaxes were made by taking much more flakes off of both sides of the core to produce a much longer cutting edge.
They are often considered the pocket knives of their day, capable of butchering game, shaping wood, digging holes and even for defence or hunting.
This technology would spread out of Africa with homo erectus to many parts of eurasia including northern europe, the middle east and southeast asia.
These populations would adapt to their new environments and either evolve into distinct species or more derived forms of homo erectus.
One these decendants was homo antecessor, they lived in western europe 1.2 million years ago.
Carbonell, E. (2008). "The first hominin of Europe". Nature. 452 (7186): 465–469. Bibcode:2008Natur.452..465C. doi:10.1038/nature06815
Campaña, I.; Pérez-González, A.; Benito-Calvo, A.; Rosell, J.; Blasco, R.; de Castro, J. M. B.; Carbonell, E.; Arsuaga, J. L. (2016). "New interpretation of the Gran Dolina-TD6 bearing Homo antecessor deposits through sedimentological analysis"
Ashton, N.; Lewis, S.G.; De Groote, I.; Duffy, S.M.; Bates, M.; Bates, R.; Hoare, P.; Lewis, M.; Parfitt, S. A.; Peglar, S.; Williams, W.; Stringer, C. (2014). "Hominin footprints from Early Pleistocene deposits at Happisburgh, UK"
This makes them the oldest known hominins to call europe western europe home.
They are thought to have been an offshoot of erectus.

Their tools were quite simple and they would eventually go extinct around 800,000 years ago.
Sarmiento, E. E.; Mowbray, K.; Sawyer, G. J.; Milner, R.; Deak, V.; Tattersall, I. (2007). "Homo antecessor". The Last Human: A Guide to Twenty-two Species of Extinct Humans. Yale University Press. pp. 190–191. ISBN 978-0-300-10047-1
It is thought that they did not contribute the genetics of future species living europe.
Another wave of erectus or perhaps more derived form would replace them.
By the middle pleistocene, 780,000 years ago, the descendents of erectus had evolved into more modern forms with larger brains and more complex technology.
The hominins living throughout africa, europe and western asia during the middle pleistocene are collectively classified as homo hiedelbergenisis.
There has been debate regarding whether to consider african populations as a different species than europe or asian populations because they were quite different.
Genetics suggest that possibly as early as 700,000 years ago these populations would separate.
Meyer, M.; Arsuaga, J.; de Filippo, C.; Nagel, S. (2016). "Nuclear DNA sequences from the Middle Pleistocene Sima de los Huesos hominins". Nature. 531 (7595): 504–507. Bibcode:2016Natur.531..504M
Prüfer, K.; et al. (2014). "The complete genome sequence of a Neanderthal from the Altai Mountains". Nature. 505 (7481): 43–49. Bibcode:2014Natur.505...43P
Krings, M.; Geisert, H.; Schmitz, R. W.; Krainitzki, H.; Pääbo, S. (1999). "DNA sequence of the mitochondrial hypervariable region II from the Neandertal type specimen". Proceedings of the National Academy of Sciences. 96 (10): 5581–5585. Bibcode:1999PNAS...96.5581K
The differences between these populations would continue to accumulate and about by around 300-400 thousands years ago, would be enough to classify them as different species.
Meyer, M.; Arsuaga, J.; de Filippo, C.; Nagel, S. (2016). "Nuclear DNA sequences from the Middle Pleistocene Sima de los Huesos hominins". Nature. 531 (7595): 504–507. Bibcode:2016Natur.531..504M
In african and some of the middle east lived our own ancestors, in europe and parts of asia lived the neanderthals, and in the east lived the denisovans and other hominins.
Denisovans are another hominin very important the story neanderthals.
This is because, they are more closely related to neanderthals than we are.
Based on nDNA, Neanderthals and Denisovans share a more recent last common ancestor with each other than with homo sapiens.
Neanderthals and Homo Sapiens actually share a more recent mtDNA common ancestor,
But this is likely due to an interbreeding event rather than diverging populations.
This common ancestor population nicknamed “neandersovans” is thought to have spread from africa to eurasia, replacing and interbreeding with the other archaic hominins in these areas.
Rogers, A. R.; Harris, N. S.; Achenbach, A. A. (2020). "Neanderthal-Denisovan ancestors interbred with a distantly related hominin". Science Advances. 6 (8): eaay5483. Bibcode:2020SciA....6.5483R
Based on mutation rates, this population would diverge into neanderthals and denisovans between 470,000 and 380,000 years ago.
Prüfer, K.; et al. (2014). "The complete genome sequence of a Neanderthal from the Altai Mountains". Nature. 505 (7481): 43–49. Bibcode:2014Natur.505...43P

This correlates with the appearance of early neanderthals during this time.
450,000 year old remains from france which are generally classified as hiedelbergensis show the first appearance of neanderthal features.
Day, M. H. (1986). Guide to Fossil Man. University of Chicago Press. pp. 48–55. ISBN 978-0-226-13889-3.
Guipert, G. (2005). Reconstruction and Phyletic Position of the Skull Bones of Tautavel Man (Arago 21-47) and Biache-Saint-Vaast 2. Contribution of Imaging and Three-Dimensional Analysis
430,000 year old remains from sima de los huesos from northern spain have much more similarities with neanderthals and are widely considered to be ancestral to later classic neanderthals.
Meyer, M.; Arsuaga, J.; de Filippo, C.; Nagel, S. (2016). "Nuclear DNA sequences from the Middle Pleistocene Sima de los Huesos hominins". Nature. 531 (7595): 504–507. Bibcode:2016Natur.531..504M
Bischoff, J. L.; Shamp, D. D.; Aramburu, A.; et al. (2003). "The Sima de los Huesos hominids date to beyond U/Th equilibrium (>350kyr) and perhaps to 400–500kyr: new radiometric dates"
Arsuaga, J. L.; Martínez, I.; Gracia, A.; Lorenzo, C. (1997). "The Sima de los Huesos crania (Sierra de Atapuerca, Spain). A comparative study". Journal of Human Evolution. 33 (2–3): 219–281. rindoi:10.1006/jhev.1997.0133
Neanderthal features would continue to evolve.
Around 130,000 years ago, classic neanderthals would appear which have an array of distinguishing skeletal features from early neanderthals.
Before talking about the anatomy of these people, there is one question left to answer.
Were neanderthals really a distinct species?

Classification

The question is may seem fairly simple at first glance, but it is extremely nuanced.
To gain a better understanding, I asked Paleoanthropologist Gilbert Tostevin from the University of minnesota.
“I do think that it is a really good question to ask about what defines a species, and how does one consider neanderthals, in terms of species relative to modern humans. In terms of the most standard or extreme version of the definition of species concept, which would be the biological species concept of ernest maire, which states that individuals of a species can reproduce together and produce viable offspring that they themselves could reproduce. So when we look at the contexts of let say a horse and a jackass. They can mate and produce a mule, but the mule will not be fertile, there is a chromosomal difference. Such that they don’t produce fertile offspring. In that case, horses and mules are not the same species. In terms of the definition of a species in that sense, neanderthals were part of our species, so you could call them homo sapiens neanderthalensis, so a subspecies of modern humans vs modern humans being homo sapiens sapiens.
On the other side of it, must recognize that speciation is not an event it is a process,
but in fact, all the different concepts of speciation are part of a continuum. So you start off with a separation of two populations usually geographically,
If you have a geographical barrier, let's say one population expands into a population that has a geographical barrier, eventually you might get two populations on either side of the barrier

diverging by random chance which we call genetic drift, if their adaptations in those locations start fitting in those different locations they might develop unique traits that help them survive in that particular environment that might make them different enough that when those population comeback together, let's say on the other sides of the geographic barrier or through time, that they might, one not be able to reproduce, but also, selection might favor them not to reproduce. This is where you get the species recognition point in evolution. Where you have two populations that wont recognize each other as mates.
This is one of the ways that evolution gradually separates the genetics such that the populations in different places with different selective pressures, will be adapted to those locations even when on the edges of those distributions, they might come back together and potentially mate.
When looking at species issues, a lot of times I want to call neanderthals just like modern humans, in terms of modern human species, they are late homo sapiens, but evolutionarily they have some uniquely derived traits that no modern human has today, and that modern humans alive at the time, that neanderthals also do not have. So for instance I mentioned parts of the hand anatomy, some aspect of the shoulder and the pelvis.
They are different, and this shouldn't really surprise us because it evolution works, then species concepts cannot actually be hard, the cannot be a hard line, it cannot always be on this side of on this side, because evolution wont happen if you dont have a gradual process or speciation
29:45-32:44
Neanderthals were indeed far different than any modern human alive today.
This statement stands even when considering that many modern humans actually have neanderthal DNA.
Considering neanderthals to be another species or considering them to be in our species is undeniably subjective.
Many paleoanthropologists would consider them to be a different human species.
For understanding the place of neanderthals in human evolution, it is useful to consider them a different species because they were separated from our ancestors for hundreds of thousands of years.
What you should learn from all of this is that the designation of species really is a scientific construct that doesn't necessarily apply to the reality of biology as rigidly as the word may suggest.
But this creates another question, should we consider them human?
Well, human does not mean simply homo sapien.
Human is not a taxonomic word and therefore is subjective.
Since neanderthals seem to have behaved in very similar ways to modern humans, most anthropologists would say they satisfy the requirements of being human.
Many would even say other species as far back as erectus or habilis should be considered human.
From a distance you would likely recognize them as a member of our species.

ANATOMY

Neanderthals had a build and appearance relatively similar to modern humans.
One of their main differences was their shorter and squatter bodies.
Their limbs were shorter, their chests were wider and their muscles were larger.

Based on 45 Neanderthal long bones, the average height was 165 cm or 5 ft 5 in for males and 152 cm or 5 feet for females.
Helmuth, H. (1998). "Body height, body mass and surface area of the Neanderthals". Zeitschrift für Morphologie und Anthropologie. 82 (1): 1–12. doi:10.1127/zma/82/1998/1
For comparison, the average height of Upper Palaeolithic european humans is 176 cm or 5 ft 9 in for males and 163 cm or 5 ft 4 in for women.
Formicola, V.; Giannecchini, M. (1998). "Evolutionary trends of stature in Upper Paleolithic and Mesolithic Europe". Journal of Human Evolution.
On average, the modern humans that would later dominate europe were fairly taller, but lighter.
The fossil record shows adult Neanderthals varied from about 147.5 to 177 cm or 4 ft 10 to 5 ft 10.
Duveau, J.; Berillon, G.; Verna, C.; Laisné, G.; Cliquet, D. (2019). "The composition of a Neandertal social group revealed by the hominin footprints at Le Rozel (Normandy, France)"
Some certainly grew larger and a height of 182 cm or 6 feet was likely attainable.
For Neanderthal weight, samples of 26 specimens found an average of 77.6 kg or 171 lb for males and 66.4 kg or 146 lb for females.
Froehle, A. W.; Churchill, S. E. (2009). "Energetic competition between Neandertals and anatomically modern humans"
The body mass index for Neanderthal males was calculated to be 26.9–28.2, which in modern humans correlates to being overweight.
Though neanderthals were literally big boned.
Their bones were thicker and denser than modern humans.
These bones likely result from a combination of naturally thick bones and a very active lifestyle.
Neanderthals also had more muscle mass than the average modern human.
Overall, they were about 15% heavier than the average modern human despite the fact that they were shorter.
One of the most famous neanderthal individuals, la ferrassie 1, was only 1.6 meters or 5 foot 2 inches tall but he weighed an estimated 85 kilograms or 190 pounds.
This indivudual was undoubtedly very strong in his lifetime.
Though, people tend to overexaggerate their strength.
Modern athletes and powerlifters who regularly exercise reach similar if not higher levels of strength.

Build

Their morphology has caused many different hypotheses regardings its function.
The most common explanation has been that they were adapted to the glacial conditions.
Neanderthals experienced at least four separate glacial periods.
These periods would have been very hard to survive in central europe.
Europe is already cold in the modern day but it would have been much colder during these periods.
The idea is that neanderthal morphology evolved to be shorter and squatter to survive these freezing conditions.
It comes down to simple physics, less surface area means less heat lost.
This correlates with populations of modern humans living in arctic conditions.
They have also evolved shorter limbs and squatter bodies.

The problem with this thought process is that neanderthals living in warmer conditions in around the mediterranean and the middle east, also retained this squat morphology.
And to add to this, during interglacial periods, europe would have been quite warm.
Alternate hypothesis have also been proposed.
In 2019, English anthropologist John Stewart suggested Neanderthals were adapted for sprinting.
Stewart, J.R.; García-Rodríguez, O.; Knul, M.V.; Sewell, L.; Montgomery, H.; Thomas, M.G.; Diekmann, Y. (2019). "Palaeoecological and genetic evidence for Neanderthal power locomotion as an adaptation to a woodland environment"
Their robust bodies may have allowed them to quickly run after prey.
DNA analysis also indicates a higher proportion of fast-twitch muscle fibres in Neanderthals than modern humans.
He explained their body proportions and greater muscle mass as adaptations to sprinting as opposed to the endurance-oriented modern human physique.
They had longer heel bones than modern humans, which means that they also has a longer achilles tendon.
A longer achilles tendon would have been less efficient at storing energy for long distance running and more suited towards sprinting.
But these adaptations were also useful for hiking up steep hills as well.
Their shorter limbs were certainly not useful for hiking but they were for staying warm and for sprinting.
Both the hype arctic hypothesis and the sprinting hypothesis are likely true in their own ways.
It is undeniable that neanderthals lived through some very cold conditions and their morphology couldn't help but be affected by this.
For example, the Neanderthal LEPR gene concerned with storing fat and body heat production is similar to that of the woolly mammoth; it was almost certainly an adaptation for cold climate.
Other aspects of their morphology such as their heel length and fast twist muscle proportion suggest that sprinting was a part of how they were shaped.

Shoulder

Another aspect about neanderthal morphology that has long been debated, is whether their humeri allowed them to efficiently throw.
Originally evidence seemed to indicate their shoulders could not over arm throw well.
Though additional studies and physical evidence now highly suggests that they could throw.
Berthaume et at (2014) found that neanderthal humeri were efficient at both thrusting and throwing.
There was no evidence that thrusting was more prominent.
It also found that sapien and neanderthal humeri, although different, showed similarities in resisting throwing and thrusting stress.
At a site in northern france, neanderthal arm bones have micro and macro traumas associated with habitual spearing throwing.
The discovery of the schonigen spears also provided physical evidence that spears may have been being thrown in europe even by the ancestors of classic neanderthals.
They certainly were able to throw and evidence suggests that they did even though their shoulder mechanics are not the best for overarm throwing.

Many other small features about neanderthal bodies differed from our own.
The distal digit of their thumb was longer than modern humans, this would have provided them with a comparatively wider and stronger grip.
Their rib cages were wider and barrel shaped.
They had longer and straighter ribs that may have provided them with room for a larger diaphragm and possibly a greater lung capacity.
Moving up from the body, their skulls contained many interesting differences.
When looking at a neanderthal up close, the first thing you might notice is their large brow.
This brow was useful at protecting their face and eyes against heavy blows from animals, rock falls and other environmental hazards.
You may notice their large eyes, larger than any modern human you have met.
Pearce, E.; Stringer, C.; Dunbar, R. I. M. (2013). "New insights into differences in brain organization between Neanderthals and anatomically modern humans
Along with these eyes, they also had a bumb on the back of their skull called the occipital bun.
This feature may be responsible for a number of purposes but one may have been to make room for the larger occipital lobe in neanderthals.
Pearce, E.; Stringer, C.; Dunbar, R. I. M. (2013). "New insights into differences in brain organization between Neanderthals and anatomically modern humans
The occipital lobe is responsible for visual perception.
Their large eyes in conjunction with their large occipital lobes would have given them better vision, especially in low light conditions.
This may have considerably helped them hunt during dawn or dusk.
They also had large sinuses and olfactory bulbs which would have provided them with a good sense of smell.
Sometimes they are depicted with very large noses but in reality their noses would have been similar in size to modern humans.
Though their sinuses were nearly a third larger than living populations.
They would have been able to take in almost twice as much air as modern humans through their noses.
Their large sinuses may have also been used to warm up air before it entered their lungs.
In fact, their sinuses show some similarities with modern arctic populations.
Another part of their appearance which may seem strange, is their lack of a chin.
Gunz, P.; Tilot, A. K.; Wittfeld, K.; et al. (2019). "Neandertal introgression sheds light on modern human endocranial globularity"
We perceive a chin to be a normal part of a humans face when in fact, we are the odd balls for having them.
Every other species of hominin and primate lack a chin, because, chins are pointless.
They do not help with chewing or anything mechanical, they are purely for show.
https://onlinelibrary.wiley.com/doi/full/10.1111/joa.12307
Some believe that they developed as our species became increasingly social and less aggressive.
This process of self domestication may have decreased testosterone levels in male and created our modern facial structure.
We do not know for sure the role of the chin, but we know that neanderthals didn't have them.

Though without a chin, their actual jaws were quite large.
They had shovel shaped incisors and large molars.
Their molars also differed from modern humans in that they had and enlarged pulp.
Infant neanderthals also got their teeth up to for months earlier than modern humans.
This would have allowed them to eat solid foods siginifcantly earlier.
The last feature of the neanderthal skull that you would notice quite easily is their sloped back, flat skull.
Unlike modern humans which have a globular skull, neanderthals had a flatter elongated skull.
This skull of course housed their large brain.
Male neanderthals averaged a brain size of 1640 cubic centimeters while femiales average 1460 cubic centimeters.
In comparison, modern european males average 1,360 cubic centimeters while femiles average 1200 cubic centimeters.
The largest neanderthals braincase, amud 1, had a brain size of 1736 cubic centimeters.
At face value, it seems that neanderthals had significantly larger brains than our species, but it is more complicated than that.

Brain why was it bigger?

“Their brains were very large but they actually were not as large as some people portray them to be, so they are frequently described as the largest in cubcentimeter of any hominin, but brain size is actually related to body size. So whales have much bigger brains than we do, but they also have much bigger bodies. So if you control brain size to body size with neanderthals and this is usually done by looking at the size of the orbit of the eye. Which reflects body size much more so than the rest of the cranium, neanderthals are a little bit less big in brains relative to body size than modern humans, so they are not the brainiest of the hominins but then again there are many humans alive today that have brains smaller than neanderthals.
5:14-6:13

Besides overall size, the organization of a brain is another very important aspect to its function.
Endocasts of their brains have shown that they had smaller parietal lobes and a smaller cerebellum.

Kochiyama T, Ogihara N, Tanabe HC, Kondo O, Amano H, Hasegawa K, Suzuki H, Ponce de León MS, Zollikofer CPE, Bastir M, Stringer C, Sadato N, Akazawa T. Reconstructing the Neanderthal brain using computational anatomy. Sci Rep. 2018 Apr 26;8(1):6296. doi: 10.1038/s41598-018-24331-0. PMID: 29700382; PMCID: PMC5919901.

Both of these areas of the brain are very important for a number of things including creativity, muscle memory, language and social abilities.
This does not mean that all of neanderthals were necessarily less intelligent in these areas but it does mean that there were differences.
Their temporal lobe was larger than modern humans.
The temporal lobe is associated with processing language, pattern recognition, perception and memery acquisition.
As mentioned earlier they had larger occipital lobes and olfactory bulbs.
These structures are responsible for seeing and hearing among other things.
Compared to modern humans, a greater proportion of the neanderthal brain was devoted to visual and somatic systems.

"The somatosensory cortex is a region of the brain which is responsible for receiving and processing sensory information from across the body, such as touch, temperature, and pain."
This left less neural tissue over for other brain areas in neanderthals.
Homo sapiens on the other hand had smaller than expected visual areas for a primate of our size.
Pearce E, Stringer C, Dunbar RI. New insights into differences in brain organization between Neanderthals and anatomically modern humans. Proc Biol Sci. 2013 Mar 13;280(1758):20130168. doi: 10.1098/rspb.2013.0168. PMID: 23486442; PMCID: PMC3619466.
Therefore, it wasnt that neanderthals had abnormally large eyes and visual cortex but that homo sapiens actually have abnormally small visual systems.
This seems to have left sapiens with more neural tissue to devote to other regions of the brain.
Neanderthal skulls show different rates of brain growth, with individuals reaching maturity faster than modern humans.
It would have taken a neanderthal around 15 years to reach adulthood.
That is nearly a decade earlier than it takes modern humans to reach adulthood.
The brains of neanderthals are not comparable to any modern human.
The differences they had are undoubtably responsible for the different trace that they left in the fossil record.
It is easy to focus on all the similarities that neaderthals had with modern humans but we can not let them overshadow that fact that they were different.

Skin and hair color & regional variation

Neanderthals, like modern humans, had a range of skin, hair and eye colors.
This is due to the fact that they occupied a wide geographic range.
A neanderthal from France would have looked quite different than one from the middle east.
Even neanderthals in the same populations would have had varied appearances just like modern europeans.
However we must be careful in assuming that if modern humans living in a region have light skin, then the neanderthals that once lived there had light skin too.
DNA analysis of three Neanderthal females from southeastern Europe indicates that they had brown eyes, dark skin color, and brown hair; with one having red hair.
Predicting Homo Pigmentation Phenotype through Genomic Data: From ...
https://onlinelibrary.wiley.com/doi/10.1002/ajhb.22263.
Other neanderthal populations living in the middle east and even in sibera had dark skin, eyes and hair.
Even though lighter skin is more frequent at higher latitudes in modern homo sapiens, the same wasn't necessarily true for other humans species.
Both the neanderthals and denisovans living in the altai mountains of siberia had a dark complexion.
The reason that light skin is more common at higher latitudes in modern humans is generally explained by the lack of sunlight in these environments.
Humans need sunlight to synthesize vitamin D.
Since sunlight is less intense at higher latitudes, light skin is evolved to absorb more sunlight when available.
However, neanderthals and even early europeans got a lot of vitamin D from their rich diet.

It was only in the past 10,000 years that europeans actually evolved light skin.
The prevalence of light skin in populations in the modern day is generally due to agricultural diets.
Due to this, it isnt surprising that many neanderthals living in europe would have a had relativly darker skin though not all did.
Two different neanderthal inidivudials from italy and spain both provided fragments of the Mc1r sequence.
In modern humans, this gene is responsible for light skin and red hair.
However, the Mc1r gene the researchers had found was different than the one found in modern humans.
In order to test if this gene would have had a similar effect in neanderthals, they inserted the neanderthal gene into human pigment cells.
The gene produced the same loss of function that gives red head their unique coloration.
This study provided solid evidence that some neanderthals did indeed have light skin and red hair.
Though the frequency of this phenotype remains unknown.
Lalueza-Fox, C. et al. 2007
Lalueza-Fox C;Römpler H;Caramelli D;Stäubert C;Catalano G;Hughes D;Rohland N;Pilli E;Longo L;Condemi S;de la Rasilla M;Fortea J;Rosas A;Stoneking M;Schöneberg T;Bertranpetit J;Hofreiter M; "A Melanocortin 1 Receptor Allele Suggests Varying Pigmentation among Neanderthals." Science (New York, N.Y.), U.S. National Library of Medicine, https://pubmed.ncbi.nlm.nih.gov/17962522/.
Just as in modern humans, red hair was probably not very common in neanderthals as it was not present in other sequenced individuals.
The phenotype was likely more common in northern regions just as it is today.
Neanderthals undoubtedly had a wide array of skin, hair and eye colors.
Another questions regarding their hair is how much body hair did they have?
From genetics, it is known that the genes that make modern humans furless date back to around 1.7 million years ago.
"How to Be Human: The Reason We Are so Scarily Hairy." New Scientist, New Scientist, 9 Oct. 2017, https://www.newscientist.com/article/mg23631460-700-why-are-humans-so-hairy/.
Since this is well before our last common ancestor with neanderthals, we know that neanderthals would have had furless skin.
Genetics also corroborate this.
Just like us, they still had body hair, but even the hairiest neanderthals would not of had actual fur.
Anatomically, neanderthals are fairly similar to modern humans, though their differences cannot be overlooked.
Their anatomy was far different than any modern human alive today even if at the surface we vary so much.

TECHNOLOGY = "Part III - Tools to live"

Neanderthals utilized a vast array of technologies to survive their challenging world.
Many materials and techniques were used to create a lot with very little.
Since stone does not decay like biological matter, thousands upon thousands of neanderthal stone tools have been recovered.

This has allowed us to learn an incredible amount about their lifes.

Stone and Stone cores

To understand these tools, we must first understand the evolution of stone tool technology in general.

As mentioned earlier, the first stone tools made by our ancestors were simple handaxes with a few flakes taken off.

This simplistic technology is considered mode I by archaeologists.

Mode II technology also known as achulean technology would appear with homo erectus around 1.7 million years ago.

Stone cores were worked symmetrically on both sides to create much more refined handaxes.

There was not much of a strategy to creating flakes or utilizing the material effectively.

This would change roughly 300,000 years ago with the emergence of Levallois technology.

Richter, Daniel; Grün, Rainer; Joannes-Boyau, Renaud; Steele, Teresa E.; Amani, Fethi; Rué, Mathieu; Fernandes, Paul; Raynal, Jean-Paul; Geraads, Denis (2017-06-07). "The age of the hominin fossils from Jebel Irhoud, Morocco, and the origins of the Middle Stone Age". Nature. 546 (7657): 293–296. Bibcode:2017Natur.546..293R

The levallois technique, also known as mode III technology appeared throughout europe, the middle east and north africa during the appearance of the first anatomically modern humans and some of the earliest neanderthals.

The creation of the technique likely appeared independently in various regions though it is often credited to the neanderthals.

“When we first see the classical anatomical forms of neanderthals 250,000, they were utilizing a middle paleolithic technology which is based on taking a core and striking flakes off of a core and then utilizing the flakes which they would used ot make a speak and kill game, mostly by throwing and sometimes by stabbing.

This middle paleolithic technology of cores and flakes is slightly different form the lower paleolithic, which is what we get mostly with homo erectus, and homo hiedelbergensis, who was immediately before homo neanderthalensis, who were using handaxes which we call the achulean culture or technocomplex. And they were using a handaxe core that in and of itself was a sharp implement for cutting, for pounding and for butchery. The tools in the middle paleolithic were not the tool. But it was the shaping of the flakes with particular types of reduction by taking flakes of stone off of a core, that charcterizes what neanderthals were doing in that time period. So we can find objects such as this flint core which was probably a nodule, that was struck, removing flakes which are then utilized for cutting meat and wood.

36;23

The technique itself consisted of striking preferential flakes off of prepared lithic cores.

The core was shaped in specific way to created a domed shaped core known as a tortoise core.

A platform was prepared on a highspot which when ultimately stuck, created a large preferential flake.

This flaked nearly the entire underside of the core, efficiently utilizing much of the core.

Experiments have shown that the levallois core is an economic optimal strategy of raw material usage.

Lycett, S.J.; M.I., Eren (2013). "Levallois economics: and examination of 'waste' production in experimental produced Levallois reduction sequences". Journal of Archaeological Science. 40 (5): 2384–2392.
It can generate the longest cutting edge per weight of raw material.
This would have allowed neanderthals to be high mobile, as they could get the most out of their material.
The actual levallois flake produced was very sharp on all sides.
It would have been very efficient as a butchering tool, much more so than a handaxe.
Neanderthals still used handaxes though for more generalized purposes.
Handaxes are not the most effective butchering tools because of their often steep edges and limited resharpending potential.
Levallois flakes on the other hand are quite thin and can be retouched easily.
“Most of the technology we that see with neanderthals is taking flakes off of prepared cores like levallois, and then the flakes are immediately utilized, or they might be resharpened of their morphology changes such that it makes a different shaped edge, then it can be resharpened. Most of the tools that we get in the middle paleolithic are flake tools meaning that they are not very long relative to their width to their width so they would just hold in the hand and utilize as a flake tool. 40;21
A sharp flake could originally be used as a knife and then later be resharpened into a hide scraper of other tool.
With the levallois method other types of flakes could also be created.
By isolating two converging ridges and striking beneath them, a levallois point could be made.
These points are unsymmetrical but come with very sharp converging edges.
Once hafted, these points could be very deadly weapons,

Points

We do know that neanderthals were hafting tools also, particularly points, that were made with levallois technology that would allow the form to make convergent edges that come to a point, this is actually not such a classic neanderthal point but it is pretty close with the two convergent edges. In terms of how it would be haft, it would be stuck into a haft like this, and we have examples of very crude hafts from around 400,000 years ago where they are just shoving it into a crack in the wood, otherwise we have evidence that from abrasion on the edges and forms of glue that was use to glue tells us that they were hafting things in neanderthal time period weather they were doing for knifes or large stabbing spears are more likely than true projectiles, throwing them would have been also easy but the tip area of a point like this is a bit large than modern humans technology, they look more like stabbing spears than something that would fly through the air. This is part of the argument of why neanderthals were so much more stronger than moderns that they were engaging in a harder life like confrontations with violent animals that they were trying to kill. 41;12
Levallois points were almost certainly hafted, however they may have been hafted in a very rudimentary way.
We will talk more on this later.
In a study on 117 levallois points, eight points displayed use wear damage.
Locht, J.~~L., Antoine, P., Bahain, J. J., Dwrila, G., Raymond, P., Limondin Lozouet, N., Gauthier, A., Debenham, N., Frechen, M., Rousseau, D. D., Hatte, C., Haesaerts, P., Metsdagh, H., 2003. Le gisement~~

paleolithique moyen et les sequences pleistocenes de Villiers-Adam (Val-d'Oise, France). Chronostratigraphie, envi ronnement et implantations humaines. Gallia Prehistoire 45, 1e111.
Two of them were used for wood working activities, six are associated with buterery while one point was distinct from the others.
An examination of the point showed a chipped and denticulated left edge.
This damage denotes violent penetration into an animal carcass and is consistent with contemporary tests of haft spear points.
Though this study suggests that the points were used as spear points, it also suggests that most werent.
Many would have been used for woord working or butchery.
Nonetheless this does not diminish the significance of these tools on the tips of spears.
Fossil remains with impact damage consistent with levallois points as well as fossils with literally levallois points embedded in them confirms the used of this technology in hunting activites.
https://www.cambridge.org/core/journals/antiquity/article/abs/levallois-point-embedded-in-the-vertebra-of-a-wild-ass-equus-africanus-hafting-projectiles-and-mousterian-hunting-weapons/A777CC4E61F25793526A3316D8303C8E
https://www.researchgate.net/publication/273054548_A_Levallois_point_embedded_in_the_vertebra_of_a_wild_ass_Equus_africanus_hafting_projectiles_and_Mousterian_hunting_weapons
A find like this is extraordinary for the time period.
We will talk further about the use of these spears when we discuss how neanderthals would have hunted.
Levallois points are were commonly made by neanderthals, but other types of points were also used.
Triangular flakes resulting from less standardized platforms were often utilized.
These flakes could be turned in convergent scrapers.
As their names suggests, there were primarily used as scrapers though they may have also functioned as spear points.
Mousterian points were another point created from triangular flakes or levallois flakes.
They were modified by taking off additional flakes.
This created a more symmetrical point that was often easier to haft.
Later neanderthal points dating to the twilight of neanderthal existence were even bifacial and highly refined.
Bifacial points from hohle fels, germany were made with considerably skill.
“Stone Tool Tells the Story of Neanderthal Hunting.” Stone Tool Tells the Story of Neanderthal Hunting | University of Tübingen, 11 Jan. 2023, https://uni-tuebingen.de/en/university/news-and-publications/press-releases/press-releases/article/stone-tool-tells-the-story-of-neanderthal-hunting/.
This point in particular was certainly hafted and used as a spear point.
It was resharpened multiple times until it was no longer useful and likely discarded.
Though it looks rough, during it original creation it would looked similar to this.
Another point from a cave in switzerland preserves a more pristine bifacial point.
Conard, Nicholas. (2011). The Demise of the Neanderthal Cultural Niche and the Beginning of the Upper Paleolithic in Southwestern Germany. 10.1007/978-94-007-0415-2_19.

These points indicate that neanderthals point technology did reach a considerable complexity towards the end of their time.
Most if not all neanderthals points were created with the intention of being placed on thrusting spears.
These points were too large to be a part of a projectile such as an arrow, atlatl dart or javelin.
Their thrusting spears would have likely been very robust and primarily for stabbing.
This does not mean that could not have been thrown.
Some evidence of wounds caused by levallois points suggest that they were used as projectiles.
These spears would have likely been thrown at times, but only short distances.
With the mass of a robust levallois point and a heavy shaft, these spears would have packed a considerable puch when thrown in close quarters.
Though a neanderthal may have preferred to hold onto their weapon and deliver most of their blows by hand.
This is supported by the high rate of neanderthal injury suggesting that they got very close to their prey.

Hafting

As mentioned previously, levallois points and other neanderthal points would have been hafted to spears.
Boëda, E.; Geneste, J. M.; Griggo, C.; Mercier, N.; Muhesen, S.; Reyss, J. L.; Taha, A.; Valladas, H. (2015). "A Levallois point embedded in the vertebra of a wild ass (Equus africanus): hafting, projectiles and Mousterian hunting weapons". Antiquity. 73 (280): 394–402. CiteSeerX 10.1.1.453.29
Points from earlier periods were left with unground edges.
This is important because the sharp edges of a levallois point would cut through any cordage wrapped over them.
This suggests that early levallois points were simply placed in a wooden slot with perhaps the aid of an adhesive.
Later levallois points aswells as mousterian and bifacial points had ground edges which would have been warped with some kind of wrapping or cordage.
Leather, plant fiber cordage, sinew and gut would have all been great materials to hold points in place.
Chemical analysis from a mousterian point and two levallois points from the site in syria have shown that a natural glue was present on the base.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0213473
Adhesives such as pine tar, birch tar and bitumen have all been found at neanderthals sites.
The oldest evidence of adhesive use attributed to neanderthals comes from two pieces of birch tar that date to around 200,000 years ago.
Mazza PPA, Martini F, Sala B, Magi M, Colombini MP, Giachi G, et al. A new Palaeolithic discovery: tar-hafted stone tools in a European Mid-Pleistocene bone-bearing bed. J Archaeol Sci. 2006;33(9):1310–8. https://doi.org/10.1016/j.jas.2006.01.006.
Birch tar is dervived from birch bark and is produced by scraping the left over resin of burnt bark off of cobbles.
https://www.pnas.org/doi/10.1073/pnas.1911137116
This material is a great adhesive and is quite shock absorbent.

An amazing piece of birth tar from Konigsaue, Germany, preseverses imprints of wood, stone, and even a neanderthal finger print.
Wragg Sykes, Rebecca. (2015). To see a world in a hafted tool: Birch pitch composite technology, cognition and memory in Neanderthals. 10.1017/CBO9781139208697.008.
Evidence of hafting couldn't get much better than this.
Another quite easily obtained adhesive would be conifer resin, also known as pine sap.
It can be used straight from the tree, though it is not very shock resistant.
As primitive technology enthusiasts may know, adding beeswax makes it an exceptional glue, and neanderthals knew this too.
Residue from ten stone tools from grotta del fossellone and grotta di sant'agostino contained the chemical signatures of conifer resin and one contained chemicals from beeswax.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0213473
Other sites containing pine resin and beeswax have strengthened the idea that neanderthals purposefully mixed these components to create a strong adhesive.
The last adhesive used, Bitumen, is a sticky, highly viscous form of petroleum that may have been harvested form natural deposits across europe.
Boëda, E., Bonilauri, S., Connan, J., Jarvie, D., Mercier, N., Tobey, M., Valladas, H., al Sakhel, H., Muhesen, S. 2008. Middle Palaeolithic bitumen use at Umm el Tlel around 70 000 BP. Antiquity 82: 853-86.
In its natural state it is sticky and ready to use.
Neanderthals from el sidron cave in spain were found to have bitumen in their dental calculus.
Radini, A., Buckley, S., Rosas, A., Estalrrich, A., De la Rasilla, M., & Hardy, K. (2016). Neanderthals, trees and dental calculus: New evidence from El Sidrón. Antiquity, 90(350), 290-301. doi:10.15184/aqy.2016.21
It has been hypohthesized this may have occurred as using the mouth to aid in the hafting of tools.
Perhaps by clamping their teeth down on the haft, holding the lithic in one hand and applying the adhesive with the other.
Another form of adhesive that may have been used but we dont have evidence for is hide glue.
Hide glue can simply be cooking bits of hide or sinew next to a fire with indirect heat.
Neanderthals would have likely noticed the adhesive properties of bits of hide or sinew on meat they were cooking.
The glue produced by this method is quite strong but more importantly, it binds sinew, gut and leather together.
Hide glue is essentially protein that can be used to adhere bindings together.
Neanderthals may have used it on the binding which kept their spears points in place though we do not have evidence of it use.
Still, it is important to consider technology that we do not have direct evidence for.
Another important form of evidence for hafting comes from polishes.
Hafting a tool with adhesive creates clear signs on the stone.
Many artifacts including points, retouched tools and even random flakes were hafted.
AlfredPawlika, JürgenThissenb , et al. "Traceological Analysis of 'Unusual' Wear Traces on Lithic Artefacts from the Middle Palaeolithic Site Inden-Altdorf and the Functional Context of the Site."

Quaternary International, Pergamon, 16 Mar. 2016, https://www.sciencedirect.com/science/article/pii/S1040618215013865.

In some sites, nearly half of the artifacts had hafting micropolishes.

Many other sites show that hafting stone tools was quite common in the neanderthal world.

When looking at neanderthal tool remains, they may appear quite crude and simplistic.

But imagining them hafted on various handles and grips sheds light on the complexity of their tools.

Wooden Tools

Another underrepresented aspect of neanderthal technology was their wooden weapons and tools.

Actual projectiles as well as many other weapons such as thrusting spears and throwing sticks were made of wood.

"In terms of the technology involved, neanderthal technology tend to be focused more on using stone to carve wooden objects as implements for hunting where as modern humans tended to haft their stone tools more frequently" 13;55

Wood was worked with a number of different stone tools.

Levallois points and blades and were efficient tools for shaving wood.

Backed knifes would have also worked well.

Notched tools were effective at shaving wood while denticulate tools could be used to saw wood.

Blades could also be turned into tools called burins.

Burin

"This is a fairly thick blade that was retouched here, so it was probably longer, and the edge was taken off, to make a little platform to them make a burin spall, the burins themselves were actually good little barbs, but the actual scar left on the blade, this becomes the burin and the little piece become the burin spall. This is actually excellent for graving bone and wood. You can literally shave bone off the end because it is both sharp and fairly robust. And stone is very sharp but it is also very brittle. So if you are trying to work something very hard, you need a steeper edge. And so a burin is really very useful for that." 46;25

With their array of wood working tools, there able to create very refined wooden technology.

Schonigen

The amazing discovery of the schonigen spears in 1994 recovered 10 wooden weapons dating to over 300,000 years ago.

Thieme, Hartmut (February 1997). "Lower Palaeolithic hunting spears from Germany". Nature. 385 (6619): 807–810. Bibcode:1997Natur.385..807T

They are the oldest complete wooden tools ever discovered and were either made by early neanderthals or late hiedelbergeneis

Schoch, Werner H.; Bigga, Gerlinde; Böhner, Utz; Richter, Pascale; Terberger, Thomas (December 2015). "New insights on the wooden weapons from the Paleolithic site of Schöningen"

Wood degrades in a only a few years in most cases but the rapid sedimentation and waterlogged condition of the site provided the precise conditions for preservation.

The site was once a lake shore that eventually became buried with the retreat of the elsterian ice sheet.

The spears and other wooden tools were found in direct association with animal remains and stone and bone tools.
The wooden tools take a variety of shapes seemingly design for different purposes.
The spears are between 1.84 to 2.53 meters or 6-8.3 feet in length.
Schoch, W.; et al. (2015-12-01). "New insights on the wooden weapons from the Paleolithic site of Schöningen"
The majority of the spears were made from slow growing spruce trees while spear four which was made of pine.
The points of the spears were carved from the bases of the trees which is denser.
All spears of the spears were tapered on both ends except for spear six.
Spear six also has a natural kink, it has been interpreted as a thrusting spear.
However, the other spears taper aerodynamically and are weighted with their center of gravity in the fron third of the shaft.
Their design and weighting suggests that they may have been used as javelins.
Contemporary experiments using replicas demonstrated that spear two could be thrown as far as 20 meters of 65 feet.
Milks, Annemieke; Parker, David; Pope, Matt (2019-01-25). "External ballistics of Pleistocene hand-thrown spears: experimental performance data and implications for human evolution"
The spear performed similarly to modern javelins.
The spears suspected to be javelins also performed well as thrusting weapons.
They likey were used multiple ways.
The evidence suggests that some of the spears would have been efficient for throwing while others, especially spear 6 was made for thrusting.
Schoch, Werner H.; Bigga, Gerlinde; Böhner, Utz; Richter, Pascale; Terberger, Thomas (2015-12-01). "New insights on the wooden weapons from the Paleolithic site of Schöningen"
All of them would have been useful for hunting or defending against predators.
What is interesting about these spears is not only of them had a hafted point.
This is not surprising considering they date between 300-330,000 years ago.
Hafted points would become more frequent in later times periods.
In addition to the spears there were other wooden objects.
Double pointed sticks 64 cm or 2 feet long are suspected to have been used as throwing sticks.
Conard, Nicholas J.; Serangeli, Jordi; Bigga, Gerlinde; Rots, Veerle (May 2020). "A 300,000-year-old throwing stick from Schöningen, northern Germany, documents the evolution of human hunting"
Throwing sticks have been used across many human societies to target small game or driver larger game.
The neanderthals at schonigen may have been targeting waterfowl with these weapons.
Another wooden tool found at the site was a charred wooden stick that has been interpreted as a skewer for roasting meat.
Schoch, W.; et al. (2015-12-01). "New insights on the wooden weapons from the Paleolithic site of Schöningen"
The last wooden objects yet to be mention short worked shafts with notches cut into them.
Thieme H. 1999: Altpaläolithische Holzgeräte aus Schöningen, Lkr. Helmstedt. Germania 77, S. 451-487

They have been inferred as handles for stone tools, they were likely paired with a sharp flake that would act as a knife.
Other wooden tools created by neanderthals exist, though they are very rare.
The oldest wooden tool that is either attributed to early neanderthals or their ancestors is the clacton spear.
Allington-Jones, L., (2015) Archaeological Journal, 172 (2) 273–296 The Clacton Spear – The Last One Hundred Years
It was discovered off the coast of england and has dated to 420,000 years ago.
Since the spear only consists of a tip, it is unknown if the spear would have been a suitable for throwing though it certainly could have been used for thrusting.
The existence of this technology predating the appearance of true neanderthals and its appearance in germany a hundred thousand years later suggests that most, if not all neanderthals would have used wooden spears.
Other wooden neanderthal objects have been found including another spear, though their preservation is poor and their purpose is debatable.
The site of abric romani preserved the imprints of many wooden objects.
CARBONELL, E., & CASTRO-CUREL, Z. (1992). Palaeolithic wooden artefacts from the Abric Romani (Capellades, Barcelona, Spain) Journal of Archaeological Science, 19 (6), 707-719 DOI: 10.1016/0305-4403(92)90040-A
Though the wood has long size decayed, the travertine has preserved a cast with incredible detail.
A few flat wooden dish like objects have been found.
A large pole 5m meters or 16 feet long may have been part of a structure.
An impression of a very interesting knife or spade like object was also found.
This object is very unique as nothing like it has ever been found even in modern human societies.
It may heave been used as a butching tool or perhaps a digging tool.
We will never know for sure.
There are a handful of other impressions from wooden tools that are more enigmatic.
Castro-Curel, Z., & Carbonell, E. (1995). Wood Pseudomorphs From Level I at Abric Romani, Barcelona, Spain Journal of Field Archaeology, 22 (3), 376-384 DOI: 10.1179/009346995791974206
Overall, the findings at abric romani have taught us that much of the items made and used by neanderthals would have been wooden.
Besides spears and handles, many unique objects would have been made.
Though stones have stood the test of time, wooden tools were just as essential to neanderthal survival.

Bone

Neanderthals also utilized other materials when creating tools.
Bone and shell tools were used though in limited ways.
Bone tools were mostly limited to lissoirs and flint knapping tools.
Hammers often made of animal limb bones were great tools for striking flakes off of cores.
Smaller, broken bone shards called retouchers are quite common throughout neanderthals sites.

They vary in construction but neanderthals generally preferred the bones from the rear limbs of large animals such as aurochs, horse and bison.
Materials such as jaws, horn cores, and mammoth ivory were also utilized.
In one case, even another neanderthals skull fragment was used as a retoucher.
Rougier, H.; Crevecoeur, I.; Beauval, C. (2016). "Neandertal cannibalism and Neandertal bones used as tools in Northern Europe"
These tools would be used to resharpen stone edges by hitting off small flakes.
Other bone tools display evidence that they may have been used for indirect percussion flintknapping.
Sykes, Wragg Rebecca. Kindred: Neanderthal Life, Love, Death and Art, Bloomsbury Sigma, London, 2022, pp. 132–133.
This advanced flintknapping technique consists of using two tools.
A tool contacting the stone tool, and a tool to hit the other tool.
This technique accurately focuses a lot of focus into a small point.
It is a very effective technique that allows for making much better stone tools.
It is unclear if these tools were really used in this way, though our evidence suggests it is certainly possible.
At the schonigen site, sharp bones may have functioned as knives to cut flesh.
Van Kolfschoten, Thijs; et al. (2015-12-01). "Lower Paleolithic bone tools from the 'Spear Horizon' at Schöningen (Germany)"
In other sites, mammoth tusks seem to have been split and knapped into scrapers.
At a side in germany, over a dozen bone artifacts dating to over 60,000 years ago have been found, and some may have been points.
Pastoors, Andreas. “Blades ? – Thanks , no interest !-Neanderthals in Salzgitter-Lebenstedt Klingen ? – Danke , kein Interesse ! – Neanderthaler in Salzgitter-Lebenstedt.” (2012).
Flattened mammoth ribs with point tips may have functions as spear points.
A smaller point made of a reindeer antler was almost certainly a spear point.
It is light enough that it may have been hafted on a javelin or dart.
It is possible that a point of this size could be hafted on an arrowhead, though our evidence does not suggest that neanderthals ever used this technology.
It certainly could have been part of a light throwing spear or possibly, even an atlatl.
This idea is similarly lacking any support but it is an interesting idea to consider.
The appearance of hafted bone points throughout europe is largely correlated with the appearance of modern humans, but their existence in neanderthal sites tell us that neanderthals were certainly aware and capable of this technology to some extent.
This technology is only found at one site in germany, but bone does not always stand the test of time.
It is possible that bone points were used elsewhere and left little trace though we just don’t know.
Another tool made of bone found at various neanderthal sites were leather working tools called lissoir.
Callaway, E. Neanderthals made leather-working tools like those in use today. Nature (2013). https://doi.org/10.1038/nature.2013.13542

These tools, also known as slickers or burishers, are used to rub into hides to make them softer and more water resistant.
Neanderthals chose the ribs of large herbivores to make these tools.
Though these lissoirs could be made with the abundant reindeer for which they hunted, they preferred the more uncommon bison and aurochs ribs.
Martisius, N. L.; Welker, F.; Dogandžić, T.; et al. (2020). "Non-destructive ZooMS identification reveals strategic bone tool raw material selection by Neandertals"
Besides mammal bones, shell was also heavily utilized by various populations of neanderthals, particularly in the italian peninsula.
In areas of poor quality stone, we see that neanderthals often used shell as an alternative.
Shell is hard material that can be knapped similarly to stone but can also be resharpend simply by rubbing against abrasive stone.
Over 170 worked shell tells were found in grotta dei moscerini alone.
Villa, P.; Soriano, S.; Pollarolo, L. (2020). "Neandertals on the beach: use of marine resources at Grotta dei Moscerini (Latium, Italy)"
Out of these shells, about 24% of the shells were gathered alive from the seafloor, meaning these Neanderthals had to wade or dive into shallow waters to collect them.
These Live clams have stronger and more robust shells than unoccupied specimens.
They also offered a small snack everytime they need another tool.
Across various sites, these tools were used for cutting meat, scraping skins and even shaping wood.
Colonese, A. C.; Mannino, M. A.; Mayer, DE (2011). "Marine mollusc exploitation in Mediterranean prehistory: an overview". Quaternary International. 239 (1–2): 86–103. Bibcode:2011QuInt.239...86C
Shell tools are found in parts of italy and greece, but are absent from other mediterranean sites.
Considering that neanderthals were certainly using aquatic resources elsewhere, it is strange that shell tools are not more common.
It is possible that these sites exist but lie beneath the oceans surface.
The ocean undoubtably conceals many other facets of neanderthal life.

Staying Warm= “Part III - Tools to live”

Use of fire

The use of fire by our genus was clearly a major technological development for our genus.
Evidence of the use of fire by our ancestors extends more than a million years into prehistory.
To understand the significance of this technology we should take a further look into why exactly it was so advantageous.
First and foremost, fire provided heat.
Neanderthals lived across a range that was often quite cold depending on the current environmental conditions.
Other ways to stay warm existed such as clothing, but fire provided direct heat.
At the site Abric Romani, there are eight evenly spaced hearths aligned against the rockshelter wall.
http://etherplan.com/neanderthal-social-structure.pdf
These hearths have been interpreted as personal fires used to keep individuals warm while sleeping.
A similar construction has been observed by australian desert aborigines.

They would sleep with little glowing campfires on either side of them.
The alternating position of between man and fire provided an economical to stay warm.
Other neanderthal sites show similar constructions.

Cooking

The advantage of fire arguably more important than warmth was its use for cooking.
Charred bones that may have been cooked are widely known from many neanderthal sites.
This suggests that meat and marrow were likely being cooked, other tissue such as organ meat does not preserve well in the fossil record.
Cooking meat breaks down tough fibers and connective tissue, which makes it easier to chew and digest.

Khanum F, Siddalinga Swamy M, Sudarshana Krishna KR, Santhanam K, Viswanathan KR. Dietary fiber content of commonly fresh and cooked vegetables consumed in India. Plant Foods Hum Nutr. 2000;55(3):207-18. doi: 10.1023/a:1008155732404. PMID: 11030475.

It also leads to better nutrient absorption and kills any harmful pathogens.
Direct evidence for cooking plants is very rare in the neanderthal fossil record though it does exist.

Lev, Efraim, Mordechai E. Kislev, and Ofer Bar-Yosef. 2005. Mousterian vegetal food in Kebara Cave, Mt. Carmel. Journal of Archaeological Science 32:475–484.

The kebara assembledge consists of more than 4,000 charred seeds, which were mostly from legumes and nuts.
https://www.journals.uchicago.edu/doi/full/10.1086/692095
It is possible these seeds came from dumg or animal carcasses, though their density suggests they were deposited from direct cooking.
The use of fire for cooking is often correlated with the shrinking of our ancestors large ape gut.
The large guts seen in earlier members of our species were used to digest tough plant fibers and unprocessed meat.
To process this food, their gut had to use a lot of energy by itself, meaning less energy was available for things such as large body and brain size.
More nutrient dense food allowed us to have a much smaller gut which is hypothesized to have led to development to the larger brain sizes seen in hominins such as neanderthals and modern humans.
The presence of many hearths at neanderthals sites with charred food remains indicates that fire was often used for cooking.
Though it should be noted that fire may have not alway been available and raw food would have been eaten.

Productivity

Another important use of fire not relized by many is its increase on human productivity.
The light fire provides would have increased the hours which people could craft tools and socialized.
Modern humans have about a 16 hour waking period while other apes are only awake from sun up to sun down which is around 4 hours less.

Gowlett JA (June 2016). "The discovery of fire by humans: a long and convoluted process". Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences. 371 (1696): 20150164. doi:10.1098/rstb.2015.0164

Considering many groups of neanderthals lived in dark caves, the light of fire would have been very useful for their many crafts.
Flint knapping was often done within caves, fire would have been essential for this.
Other tasks like hideworking, woodworking and butchery would have needed light.
Socializing is also an overlooked aspect that fire would have allowed.
I would venture to say we have all sat around a fire captivated by the methodical flames while talking with friends and family.
Neanderthals similarly would have talked about the days activities, future projects and possibly old stories of great beasts and even greater hunters.
One can only imagine how fascinating it would be to hear one of these conversations with the help of a linguist.

Starting fires

Another important question regarding neanderthal fire use is how they obtained fire in the first place?

Gowlett JA (June 2016). "The discovery of fire by humans: a long and convoluted process". Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences. 371 (1696): 20150164. doi:10.1098/rstb.2015.0164

The obvious answer would be naturally occurring wildfires.
Wildfire occurring from lightning strikes would have been well known to neanderthals living across eurasia.
Fire could be harvested and kept going for weeks, months and possibly even years with the right planning.
The problem with this method is that natural fires are not reliable or necessarily predictable, especially in colder seasons.
The many neanderthal sites with evidence of fire has alway made researchers wonder if they were able to create their own fire.
Direct artefactual evidence for regular systematic fire production has been found at multiple sites across france according to a 2018 study.

Sorensen, A.C., Claud, E. & Soressi, M. Neandertal fire-making technology inferred from microwear analysis. Sci Rep 8, 10065 (2018). https://doi.org/10.1038/s41598-018-28342-9

Dozens of late middle palaelithic bifacial tools exhibit evidence of repeated abrasion with a hard mineral material.
The macroscopic and microscopic traces found on the axes are consistent with experimental reconstruction struck with pyrite also known as marcasite.
Striking a flat lithic surface with pyrite creates sparks which can be harvest for fire creation.
The evidence suggests that this technology was atleast present within souther france though it may have also been used elsewhere.
Another study from 2016 found evidence that neanderthals were using manganese dioxide to help start fires.

Heyes, P., Anastasakis, K., de Jong, W. et al. Selection and Use of Manganese Dioxide by Neanderthals. Sci Rep 6, 22159 (2016). https://doi.org/10.1038/srep22159

Scratch marks on blocks of manganese dioxide suggest that the substance was being turned into a powder.

When this powder is sprinkled over wood, it had shown to lower the ignition temerpute of the wood significantly, allowing for fires to be started much easier.
It is debated if this substance was actually used to start fires because it also could have been used as a black pigment.
However, a variety of other materials such as charcoal would have worked perfectly well as black pigment.
The careful selection of maganese dioxide and subsequent processessing suggests it may have played an important role in starting fires at least in southern france.
Another complicated but important form of evidence that neanderthals were creating fires comes from the chemistry of ancient hearths.
A 2019 study found that the polycyclic aromatic hydrocarbons in the floor sediments from an armenian cave suggest that fire was being created independently of natural sources.
Heyes, P., Anastasakis, K., de Jong, W. et al. Selection and Use of Manganese Dioxide by Neanderthals. Sci Rep 6, 22159 (2016). https://doi.org/10.1038/srep22159
Other fire making techniques such as friction made fire must also be considered.
Hand drills and fire ploughs are of very simple construction yet are reliable ways to start a fire.
Unfortunately this technology would leave very little if not nothing behind archaeology.
Existing evidence suggests that some neanderthals likely did create their own fires, but it certainly does not mean that the majority did.
The evidence of handaxes being struck with a hard mineral and the hydrocarbon evidence both date to less than 60,000 years ago meaning these sites are quite recent in regards to neanderthal existence.
Earlier neanderthals likely did not know of this technology though future research may indicate otherwise.
Another aspect of their fires that we must consider is, what were their fires like?
Most of their fires were simple circular fires without surrounding stones.
Other more permanent hearths were build in divits or with stones surrounding them.
This would have improved heat retention and decreased direct heat.
At abric romani, some fires have small trenchs dug to them which would have increased the airflow to the fire.
Kedar, Y. and Barkai, R., 2019. The Significance of Air Circulation and Hearth Location at Paleolithic Cave Sites. Open Quaternary, 5(1), p.4. DOI: http://doi.org/10.5334/oq.52
Across their sites, many types of wood was burned.
Pine is the most common across their sites because it is very abundant and produces a lot of dead wood.
Their fires mainly consisted of naturally dead wood and some fresh green wood.
Cutting down trees would have been very difficult with their technology and there was little need in regards to fires.
Most areas they inhabited would have had enough dead wood to burn for months within an hours walk.
Twiggy branches, large sticks and even whole logs seem to have been brought back to their shelters to be burned.
Some sites even have evidence of large woodpiles.
Other sources of fuel were also used.

Bone was a common material to burn.
Bone is hard to get alight though it would ahve increased the longevity of their fires quite a bit.
On the steppe where wood would not have been very common, bone would have been a convenient alternative.
Even in environments with plenty of wood, it would have bene useful.
Another source that some neanderthals utilized was coal.
Neanderthals at the les caralettes rock shelter burned coal for many centuries.
panelThéryI.aGrilJ.bVernetJ.L.cMeignenL.dMauryJ.e, Author links open overlay, et al. “Coal Used for Fuel at Two Prehistoric Sites in Southern France: Les Canalettes (Mousterian) and Les USCLADES (Mesolithic).” Journal of Archaeological Science, Academic Press, 25 May 2002, https://www.sciencedirect.com/science/article/abs/pii/S0305440396900485.
The coal in question is brown coal.
Brown coal is not easy to light but once it is it burns hot and would have significantly increase the longevity of their fires.
They sources the coal from about 10 kilometers or 6 miles away.
Who knows how they discovered that rock could burn.
It is another testament to their deep knowledge of their surroundings.
Another form of fire technology that can be considered are portable embers.
Instead of starting an entirely new fire, embers can be carried long distances to the next camp.
There are a varied a of ways to carry and ember.
A smoldering piece of wood can simply be wrapping in green leaves though other materials such as fungus may be more effective.
Otzi the iceman was found with a tinger fungus that is suspected to have been used to carry embers.
Capasso L (December 1998), "5300 years ago, the Ice Man used natural laxatives and antibiotics", Lancet, 352 (9143): 1864, doi:10.1016/S0140-6736(05)79939-6
Once set a light, tinger fungus can smolder for hours before going out.
Though we do not have evidence of neanderthals using this technology, it is still interesting to speculate.
Clothing Include ambient shots between sections
Another technology that neanderthals must have utilized to survive the colder winters months is clothing.
Clothing may have been used as far back as the lower paleolithic, though direct evidence does not exist.
Our oldest direct evidence of clothing is less than 10,000 years old, it just does not stand the test of time.
However, many forms of indirect evidence can tell us an incredible amount about the clothing that neanderthals would have worn.
The placement of cut marks on the bones of butchered animals indicates that neanderthals were preserving the skin of their prey.
Use wear on lithics from dozens of neanderthals sites confirm that they were being used on hides.

Doronicheva, E.V., Golovanova, L.V., Kostina, J.V. et al. Functional characterization of Mousterian tools from the Caucasus using comprehensive use-wear and residue analysis. Sci Rep 12, 17421 (2022). https://doi.org/10.1038/s41598-022-20612-x

Researchers are even able to distinguish lithics that were mainly used on fresh hides from ones that were used on dry, processed hides.

Some artifacts are so worn that they must have been used for many hours.

Heavy wear present on the teeth of neanderthals similar to contemporary hunter gathers indicates that they were using their teeth as a clamp to hold on to hides as they worked them.

Estalrrich, A.; Rosas, A. (2015). "Division of labor by sex and age in Neandertals: an approach through the study of activity-related dental wear". Journal of Human Evolution. 80: 51–63. doi:10.1016/j.jhevol.2014.07.007

Neanderthals from colder regions even show significantly more wear on their teeth suggesting that hides were being worked at a higher frequency.

Hide working is a hard, time consuming process.

First, all fat and muscle tissue must be cleaned form the hide shortly after butchering an animal or else the hide will rot.

This process is very time consuming and physically demanding.

This is what hide scrapers would have been used for, a very common tool in neanderthal assemblages.

After this step is complete, the hide must be dried.

After drying in sunlight, by a fire or in a dry cave, the hide can be stored indefinitely without spoiling.

But a dry hide can be as stiff as a board, it must be worked further.

The hide must be soaked in a water source to become pliable once again.

Once wet, it is easily stretched.

This can be done over a hard surface or even by hand.

After sufficient stretching, it can be left to dry once more.

The next step would be to work a fatty substance into the hide.

This water proofs the hides and makes them even softer.

Any kind of fat could be used but bone marrow, and especially brain work much better due to the nature of their chemistry.

At this point, lissior could be used to further work the hide.

They are not essentially but makes a much finer product.

The last step that may have been used is smoking.

Smoking a hide drastically increases its longevity and durability.

It is not essential, but neanderthals we likely aware of its affect on their hides.

Evidence from the site of neumark nord suggests that neanderthals even tanned their hides to make leather.

Wil Roebroeks et al. 2021. Landscape modification by Last Interglacial Neanderthals. Science Advances 7 (51); doi: 10.1126/sciadv.abj5567

Hides must be exposed to tannins in order to stablize the proteins to resist decay.

Tanning seems to have been done at this site with boiled oak and chestnut bark.

Soaking the hides in this solution would have not only dyed them a pleasant color but also made them last much longer.

This process may have also been used at other sites though further evidence is required.
Hides may have been used for a number of things, but clothing was certainly an important process.
Neanderthals lived in colder environments than contemporary hunter gathers that wear parkas and other heavy clothing.
Thermal modeling has shown that neanderthals must have covered much of their body in colder regions to survive.
Neanderthals were stockeir than modern humans and able to deal with temperatures 4 degrees celsius colder.
Taking this into account, Wales et al 2012 compared the climate that the neanderthals lived in to 245 modern human hunter gatherer groups.
NathanWales, et al. “Modeling Neanderthal Clothing Using Ethnographic Analogues.” Journal of Human Evolution, Academic Press, 17 Oct. 2012, https://www.sciencedirect.com/science/article/abs/pii/S0047248412001571.
The resulting data predicted that on average, neanderthals would have had to cover up 80% of their bodies during winter.
The amount of clothing needed heavily fluctuates from regions to region and depending on whether or not the world was in a glacial or interglacial period.
Neanderthals living central europe during glacial periods would have had to cover over 90% of their bodies during the winter.
Though even in the coldest periods, neanderthals living on the coast of the mediterranean would have had to wear much less clothing, particular in the iberian peninsula.
Clothing would would have certainly fluctuate from season to season and in larger scales with climatic changes.
As for the actual clothing, it is hard to say exactly what they would have worn.
Wales et al did suggest that hands and feet must have been covered in colder periods to survive.
Wales, N. (2012). "Modeling Neanderthal clothing using ethnographic analogues". Journal of Human Evolution. 63 (6): 781–795. doi:10.1016/j.jhevol.2012.08.006. PMID 23084621.
Clothing did not necessarily have to be fitted, but it certainly would have helped.
That brings us to big question about neanderthal clothing.
Was it sewn together or simply draped around the body?
To date, no eyed neanderthal needle has ever been found.
Though eyed needles are not essential for fitted clothing.
All that is necessary is an awl and cordage.
Awls could have been made of stone, bone or even wood.
Stone and bone objects found at neanderthal sites may have been used to make holes in hide.
After a hole was made, cordage could simply be pushed through.
Various materials could have been used for cordage.
Thin strips of hide, sinew, and plant fibers would ahve all worked well.
In France, there is evidence that plant fibers were being twisted into cord around 50,000 years ago.

Hardy, B.L., Moncel, MH., Kerfant, C. et al. Direct evidence of Neanderthal fibre technology and its cognitive and behavioral implications. Sci Rep 10, 4889 (2020). https://doi.org/10.1038/s41598-020-61839-w

The small fragment was made of the inner bark of an evergreen tree.
They were twisted to form a 3 ply cord.
This cord in particular does not appear to have been very strong though it still would have been useful.
It is unclear how widespread this technology was considering that the materials are biodegradable and preserve very poorly.
Hides could have been stitched together to create fitted clothing.
A set of neanderthal clothing including an upper body garment and leg coverings would require around five large hides.
Many animals would have been available to neanderthals for clothing.
Their most common game of deer would have been an easy choice, but deer hair falls out of the hide quite easily.
Deer hides may have been made into buckskin for a variety of leather crafts and garments.
Specific hides were likely sought after for different garments because of their different properites.
Thicker hides such as bear, bison, and woolly rhino may have provided exceptionally warm skins, likely utilized for heavy coats.
Some of these hides such as wooly rhino or mammoth may have been impractible for clothing.
They may have been used as heavy blankets or walls for shelters.
Additional garments such as shoes, gloves or hats could have been made with trimmings or small sections of hides.
Shoes and hats would have only been worn in very cold periods.
Like contemporary hunter gatherers, neanderthals would have had callused feet which wouldn't have required shoes in most environments.
An analysis of their feet and posture indicates that neanderthals did not wear hard soled shoes.
ErikTrinkausa, HongShangab, et al. "Anatomical Evidence for the Antiquity of Human Footwear: Tianyuan and Sunghir." Journal of Archaeological Science, Academic Press, 11 Jan. 2008, https://www.sciencedirect.com/science/article/abs/pii/S0305440307002476.
Most surviving neanderthal footprints are from barefooted individuals.
Though, at theopetra cave in greece, one footprint is barefooted while the other two seem to have been covered by some sort of material.
Degioanni A, Bonenfant C, Cabut S, Condemi S. Living on the edge: Was demographic weakness the cause of Neanderthal demise? PLoS One. 2019 May 29;14(5):e0216742. doi: 10.1371/journal.pone.0216742. PMID: 31141515; PMCID: PMC6541251.
The print may support the hypothesis that simple foot coverings were worn.
Soft coverings made of hide or perhaps woven grasses must have been used during the winter and especially in glacial periods.
Otzi the iceman was discovered with what has been interpreted as a grass cloak.
The oldest pair of shoes ever discovered were made of leather and grass while the oldest sandals were made of sagebrush bark.
It seems likely that some of their clothing and toolkit were utilized grass.

Since we know that some neanderthals were able to create cordage, weaving is certainly not out of the question.
Besides just clothing, hide and cordage technology would had many other uses.
Warm fur pouches for carrying infants would have been essentially for cold winters.
Babies may have been strapped to the back of neanderthal mothers as seen in inuit and native american cradleboards.
Fur bags and pouches would have been very useful for carrying around the neanderthals tool kit.
Neanderthals were highly nomadic and carried everything with them.
Bone tools, hides, weapons, flinkapping tools, stone, dried meat, bedding, fire making materials, and more.
Bags made of animal skins or stomachs would have been essential.
Limb extremities left on hides could have functioned as shoulder straps or handles.
Other uses of hides includes bedding and shelter.
Hide is a very versatile material that neanderthals certainly exploited.
It was one of the many materials that neandertals utilized made of animal products.
Products that can only be procured with the death an animal.

Lifestyle = “Part IV - Sustenance”

HUNTING

Hunting was certainly one of their main forms to obtain sustenance and raw materials.
Across their vast range both spatially and temporally, many different kinds of animals would have been hunted in many different ways.
Their technology, wear on their artifacts and damage to the bones of their prey can allow us to understand how hunting may have been done.
Like mentioned earlier, much of their technology was focused on creating wooden implements.

Direct evidence

As seen at the schoningen site, throwing javelins and thrusting spears were being created even early on in neanderthal existence.
Even relatively simple wooden spears were formidable in the hands of neanderthals.
The large horses found at the schoningen site weighed over 500 kg or 1100 pounds.
The site is located on an ancient lakeshore where neanderthal hunters likely ambushed their prey.
It was originally interpreted as a mass killing event but later discoveries found that the horses were hunted in separate seasons.
The hunters likely herded horses towards the lake where they were less mobile and easier to ambush.
The ability to kill large animals with such simple tools is a testament to their hunting ability, which likely included preplanning and extensive knowledge of animal behavior.
A very similar site which also consists of ancient lake shore in germany preserves the remains of over 100 fallow deer.

S. Gaudzinski-Windheuser et al., Evidence for close-range hunting by last interglacial Neanderthals, Nature Ecology & Evolution 2, 1087-1092, 25 June 2018,

Gaudzinski-Windheuser, S., Noack, E.S., Pop, E. et al. Evidence for close-range hunting by last interglacial Neanderthals. Nat Ecol Evol 2, 1087–1092 (2018). https://doi.org/10.1038/s41559-018-0596-1

Out of the mostly prime aged males, two different individuals have puncture wounds present on a hip and a neck bone.

These woulds are consistent with a low velocity thrust, likely underhanded.

Getting within thrusting range of an agile deer is no easy task

These hunters would have had to conceal themselves hours in advance while coordinating with multiple individuals.

The powerful neanderthal anatomy would have allowed for quick and powerful bursts of speed that would have aided them in ambushing unsuspecting prey.

Though only two of the deer at the site have direct evidence of puncture wounds, it is likely that most if not all of them were hunted telling by the context of the site.

Many wounds such as a punctured lung would not necessarily be evident in their skeleton.

Other wounds are highly evident.

The vertebrae of an african wild donkey form syria has a fragment of a levallois point embedded in it.

Boëda, Eric. (1999). A Levallois point embedded in the vertebra of a wild ass (Equus africanus) : hafting, projectiles and Mousterian hunting weapons. Antiquity 73. 73. 10.1017/S0003598X00088335.

The fragment impacted the animal with a high degree of kinetic energy.

If the animal was struck while standing, the trajectory of the weapon must have been parabolic.

The high kinetic energy and parabolic trajectory suggest that this weapon was thrown rather than thrusted.

The wound would have caused immediate paralysis of the limbs and likely a quick death.

This example overturns the idea that levallois points hafted on spears were only used as thrusting spears.

Still, these spears would have been quite heavy and would have only been thrown short distances.

Whether thrown or thrusted, the weapons would have create massive flesh wounds.

The fragment found in this particular vertebrae already had a broken tip before impacting the donkey's neck.

This may indicated that it was used multiple times in the same hunt or that it was damaged from a prior hunt.

Whatever the case, even with a broken tip it was able to deliver a fatal wound.

Though some of this evidence may make it seem like neanderthals primarily threw their spears, in reality, thrusting was more common.

We know this based on artifacts but also by that fact that 79-94% of our neanderthal specimens show evidence of healed major trauma associated.

Nakahashi, W. (2017). "The effect of trauma on Neanderthal culture: A mathematical analysis". Homo. 68 (2): 83–100. doi:10.1016/j.jchb.2017.02.001

Up to 50% of neanderthals were severely injured throughout their lifetimes.

Confrontations with large dangerous game is generally the explanation for such a high injury rate.

Even game not typically seen as dangerous such as deer can cause life threatening injuries at close range.
Very large animals such as moose, woolly rhino and mammoth would have been very deadly.
Due to the risk of hunting these animals and their pure bulk, some question whether hunting them would have been possible.

Proboscideans

Proboscidean hunting in particular seems to be a point of contention for many.
In pliestocene eurasia, there lived both the woolly mammoth and the straight tusked elephant.
Woolly mammoth were around the same size of modern elephants while the straight tusked elephant was much larger.
Recent contemporary hunter gatherer populations in africa have been known to take down adult elephants with only spears.

Agam A, Barkai R. Elephant and Mammoth Hunting during the Paleolithic: A Review of the Relevant Archaeological, Ethnographic and Ethno-Historical Records. Quaternary. 2018; 1(1):3. https://doi.org/10.3390/quat1010003

In some cases, a singular hunter was able to sneak beneath an elephant before delivering a fatal blow from beneath the animal.
Considering mammoths and elephants are known throughout many neanderthal sites, it is certainly possible that some of these inidivuduals were actively hunted.
When taking account of the wide razor sharp edges of levallois point in tandem with a heavy shaft, the idea of a group of neanderthals taking down a mammoth or elephant seems much more plausible.
Perhaps mature mammoths were only hunted in times of scarcity of perhaps before winter, though it can be said that they were not relied upon or were the usual prey of most neanderthals.
Though young mammoths and elephants may have been preyed up much more often.
A fascinating site in Belgium called spy cave has evidence that neanderthals preyed on young mammoths.

Mietje Germon préa Mircea Udrescua Evelyne Fiersb, overlay, et al. “Possible Evidence of Mammoth Hunting at the Neanderthal Site of Spy (Belgium).” Quaternary International, Pergamon, 15 Oct. 2012, https://www.sciencedirect.com/science/article/abs/pii/S1040618212032466.

The site has many interesting remains but the mammoth remains are peculiar.
There is an abnormally high frequency of young mammoth skulls.
In a very interesting paper, it is hypothesized young mammoths were targeted by these neanderthals for their brain matter.
The brains of young mammoths provided essential long chain fatty acids.
It was found neanderthals were less efficient than some modern humans at synthesizing these fatty acids which are very important for neural growth.
Mammalian brain tissue is one of the richest sources of these long chain fatty acids.
Therefore, eating these mammoth brains actually helped them in their own brain development.
Another interesting thing about baby mammoths or elephants, is that they are not naturally afraid of humans.
Young elephant calves have no instinctive fear of humans and are known to attach themselves to them.

It is possible that baby probocsideans were even kept as some kind of pets in rare instances.
Though we would assume that these people would have just hunted a helpless animal mercilessly, even relatively unintelligent animals are known to form strange bonds with animals that may typically be seen as prey.
It is not out of the question that a group of neanderthals well off with food may befriend a young mammoth to possibly eat later.
Besides probosicdeans, other very large animals were hunted.
Multiple rhino species called europe home.
The woolly rhino weighed around 3000 kilograms or 6600 pounds.
Mercks rhinoceros and the narrow nosed rhinoceros both weighed around 1800 kilograms or 4000 pounds.
At around half of the weight, camelus knoblochi was much taller at 3 meters of 10 feet.
The Aurochs, the undomesticated ancestor of cattle weighed as much as 1500 kgs or 3300 pounds.
Megaloceros was a giant species of deer with the largest antlers ever discovered.
They weighed as much as 700 kilograms or 1500 pounds and would have certainly been a sight to see.
During interglacials hippopotamus moved all the way up to central europe.
Extinct species such as red deer, reindeer, ibex, moose and bison were all hunted.
Carnivores also seem to have been hunted.
There is evidence of direct brown and cave bear hunting in and out of hibernation.
Romandini, M.; Terlato, G.; Nannini, N. (2018). "Bears and humans, a Neanderthal tale. Reconstructing uncommon behaviors from zooarchaeological evidence in southern Europe". Journal of Archaeological Science. 90: 71–91. doi:10.1016/j.jas.2017.12.004
Bear are not an easy animal to hunt but they become much more vulnerable when hibernating.
Other large predators such as cave lions, cave hyenas and wolves would have all been prey occasionally.
All of these animals would technically be considered megafauna.
Megafauna are just animal that weigh over 45 kgs or 100 lbs.
But neanderthals hunted a much larger variety of prey.
Smaller animals such as birds, small mammals and reptiles were hunted more than we once thought.
Because of these animals are smaller, their remains do not tend to preserve as well in the fossil record.
Due to this, preservation bias made us think that neanderthals only hunted large game.
We even thought that homo sapiens may have outcompeted them because they had an overspecialized diet.
However, recent evidence has suggest otherwise.
A team led by paleoanthropologist eugene morin examined the fossil rabbits remains from eight mediterranean sites.
New Evidence of Broader Diets for Archaic Homo Populations in the ...
https://www.science.org/doi/10.1126/sciadv.aav9106.
What they found was that most of the rabbit remains were adults.

This suggests that they were not targeting the rabbits homes but instead hunting them individually.
Rabbits do not provide very many calories and were likely only a snack but the fact that neanderthals were able to catch these animals is interesting.
Rabbits are extremely difficult to catch by hand and are also hard to hunt with traditional weapons.
Throwing sticks may have been used but traps are generally more effective.
Neanderthals were certainly cognitively advanced enough to create a variety of traps.
Small game very well may have been caught with snares or deadfalls.
The high rate of bird remains at their sites raise a number of questions regarding how they procured them.
At sites in gibraltar, the remains of 143 different bird species have been found including ground dwelling species and even eagles and vultures.
Brown, K.; Fa, D. A.; Finlayson, G.; Finlayson, C. (2011). "Small game and marine resource exploitation by Neanderthals: the evidence from Gibraltar"
Some bird species such as choughs nest in caves at night and can be easily caught by hand.
Gound dwelling birds such as grouse or quail could have been taken with a throwing sticks, plain old rocks or even traps.
Birds of prey would have frequented carcasses which would have made them vulnerable to being taken by a projectile.
Though these birds are very intelligent and have extremely keen senses.
It would have been very difficult to sneak up on them and even more difficult to kill them.
Though the unusually high rate of eagle remains at neanderthal sites and strange modifications to their bones suggest that eagles may have had a symbolic meaning in neanderthal culture.
Radovčić, D.; Sršen, A. O.; Radovčić, J.; Frayer, D. W.; Petraglia, M. D. (2015). "Evidence for Neandertal jewelry: modified white-tailed eagle claws at Krapina"
Another food source were reptiles.
The remains of at least 20 butchered tortoises have been found at bolomar cave in spain.
Brown, K.; Fa, D. A.; Finlayson, G.; Finlayson, C. (2011). "Small game and marine resource exploitation by Neanderthals: the evidence from Gibraltar"
Tortoises from the region became significantly smaller over time, likely reflecting over hunting which may have led to their extinction in iberia.
Freshwater turtles were also caught at an ancient lake in israel.
Aquatic resources in general were quite an important part of the diet of some neanderthal populations.

Fishing

Neanderthals seem to have exploited aquatic resources to a similar degree as our own early ancestors.
Neanderthals particularly in southern europe ate all kinds of marine life.
Crabs, clams, seals, many specie of fish, dolphins, and sea birds were all enjoyed.
At figeuria brava portugal, almost 800 shells of multiple species were found.
Zilhão, J.; Angelucci, D. E.; Igreja, M. A.; et al. (2020). "Last Interglacial Iberian Neandertals as fisher-hunter-gatherers"
This cave also preserves the remains of marine mammals with butcher marks.

The remains of a monk seal, a ringed seal and two different bottlenose dolphins have been found.
Stringer, C. B.; Finlayson, C.; Barton, R. N. E. (2008). "Neanderthal exploitation of marine mammals in Gibraltar"
How these animals were acquired is a mystery.
It is likely they were simply scavenged but other possibilities exist.
Seal could be killed in shallow waters or while lounging on the shore, but dolphin would have been harder to encounter.
A beached dolphin would have been easy prey and of course washed up carcass could have been scavenged.
It is also possible they were hunted near the shore with spears.
No hooks are known from neanderthals remains and neither are weights that could have been used for nets.
Fishing methods would have likely consisted of hand and spear fishing, however, bony growths on neanderthal skulls may suggest something else.
Surfers ear is a condition where the ear canal begins to grow bony protrusions in response to exposure to moist and cold conditions.
Trinkaus E, Samsel M, Villotte S (2019) External auditory exostoses among western Eurasian late Middle and Late Pleistocene humans. PLoS ONE 14(8): e0220464.
https://doi.org/10.1371/journal.pone.0220464
The presence of this condition on many neanderthal skulls may support the idea that they were diving.
The abundance of shells at their sites suggests they were primarily foraging though hunting is not out of the question.
Neanderthals also harvested fish in freshwater.
Trout, chub and eel have been found in Grotte di Castelcivita, Italy which is on a river.
Villa, P.; Soriano, S.; Pollarolo, L. (2020). "Neandertals on the beach: use of marine resources at Grotta dei Moscerini (Latium, Italy)"
Multiple sites in france have evidence of chub and european perch.
Hardy, B. L.; Moncel, M.-H.; Daujeard, C.; et al. (2013). "Impossible Neanderthals? Making string, throwing projectiles and catching small game during Marine Isotope Stage 4 (Abri du Maras, France)". Quaternary Science Reviews. 82: 23–40. Bibcode:2013QSRv...82...23H
Kudaro cave russian even has evidence of black sea salmon.
Bocherens, H.; Baryshnikov, G.; Van Neer, W. (2014). "Were bears or lions involved in salmon accumulation in the Middle Palaeolithic of the Caucasus? An isotopic investigation in Kudaro 3 cave". Quaternary International. 339–340: 112–118. Bibcode:2014QuInt.339..112B
It is generally thought that a lot of the evidence of neanderthals eating fish is lost due to the sea level rising and covering up coastal sites.
Even with the evidence we have, it is clear that some neanderthals exploited aquatic environments for food and resources.
One such lesser talked about food source would be insects.
Eating insects may be frowned upon in some modern societies though in others it is extremely common.
Hunter gatherer societies are known to recognize the importance of insects.

A variety of bugs can simply be caught by hand or with simple tools.
Smashing open rotting logs or scavenging grubs from carcasses could have provided valuable nutrients, especially in times of scarcity.
Parasites on their prey and on themselves may have served as a quick snack.
Some arctic people have consider the parasites on the inside of caribou pelts to be a delicacy.
There is currently no evidence of insect exploitation though insects generally do not fossilize well so this is not surprising.
Since beeswax was mixed with some of their adhesives, we can assume that they were also harvesting honey.
Degano I;Soriano S;Villa P;Pollarolo L;Lucejko JJ;Jacobs Z;Douka K;Vitagliano S;Tozzi C; “Hafting of Middle Paleolithic Tools in Latium (Central Italy): New Data from Fossellone and Sant'agostino Caves.” PloS One, U.S. National Library of Medicine, https://pubmed.ncbi.nlm.nih.gov/31220106/.
Contemporary hunter gatherers are known to be obsessed with honey even if they get stung a bit.
Bee hives would have provided them with tasty honey, nutritious larvae, and useful beeswax.

Cannibalism

The last food source we will be talking about is other neanderthals.
Neanderthals, just like homo sapiens, practiced cannibalism from time to time.
The oldest evidence of cannibalism from neanderthals comes from 120,000 years ago.
At Moula gercy cave in southeastern France, the remains of at least six cannibalized have been found.
Defleur, A.; White, T.; Valensi, P.; Slimak, L. (1999). "Neanderthal cannibalism at Moula-Guercy, Ardèche, France"
Two adults, two teenagers, and two children.
Their flesh was cut and scraped from the bone, and their bones were smashed and thrown among the remains of their other prey.
Many neanderthals at moula gercy seem to have suffered from malnutrition.
This is evident by the thinner bands of enamel on several teeth from moula guercy cave.
Only the remains of six individuals were cannibalized at the site, and subsequent layers of habitation don't include cannibalized remains.
Two authors of a 2019 paper about the site said “The cannibalism highlighted at Baume Moula-Guercy is not a mark of bestiality or sub-humanity, If anything, it’s a gut-wrenchingly human story of hard choices in desperate times.”
AlbanR.DefleuraPersonEnvelopeEmmanuelDesclauxbEnvelope, et al. “Impact of the Last Interglacial Climate Change on Ecosystems and Neanderthals Behavior at Baume Moula-Guercy, Ardèche, France.” Journal of Archaeological Science, Academic Press, 19 Feb. 2019, https://www.sciencedirect.com/science/article/abs/pii/S0305440318304680?via%3Dihub.
At the end of the day, our bodies are edible and many will choose survival or starvation.
Another cave in northern Spain paints a grimmer picture.
At el sidron cave, an exceptionally well-preserved assemblage of bones preserves the remains of 13 individuals.
Rougier, H., Crevecoeur, I., Beauval, C. et al. Neandertal cannibalism and Neandertal bones used as tools in Northern Europe. Sci Rep 6, 29005 (2016). https://doi.org/10.1038/srep29005

They include three adult males, four adult females, three adolescents, two juveniles, and one infant.
Analysis of their mitochondrial DNA supports the hypothesis that the 13 individuals represent one cohesive family group.
Genetic Evidence for Patrilocal Mating Behavior among Neandertal ... - PNAS. https://www.pnas.org/doi/10.1073/pnas.1011553108.
The bones are full of cut marks and have been smashed to bits.
This family was almost certainly murdered and cannibalized by another group.
The group only had three adult males which may have been easily overpowered.
Even these adult men and women seem to have been quite young as seen by the wear on their teeth.
This group may have been purposely targeted as a food source by a larger, stronger group.
The remains of this family also indicate that they had been suffering from nutritional stress for their entire lives.
Genetic Evidence for Patrilocal Mating Behavior among Neandertal ... - PNAS. https://www.pnas.org/doi/10.1073/pnas.1011553108.
Their diet seems to have been made mostly of plant seeds, tubers and a smaller quantity of meat.
They may have been targeted by another tribe that was having trouble filling their stomachs.
Another site in Belgium has grisly evidence of neanderthals being butchered.
Rougier, H.; Crevecoeur, I.; Beauval, C. (2016). "Neandertal cannibalism and Neandertal bones used as tools in Northern Europe"
Yravedra, J.; Yustos, M. (2015). "Cannibalism in the Neanderthal world: an exhaustive revision"
Through the cut marks present on the bones, it was determined that the upper limbs were disarticulated, the lower limbs were defleshed and smashed and the chest was disemboweled among other smaller cuts.
Their butchering was conducted in a very similar way to their normal prey of reindeer.
Some neanderthal bones were also used as retouchers to freshen up the edge of their stone tools.
The aforementioned examples may be painting a picture that is not necessarily accurate.
Neanderthals were expert butchers.
If they were consuming other neanderthals on a daily basis, we would see much fewer cut marks on these remains.
Cannibalism would have been reserved mainly for starvation.
When considering all of our neanderthal remains, it is apparent that neanderthals practiced cannibalism to a similar degree as our own species.
To label them all as cannibals is as inaccurate as calling all homo sapiens cannibals.

Diet

Regardless of what they were eating, we know that they needed plenty of calories to survive.
On average neanderthals were shorter than modern humans, though their much stockier bodies required comparably more nutrition.
Their shorter legs meant more steps, and deep snow would have been would have been hardwork to move through.

Cold environments without highly tailored clothing would have used a lot of energy just to stay warm.
Carrying equipment, babies or injured friends would have been even more taxing.
Larger brains, hearts and digestive tracks would have passively burned a lot of energy whether active or not.
Between 3,500-5000 calories would have been daily.
Hockett, B. (2012). "The consequences of Middle Paleolithic diets on pregnant Neanderthal women". Quaternary International. 264: 78–82. Bibcode:2012QuInt.264...78H
Contemporay hunter gatherers living in similarly cold environments are known to eat over 3kg or 6.5 pounds of meat each day, that is around 5,500 calories.
Sharma, S., Hopping, B. N., Roache, C., & Sheehy, T. (2013). Nutrient intakes, major food sources and dietary inadequacies of Inuit adults living in three remote communities in Nunavut, Canada. Journal of Human Nutrition and Dietetics, 26(6), 578-586. doi:10.1111/jhn.12091
Neanderthals living a similar lifestyle may have had to consume as much as 7,000 calories a day.
Such a large amount of calories could only have come from animal products.
An average group of neanderthals between 8-12 individuals would have needed a 3-4 medium sized animals such as deer or ibex a week just to survive.
A larger kill such as a wooly rhino, bison, or aurochs could feed an average group for over two weeks.
However, massive quantities of lean meat can actually lead to a form of malnutrition called protein poisioning.
Many people get confused with the term “protein poisoning” because of the popularity of carnivorous diets.
Protein poisoning does not occur from just eating meat, it occurs when almost all calories consumed come from protein in lean meat.
Spikins, P.; Needham, A.; Wright, B. (2019). "Living to fight another day: The ecological and evolutionary significance of Neanderthal healthcare". Quaternary Science Reviews. 217: 98–118. Bibcode:2019QSRv..217...98S
The lack of other nutrients specifically in lean meat can lead to health problems such as dysentary and even starvation.
In order to have a heavily animal based diet, Neanderthals would have certainly needed to consume eyes, brains, tongues, fat, marrow and other fatty organs.
Fat in general is a very vauable resource in hunter gather societies.
Considering they heavily processed long bones and skulls, it appears they highly valued fat and marrow.
Neanderthals may have even eaten the partially digested contents found in the stomachs of their prey as also seen in contemporary hunter gatherers.
An important question about the diet of neanderthals is what proportion or animal products did they eat in comparison to other foods such as plants or fungi.
“We can also look at the exploitation of fauna among neanderthals through the isotopic chemistry of their bones and teeth, such that we can look at the trophic level signatures, trophic level being that the bottom of the trophic pyramid is the herbivores who were getting their

energy from the sun, and then you have the animals eating the herbivores, or then you have the herbivores eating the plants, and then you have the carnivores eating the herbivores. 17:06
And so certain isotopic ratios will identify that location of an animal within the trophic level, and neanderthals have been plotting, very very high on the trophic level, even higher than hyenas and other carnivores that are exclusively eating meat, now we know that neanderthals were eating other things besides meat, we have preserved starch grains on the teeth of neanderthals that are preserved within the plaque of the calculus, so when you go to the dentist and they scrape off all of the white stuff it is actually evidence of what you have been eating.
Neanderthals didn't have dentists so now we are able to go and scrape their teeth, dissolve the calcium carbonate formation of the plaque and recover the microscopic evidence of what they have been eating. And sometimes that is plant phyitolyths, so glass fossils from inside of plants, sometimes its starch grains. 17:39
"So we know that neanderthals are eating plants, we also can find burnt plant remains at certain archaeological sites, particularly in the near east where the preservation is better.18:44
"So we know that they are eating other things besides meat, however their trophic signature is very very high, and this could indicate that either they are eating other carnivores, or that they are eating eachother, or that they are infact digesting themselves, if you go through periods of starvation, your body will actually start metabolisng yourself, that will actually have a signature like you are a high trophic level carnivore. 19:01

Foraging

Plants would have certainly been an important part of the diet of neanderthals though we have to consider the limitations of plants as a whole.
Many wild plants are not very calorically dense.
They offer a wide array of nutrients but neanderthals would have typically been concerned with warding off starvation and not feeling marginally better.
Edible plants also do not grow at a high frequency during the winter meaning that meat intake would have increased during these months.
Nuts, moss, tree barks and mushrooms would have been some of the few plants and funghi available during the winter.
Dental tartar from Grotte de Spy in Belgium, indicated that the inhabitants had a diet including mouflon sheep and woolly rhinoceros, and mushrooms.
Weyrich, L. S.; Duchene, S.; Soubrier, J.; et al. (2017). "Neanderthal behaviour, diet, and disease inferred from ancient DNA in dental calculus". Nature. 544 (7650): 357–361
During warmer interglacial periods, plants seem to have played a larger role in neanderthal diets.
Middle eastern sites preserve the remains of charred nuts including acorns, walnuts, pistachios, hazel and pine nuts.
Madella, M.; Jones, M. K.; Goldberg, P.; Goren, Y.; Hovers, E. (2002). "The Exploitation of plant resources by Neanderthals in Amud Cave (Israel): the evidence from phytolith studies"
Fruits include dates, figs, olives and grapes.
Tubers include nut grass, bulbous barley and wild radishes.
The large variety of plants found at these sites suggest that they had a knowledge of many plants and new how to get them.

Neanderthal toothwear supports the idea that animal products were the primary source of nutrients.
However, their wear is not like arctic people who exclusively eat meat, it is more similar to populations with a relatively varied diet.
The dental calculus of an individual from el sidron cave had no evidence of large mammal DNA but it did have evidence of pine, mushrooms and moss.
Weyrich, L. S.; Duchene, S.; Soubrier, J.; et al. (2017). "Neanderthal behaviour, diet, and disease inferred from ancient DNA in dental calculus". Nature. 544 (7650): 357–361
This discovery created claims of vegetarian neanderthals all of the internet thought the truth its more complicated.
The DNA found in the calculus matched mushrooms from the area, pine bark from east asia and moss with little to no nutiritonal value.
The moss and pine bark may have gotten into the test through contamination.
The actual dental wear on the remains of this individual and others at el sidron suggests a varied diet including plants and animal products.
Estalrrich A, El Zaatari S, Rosas A. Dietary reconstruction of the El Sidrón Neandertal familial group (Spain) in the context of other Neandertal and modern hunter-gatherer groups. A molar microwear texture analysis. J Hum Evol. 2017 Mar;104:13-22. doi: 10.1016/j.jhevol.2016.12.003. Epub 2017 Feb 4. PMID: 28317553.
The idea of a purely vegetarian neanderthal seems to be a product of our modern imagination rather than a reflection of reality.

Preparation

When considering neanderthal diets, we must also consider how they food would have been prepared.
As already mentioned, cooking food breaks it down and thus increases it nutritional value along with other benefits.
But how was meat actually cooked?
Roasting meat on skewers would have been a good way to quickly cook up a piece of meat.
A stick from the schonigen site even appears to have been used for that exact purpose.
The problem with roast a piece of meat over a fire is that precious calories are dripped into the fire and the meat may still remain quite tough.
Other methods such as making stews or baking throwing a large piece of meat directly on the coals and then burying it would have provided more calories.
It is easy to bury meat in a fire and let it cook but creating some kind of stew or soup is much harder.
It requires a waterproof container that can also withstand a lot of heat.
Rocks heated in the center of a fire can be placed into any container of water to boil it.
A bark bowl, or animal stomach or skull could have been used for this purpose.
There is even a rock structure from abric romani that may have been used as container to boil liquids.
IPHES, Comunicació. “Recovered a Container Excavated on a Neanderthal Occupation Floor from 60 000 Years Ago.” IPHES News, 26 Aug. 2015, https://iphesnews.wordpress.com/2015/08/26/recovered-a-container-excavated-on-a-neanderthal-occupation-floor-from-60-000-years-ago/.

A hole in the rock capable of being filled with a liquid is located right next to a high quantity of hearths.
It may have been used to boils stews or steam meat.
Plant remains from other sites also appear to have been cooked.
Along with caloric staples, neanderthals may have seasoned their food with wild herbs.
In the calcalus of a neanderthal from el sidron cave, researchers found camolie and yarrow.
Niether of these plants have any nutritional value though they do have strong flavors.
They may have been used to add flavor to their food though they may have also been used as medicine.
Hardy, K., Buckley, S., Collins, M.J. et al. Neanderthal medics? Evidence for food, cooking, and medicinal plants entrapped in dental calculus. Naturwissenschaften 99, 617–626 (2012). https://doi.org/10.1007/s00114-012-0942-0
Besides immediate use, we must consider how neanderthals would have stored perishable goods such as meat and even some plants.
Killing or scavenging a woolly mammoth would have left a neanderthal band with millions of calories.
Agam, A.; Barkai, R. (2018). "Elephant and mammoth hunting during the Paleolithic: a review of the relevant archaeological, ethnographic and ethnohistorical records"
Enough to feed a band of neanderthals for months.
Even an abundance of relatively smaller animals may have warranted preservation.
At Grotte du Lazaret in France, a total of 23 red deer, 6 ibexes, 3 aurochs, and 1 roe deer appear to have been hunted in a single autumn hunting season.
Valensi, P.; Michel, V.; et al. (2013). "New data on human behavior from a 160,000 year old Acheulean occupation level at Lazaret cave, south-east France: An archaeozoological approach". Quaternary International. 316: 123–139. Bibcode:2013QuInt.316..123V
The entire carcasses seem to have been transported to the cave and then butchered.
Because this is such a large amount of food to be consumed, it is possible these Neanderthals were curing and preserving it before winter set in.
Curing meat could have been accomplished in a few ways.
Meat can simply be air dried in the right conditions to preserve it.
Neanderthals could have smoked their meat over a fire which is very effective way to preserve it.
Salt may have been used but it is hard to come across in significant quantities in many places.
If it was cold enough outside, meat could of course just have been frozen.
Meat could have stayed frozen for many months during glacial periods, possibly even in the summer depending on how cold there period was.
Meat may have also been fermented, many recent indigenous peoples fermented meat and other foods.
At cueva de los aviones, spain, the remains of shellfish and seaweed may indicate that water soaked seaweed was being used to keep shellfish alive or to keep them fresh.
Zilhão, J.; Angelucci, D. E.; Badal-García, E. (2010). "Symbolic use of marine shells and mineral pigments by Iberian Neandertals". Proceedings of the National Academy of Sciences. 107 (3): 1023–1028. Bibcode:2010PNAS..107.1023Z. doi:10.1073/pnas.0914088107

Competition with predators

By procuring all of these food resources, neanderthals made themselves a target for other carnivores and scavengers.
Neanderthals were a dynamic part of the wider ecosystem that we cannot over look.
Cave lions, as big as the biggest tigers, targeted horses, large deer and aurochs and bison.
A pride of such lions would certainly be a threat for any neanderthals butchering prey.
Homotherium, also known as the scimitar cat, hunted young mammoths and other fairly large game.
Wolves and Leopards hunted a variety of prey.
Multiple species of bear would have ran into neanderthals on many occasions.
Bears may have attempted to steal carcasses from neanderthals or even target individuals.
Bears in general do not typically target humans as a food source, though surprise encounters or defensive mothers often trigger attacks.
The massive cave bear stood 3.5 meters or nearly 12 feet in height.
They also weighed up to 1000 kg or 2200 pounds.
As their name suggests, they would have competed with neanderthals over cave space.
Other bears like the brown bear and steppe bear also occupied cave space.
Cave bears are vulnerable while hibernating and may have actually been more of a food source than a competitor in the winter.
Some remains even indicate that bear hunts may have been a cultural practice among some groups.
Another predator that neanderthals would have frequently ran into were cave hyenas.
Neanderthals and cave hyaenas had very similar niches, though they may have exemplified niche differentiation.
Though going after the same prey and living in similar places, they may have actively avoided each other.
Animal remains from neanderthal caves indicate they targeted prime individuals while hyaenas hunted weaker or younger prey.
Nonetheless, hyenas are often known to steal kills from other animals with intimidation tactics.
Remains of neanderthals even indicate that they were either preyed upon or scavenged by these powerful beasts from time to time.
With a world full of hungry beasts, neanderthals certainly had to deal with violent confrontations.
Camaros 2016 looked at 124 neanderthal specimens and analyzed the source of their skeletal trauma.
Camarós, E.; Cueto, M.; Lorenzo, C.; Villaverde, V. (2016). "Large carnivore attacks on hominins during the Pleistocene: a forensic approach with a Neanderthal example"
36% were victims of bear attacks, 21% were attacked by bigcats, and 17% had evidence of wolf attacks.
Interestingly none of this sample were victims of hyenas though other neanderthals certainly were.
These conflicts may have happened for a number of reasons and many likely involved carcasses.
With such stiff competition, neanderthals certainly had ways to defend their kills.
They likely engaged in intimidation tactics such as yelling, arm waving and stone throwing.
It is possible that they even lured carnivores to their kill sites to also target as prey.

This may explain why carnivore remains are found at their sites.
Still, these animals are very dangerous.
Being able to quickly harvest game would have been a necessity.
Deer and other medium sized game could of been dragged off, but larger game would have put them at a higher danger of encounters with lions or hyenas.
“We would think that neanderthals would come to the carcass rather than dissecting it and then bring it to their locations. Modern humans when they kill an animal like that will go to a carcass instead of bring the carcass to the people.
15:33-16:01
Camp sites formed around large animal carcasses may have nerve racking to live in, but it would have been the most calorie efficient way to process a large animal.
The idea of mobile neanderthal campsites conjures up questions about how they actually moved through the landscape.
Climate changes = “Part IV - Dynamica world”
Neanderthals are most commonly pictured as cave dwellers.
This is not just a stereotype, caves were certainly heavily utilized.
Though due to their ability to preserve remains, they are overrepresented.
Depending on their structure caves can provide protection from all sides and stable temperature.
Fires were typically made near the cave entrance to of course prevent breathing hazards.
It is possible that some form of wall or barrier was put at the end of caves to keep the cold and any predators from entering.
Many caves that neanderthals used had an obvious organizational pattern.
Dedicated areas were designated for sleeping, knapping, butchery and of course the hearth.
In some caves, specific hearths were reused for many generations.
Some even have rocks around them that could have been used to contain the fire or maybe for butchery.
Large blocks of stone are known from various neanderthal sites.
Some are surrounded with the remains of skulls suggesting that they were used as an anvil for breaking hard bones open.
Others that are not next to animal remains may have been used to sit on or perhaps to rub hides against.
Travertine from abric romani has preserved the remains of large pieces of wood.
Vallverdú, J., Vaquero, M., Cáceres, I., Allué, E., Rosell, J., Saladié, P., Chacón, G., Ollé, A., Canals, A., Sala, R., Courty, M., & Carbonell, E. (2010). Sleeping Activity Area within the Site Structure of Archaic Human Groups Current Anthropology, 51 (1), 137-145 DOI: 10.1086/649499
The wood may have been back up firewood though it also may have been some kind of furniture or structure.
Some caves have the remains of what seem to be post holes inside.
Perhaps shelters were made inside of caves.
There is also evidence from that hides were places on the ground in some caves as a sort of carpet or mat.
Other caves have evidence of grass beds nearby a hearth which were likely used for sleeping.

Cabanes, D., Mallol, C., Expósito, I., Baena, J., 2010. Phytolith evidence for hearths and beds in the late Mousterian occupations of Esquilleu cave (Cantabria, Spain). Journal of Archaeological Science, 37, 2947-2957.

Images of cold rocky caves with neanderthals crouching on a dusty stone floor may not necessarily be very accurate.

Instead, firelit caves living spaces with tents, rugs and other furishings may be a more accurate depiction of some of these caves.

Though even well established caves like abric romani were only used temporarily.

Neanderthals were highly nomadic and only stayed for a period of weeks, not months or years.

Only so many animals exist in one area and once they were exhausted, neanderthals moved on.

Many animals also follow seasonal migrations and neanderthals would have moved with them.

A site in spain known as Teixoneres cave may preserve a seasonal hunting camp.

Zilio, L., Hammond, H., Karampaglidis, T. et al. Examining Neanderthal and carnivore occupations of Teixoneres Cave (Moià, Barcelona, Spain) using archaeostratigraphic and intra-site spatial analysis. Sci Rep 11, 4339 (2021). https://doi.org/10.1038/s41598-021-83741-9

Horses are found at the site but only during the late spring and early summer periods.

A time when horses mate and are generally more vulnerable to predation.

The site also had fewer hearths and stone tools than we would expect from a neanderthal home.

The site seems to have only been stayed at for a few days at a time, certainly not a place where generations of neanderthals grew up.

Other sites also show individual occupations periods that could have only been a couple of nights at most.

Since there are not caves everywhere, neanderthals would have certainly had to construct shelters.

At the french site of la folie, it appears that large wooden poles were rammed into the ground and supported with large stone blocks.

panelManuelVaqueroab, Author links open overlay, et al. “The Organisation of Living Spaces in Neanderthal Campsites.” Updating Neanderthals, Academic Press, 1 July 2022, https://www.sciencedirect.com/science/article/pii/B9780128214282000019.

The space was around 10 meters or 32 feet in diameter and was likely not roofed.

Perhaps thin sticks were woven between the larger poles to create a wall to protect from wind and predators.

Within the structure, there is evidence of different areas of activity including a butchery station, leather working area, flintknapping space and a bedding area.

Even though they had to invest a lot of time making this structure, they only seem to have stayed for a few weeks at most.

At another site in ukraine, a ring shaped structure made of mammoth bones was found.

Demay, L.; Péan, S.; Patou-Mathis, M. (2012). "Mammoths used as food and building resources by Neanderthals: zooarchaeological study applied to layer 4, Molodova I (Ukraine)" (PDF). Quaternary International. 276–277: 212–226. Bibcode:2012QuInt.276..212D. doi:10.1016/j.quaint.2011.11.019. hdl:2268/190618.

It was 7 by 10 meters of 23 by 33 feet.

It contained hearths, a craftings area and cooking area.
This structure is similar to later modern humans from the russian plains.
With little wood to go around, mammoth bones were some of their only building materials.
It is unlikely that all of these mammoths were directly hunted but some of them likely were.
Neanderthals likely created many small shelters across their broad landscape that would not necessarily preserve any evidence in the fossil record.
A simple shelter made of sticks and shrubs would not leave much evidence.
Portable shelters such as teepees or hide tents may have been made.
However, the large teepees that were made by the plains indians required horses and dogs to move efficiently.
Since neanderthals had neither of these animals at their will, their portable shelters would have been limited in size.
Neanderthals seem to have moved across their landscape in yearly cycles from one shelter to another.
Some sites were repeatedly returned to were used for thousands of years.
Occasionally some of these sites were abandoned for decades of even hundred or thousands of years.
Perhaps their inhabitants died out or perhaps they found greener pastures elsewhere.
It is hard to reconstruct their yearly cycle but considering they were returned to many of the same caves, there was certainly a rhyme and rhythm to their movement.
Neanderthals did not seem very concerned with other groups taking over their caves.
This is likely because neanderthal populations were always quite low.
Analysis of neanderthal DNA suggests that neanderthal populations hardly exceeded 10,000 individuals and never exceeded 15,000 individuals.
Mafessoni and Prüfer, "Better Support"; Krist Vaesen, Gerrit L. Dusseldorp, and Mark J. Brandt, "An Emerging Consensus in Palaeoanthropology: Demography was the Main Factor Responsible for the Disappearance of Neanderthals," Scientific Reports 11, no. 1 (March 1, 2021): id. 4925, doi:10.1038/s41598-021-84410-7; Frederico Sánchez-Quinto and Carles Lalueza-Fox, "Almost 20 Years of Neanderthal Palaeogenetics: Adaptation, Admixture, Diversity, Demography and Extinction," Philosophical Transactions of the Royal Society B: Biological Sciences 370, no. 1660 (January 19, 2015): id. 1660, doi:10.1098/rstb.2013.0374.
Populations were separated into small isolated groups with some being fairly inbred.
Krist Vaesen et al., "Inbreeding, Allee Effects and Stochasticity Might Be Sufficient to Account for Neanderthal Extinction," PLoS One 14, no. 11 (November 27, 2019): id. e0225117, doi:10.1371/journal.pone.0225117; Prüfer et al., "The Complete Genome Sequence."
The Neanderthals had a massive range from britain to siberia to the middle east.
Their overall range was as much as 26 million square kilometers or 10 million square miles.
This is about the size of russia and the united states combined.
Despite their massive range, their population density was only 0.0002 individuals per square kilometer.
Mongolia, the least populated country, has population density of 2.07 individuals per square kilometer.
Their population was only 1/10 of the size of the population of homo sapiens that would eventually move into their territory.

Their low population may have been due to a low fertility rate and a high infant mortality rate.
Kay Prüfer et al., “The Complete Genome Sequence of a Neanderthal from the Altai Mountains,” Nature 505, no. 7481 (January 2, 2014): 43–49, doi:10.1038/nature12886; Fabrizio Mafessoni and Kay Prüfer, “Better Support for a Small Effective Population Size of Neandertals and a Long Shared History of Neandertals and Denisovans,” Proceedings of the National Academy of Sciences, USA 114, no. 48 (November 28, 2017): E10256–E10257, doi:10.1073/pnas.1716918114; Jean-Pierre Bocquet-Appel and Anna Degioanni, “Neanderthal Demographic Estimates,” Current Anthropology 54, no. S8 (December 2013): S202–S213, doi:10.1086/673725.
Such a low population allowed for the proliferation of harmful gene variants which in turn may have kept their population low.
We will talk more about their population when we talk about their decline.
Another aspect of their world that we must discuss is how it changed over large time periods.
The earth has been in an iceage for roughly 2.5 million years.
What most people think of when we talk about ice ages is the last glacial period.
A glacial period is a cold period caused by variations in the earths orbit that effects how much solar radiation the earth recieves.
The last glacial period lasted from 120,000 years ago to 11500 years ago.
J. Severinghaus; E. Brook (1999). "Abrupt Climate Change at the End of the Last Glacial Period Inferred from Trapped Air in Polar Ice". Science. 286 (5441): 930–4. doi:10.1126/science.286.5441.930. PMID 10542141
They are then followed by a warmer interglacial period, we are currently in an interglacial period.
During the roughly 400,000 years of neandethal existence, four different glacial periods occurred, with four interglacials between them.
Lisiecki, Lorraine E.; Raymo, Maureen E. (2005). "A Pliocene-Pleistocene stack of 57 globally distributed benthic δ18O records". Paleoceanography. 20 (1): n/a. Bibcode:2005PalOc..20.1003L. doi:10.1029/2004PA001071
These periods are far too long to be noticeable within a lifetime though neanderthal existence was undoubtable dictated by these climatic changes.
In glacial periods, northern europe and much of the british isles were covered by large glaciers.
Central europe was left as mostly barren tundra while the alps were also covered in glaciers.
Many neanderthal populations were forced to move south.
Due to so much ice locked up in glaciers, southern europe swelled in landmass during these periods.
Some islands could be simply walked to and coastlines everywhere expanded.
Inversely, warmer interglacial periods would have allowed neanderthals to move farther north though territory would have been lost from rising sea levels.
Interglacials in general were much more tolerable to live in and neanderthals had greater success during these times.
Understanding these climatic changes can help us understand larger picture of neanderthal life.
The last aspect of their landscape that we must consider is how did they actually move through it.
Neanderthals were very adaptable and could live at sea level or at relatively high altitudes.
They were not discouraged by high mountain ranges of low valleys.
Just like modern hunter gatherers, they would have had a details mental map of their range.

They would have been able to navigate many miles based on familiar landscapes and perhaps, they stars.
Stars must have been a thing of wonder for these people.
Perhaps a symbolic meaning was attached or maybe they were seen in a more practical light.
Regardless we know that they would have been very familiar with them and navigation is a possibility.
From analysing how they used stone, we can get a hint about how they moved through the landscape.
From their sites, poor quality stone is usually sourced with about 5-10 kilometers of 3-6 miles.
Hayden, B. (2012). "Neandertal social structure?". Oxford Journal of Archaeology. 31 (1): 1–26. doi:10.1111/j.1468-0092.2011.00376.x
This range may represent their typical foraging area once they reached a site.
Poor quality stone was typically left within this range after the neanderthals left.
Only high quality stone would have been carried further.
Quality flint was often carried more thant 60 kilometers or 40 miles from its source before being discarded.
The highest quality flint and the sharpest rock, obsidian, were carried more than 300 kilomters or 190 miles before being discarded.
Pearce, E.; Moutsiou, T. (2015). "Using obsidian transfer distances to explore social network maintenance in late Pleistocene hunter-gatherers". Journal of Anthropology and Archaeology. 36: 12–20. doi:10.1016/j.jaa.2014.07.002. PMC 4157217. PMID 25214705
These tools may represent the existence of long distance trade networks.
Neanderthals may have traded though they were so nomadic that it is hard to rule out actual movement.
Moving such distances would have required crossing significant obstacles.
Streams and small rivers may have simply been walked or swam across though larger rivers and oceans would have been difficult to cross.

Use of boat

Despite this, neanderthal remains are found on islands separated from the mainland by many miles.
The only way to get to these islands would have been to swim or perhaps use some sort of flotation device.
Artifacts on crete date back to 130-107 thousand years ago.
Ferentinos, G.; Gkioni, M.; Geraga, M.; Papatheodorou, G. (2012). "Early seafaring activity in the southern Ionian Islands, Mediterranean Sea". Journal of Archaeological Science. 39 (7): 2167–2176. Bibcode:2011JQS....26..553S. doi:10.1016/j.jas.2012.01.032.
Crete has been an island for some 5 million years and is 40 kilometres from its closest neighbour.
Even during glacial periods when the sea level was much lower, it would have been nearly the same distance.
40 kilometers is quite a long distance to swim.
Neanderthals would not have necessarily have been the best swimmers.
Their high muscle mass and thick bones would not have made them very buoyant and their short limbs were not the best to propel them.

We must also consider that not all neanderthals were full grown adults.
Teenagers, toddlers and infants were all part of a neanderthal group at any given time.
Depending on their age, it would be nearly impossible for young neanderthals to swim this far.
Ambitious journeys such as crossing over to crete were almost certainly highly planned affairs.
Some type of flotation device may have been necessary.
Botant logs may have been held onto while children sat attop them.
More complex constructions may have certainly been used considering their crafting ability.
However an above water boat is unlikely consider how challenging they can be to make.
A dugout canoe would be extremely labor intensive though some type of reed boat could have been made.
Other islands also show evidence of long distance travel over the mediterranean.
Zakynthos and cephalonia also have artifacts older than 100,000 years.
Carter, T.; Contreras, D. A.; Holcomb, J.; Mihailović, D. D. (2019). "Earliest occupation of the Central Aegean (Naxos), Greece: implications for hominin and Homo sapiens' behavior and dispersals". Science Advances. 5 (10): eaax0997. Bibcode:2019SciA....5..997C. doi:10.1126/sciadv.aax0997. PMC 6795523. PMID 31663021.
These islands were still islands during periods of low sea levels.
Sardinia, Melos, Aloneisos, Naxos may have been inhabited.
Even the strait of Gibraltar may have been crossed.
Strasser, T. F.; Runnels, C.; Wegmann, K. W.; Panagopoulou, E. (2011). "Dating Palaeolithic sites in southwestern Crete, Greece". Journal of Quaternary Science. 26 (5): 553–560. Bibcode:2011JQS....26..553S. doi:10.1016/j.jas.2012.01.032.
If they really did cross the seas, their ability to engineer boats and navigate through open waters would speak volumes to their advanced cognitive and technical skills.

Culture = “Part III - Human world”

Social Structure

Considering their world was quite lonely, we must consider what their social lives were like.
First, we must consider the lives of pregant women.
Giving birth would have been about as dangerous as it is in modern humans.
Neanderthals infants were born with a brain size of about 400 cc, similar to modern human babies, though their skeletons were much more robust.
University of Zurich. "Childbirth Was Already Difficult For Neanderthals." ScienceDaily. ScienceDaily, 9 September 2008. <www.sciencedaily.com/releases/2008/09/080908203013.htm>.
Female neanderthals had larger pelvis’s than modern humans but infants also had long and more robust skulls.
Pregnant neanderthal mothers would have likely sought after shelter such as a cave or rock shelter when their time was near.
Since most neanderthals seem to have been born in the spring, they may have planned to give birth at certain locations.
Friends, parents or even grandmothers may have assisted in the birthing process.
If a neanderthal and their mother was lucky enough to survive birth, they would be breastfed for up to 2 and half years.
Smith, T. A.; Austin, C.; Green, D. R.; et al. (2018). "Wintertime stress, nursing, and lead exposure in Neanderthal children"

This is similar to modern hunter gatherers.
An extra 500 calories on average may have been needed for neanderthal mothers to feed their infants.
Hockett, B. (2012). "The consequences of Middle Paleolithic diets on pregnant Neanderthal women". Quaternary International. 264: 78–82. Bibcode:2012QuInt.264...78H
Based on living people, an estimated 1 in 2000 neanderthals would have been born intersex.
Fausto-Sterling, Anne (2000). Sexing the Body: Gender Politics and the Construction of Sexuality. Basic Books. p. 53. ISBN 978-0-465-07714-4.
Blackless, Melanie; Charuvastra, Anthony; Derryck, Amanda; Fausto-Sterling, Anne; Lauzanne, Karl; Lee, Ellen (March 2000). "How sexually dimorphic are we? Review and synthesis". American Journal of Human Biology. 12 (2): 151–166. doi:10.1002/(SICI)1520-6300(200003/04)12:2<151::AID-AJHB1>3.0.CO;2-F
A low number but statistically significant considering their population size.
These individuals are almost ubiquoustously accepted across hunter gatherer societies as another set of hands and their actual role in society varies.
Doug P. VanderLaan, Zhiyuan Ren, Paul L. Vasey. Male Androphilia in the Ancestral Environment. Human Nature, 2013; DOI: 10.1007/s12110-013-9182-z
Considering these individuals certainly existed, it is interesting to imagine how they would have fit in the neanderthal social structure.
Due to a high level of ailments at a young age, it appears that young neanderthals were immediately put to work helping the group.
Both male and female neanderthal children show a similar rate of a highly active life.
Hayden, B. (2012). "Neandertal social structure?". Oxford Journal of Archaeology. 31 (1): 1–26. doi:10.1111/j.1468-0092.2011.00376.x
They would have had many skills to learn, many of which were physically exhausting such as working hides.
Though a childhood with toys and plenty of laughter is not out of the question.
Young chimpanzee females are known to carry around objects to mimic infants.
Young neanderthal girls may have also played with some sort of makeshift dolls.
Both sexes may have been given their own stone tools to play with at a young age.
As men and women matured, their tasks would have diverged.
Toothwear patterns in neanderthals differ from men and women.
Women seem to have commonly used their teeth for carrying things around while men have more wear on the their upper tooth.
Estalrrich, A.; Rosas, A. (2015). "Division of labor by sex and age in Neandertals: an approach through the study of activity-related dental wear". Journal of Human Evolution. 80: 51–63. doi:10.1016/j.jhevol.2014.07.007
We do not know what exactly they were doing though it is clear there was a sexual division of labor.
Though the typical picture of men hunting large game while women foraged harmless berries does not seem to be true.
First of all, this idea is not really even true for modern human populations.
Across hunter gatherer societies, women often hunt small game and even sometimes medium to large game.

In some hunter gatherer societies, women provide up to a third of the meat for the tribe.
"Agta Forager Women in the Philippines." Cultural Survival, https://www.culturalsurvival.org/publications/cultural-survival-quarterly/agta-forager-women-philippines.
Neanderthal women were stocky and strong and would have certainly been capable of hunting.
Though based upon hunter gatherer societies, the larger the prey and the farther away it is away has a direct correlation to a higher proportion of male hunters.
Neanderthal women may not have taken part in some of the larger more dangerous hunts but they were still certainly getting injuries from dangerous animals.
Hayden, B. (2012). "Neandertal social structure?". Oxford Journal of Archaeology. 31 (1): 1–26. doi:10.1111/j.1468-0092.2011.00376.x
Some hunts undoubtly included men and women.

Sexual relations

Another question we must ask regarding neanderthal relationships is what were their sexual relationships like.
It is of course very difficult to answer a question like this from the remains that we have.
Funny enough, a way to test this comes from finger length ratios.
It is thought that finger length ratios are affects by androgens such as testosterone in the womb.
High levels of hormones increase the length of the fourth finger in comparison to the second finger.
Neanderthal finger ratios were lower than most populations of living humans.
Nelson Emma, Rolian Campbell, Cashmore Lisa and Shultz Susanne 2011Digit ratios predict polygyny in early apes, Ardipithecus, Neanderthals and early modern humans but not in AustralopithecusProc. R. Soc. B.2781556–1563
http://doi.org/10.1098/rspb.2010.1740
This means that males were likely very competitive with mates and more promiscuous than people modern humans.
They may have formed more polygamous relationshps than modern contempary hunter gatherers though of course take this with a grain of salt.
Due to their relatively similar rates of sexual dimorphism as modern humans, they probably commonly had pair bonded sexual relationships.
And these relationships were likely even same sex.
Same sex relationships are quite common across that animal kingdom and have been reported in every species of great ape.
There is no doubt that this would have been the same for neanderthals.

Community

Beyond thinkin about individuals, we must think about the larger neanderthal community.
Their groups sizes averaged between 10-30 individuals.
Hayden, B. (2012). "Neandertal social structure?". Oxford Journal of Archaeology. 31 (1): 1–26. doi:10.1111/j.1468-0092.2011.00376.x
Smaller groups seem to have splintered off perhaps for specialized hunting and gathering tasks.
Some sites show only three individuals stayed for short periods.
The previously mentioned family that was cannibalised at el sidron has told us a lot about neanderthal family organization.

Seven of the 13 individuals, of which 6 were men, share the same mtDNA haplotype.
Three of the four adult females have different mtDNA lineages.
Duveau, J.; Berillon, G.; Verna, C.; Laisné, G.; Cliquet, D. (2019). "The composition of a Neandertal social group revealed by the hominin footprints at Le Rozel (Normandy, France)". Proceedings of the National Academy of Sciences. 116 (39): 19409–19414. Bibcode:2019PNAS..11619409D. doi:10.1073/pnas.1901789116. PMC 6765299. PMID 31501334
This suggests that the men were all closely related while the women were from an outside group.
This group likely practiced patrilocality, meaning that the women moved to the males group instead of vice versa.
Though we must be careful when coming to any concrete conclusions.
Other groups may have had much different customs or organiszations.

Larger network

Neanderthal groups were likely part of a larger network of similar groups.
In order to avoid interbreeding, this larger network would of had to be around 500 individuals.
Hayden, B. (2012). "Neandertal social structure?". Oxford Journal of Archaeology. 31 (1): 1–26. doi:10.1111/j.1468-0092.2011.00376.x
However, genetic evidence tells us that a fair amount of neanderthals may have been inbred.
Though, based on artifact transfer, neanderthals seem to have been capable of creating expansive ethnolinguistic tribes.

Language

Many tribes in a region may have been able to directly communicated through a similar language.
Due to their technical and cultural complexity, it is reasonable to assume that some kind of language was spoken.
“They had language, their language in terms of their speech was slightly different from ours, but we dont have any reason to assume that the language was so different that it could not have performed like a grammatical language.
A fairly complicated language was likely necessarily to navigate their complex world.
The hyoid bone is a small bone at the front of the neck which is used to support the tongue is and very important for speech.
A neanderthal hyoid bone found in israel is nearly identical to the hyoid of modern humans.
D’Anastasio, R.; Wroe, S.; Tuniz, C.; Mancini, L.; Cesana, D. T. (2013). "Micro-biomechanics of the Kebara 2 hyoid and its implications for speech in Neanderthals"
Some have claimed that neanderthals would have high pitched squeaky voices.
However, multiple studies on the morphology of the neanderthal vocal apparatus prove that they could produce a similar range sounds as modern humans.
Boë, L.J.; Heim, J.L.; Honda, K.; Maeda, S.; Badin, P.; Abry, C. (2007). "The vocal tract of newborn humans and Neanderthals: Acoustic capabilities and consequences for the debate on the origin of language. A reply to Lieberman". Journal of Phonetics. 35 (4): 564–581. doi:10.1016/j.wocn.2007.06.006
Neanderthals ear bones also suggest that they were capable of hearing a similar range of sounds.

Alexander Stoessel, Romain David, Philipp Gunz, Tobias Schmidt, Fred Spoor, Jean-Jacques Hublin. Morphology and function of Neandertal and modern human ear ossicles. Proceedings of the National Academy of Sciences, 2016; 201605881 DOI: 10.1073/pnas.1605881113

Beyond being able to make and hear complex noises, a complex brain is needed to process them.

Neanderthals had an expanded Broca's area of their brain which in modern humans is associated with the formulation of sentences and speech comprehension.

They had similar rates of right handedness as modern humans which reflects asymmetry of the brain and supports language ability.

DNA can offer us a more detailed look into what they may have been capable of.

Among 48 genes associated with language in modern humans, 11 of these genes differ from modern humans.

Murphy, E.; Benítez-Burraco, A. (2017). "Paleo-oscillomics: inferring aspects of Neanderthal language abilities from gene regulation of neural oscillations

These 11 genes do not necessarily inhibit complex communication but they do differ.

Of the similar genes, neanderthals had a FOXP2 but it was not the same as our modern variant.

Krause, J.; Lalueza-Fox, C.; Orlando, L. (2007). "The derived FOXP2 variant of modern humans was shared with Neandertals". Current Biology. 17 (21): 1, 908–1, 912. doi:10.1016/j.cub.2007.10.008

This gene is associated with speech and language development.

Overall, DNA evidence suggests that modern humans have a stronger ability to express language than our neanderthal cousins.

This makes sense considering that neanderthals lived in secluded groups and overall had a lower population density.

Modern humans in general are much more social than neaderthals.

When thinking about the actual language that they spoke, it is important to understand that there was not one singular neanderthal language.

Over their vast range, their languages may have even differed to a similar degree as contemporary indigenous people.

There are 839 living languages in papua new guinea alone due to how isolated the populations on the island are.

We can also imagine that some neanderthal populations may have spoken very differently than we are familiar with.

Some groups may have spoken with clicks like khoisan languages or possibly with whistles.

Migrating groups of neanderthals may have had a very difficult time communicating with each other.

Neanderthal groups may have found themselves interacting to people that were very culturally different.

Culturally distinct

As mentioned early on in the video, there is evidence that neanderthal cultures from central europe were different from southern ones and another culture east of the altai mountain were also different.

Fabre, V.; Condemi, S.; Degioanni, A. (2009). "Genetic evidence of geographical groups among Neanderthals". PLOS ONE. 4 (4): e5151. Bibcode:2009PLoSO...4.5151F

Not only did they use slightly different technology, there were anatomical differences.

Rosas, A.; Bastir, M.; Martínez-Maza, C. (2006). "Paleobiology and comparative morphology of a late Neandertal sample from El Sidrón, Asturias, Spain"

But we cant only think about culture from a geographical perspective, we must also consider time.

Different tool making traditions and cultures appeared throughout space and time.

La quina is a neanderthal site from france where the la quina mousterian industry was dicovered.

Jelinek, A., 2013: Neandertal Lithic Industries at La Quina, University of Arizona Press, April 18, 2013

These neanderthals had a specific way of live that was different form other groups.

They specialised in reindeer hunting.

Just like some modern cultures, they followed the reindeer, and lived off what they provided.

They brought their entire carcasses back to their sites and processed them with their uniqure thick asymmetric tools.

These tools could be retouched many times, useful for nomadic hunters.

The quina technocomplex appeared around 80,000 years ago in southern france during the MIS 4 glacial period.

Hardy B., 2004: Neanderthal behaviour and stone tool function at the Middle Palaeolithic site of La Quina, France Antiquity Sep 2004, Vol. 78 Issue 301, p. 547, 19p

This period was very cold and caused the many prey animals to become regionally extinct.

Hyenas also seem to have abandoned the area possibly because of the lack of prey.

Quina sites contain mostly reindeer and hardly any red or roe deer.

Debénath A. et Jelinek A. et al., 1998: Nouvelles Fouilles à La Quina (Charente) Gallia Préhistoire, 40, 1998, p. 29-74

This suggests that these neanderthals did not frequent forests and we more accustomed to the tundra.

Reindeer are known to be very migratory and quina sites appear to have hunted reindeer at all times of the years.

This means that they were aware of the reindeers movements and either followed them or intercepted along the way.

Many quina sites also appear to have been intensely used but only for short periods.

The quina culture continued to exist after MIS 4 ended and colder glacial period had began.

Hardy B., 2004: Neanderthal behaviour and stone tool function at the Middle Palaeolithic site of La Quina, France Antiquity Sep 2004, Vol. 78 Issue 301, p. 547, 19p

Though it would only be a few thousand years before the culture disappeared around 50,000 years ago.

The important thing to understand about this culture is that it represents how the neanderthal world was complex and distinct cultures formed and disbanded due to a variety of reasons.

When considering how neanderthal groups from different areas would have interacted with eachother, we cannot overlook conflict or even war.

Warfare

Perhaps the ugliest and simultanously most celebrated human cultural invention would be war.

War is more or less ubiquitous across modern human cultures.

And Many like to speculate that it was the same way in prehistory.

But Warfare did not even appear in our species until we started settling down and our populations rose rapidly.

Kelly, Raymond (October 2005). "The evolution of lethal inter-group violence". PNAS. 102 (43): 24–29. doi:10.1073/pnas.0505955102. PMC 1266108. PMID 16129826

Wendorf, F., 1968, A nubian final paleolithic graveyard near Jebel Sahaba, Sudan. In: F. Wendorf (Ed.). The Prehistory of Nubia. Southern Methodist University, Dallas, pp. 954-995.

Some anthropologists have even considered warfare to be a relatively new cultural invention that is only around 10,000 years old.

Ferguson, R.B., 2011, Born to live: challenging killer myths. In: R.W. Sussman, C.R. Cloninger (Eds.). Origins of Altruism and Cooperation. Springer, New York, pp. 249-270.

Otterbein, K.F., 1999. A history of research on warfare in anthropology. American Anthropologist, 101(4), 794-805.

Gat, A., 2015. Proving communal warfare among hunter-gatherers: The quasi-Rousseauan error. Evolutionary Anthropology, 24, 111-126.

Though we think of warfare as fundemental to the human condition, it was actually quite rare during the paleolithic.

Kelly, Raymond C. (2000). Warless Societies and the Origin of War. University of Michigan Press. ISBN 978-0472067381

When considering warfare during this period we must define what we even mean.

Regarding neanderthals, warfare would simply consist of separate groups attempting to injure or kill members of other groups.

Author links open overlay panelLukeGlowackiabPersonEnvelopeMichael L.WilsoncdRichard W.Wranghame, et al. “The Evolutionary Anthropology of War.” Journal of Economic Behavior & Organization, North-Holland, 23 Sept. 2017, https://www.sciencedirect.com/science/article/abs/pii/S016726811730255X#preview-section-references.

There are only a few examples that we could point to regarding neanderthal conflict.

The neanderthal family at el sidron seem to be the victims of a starving group of neighbors.

This example may classify as warfare but seems to be more of a case of survival exocannibalism.

A skeleton from la roche a pierrot france preserves a healed blade wound on the top of an individuals skull.

Zollikofer, C. P. E.; Ponce de Leon, M. S.; Vandermeersch, B.; Leveque, F. (2002). "Evidence for interpersonal violence in the St. Cesaire Neanderthal"

Based on comparative and actualistic date, Zollikofer 2002 concluded that this injury was inflicted during an act of intragroup, interpersonal violence.

Meaning that the injury was likely inflicted by an individual within the victims group, he was then nursed back to health by this group and possibly even by the individual that injured him.

Considering the wider context, this example is not indicative of warfare with other groups but rather violence within a group.

At the shanidar cave of iraq, a lesion on the rib of a neanderthal is characteristic of a projectile weapon.

Churchill SE;Franciscus RG;McKean-Peraza HA;Daniel JA;Warren BR; “Shanidar 3 Neandertal Rib Puncture Wound and Paleolithic Weaponry.” Journal of Human Evolution, U.S. National Library of Medicine, https://pubmed.ncbi.nlm.nih.gov/19615713/.

The morphology of the injury is consistent with a low mass, low kinetic energy projectile weapon.

The injury only damaged one rib but may have also damaged the individuals lung.

Shanidar 3 was 40-50 years old and may have died due to the wound.

Whether it was a hunting accident, an act of interpersonal violence or violence from another group, we may never know.

It is possible it was even made by modern humans though we just don't know.

Overall conflict and warfare does not appear to be very common in the neanderthal world.

Neanderthal populations were just too low to make conflict all that common.

When considering their population density, there just does not seem to have been an incentive for two groups to fight.

ART and symbolism

Since we have just talk about the ugliest aspects of the human condition, we should talk about the beautiful.

The expression of art and culture.

It was once though that neanderthals were were not capable of symbolism.

This was because early modern human remains are full of art, something that was seemingly absent from neanderthal remains.

As more discoveries were made, it became apparent that neanderthals were capable of symbolism even if it was expressed quite differently than it was in early modern humans.

Red ochre

Some of the first indications that neanderthals may have thought symbolically came from the large amounts of red ochre found at their sites.

Red ochre is a term that describes various kinds of iron oxide pigments which can be a variety of warm colors.

It is still used today across many cultures as a pigment and a medicine and it was widely used throughout prehistory.

Neanderthals used red ochre over 200,000 years ago, around the same time that our own specie began to use it.

Roebroeks W, Sier MJ, Nielsen TK, De Loecker D, Parés JM, Arps CE, Mücher HJ. Use of red ochre by early Neandertals. Proc Natl Acad Sci U S A. 2012 Feb 7;109(6):1889-94. doi: 10.1073/pnas.1112261109. Epub 2012 Jan 23. PMID: 22308348; PMCID: PMC3277516.

Identifying how neanderthals used this material is quite complicated.

If they used it to paint themselves we will never know.

The himba people of namibia use a combination of ochre and fat to create a paste.

Havenga, D.; Akoba, R.; Menzi, L.; Azizi, S.; Sackey, J.; Swanepoel, N.; Gibaud, A.; Maaza, M. (December 2022). "From Himba indigenous knowledge to engineered Fe2O3 UV-blocking green nanocosmetics". Scientific Reports. 12 (1): 2259.

This paste is then spread across their skin and hair to protect themselves from the harsh desert climate.

They also use it as a mosquito repellant, during initiation ceremonies and during funerals.

Rifkin, Riaan F. (2015). "Ethnographic and Experimental Perspectives on the Efficacy of Ochre as a Mosquito Repellent". The South African Archaeological Bulletin. 70 (201): 66. ISSN 0038-1969. JSTOR 24643609.

Other cultures have been known to use it to tan hides or even for food preservation.

Neanderthals may have been using it in many of the same ways.

They may have also used it to paint their clothes or perishable goods, both of which would not preserve well in the fossil record.

Though analysis of pigments from a site in france suggest that they were applied to soft materials such as hides or even humans skin.

d'Errico, F.; Vanhaeren, M.; Henshilwood, C. (2009). "From the origin of language to the diversification of languages: What archaeology and paleoanthropology say?". Becoming eloquent: advances in the emergence of language, human cognition, and modern cultures. John Benjamins Publishing Company. p. 25. ISBN 978-90-272-3269-4.

Hides may have been dyed brilliant shades of orange and red for ritualistic event or even just for daily life.

Red ochre and other pigments are also found on some objects.

A geode from romania was coated with red ochre.

Cârciumaru, M.; Niţu, E.-C.; Cîrstina, O. (2015). "A geode painted with ochre by the Neanderthal man". Comptes Rendus Palevol. 14 (2): 31–41. doi:10.1016/j.crpv.2014.05.003

The strange object was brought back to a cave and painted on every surface.

Other containers from the same site made of stalagmites appear to have been used as mixing containers.

The geode had no practical use but nevertheless it was carried back to the cave and covered in paint.

Other objects that may have been pendants were were painted with pigments.

A fossil sea snail shell that may have been painted red was transported over 100 kilometesr or 62 miles to neanderthal site.

Other shells from spain dating over 115,000 years were perforated and painted with black, red and yellow pigments.

Zilhão, J.; Angelucci, D. E.; Badal-García, E. (2010). "Symbolic use of marine shells and mineral pigments by Iberian Neandertals". Proceedings of the National Academy of Sciences. 107 (3): 1023–1028. Bibcode:2010PNAS..107.1023Z. doi:10.1073/pnas.0914088107

The shells are naturally vibrant on one side and they may have been painted to make them colorful on both sides.

Considering they have holes present in them, they may have been strung together to make a necklace.

Necklaces

Other evidence of necklaces exist.

Perhaps the most interesting evidence comes from Krapina site of croatia.

Here, 130,000 year old eagle talons appear to have been strung into a necklace.

Radovčić, D.; Sršen, A. O.; Radovčić, J.; Frayer, D. W.; Petraglia, M. D. (2015). "Evidence for Neandertal jewelry: modified white-tailed eagle claws at Krapina"

Eight of these talons were excavated together.

The necklace would have taken 3-4 eagles to create.

It is unlikely that all of these eagles were simply found deceased.
Deep notches and smooth cut marks present on the base of the talons would have helped to string it together.
Recent analysis showed evidence of a fiber still present on one of the talons which may be a remanent of the leather or sinew that once held it together.
Radovčić, D., Birarda, G., Sršen, A.O. et al. Surface analysis of an eagle talon from Krapina. Sci Rep 10, 6329 (2020). https://doi.org/10.1038/s41598-020-62938-4
Some of the talons even have evidence that red, yellow and black pigments were applied to them.
This evidence may be the earliest evidence of jewelry in europe.
It may also be evidence that nenaderthals had a symbolic culture long before contact with modern humans.
Another similar eagle talon necklace from spain daing to 39,000 years ago though it may have been made by neanderthals since it overlaps with modern humans.
Rodríguez-Hidalgo, A.; Morales, J. I.; Cebrià, A.; et al. (2019). "The Châtelperronian Neanderthals of Cova Foradada (Calafell, Spain) used imperial eagle phalanges for symbolic purposes". Science Advances. 5 (11): eaax1984. Bibcode:2019SciA....5.1984R
Talons are known in other sites as well as the wings of eagles.
Interestingly, other parts of these birds with significant quantities of meat are not present in these caves.
Wings in general are vastly overepresented in at neanderthals sites compared to other parts of birds.
Neandersthals mainly selected the primary flight feathers from wings.
Late Neandertals and the Intentional Removal of Feathers as ... - PNAS. https://www.pnas.org/doi/10.1073/pnas.1016212108.
These feathers do not appear to have any practical purpose.
They do not provide warmth and they were not useful in stabalizing a projectile due to the size of neanderthal spears.
The most likely answer would be that they were used for their inherent aesthetic value.
Feathers are commonly used throughout indigenous societies for this very same purpose.
Another site in ukraine preserves evidence of modified raven bones.
17 of the bones were decorated with intentional equidistant marks.
d'Errico, F.; Tsvelykh, A. (2017). "A decorated raven bone from the Zaskalnaya VI (Kolosovskaya) Neanderthal site, Crimea"
The reasoning behind this is of course enigmatic.
They could have been made to count, to aid in the grip of the bone or some for some aesthestic purpose.
Either way, this is further evidence of bird bones being interacted in a way that does not have a surivalistic explanation.
Birds, especially larger raptors and corvids, may have indeed had a symbolic meaning across many neanderthal populations.
Clearly these animals are impressive not only in the way they interacted with their environment but also in their inherent aesthetic value.

Bones from a variety of other animals also seem to have been treated in ways that are not consistent with butchery.
A hyena bone from les predelles has nine strange parallel incisions.
Perhaps it is evidence that neanderthals were counting things.
A giant deer phalanx from germany has even stranger markings.
Leder, D.; Hermann, R.; Hüls, M.; et al. (2021). "A 51,000-year-old engraved bone reveals Neanderthals' capacity for symbolic behaviour". Nature Ecology & Evolution. 5 (9): 1273–1282. doi:10.1038/s41559-021-01487-z. PMID 34226702. S2CID 235746596
The bone appears to have been clean of tissue and possibly boiled.
After drying, it was then carved with slanted, intersecting lines and smaller tick marks.
Carving these deeps notches would have taken some time and it was certainly not accidental.
A peice of flint from the crimian mountains has 13 deep lines scratched into the cortex.
The lines would have had no practical function.

Items

Unmodified natural objects known as manuports are known throughout many neanderthal sites.
Neanderthals transported various rocks and even fossils to their sites.
Some of these objects do have practical purposes but we cannot look past their obvious eye catching looks.
Quartz crystals can be knapped, and neanderthals certainly did knap them, though others were left unmodified.
Other minerals that they brought into their sites include cerussite, iron pyrite, calcite and galena.
A variety of fossils of aquatic organisms have been found at their sites including shells, polyps, sea urchins and belemnite beaks.
A fossil nummulite shell from hungary even has a cross etched into it.
Moncel, M.-H.; Chiotti, L.; Gaillard, C.; Onoratini, G.; Pleurdeau, D. (2012). "Non utilitarian objects in the Palaeolithic: emergence of the sense of precious?". Archaeology, Ethnology & Anthropology of Eurasia. 401: 25–27. doi:10.1016/j.aeae.2012.05.004
Some of these aquatic animals would have been familiar to neadnerthals and may have been strange for them to see in the medium of stone.
Though they did not understand how these fossils came to be, they undoubtedly found them to be interesting.

Mask

Another interesting artifact recovered form a neanderthal site is the mask of la roche cotard.
Marquet, J.; Lorblanchet, M.; Oberlin, C.; Thamo-Bozso, E.; Aubry, T. (2016). "New dating of the "mask" of La Roche-Cotard (Langeais, Indre-et-Loire, France)". Paleo Revue d'Archéologie Préhistorique. 27: 253–263.
It was made of a piece of flint with a bone pushed through a hole on the midsection.
It has been interpreted to resemble the upper half of the face, with the bone representing eyes.
Marquet, J.-C.; Lorblanchet, M. (2003). "A Neanderthal face? The proto-figurine from La Roche-Cotard, Langeais (Indre-et-Loire, France)". Antiquity. 77 (298): 661–670. doi:10.1017/s0003598x00061627. ISSN 0003-598X. S2CID 162609308.
It may represent an human or even animal faced.
The actual function of this so called mask is unknown.

It is unlikely that this artifact would have been worn considering it is a made of a heavy piece of flint.
It has been argued that it may have actually been a device for tying knots.
Though it would be very coincidental that it was used for a different purpose yet resembles a face so well.
Its purpose remains unknown.

Music

Another fascinating object is the divje babe flute.
Canadian musicologist Robert Fink said the original flute had either a diatonic or pentatonic musical scale.
Fink, R. (1997). "Neanderthal flute: oldest musical instrument: matches notes of do, re, mi scale: musicological analysis". Crosscurrents (183): 1–9. ISBN 978-0-912424-12-5.
This artifact is very controversial.
Some claim it to have been made by modern humans and others think it may have been made by a carnivore bite.
Turk, M.; Turk, I.; Dimkaroski, L. (2018). "The Mousterian musical instrument from the Divje Babe I Cave (Slovenia): arguments on the material evidence for Neanderthal musical behaviour". L'Anthropologie. 122 (4): 1–28. doi:10.1016/j.anthro.2018.10.001. S2CID 133682741. Archived from the original on October 20, 2021. Retrieved January 9, 2020.
The bone comes from a very young cave bear.
The holes were likely made by humans and seem to be deliberately spaced.
It remains unknown whether it was a musical instrument.

Denisova cave

Another place where stunning artifact have been found is at denisova cave.
Though denisova cave is typically known as the place that housed denisovans, neanderthals also lived there.
In fact, a girl that lived at this cave 90,000 years ago was the daughter of denisovan and neanderthal parents.
Slon, Viviane; Mafessoni, Fabrizio; Vernot, Benjamin; de Filippo, Cesare; Grote, Steffi; Viola, Bence; Hajdinjak, Mateja; Peyrégne, Stéphane; Nagel, Sarah; Brown, Samantha; Douka, Katerina; Higham, Tom; Kozlikin, Maxim B.; Shunkov, Michael V.; Derevianko, Anatoly P.; Kelso, Janet; Meyer, Matthias; Prüfer, Kay; Pääbo, Svante (2018-08-22). "The genome of the offspring of a Neanderthal mother and a Denisovan father". Nature. 561 (7721): 113–116. Bibcode:2018Natur.561..113S. doi:10.1038/s41586-018-0455-x. ISSN 0028-0836. PMC 6130845. PMID 30135579.
This cave is the farthest east that we know neanderthals lived.
It is hard to tell how often neanderthals would have been in the area but we know that at certain times they were.
Artifacts from this cave because exceptionally interesting in younger layers dated to around 48,000 years ago.
In these layers, many pendants, ostrich egg beads, a beautiful stone bracelet and even a bone needle.
The Siberian Times reporter, "World's oldest needle found in Siberian cave that stitches together human history" Archived 2020-05-21 at the Wayback Machine, The Siberian Times, August 23, 2016

These objects suggest that the inhabitants must have had drill technology in order to create these objects.

Hirst K K. "Denisova Cave (Siberia).Altai Mountain Paleolithic Site of Denisova Cave". Archived from the original on October 23, 2013. Retrieved March 24, 2010.

A stone hand drill could have worked but a bow or pump drill would have worked much better.
These artifacts are much more indicative of a modern human assembledge, and it may have been made by them.
Modern humans were in siberia during this time and they likely had a role in the creation of these tools.
Though we cannot rule out the possibility that neanderthals, denisovans or even a hybrid population between all three of these species are responsible.

Cave art

Besides artifacts, neanderthals also decorated their living spaces to some extent.
Art from the Maltravieso cave also located in Spain has been dated to 64,000 years ago.

Pike, A. W.; Hoffmann, D. L.; Pettitt, P. B.; García-Diez, M.; Zilhão, J. (2017). "Dating Palaeolithic cave art: Why U–Th is the way to go" (PDF). Quaternary International. 432: 41–49. Bibcode:2017QuInt.432...41P. doi:10.1016/j.quaint.2015.12.013.

It was long thought that these paintings may have been made by homo sapiens but after a new dating technique was used, it proved that these were the work of neanderthals.
These are the oldest cave paintings found anywhere on earth.
They show abstract symbols and even what appear to be animals.
In order to create these works they had to venture deep into the cave with the aid of a lightsource.
Interpreting what these symbols may represent is very difficult.
A geometric ladder-like shape was made.
Above it over a hundred dots of paint were placed.
This would have taken precision and patience.
Two paintings of what have been interpreted to be animals fill two of the ladders whole.
Both bulbous looking herbivores.
Then to the right of the work, a very strange and complex symbol was made.
It does not look to be a depiction of an animal or anything of the natural world.
A purely symbolic creation.
We can only imagine what the purpose of this painting was.
Could it represent their culture or clan?
A spoken word or a song?
Maybe a depiction of a primordial creation deity?
In truth we will never know.
In this cave there also exists a couple red ochre hand paintings.
A trend that would become very widespread throughout the upper paleolithic.
Some hunter gatherers in Australia still practice this ancient tradition.
Likely the longest living expression of art.
A mark of one's hand.
The stone age way of saying, I was here.
Looking at walls of these handprints can sometimes be ery.

Though they are distant in time, they were no less human.
Their lives wereas detailed and complicated as the one you're living right now.
It seems now that they may have been pioneers or art, rather the artless brutes we one thought they were.
This discovery has opened the door to the possibility that other european paleolithic art could have been created by our evolutionary cousins.
Hoffmann, D. L.; Standish, C. D.; García-Diez, M.; Pettitt, P. B.; Milton, J. A.; Zilhão, J.; Alcolea-González, J. J.; Cantalejo-Duarte, P.; Collado, H.; de Balbín, R.; Lorblanchet, M.; Ramos-Muñoz, J.; Weniger, G.-C.; Pike, A. W. G. (2018). "U-Th dating of carbonate crusts reveals Neandertal origin of Iberian cave art". Science. 359 (6378): 912–915. Bibcode:2018Sci...359..912H. doi:10.1126/science.aap7778. PMID 29472483.
Since sapien and neanderthal occupation overlaps, we can only say that the art was undoubtedly neanderthal if it was older than about 44,000 years ago.
At the site of la roche coatrad, the same site as where the mask was discovered, evidence of red pigment on the walls as well as finger marks were likely made by neanderthals.
Marquet, Jean-Claude, et al. “Symbolic Character Productions in the Mousterian Site of La Roche-c...” PALEO. Revue D'archéologie Préhistorique, Société Des Amis Du Musée National De Préhistoire Et De La Recherche Archéologique (SAMRA), 28 July 2015, https://journals.openedition.org/paleo/3013.
The site has tools characteristic of neanderthals as well as faunal remains dating to over 44,000 years old.
Another cave in southern Spain called the cave of Nerja has various works created over the past 40 some thousand years.
Recent dating methods have shown that some of the paintings are over 42,000 years old.
This has led some to speculate that they may be neanderthal in origin.
The paintings of two seals are among the oldest in the cave, which is an animal not commonly seen in cave art.
Other cave art found around southern europe could have been made by either neanderthals or modern humans.
These species both coexisted in the region for a few thousand years.
At gorhams cave, gibraltar, scratch marks on the floor have been interpreted as art.
E. Callaway (2014). "Neanderthals made some of Europe's oldest art". Nature News. doi:10.1038/nature.2014.15805
Rodríguez-Vidal, J.; d'Errico, F.; Pacheco, F. G. (2014). "A rock engraving made by Neanderthals in Gibraltar". Proceedings of the National Academy of Sciences. 111 (37): 13301–13306. Bibcode:2014PNAS..11113301R
13 intersecting lines were scratched deep into stone over 40,000 years ago.
This would have required an estimated 200-300 scratches were needed to produced the pattern.
Such a structure had no practical use.
Perhaps a mark of property or a careless doodle.

Stalagmite circle

A far stranger site was discovered within the french cave of bruniquel.
300 meters or nearly 1000 feet deep, a bizarre arrangement of stalagmites was found.

Jaubert, J.; Verheyden, S.; Genty, D.; et al. (2016). "Early Neanderthal constructions deep in Bruniquel Cave in southwestern France". Nature. 534 (7605): 111–114. Bibcode:2016Natur.534..111J. doi:10.1038/nature18291. PMID 27251286. S2CID 205249458.

Over 400 of these stalagmites were broken off and placed into two main rings.
The larger ring has a diameters of about 5 meters or 16 feet.
Two piles of stalagmites made of 4 distinct layers sit within the larger circle
Evidence of fire was found on multiple points on the structure.
Around a quarter of the stalagmites were burned.
The floor is of the cave is covered in flowstone, but beneath it are other hearths.
It seems that the site may have been visited repeatedly for at least hundreds of years.
The total weight of the stalagmites moved is over two tonnes.
It would have taken hours to build, likely over multiple sessions.
Artificial light would have bene needed to see, perhaps a torch or possibly the fires on the structure.
When looking at the bigger picture of the site, it is apparent that it was some kind of ritual or sacred cave.
Why would a group of neanderthals spend hours deep underground choking on smoke working on a seemingly pointless structure.
Some have claimed that is may have been a sort of shelter.
Perhaps the stalamites were used to ancor a tent of some sort.
However, the structure was so deep underground that it would be unpractical to live in.
Starting a fire for cooking or warm would have choked the inhabitants with smoke.
Fires were also had within the structure and on the walls.
This contradicts the idea that the stalagmites supported some kind of tent or pole.
Furthermore, there is no lithic or butchery waste.
There are some bones though they could have been fuel for a fire just as much as a snack.
The structure is dated to 174,000 yeas ago and is the only monumental stone structure ever made by the neanderthals.
Modern humans around the world made large megalithic structure often for spiritual or religious reasons and bruniquel may be the neanderthals take on the same impulses.

Spirituality

Though it is easy to think of neanderthals as busy hunter gatherers with little time to think abstractly, the reality is that they were human and had complicated emotions and ideas.
Attaching words such as religious or spritiual to neanderthals can be contentious.
Even doing so to early modern humans is a tricky affair.
But, there are even examples of chimpanzees symbolic or ritual behavior such as so-called sacred trees or reacting strangely in the face of storms or wildfires.
These behavoirs may be the most primitive predecessors of our modern religions and rituals.
Though we cannot pin down any classification of shamanism or animism, we can imagine that they would have had similar impulses to act based on existential thoughts.

Cave bear cult

In the early 1900's, the cave of drackenloch in switzerland was excavated.

"The Cult of the Cave Bear." Expedition Magazine The Cult of the Cave Bear Comments, Penn Museum, 1 July 1987, https://www.penn.museum/sites/expedition/the-cult-of-the-cave-bear/.

The cave was full of bear bones which was not very surprising consider it was used a den.
But the bones appeared to be arranged in very strange ways.
Low stone walls next to the cave walls seem to hold back bear long bones and complete skulls.
One skull had a shin bone stuck between its cheekbone.
Elsewhere in the cave, 6 chests or sits made of sandstone contained bearbones.
One contained bear skulls and was covered with a limestone slab.
Workmen then reportatdly dismantled much of the site before it could be photographed and only sketches remained.
The discovery and rumors associated with the cave immediately caused speculation that it was used as ritual center for a cave bear cult.
The romantic idea quickley caught on though some were skeptical.
The cave was excavated hastily by workmen who were only supervised by and archaeologist emil bachler for part of the time.
They discovered the skull with the long bone through it and some of the chests without any professional present.
No photos of the chests were taken and our only evidence comes from what bachelor says he found.
The men who saw these chests in their resting state do not even agree with what they saw and as time went by, there accounts changed.
Field notes from one man say that the structures may not even be man made and may just be accumulations of fallen rocks.
He also made no mention of stone chests but rather cavities in the floor with bones covered up by limestone slabs.
Such a thing could certainly be the work of nature and not the hands of a cultist.
Bachlers account is undeniably flawed.
Unfortunately, we will never really know because the site had been so badly damaged.
This is example is important because it displays the danger of placing our preconceived notions on remains that we may not fully understand.
They very well may have had various cults based on bears, bird, the seasons or the stars.
Though our evidence is far from conclusive though the possibility is very probable.

Funeral

Perhaps the best evidence that they may have thought ritually or spiritually comes from the burial of their dead.
Neanderthals did bury their dead, this much we can say for certain, however we do not know if their burials were symbolic funerals or just a form of predator prevention.
From a practical standpoint, burying a dead member of your group prevents attracting dangerous animals.
It also can prevent the spread of dangerous diseases and even just an unpleasant smell.
However, chimpanzees, elephants and even whales are know to display mourning behaviors.
Chimpanzee mothers are known to carry around their deceased children while in once case, a chimpanzee used a grass tool to clean the teeth a dead friend.
Though this would not necessarily classify as a symbolic but rather just a display of immense emotion.

There is no doubt that neanderthals would have mourned the loss of the loved one but we must look for further evidence of symbolism.
The first evidence of possible deliberate burial by neanderthals came from an individual form la chapelle aux saints, france.
The remains seem have been preserved in an artificial hole within the cave.
Further evidence that emerged from excavations in the 1950s and 1960s.
The cave yielded the remains of 10 Neanderthals, including one dubbed Shanidar 4, which was found with clumps of pollen.
Leroi-Gourhan, A. (1975). "The flowers found with Shanidar IV, a Neanderthal burial in Iraq". Science. 190 (4214): 562–564. Bibcode:1975Sci...190..562L
This suggested that the body had been deliberately placed in a grave and a variety of flowers were scattered on it.
Interestingly, some of the flowers have medicinal properties.
This led some to believe that the individual may have been a shaman or healer.
Solecki, R. S. (1975). "Shanidar IV: a Neanderthal flower burial in northern Iraq". Science. 190 (4217): 880–881. Bibcode:1975Sci...190..880S. doi:10.1126/science.190.4217.880
The finding was one of several lines of evidence that has led to a reassessment of Neanderthals as highly intelligent and social people.
However, the idea of burial has been controversial and the idea that flowers were placed on the grave seemed even more unlikely.
Flowers could have just grown or been blown in the sediments and some rodents are known to deposit various plants in caves.
Sommer, J. D. (1999). "The Shanidar IV 'flower burial': a re-evaluation of Neanderthal burial ritual". Cambridge Archaeological Journal. 9 (1): 127–129. doi:10.1017/s0959774300015249
Deliberate placement of flowers remains a possibility though rodent remains within the deposit are the more likely explanation.
Reexamination of the site discovered another neanderthal individual right next to the famous flower burial.
Pomeroy, E., Bennett, P., Hunt, C., Reynolds, T., Farr, L., Frouin, M., . . . Barker, G. (2020). New Neanderthal remains associated with the ‘flower burial’ at Shanidar Cave. Antiquity, 94(373), 11-26. doi:10.15184/aqy.2019.207
These new remains showed the upper half of a neanderthal in an anatomical position.
Multiple lines of evidence indicate that the Neanderthal was deliberately buried, including the fact that the sediment layer around the body is visibly different to the layer below.
Evidence of digging and replacement with different sediment is strong evidence for burial.
A variety of neanderthal sites preserve evidence of burial though it can sometimes be hard to rule out cave ins of rockfalls.
Actual deliberate neanderthal burials typically consist of shallow graves and sometimes include grave goods.
Some sites such shandiar cave or la ferrassie may actually have been mortuary centers for neanderthals.
Morturarty centers are known throughout many modern humans cultures.
People from far and wide would bring their dead loved ones to the site of herxhiem

It is possible that neanderthals would have made similar travels to these sites to put their loved ones to rest.
Children and infants in particular seem to have been buried with great respect.
An infant from la ferrassie france had three flint scarpers buried with it.
Balzeau, A., Turq, A., Talamo, S. et al. Pluridisciplinary evidence for burial for the La Ferrassie 8 Neandertal child. Sci Rep 10, 21230 (2020). https://doi.org/10.1038/s41598-020-77611-z
Its head was also left higher than the rest of the skeleton, perhaps indicating that nenaderthals deliberately piled sediment to raise the head.
An infant from amud cave, israel a child is clearly associated with a red deer jaw while the other remains of this animal are absent or pulverizeed.
Spikins, P.; Hitchens, G.; Needham, A.; et al. (2014). "The Cradle of Thought: Growth, Learning, Play and Attachment in Neanderthal Children"
At Dederiyeh cave in syria, two infants were buried.
Spikins, P.; Hitchens, G.; Needham, A.; et al. (2014). "The Cradle of Thought: Growth, Learning, Play and Attachment in Neanderthal Children"
One of them was buried laying on its back with a stone slab next to its head and a triangular piece of flint on its chest.
The other was associated with faneuil remains and over a hundred pieces of knapped stone.
At the site of teshik tash in Uzbekistan, a child was placed in a circle of ibex horns with a slab of limestone to support its head.
Spikins, P.; Hitchens, G.; Needham, A.; et al. (2014). "The Cradle of Thought: Growth, Learning, Play and Attachment in Neanderthal Children"
Finally, at the site of kilk koba in ukraine, a child was buried wit ha flint flake with etchings on it.
This is the same flake we talked about earlier.
Considering that almost any parent would be devastated to lose their child, it makes sense that deceased infants were treated with so much respect.
The association with grave goods at infant graves is indicative of a deeper symbolic meaning.
There very well may have been a ritual being preformed at these burials.
Once again, we must be careful not to apply modern ideas of spirituality or relgion on these people.
Though, at a human level, we can relate to the feeling of loss.
The people loved each other, and even after death they had residual feelings that compelled them bury the dead and sometimes leave them with valueable goods.
When considering all of our evidence of neanderthal burial, it does not appear to have been exceptionally common.
The oldest burials occurred around 70,000 years ago and become more common as the years went by.
This suggests that burials were a cultural invention that happened relatively recently in neanderthal existence.
This behaviour may have increased in frequency and became more elaborate if more time was allowed.
There have been over 400 individual neanderthals discovered, though this number may sound low because thousands of neanderthals were alive at any given time, it is actually a lot.
Fossilization is a rare process and humans also have to find these fossils.

Part of the reason we have so many fossils of neanderthals is due to burial.

Ritual cannibalism

Another kind of funeral we must take into account is ritual cannibalism.
Though cannibalism is usally thought of as a predatory affair with an unwilling victim, this is only one kind of cannibalism.
Mortuary cannibalism was actually quite common throughout history and prehistory.
At the aforementioned neolithic site of herxheim, individuals were brought from far distances before being butchered, pulverized, and then buried.
The ones doing the butchery were likely loved ones who brought the dead to the site as a form of funeral.
Similar rituals have been seen in papua new guinea and brazil.
Communities of papuans would commonly consume their deceased loved ones.
Erica Tennenhouse (26 July 2016). "Modern-Day Human Cannibalism". The Science Explorer. Retrieved 25 November 2016.
The belief is that it is much better for the body to be eaten by their people than by maggots and worms.
It has been reported that many Papuans would personally request this funeral before death.
The Tupinamba of brazil practiced ritual cannibalism on the deceased.
*Métraux, Alfred (1949). "Warfare, Cannibalism, and Human Trophies". Handbook of South American Indians. 5: 383–409.
The Tupinamba believed that the soul lives on in the body of their relatives once consumed.
It was an essential practice to help their family relieve their grief.
As you can see, cannibalism can actually be down out of great love and respect.
And there is evidence that neanderhtals may have been engaging in similar behavior.
At the site of krapina, where the possible eagle talon necklace was found, another intriguing thing was discovered.
Frayer, David W., et al. “Krapina and the Case for Neandertal Symbolic Behavior: Current Anthropology: Vol 61, No 6.” Current Anthropology, 1 Dec. 2020, https://www.journals.uchicago.edu/doi/10.1086/712088.
A well-preserved neanderthal skull was found to have strange cut marks present on its forehead.
At least 35 marks were made on the forehead of this individual likely during the same session.
The cut marks are not consistent with butchery and are more likely associated with the symbolic perimortem manipulation of the dead.
It is difficult to say what was exactly done to this individual though he wasn’t simply scoffed down by a hungry relative.
Deceased neanderthals were definitely treated differently in various neanderthal populations.
Some may have had many similarities with modern funerals while other may have looked like horror movies to us.

Compassion

Besides the way the treated their dead, we can also find hints of compassion in how they treated the living.
Neanderthals lived very hard lives and serious injuries were a common part of life.

It is generally accepted that more than 80% of the skeletal remains known to archaeologists display several injuries.
Trinkaus, E. (1995). "Neanderthal mortality patterns". Journal of Archaeological Science. 22 (1): 121–142. doi:10.1016/S0305-4403(95)80170-7.
Most of these injuries were acquired during hunting or when traversing their often mountainous terrain.
Despite so many injuries, many of them seem to have made impressive recoveries.
Spikins, P.; Needham, A.; Wright, B. (2019). "Living to fight another day: The ecological and evolutionary significance of Neanderthal healthcare". Quaternary Science Reviews. 217: 98–118. Bibcode:2019QSRv..217...98S
Bone fractures often healed without significant deformities, suggesting that they had been set with a splint of some sort.
Individuals with healed head trauma and rib lesions suggest that they had methods to prevent major bloodloss.
Bandages made of animal skin may have been used.
Some Inuit groups today, use rodent skin to dress wounds.
It’s feasible that Neanderthals would have also come across similar methods to stop the blood flow and to keep the wound relatively hygienic.
Perhaps more impressively, they appear to have avoided severe infections, indicating good long-term treatment of their wounds.
The high level of injury and recovery from serious conditions, such as a broken leg, suggests that others must have collaborated in their care and helped not only to ease pain, but to fight for their survival in such a way that they could regain health and actively participate in the group again.
Neanderthals lived in small groups, so anyone loss of life could prove catastrophic for the survival of the group.
Injury, over disease, was the most common threat, as Neanderthals didn't live in the type of environment, or in large enough communities, to be at high risk from pathogens.
Their knowledge of medicinal plants appears to have been comparable to that of contemporary hunter gatherers.
Karen Hardy, of the Catalan Institution for Research and Advanced Studies has spent years analyzing the calcified plaque left on Neanderthal teeth.
Buckley, S.; Hardy, K.; Huffman, M. (2013). "Neanderthal self-medication in context". Antiquity. 87 (337): 873–878. doi:10.1017/S0003598X00049528. S2CID 160563162
In one individual, she found the chemical signatures of yarrow and camomile.
These plants may have been used as herbs they taste extremely bitter, and have little nutritional value.
She hypothesizes that they were instead used for self-medication.
Both of these plants have anti-inflammatory and fever reducing properties.
At the shanidar cave, the flower burial may have included these plants.
Another analysis of another Neanderthal individual revealed traces of poplar, which contains the natural painkiller salisilic acid, and the mold penicillium, the source of one of our most successful antibiotics.

While we can't be sure that Neanderthals deliberately ingested these substances for medicinal purposes, it's telling that this individual suffered from a severe tooth abscess.
The individual also had painful parasites which would have caused diarrhea.
These plants were likely used to cure both of these ailments.
Many have speculated that early humans and other species such as neanderthals may have used psychoactive drugs for a varierty of reasons.
Evidence of psychoactive drug use only goes back a few thousand years ago though it is likely underrepresented.
Powerful hallucinogenic mushrooms did grow in the range of the neanderthals and they would have been aware of them.
It is possible that they were consumed for their mind altering affects and perhaps they were even part of spiritual practices.
However, no evidence of these mushrooms exist in neanderthal dental calculus or at neanderthal sites.
It is entirely possible that these mushrooms were being consumed though without evidence, we can only speculate.
Some have proposed that psilocybin mushrooms may have had a profound effect on the evolution of our genus though this theory has little evidence to support it.
McKenna, Terence (1999). Food of the Gods: The Search for the Original Tree of Knowledge : a Radical History of Plants, Drugs and Human Evolution. Rider. ISBN 978-0-7126-7038-8.
Olsen, Oscar. "The Stoned Ape Hypothesis, A Contemporary Reappraisal"
It appears psychoactive drugs were not used very much until relatively recently in human history.

Healthcare & Pathology

Besides medicine or drugs, other healthcare practices would have been just as important.
Sick, injured and especially elderly individuals would have had to be fed and cared for.
Perhaps most fascinating display of neanderthal healthcare and compassions comes from the shanidar cave in iraq.
Remains of a neanderthal who survived well into his forties were named shanidar 1.
Trinkaus, E.; Villotte, S (2017). "External auditory exostoses and hearing loss in the Shanidar 1 Neandertal". PLOS ONE. 12 (10): e0186684. Bibcode:2017PLoSO..1286684T. doi:10.1371/journal.pone.0186684. PMC 5650169. PMID 29053746.
This man lived an excessively painful life.
He had suffered a violent blow to the left side of his head at a young age.
It fractured his orbital and left him partially or totally blind in his left eye.
His teeth were abnormally worn, a sign of a degenerative disease.
He also suffered from severe hearing loss which left him partially deaf in one ear and likely completely deaf in the other.
Trinkaus, E.; Samsel, M.; Villotte, S. (2019). "External auditory exostoses among western Eurasian late Middle and Late Pleistocene humans". PLOS ONE. 14 (8): e0220464. Bibcode:2019PLoSO..1420464T. doi:10.1371/journal.pone.0220464. PMC 6693685. PMID 31412053.
To add to all this he suffered from a withered arm.
Damage to his C5 vertebrae caused his right arm to lose muscle function.

This arm was likely amputated later in his life.
If so, it is the earliest evidence of amputation on a living individual.
The damage to his arm and vertebrae caused some paralysis on the right side of this body.
To add to all of this, he suffered from not one, but two broken legs.
They had healed, but left him with a painful limp.
Even so, his legs seem to have been walked on to a similar degree as other neanderthals.
With all of these debilitating injures, he seems to have survived well into his forties, perhaps nearing his 50's.
Though still able to walk and use one arm, he wasnt taking down woolly rhino by himself.
He undoubtably survived with a little help from his friends.
They would have had to at least partially feed him and certainly protect him from predators.
After a long and loving live, he appeared to have died of natural causes.
This level of altruism is hardly ever associated with the neanderthals.
Even some human hunter gatherers have practiced killing off the weak and elderly for the good of the tribe.
But these neanderthals all those thousands years ago valued this man.
He was a part of their family, a father, a brother, maybe even a grandparent.
At the tribe's expense, he was kept alive.
Perhaps he actually provided the tribe plenty of valuable information that actually benefited their survival.
Elderly neanderthal remains are not exceptionally common though there are misconceptions regarding their lifespan and life expectancy.
Lifespan is defined as the maximum number of years that an individual can live while life expectancy is the average number of years an inidividual lives.
Neandethals had a life expectancy of between 25 to 40 years old.

Degioanni, Jean-Pierre Bocquet-Appel and Anna, et al. "Neanderthal Demographic Estimates: Current Anthropology: Vol 54, No S8." Current Anthropology, 1 Dec. 2013, https://www.journals.uchicago.edu/doi/full/10.1086/673725.

This is about the same as modern human hunter gatherers depending on what population you are looking at.
But these hunter gatherers can have life spans of over 70 years of age.
Even a wild chimpanzee reached an age of 63 while captive individuals reach their late 70's or early 80's.
It is perfectly reasonable that a very small number of neanderthals could have made it to a similar age.
At any given time, a neanderthal group may have had inidivduals in their 40's or even 50's who actively participated in daily activities.

Elders

Three living generations would not have been out of the ordinary for any group.
Older individuals would have been highly knowlegable about many things.
They would have had a much more detailed mental map of the landscape than younger individuals.

They could also remember seasons where there may have been much more snow or times when herds migrated in unexpected ways.
Even if they were not able to directly hunt large game, they would have been competent at hunting small game, time consuming foraging and taking care of the little ones.
Young neanderthals would have had to been taught flint knapping for many hours.
Though some neanderthal tools may look simplistic, creating them can be a challenge even for modern knappers.
We also have to think about the fact that even prime aged adults would become injured fairly frequently and would have needed care.
We also cannot underestimate the importance of elders for telling stories around the fire.
A simple tale about an old friend eaten by a cave bear may have served as an important educational moment for anyone listening.
Stories from long ago may have been passed on many generations.
Australian aboriginals from coast to coast tell stories of when the sea rose long long ago.
Patrick D. Nunn & Nicholas J. Reid (2016) Aboriginal Memories of Inundation of the Australian Coast Dating from More than 7000 Years Ago, Australian Geographer, 47:1, 11-47, DOI: 10.1080/00049182.2015.1077539
Much of australia is surrounded by extensive shallow shores no more than 9 meters or 30 feet deep.
Over 7000 years ago they would have been grazing grounds with many other islands sitting offshore.
After the glaciers melted, the sea levels rose and an unimaginable amount of land sank beneath the shore.
Over the next 400 generations, stories about the rising waters persisted.
Some even recall the names of great islands that were once about the waves.
Similar stories may have actually been important for neanderthal survival.
Their climate was ever changing and herds moved accordingly.
Stories of massive glaciers or rising sea levels may have persisted for hundreds or even thousands of years.
It is even possible, if not likely that some of these stories were passed on to the newcomers from the south.

Extinction = “Part VI - Tools to live”

Neanderthals and homo sapiens were not completely isolated from each for hundreds of thousands of years.
Remains from apidima cave dating to 210,000 years ago suggest that archaic homo sapiens may have been present in Greece much earlier than once thought.
Though if these fossils evidence do represent sapiens, they do not appear to have stayed long.
The fossils may represent an occasional unsuccessful migration deep withing europe from the near east.
The near east was very important place for our species and for neanderthals.
Both species ranged throughout it and genetics suggest that interbreeding occurred as early as 120,000 years ago.
Homo sapien remains from a number of sites in israel date as far back as 200,000 years ago and Nearby neanderthal sites date to the same period.

There is no doubt that neanderthals and modern humans in the near east regularly interacted and even created families together.
For over 100,000 years, both neanderthals and modern humans lived in this region.
Meanwhile, other populations of modern humans were spreading throughout much of asia.
They made it to the Indian subcontinent by 80,000 years ago and even australia by 65,000 years ago.
Meanwhile, the Modern humans in the near east do not seem to have encroached into europe until later.

Europe

The appearance of modern humans in europe is a very complicated.
It was previously thought that sapiens first followed the eastern mediterranean coast to enter southeast europe between 43 and 48,000 years ago.
Though a 2022 study found modern human fossils in France dating to between 51 and 56,000 years ago.
Modern Human Incursion into Neanderthal Territories 54,000 Years Ago at ...
https://www.science.org/doi/10.1126/sciadv.abj9496.
Alongside their remains were peculiar stone tools dubbed the neronian tools.
They consist of small projectile points that may have been spears though they could have also been atlatl points or even arrowheads.
This technology is similar to technology from africa cand the middle east which now makes sense considering that it was likely modern humans that made it.
What is even more interesting is that just as soon as they came, they left.
Neronian tools and human remains sit below additional layers of neanderthal occupation.
The remains at Grotte Mandrin may represent an unsuccessful migration by a population of modern humans.
And this brings up an interesting point about this period.
Europe was so sparsely populated that sapiens may have simply migrated in without even coming into conflict with neanderthals.
Neanderthals themselves likely would not have seen sapiens as anything but another group of humans.
Modern humans may have looked slightly different being taller, slimmer and likely darker, though from other examples, we clearly see that neanderthals had no problem mating with the newcomers.
Neanderthal war parties fighting off war encrouching warmongering sapiens is a scene of fiction.
Once again, the paleolithic does not appear to be nearly as violent as some make it out to be in regards to intergroup violence.
We have not discovered any evidence of sapiens or neanderthal who appear to have died in an interspecies war.
The reason that sapiens had difficulty migrating into the region may simply be because neanderthals were already living there.
They were adapted to the environmental conditions and there may not have been room for other humans.
It does not appear that modern humans were able to find much success in europe until they made technological innovations.

This is why, even though humans were present for a short time in france over 50,000 years ago, actual significant migrations did not seem to have occured until around 48,000 years ago in the balkans.
Here, the Bohunician industry appears to derive from the levantine emirian industry.
Hoffecker, J. F. (2009). "The spread of modern humans in Europe". Proceedings of the National Academy of Sciences. 106 (38): 16040–16045. Bibcode:2009PNAS..10616040H. doi:10.1073/pnas.0903446106. PMC 2752585. PMID 19571003.
The bohunician seems to be a transitional industry between the neanderthal mousterian and the later sapien aurignacian.
These tools may have been made by a population of both neanderthals and modern humans though we do not have fossil evidence.
A few thousand years later, this industry would evolve into the protoaurignacian.
Modern Human Incursion into Neanderthal Territories 54,000 Years Ago at ... https://www.science.org/doi/10.1126/sciadv.abj9496.
This technology consisted of bone and antler points, bone needles and awls and fine stone blades and bladelets.
These blades could be attached to composite points to create very deadly weapons.
Small cores that could easily be carried had the potential to create dozens of these razor sharp microliths.
Besides tools, upper paleolithic technology is often associated with many cultural innovations such as a variety of art and the formation of long distance trade networks.
From about 45,000 years onward, this culture and its sapien creators would spread out throughout much of western europe.
Though the replacement of the neaderthals was not so simple.
Another stone tool industry from France and northern Spain called the chatelperronian existed from 45,000 to 40,000 years ago.
This industry was also upper paleolithic and may have been produced by neanderthals.
Some have suggested that neanderthals were adopting sapien technology while others believe these tools were made by hybrid populations or simply by homo sapiens.
The industry may also partially be the result of disturbed archaelogical records from the 19th century.
Though this may all sound confusing, the larger picture is that sapiens migrating into western europe brought with them new technology that mixed with the other technologies of the region.
A 2022 study found that modern humans and neanderthals coexisted in western europe for roughly 1400 years.
I. Djakovic et al. 2022. Optimal linear estimation models predict 1400-2900 years of overlap between Homo sapiens and Neandertals prior to their disappearance from France and northern Spain. Sci Rep 12, 15000; doi: 10.1038/s41598-022-19162-z
This helps to explain why the archaeological record is so confusing.
Old ways of toolmaking adopted new techniques and eventually it appears that the new techniques were favoured by both neanderthals and modern human.

Hybridization

The coexistence of these species undoubtably included centuries if not millenia of hybridization.

We know that hybridization occurred because of all modern humans have neanderthal genetics, but we will talk about this later.
Besides this fact, our remains from this period clearly show that they were hybridizing.
The 40,000 year old Oase 2 from romania was found to have between 6-9 percent neanderthal DNA.
Fu, Q.; Hajdinjak, M.; Moldovan, O. T.; et al. (2015). "An early modern human from Romania with a recent Neanderthal ancestor". Nature. 524 (7564): 216–219. Bibcode:2015Natur.524..216F. doi:10.1038/nature14558. PMC 4537386. PMID 26098372.
This suggests that he had an neanderthal ancestor only four to six generations earlier.
With this example you must keep in mind that by 40,000 years ago, neanderthals were already on the bring of extinction.
When considering the initial periods of intermixing, first generation hybrids would have been much more common.
Neanderthal populations across western europe seem to decrease drastically after around 43,000 years ago.
The reason for their decline is not entirely understood but it certainly had to do with their population size.
Neanderthal population size fluctuated mainly based on warmer times though after about 100,000 their populations began to decline regardless of modern humans.
The reason for this decline does not seem to have to do with competition with modern humans as it started before they even appeared on the landscape.
Even when modern humans entered europe, there were plenty of resources to go around.
Both neanderthals and early european modern humans would have been rare on the landscape.
Their decline instead seems to be tied to low fertility rates and assimilation.
Neanderthals seem to have suffered many negative affect due to have low genetic diversity.
The mitochondrial genomes of six neanderthals from across europe only differ at 55 location out of more than 16,000 location.
Briggs AW;Good JM;Green RE;Krause J;Maricic T;Stenzel U;Lalueza-Fox C;Rudan P;Brajkovic D;Kucan Z;Gusic I;Schmitz R;Doronichev VB;Golovanova LV;de la Rasilla M;Fortea J;Rosas A;Pääbo S; “Targeted Retrieval and Analysis of Five Neandertal Mtdna Genomes.” Science (New York, N.Y.), U.S. National Library of Medicine, https://pubmed.ncbi.nlm.nih.gov/19608918/.
They had about three times less mitochondrial diversity than in modern human.
This resulted in the proliferation of harmful gene variants which may be tied to their low fertility rate.
Juric, I.; Aeschbacher, S.; Coop, G. (2016). "The strength of selection against Neanderthal introgression". PLOS Genetics. 12 (11): e1006340. doi:10.1371/journal.pgen.1006340. PMC 5100956. PMID 27824859.
It appears that neanderthals were already having a hard time when our new innovative species moved in.
It didn't help that our populations seemingly had a much higher fertility rate than neanderthals.
Our populations eventually seem to have swelled as much as ten fold around 40,000 years ago.

Mellars P, French JC. Tenfold population increase in Western Europe at the Neandertal-to-modern human transition. Science. 2011 Jul 29;333(6042):623-7. doi: 10.1126/science.1206930. PMID: 21798948.
This may be tied to the onset of the Heinrich 4 event which also occurred during this time.
A heinrich four event is caused by ice breaking off from glaciers in the atlantic which causes extreme seasonality.
These conditions included drought ridden summers and frigid winter which lasted for centuries.
Neanderthals had survived a few of these events before though their populations had decreased in prior heinrich events.
However, this time, homo sapiens were there.
Sapien populations appear to have done very well during this period, perhaps because of their technology or social organization.
Though you must keep in mind that this population had a significant neanderthal genetics and even purebred neanderthals.
As oase 1 shows us, many modern humans would have had a significant amount of neanderthal DNA and may even had full neanderthals in their group.
Early european modern humans at large display many features that are reminiscent of neanderthals.
Strasser, T. F.; Runnels, C.; Wegmann, K. W.; Panagopoulou, E. (2011). "Dating Palaeolithic sites in southwestern Crete, Greece". Journal of Quaternary Science. 26 (5): 553–560.
Many had slightly flattened skull caps and prominent occipital buns as well as heavily built skeletons.
The frequency of these features in early populations suggests that interbreeding was much more common than once thought.
These features would persist for tens of thousands of years, though they signifnicantly diminish throughout the upper paleolithic.
It appears that many neanderthal genes were eventually naturally bred out of the population throughout time.
Wynn, Thomas; Overmann, Karenleigh A; Coolidge, Frederick L (2016). "The false dichotomy: A refutation of the Neandertal indistinguishability claim". Journal of Anthropological Sciences. 94 (94): 201–221. doi:10.4436/jass.94022. PMID 26708102.
Buckley, S.; Hardy, K.; Huffman, M. (2013). "Neanderthal self-medication in context". Antiquity. 87 (337): 873–878. doi:10.1017/S0003598X00049528. S2CID 160563162.
Some of these genes initially were quite harmful though others may have helped the newcomers adapt to the european environment.
When considering the disappearance of the neanderthals, we must understand that it was a very long process.
Neanderthals appear to have been more or less bred out of existence.
Many populations were simply assimilated into our populations.
Their genetics in subsequent hybrid populations were watered down by the more numerous homo sapiens.
Other groups of neanderthals may have been outcompeted for food resources by groups of sapiens or hybrid groups.
However, remember, Europe is a big place and it was underpopulated during this time.

There would have been plenty of room for many of these groups to coexist.
Still the possibility exists that some groups of neanderthals were outcompeted or perhaps in rare occasions, even targeted for violent attacks.

Actual extinction date

Another aspect to consider about their extinction is when did the last true neanderthals actually go extinct.
The neanderthal range is full of isolated hard to reach areas to could have harbored neanderthals form much longer than mainland europe.
Even the entire iberian peninsula seems to have remained isolated from sapien dispersal later than the rest of western europe.
It has been hypothesized that the ebro river in northern spain may have been a formidable geographical barrier for sapien populations.
Reevaluations of sites suggest that sapiens may have been able to cross the river even over 42,000 years ago, though neanderthal populations may have still remain in isolated populations throughout iberia post 40,000 years ago.
Most purebred neanderthals were already absent from western europe this time and whimpered to virtually nothing in the next thousand years.
Though, Neanderthals in gibraltar may have survived much longer, possibly as late as 30,000 years ago.

Fontugne, M.; Reyss, J. L.; Ruis, C. B.; Lara, P. M. (1995). "The Mousterian site of Zafarraya (Granada, Spain): dating and implications on the palaeolithic peopling processes of Western Europe". Comptes Rendus de l'Académie des Sciences. 321 (10): 931–937.
Finlayson, C.; Pacheco, F. G. (2006). "Late survival of Neanderthals at the southernmost extreme of Europe". Nature. 443 (7, 113): 850–853. Bibcode:2006Natur.443..850F. doi:10.1038/nature05195. PMID 16971951. S2CID 4411186.

Though the evidence for this is based upon unusual artifacts and climatic patterns rather than direct dating.

Galván, B.; Hernández, C. M.; Mallol, C.; Mercier, N.; Sistiaga, A.; Soler, V. (2014). "New evidence of early Neanderthal disappearance in the Iberian Peninsula". Journal of Human Evolution. 75: 16–27. doi:10.1016/j.jhevol.2014.06.002. PMID 25016565.

Populations elsewhere may have survived much longer.
Mousterian tools dating to post 34,000 years ago in northern siberia may represent a late surviving neanderthal population.

Slimak, L.; Svendsen, J. I.; Mangerud, J.; Plisson, H. (2011). "Late Mousterian persistence near the Arctic Circle". Science. 332 (6031): 841–845. Bibcode:2011Sci...332..841S. doi:10.1126/science.1203866. JSTOR 29784275. PMID 21566192. S2CID 24688365.

Though these tools could have been made by sapiens as well, more direct evidence would need to be found.
Neanderthal populations living in central or even eastern asia may have been some of the last.
Though neanderthals have only been found as far east as denisova cave, they may have been more widespread in the region than fossil suggests.
Overall, it is clear that no exact date can be given for the extinction of purebread neanderthals.
By around 40,000 years ago, neanderthal populations were nearly non existent and any evidence after 37,500 years ago is very rare and often controversial.

The last neanderthal likely took their last breath in some remote mountain refuge, perhaps surrounded by a family of hybrids and sapiens.
The picture of neanderthal extinction I have laid before you is one of assimilation, infertility, gradual decline.
This picture is supported by much more evidence than sensationalist claims that neanderthals went extinct because they couldnt hunt this or that or because they their technology was not as complex as some upper paleolithic technologies.
There are many reasons why neanderthal populations may have been suffering such as diseases or unfavorable changes in the climate, but the larger picture is that they were essentially absorbed into modern human populations.
It could be said that neanderthals as a species were less innovative than homo sapiens though there are many nuances involved in this assessment.
Neanderthal technology did appear to stagnate for tens of thousands of years, though we can only really assess their stone technology.
We do not know exactly what kind of advancements may have been being made.
We are aware that neanderthal cultures adapted to different conditions such as the reindeer hunters of the quina neanderthals.
But their technology did not actually advance, it was just utilizing similar techniques in a different way.
Homo sapiens on the otherhand did appear to improve their technology more frequently during the last 100,000 years.
Sapiens living in north africa over 100,000 years ago began to produce light tanged points which may have sat at the tip of projectile weapons.
Around the same time, sapiens in central and south africa were creating complex bone and stone tools such as the katanda harpoon.
Further developments would happen in the middle east such as levallois points which were retouched to create objectively better emiran points.
Other tools from the emiran culture display a high level of complexity and only appear to have been made by modern humans.
Though before we get ahead of ourselves, we must identify that neanderthals during this time were also beginning to make more complex technology.
Though they still utilized mousterian technology, bifacial points of considerable complexity such the leaf shaped points found at hohle fels and other sites.
The point is, just when modern humans began to make technological breakthroughs, neanderthals were on the verge of extinction.
Technological innovation is largely based on population size.
The more individuals there are, the more likely it is that new idea and methods will occur.
Since neanderthal populations were always quite low, their ability to innovate also remained quite poor.
Though after sapiens moved into europe, interbred with neanderthals and expanded their populations, innovation became much more common.
This period is called the upper paleolithic.
Regional stone tool industries appeared along with art and complex culture.

“The upper paleolithic is something that the culture changes quickly, so we can talk about every 8-10,000 years, we can recognize a different upper paleolithc cultural entity where they make different stone tools, they make different bone tools, different forms of art, and they change every 5-10,000 years, where neanderthals had the same access to the same resources and they did not change at that rate, and things didnt go viral across lets just say eurasia or western europe to central europe, which we see with modern humans in the upper paleolithic.”
12:25-13:09
It is easy to take in this information and simply think that neanderthal were cognitively unable to advance as our species was.
But you must consider that neanderthal technology may have similarly innovated over time if sapiens never entered europe.
Though we are talking about hypotheticals, it is important to identify that our own ancestors were living with similar technology to neanderthals for hundreds of thousands of years before gradually innovating and expanding around the world.
It therefore may have been our culture which propelled us forward rather than our anatomy.
Neanderthals were certainly able to survive with their anatomy, but their culture stagnated and was assimilated and replaced.
If the dice rolled differently, it very well could have been neanderthals that expanded around the world.
Afterall we are both just descendants from the common ancestors with a slightly different anatomy.

Genetic persistence = “Part VIII - Tools to live”

Another question regarding their extinction is whether we can truly even consider them extinct at all.
Neanderthal genetics exist in every modern human alive today.
Though neanderthals primarily lived in europe and parts of asia, their genetics can be even be found with the most remote regions on earth.
This is of course before any population of modern human outside of africa had to past through the middle east and inevitably ran into neanderthal ancestry.
It was once thought that populations of subsaharen africans did not possess neanderthal genetics, though this has found to be false.
Recent studies have proven that every african population has some degree of neanderthal DNA, and surprisingly more than once thought.
On average african individuals have about 17 megabases of neanderthal DNA or 0.3% of their genome.

Author links open overlay panelLu Chen 1 4, et al. “Identifying and Interpreting Apparent Neanderthal Ancestry in African Individuals.” Cell, Cell Press, 30 Jan. 2020, https://www.sciencedirect.com/science/article/pii/S0092867420300593.
George, Alison. “Neanderthals Never Lived in Africa, but Their Genes Got There Anyway.” New Scientist, New Scientist, 4 Feb. 2020, https://www.newscientist.com/article/2231991-neanderthals-never-lived-in-africa-but-their-genes-got-there-anyway/.

These genes entered african genomes when populations migrated back into the continent and also throughout prehistoric and historic periods.

People throughout the rest of the world have comparatively more neanderthal DNA.
Despite the fact that europe was the main home of the neanderthals, europeans do not have the most neanderthal DNA.
They have between 1.8-2.4% neanderthal DNA while east asian, oceania, aboriginal australian and indigenous americans have between 2.3-2.5 percent.
Prüfer, K.; de Filippo, C.; Grote, S.; Mafessoni, F.; Korlević, P.; Hajdinjak, M.; et al. (2017). "A high-coverage Neandertal genome from Vindija Cave in Croatia". Science. 358 (6363): 655–658. Bibcode:2017Sci...358..655P. doi:10.1126/science.aao1887. PMC 6185897. PMID 28982794.
Preagriculture europeans appear to have had similar levels to modern asians but these levels decreased with migrations.
Reich, D. (2018). "Encounters with Neanderthals". Who we are and how we got here: ancient DNA and the new science of the human past. Oxford University Press. ISBN 978-0-19-882125-0.
Interesting, most modern european DNA actually comes from western asia and only spread to the region in the past 10,000 years.
In fact Oase 2, the man with a recent neanderthal ancestor from romania is more closely related to americans and east asians than to any european.

“2% neanderthal”

Well it is clear that neanderthal genes are present in all modern humans, but what does 2% neanderthal DNA even mean.
After all, don’t we share 99% of our DNA with chimpanzees?
“How Can Humans Range from 0-4% Neanderthal DNA, If We're Only 1.2% Different from Chimpanzees?” The Tech Interactive, 12 Feb. 2022, https://www.thetech.org/ask-a-geneticist/human-neanderthal-similarity-africans-europeans.
This is a question commonly asked in regards to neanderthals and it is reasonable to ask.
Between 95-99% of the DNA letters are in relatively the same position between Chimpanzees and Modern humans, though this calculation ignores some stretches of DNA not present in both species.
Actual genetic similarity between chimps and humans can be calculated between 71 and 95%
Neanderthals on the other hand share about 99.7% of their DNA with us, but only a few percent of our DNA is fully identical to neanderthals, as in the same genes in the same sequence.
The other 97-99% of the modern human genome is still very similar to that of neanderthals, though not identical.
When considering how this affects modern populations, it is important to note that someone with between 2-4% neanderthal DNA only has about 0.006% different DNA than someone with nearly no neanderthal DNA.
Eurasians and africans do not primarily vary genetically based on neanderthal ancestry, it is just a small part of their variation.
And even their entire variation is genetically quite small.

Genetic function

Populations across the world have similar levels of neanderthal genetics, but they are not the same.
Neanderthal genetics in europe differ from the genes fround in the western and also from east asia.

This is likely because of different neanderthal populations as well as which genes were held onto.
A gene that is useful in frigid ice age germany may not be in tropical thailand.
Overall, it appears that about 20% of the neanderthal genome survives across modern human populations.
Vernot, B.; Akey, J. M. (2014). "Resurrecting surviving Neandertal lineages from modern human genomes". Science. 343 (6174): 1017–1021. Bibcode:2014Sci...343.1017V. doi:10.1126/science.1245938. PMID 24476670. S2CID 23003860.
Meaning that about 20% of their genes were useful across our species and have survived into the modern day.
Though, when considering our initial hybridization with neanderthals, may have been quite harmful.
Due to small populations and inbreeding, neanderthals accumulated several harmful mutations that would eventually be bred out of our populations.
Initial hybrids experienced and estimated 94% reduction in fitness compared to other populations.
Juric, I.; Aeschbacher, S.; Coop, G. (2016). "The strength of selection against Neanderthal introgression". PLOS Genetics. 12 (11): e1006340. doi:10.1371/journal.pgen.1006340. PMC 5100956. PMID 27824859.
Many neanderthal genes were bred out quite quickley.
Though others appear to have been useful for adapting ot the new european environment.
Our species kept neanderthal genes associated with circadian rhythms due to the darker conditions of european winters.
Due to the cold, they also kept genes associated with thermal efficiency and metabolism.
Though these genes which helped starving neanderthals pull through a long winter appear to be linked with diabetes in the modern day.
Dolgova, O.; Lao, O. (2018). "Evolutionary and medical consequences of archaic introgression into modern human genomes". Genes. 9 (7): 358. doi:10.3390/genes9070358. PMC 6070777. PMID 30022013.
Other neanderthal genes associated with UV radiation sensitivity and red hair found in some european but mainly asian populations may have helped us adapt to the generally less intense eurasian sun.
Zorina-Lichtenwalter, K.; Lichtenwalter, R. N.; Zaykin, D. V.; et al. (2019). "A study in scarlet: MC1R as the main predictor of red hair and exemplar of the flip-flop effect". Human Molecular Genetics. 28 (12): 2093–2106. doi:10.1093/hmg/ddz018. PMC 6548228. PMID 30657907.
Ding, Q.; Hu, Y.; Xu, S.; Wang, C.-C.; Li, H.; Zhang, R.; Yan, S.; Wang, J.; Jin, L. (2014). "Neanderthal origin of the haplotypes carrying the functional variant Val92Met in the MC1R in modern humans". Molecular Biology and Evolution. 31 (8): 1994–2003. doi:10.1093/molbev/msu180. PMID 24916031.
"We further discovered that all of the putative Neanderthal introgressive haplotypes carry the Val92Met variant, a loss-of-function variant in MC1R that is associated with multiple dermatological traits including skin color and photoaging. Frequency of this Neanderthal introgression is low in Europeans (~5%), moderate in continental East Asians (~30%), and high in Taiwanese aborigines (60–70%)."

Other neanderthal genes are associated with depression, digestive problems, bloodclotting, and miscarriages.
Perhaps the most significant way that neanderthal genetics benefit some populations in the modern day is in regards to viral immunity.
Between 20-30% of all neanderthal genes in modern human are related to the immune system.
Enard, D.; Petrov, D. A. (2018). "Evidence that RNA viruses drove of adaptive introgression between Neanderthals and modern humans". Cell. 175 (2): 360–371. doi:10.1016/j.cell.2018.08.034. PMC 6176737. PMID 30290142.
These genes may have initially helped us adapt to the pathogens found in europe.
They also still affect modern populations in both good and bad ways.
In 2020, it was found that one chromosomal section from neanderthals in modern humans may serve as protection against Covid19 while another may significantly increase its severity.
Zeberg, H., Pääbo, S. The major genetic risk factor for severe COVID-19 is inherited from Neanderthals. Nature 587, 610–612 (2020). https://doi.org/10.1038/s41586-020-2818-3
A limited number of neanderthal genes may affect cognitive function in modern humans.
Some may benefit advanced though process, counting and calculating.
Gregory MD, Kippenhan JS, Eisenberg DP, Kohn PD, Dickinson D, Mattay VS, Chen Q, Weinberger DR, Saad ZS, Berman KF. Neanderthal-Derived Genetic Variation Shapes Modern Human Cranium and Brain. Sci Rep. 2017 Jul 24;7(1):6308. doi: 10.1038/s41598-017-06587-0. PMID: 28740249; PMCID: PMC5524936.
Sykes, Wragg Rebecca. Kindred: Neanderthal Life, Love, Death and Art. Bloomsbury Sigma, 2022. Page 331
Other genes may actually have negative cognitive effects on modern populations.
Much of the neanderthal DNA within the modern human genome actually has little to no effect on us.
Reich, D. (2018). "Encounters with Neanderthals". Who we are and how we got here: ancient DNA and the new science of the human past. Oxford University Press. ISBN 978-0-19-882125-0.
It is non coding DNA also referred to as Junk DNA that does not do much.
The absence of neanderthal derived mtDNA suggests that interbreeding between neanderthals and sapiens primarily consisted of neanderthal men and sapien women.
This is has caused some to assume that these neanderthal men may have been having unconsenual sex with these women, and perhaps sapien men had no interest in neanderthal women.
Though other possibilities to explain this data exist.
It is possible that couplings between sapien men and neanderthal women encountered fertility issues.
Perhaps these couplings often resulted in miscarriages, or the offspring itself was infertile.
Additionally, the lack of neanderthal derived y chromosomes which is passed from father to son suggests that is was mainly hybrid females that contributed to modern sapien genes.
Though we do not entirely understand why these genes passed on this way, the possibility of fertility issues may be evidence that neanderthals were indeed a distinct species.
While modern humans may have only inherited between about 1-3% neanderthal DNA, it is a significant amount with observable implications.

Conclusion = “Misc?”

Though the neanderthal anatomy may be extinct, there are more neanderthal genetics passing around modern populations than there ever was in the paleolithic.
In a way, neanderthals are more successful now than ever before.
Their legacy lives on with you and me and they will forever be apart of our story.
With wise stones and fortunate fossils, we are given just a miniscule glimpse into the countless years the neanderthals spent dominating the landscape.
New remains and reexaminations of old remains constantly alter what we think we know about these people.
Our ideas and views about these people will undoubtably change as the years go by, though they will forever remain shadows on the wonderful landscape that is eurasia.

Fine = “Authors note”

First and foremost, I want to thank all of you for watching this video.
Since this section is obviously located at the end, there is a good chance that you watched the entire video.
Absolutely amazing.
Next I want to thank some of the people who helped me put this all together.
Huge thanks to Gilbert Tostevin for appearing in the video, Rudolph wilkins for helping me with the script, rebecca wragg Sykes for writing an amazing book, and all of my friends who dressed up as neanderthals.
This is by far the longest project I have ever made and I have been working on it for over a year in some capacity.
It is quite amazing that I can post such a long video completely supported by youtube.
Next let's talk about the information presented in this work.
This video is based on studies with information that will change in light of new discoveries.
That means some of the information displayed will change too.
Other things I mentioned are debated and clear answers do not always exist.
As of the publishing date, all of this information should be accurate to our current understanding of neanderthals.
I have included a link to the script which I used to create this video.
My sources can be found as comments on the side their corresponding sentences.
If you noticed anything incorrect in this project, please respectfully write a comment down below.
Otherwise, just write a comment to say hello.
This has been your host north 02, and I hope to see you on the next one.
Arrivederci

Dopofine

Bossa nova,
Nightfly steely dan

Chapters: