Walrus tusks were Viking Age gold

Nancy: It’s the late 800s, in the court of England’s King Alfred the Great. But this is not your stereotypical Hollywood-style English court. It was likely a smoky hall with thick wooden beams, flickering firelight, maybe the smell of roast meat and damp wool.

Alfred the Great is a king, yes, but from what we know of him... he’s kind of a nerd. He loves books. Latin translations. Geography.

And then in walks this guy named Ottar.
He has come from northern Norway, from far above the Arctic Circle. Maybe he’s wearing sealskin, he probably smells like salt and whale oil, and he starts telling this wild story of his explorations in the far north.

He’s not a Viking raider, although there were still plenty of them around. He’s an explorer and a chieftain. He tells the king about trading with the Sami people in the far north of what we now call Fennoscandia, about walrus hunts and tusks the size of swords and thick walrus hides that sailors prize as ropes. He even brought some of those tusks as gifts to the king.

And then, one of Alfred’s scribes—maybe a monk, maybe a translator—starts writing this all down. Not in Latin. But in English. Old English.
Alfred believed that wisdom shouldn't be locked away in foreign languages. It should be *shared*. We know that because we still have the text today.

James: And there's this absolutely extraordinary account that survives in an Anglo-Saxon text, which was written down at the end of the 800sAD that describes how an Arctic Norwegian chieftain visited the court of Alfred the Great. And this Arctic chieftain,Ottar, traded for walrus tusks with the Sami in northern FennoScandinavia, and that he took some of them as gifts to give to the king. And this account is really the first direct reference we have for the trade of walrus Ivory through Scandinavia.

James: So certainly it was the case that some walrus ivory tusks were traded as exceptional rarities and very precious objects in the period prior to the settlement of Greenland.

James:And this document attests to that. But we now know by comparing this document to the archeological evidence, that at that stage, they were very, very rare.

Nancy: That’s

James: James Barrett, and I'm a professor of Medieval and Environmental Archeology at the NTNU University Museum.

Nancy: It's hard to find a modern-day comparison for how incredibly fascinating and valuable walrus tusks were, whether they were whole or carved into ornate religious pieces. When people in Europe held a piece of carved walrus ivory, it was more than just art. Those pieces embodied a story. A story of cold oceans, long voyages, skilled craftsmen and an Arctic world most of them would never see.

Music transition

Nancy: I'm Nancy Bazilchuk and you're listening to 63 Degrees North, an original podcast from NTNU, the Norwegian University of Science and Technology.

Today, I'm diving into a story of tusks—more specifically, walrus tusks—and how they shaped the fate of Viking explorers and the rise of the Arctic trade.

In the Viking Age, walrus ivory wasn't just valuable— it was *global*. These tusks fueled a long-distance trade network that stretched from Inuit hunters far above the Arctic Circle to churches and royalty in cities as far flung as Novgorod, Kyiv and Köln.

Walrus tusks may just have been one of the main reasons Norse settlers first sailed west to Greenland in the 980s—and just as likely, part of the reason they left it behind 500 years later.

Historians have floated a half-dozen theories for why these Greenland settlements vanished: climate change, the Black Death, even bad farming habits imported from Scandinavia?

But what if…*it all came down to walrus ivory?*

This story doesn't end with trade routes and treasure, though. What scientists are learning today from ancient walrus skulls and tusks—using DNA, isotopes, and even skull shape— also contain clues to resilience. And maybe, a map for how Arctic life can survive in a warming world.

Nancy: At the center of this research is James Barrett, who you met earlier. His fascination with global trade of natural resources started young.

James: I grew up in rural Nova Scotia on the east coast of Canada in a family where my mother was from a lobster fishing village, and my father was from a forestry background. And these are both very rural occupations that are nevertheless completely dependent on global markets.

Nancy: As a graduate archeology student, he decided to study the cod trade, in part because of the historical account describing Ottar's visit to the court of Alfred the Great. *What really piqued his interest at that time was what WASN'T in Ottar's story.*

James: He mentions all kinds of fascinating things about northern Norway, including the hunt for walruses and the trade for walrus tusks with the Sami, for instance. But he doesn't mention cod at all. So something strange had happened, between the late 800s, when cod from Northern Norway isn't mentioned, and the early 1300s when it's making up 90% of Norway's exports.

Nancy: And how did a young PhD candidate figure out what was happening with the cod trade in the late 800s, when there are precious few written records?

He dug up middens, which is what archaeologists call garbage dumps, in Caithness , and elsewhere in the North of Scotland. The idea was to comb through these ancient rubbish heaps to look for fish bones!

And… he found them. Thousands of itty bitty fish bones as small as 4 millimeters that he sieved out of tons and tons of dirt! And what he uncovered was the dawn of a large-scale international cod trade.

James: I was excavating middens where the rubbish in these middens, just from daily life, was over 90% cod bones. It was hardly any soil. It was basically just bones and bones and bones. And this wasn't something that was consistent through time.

This was something that seemed to be suddenly happening in the 900, in the 1000s, that this fishing was becoming so important. And when I started then looking at the archeological fishbone record elsewhere, England….but also elsewhere in continental Europe, it seemed like there was actually a sudden emergence of very large scale, marine fishing in the years around 1000 AD.

Nancy: Now James and his colleagues are working on a much bigger project that's in the same spirit as digging up ancient middens and reading ancient DNA from cod bones. They're looking at the global history of the walrus tusk trade. It's part of a larger multidisciplinary project called 4-Oceans, with researchers from across Norway and Europe looking at a range of marine creatures, from cod to otters to whales – and yes, walruses – to understand their economic and social importance over the last 2000 years. I'll put a link to their website in the show notes.

Nancy:And the tools they're using? They're mind boggling. On one end, you've got cutting-edge tech like a gas chromatography isotope ratio mass spectrometer and ancient DNA sequencing. On the other, there's old-school detective work—measuring centuries-old walrus skulls and scanning them in 3D. Each one is a different way to extract secrets out of the past.

Nancy: One of the most striking discoveries related to this research – although it predates the 4-Oceans project – came from when James and his colleagues looked at ancient DNA and stable isotopes in old walrus skulls. These two tools helped researchers figure out that there were two slightly different populations of walruses.

James: Given the direction of the currents around Southern Greenland, it's very easy for a walrus to swim from east to west. It's exceptionally difficult for a walrus to swim from west to east. So because of that, through sequential mutations and natural selection, the walrus population that is west of Greenland stayed west of Greenland, and acquired a very, very distinctive genetic signature.

Nancy: Another subgroup came from elsewhere, but might possibly include some migrants from Greenland too. Knowing where walruses originated would prove to be instrumental in unlocking the secrets of Viking and medieval walrus tusk trade.

The use of what are called stable isotopes allows researchers to actually get even more detail.

Katrien: So we're looking at carbon, nitrogen, and sulfur, and all three of them, they tell a different aspect of the life and the diet of a walrus. So carbon for example, tells us what kind of food it ate. Mostly it's gonna show was it ate marine food, of course. Nitrogen also shows us what kind of food it ate, especially like if it eats mostly shells or if it's sometimes also snacks on birds or other like baby seals sometimes, which walrus are known to do. And sulfur also can tell us something about the exact location. It, it comes from, like, especially related to how far from the coast it was or how deep in the water it was feeding. So these isotopes can really tell us where it was living and what it was feeding on.

Nancy: That’s
Katrien: Katrien Dierickx. I'm a postdoctoral research fellow at the NTNU University Museum, as part of the Four Oceans Project.

Nancy: Katrien is working with James and another colleague, Erin Kunisch, on isotopes, as well as measuring and studying skulls. We’ll get back to hers and Erin’s work in a bit. But these tools have been key in highlighting just how critical Greenland’s walrus population has been in the ivory trade.

James: The interesting thing is that when one looks at the ivory objects that survive from the Viking age to the Middle Ages, and also using DNA and isotopes, most of them are from Greenland, rather than from the European Arctic.

Nancy: This led the researchers to piece together a picture of the kind of big-time global trade that James identified back when he was a PhD candidate, sieving old rubbish heaps for ancient cod bones.

James: Throughout Northwestern Europe, there are very large numbers of walrus ivory finds dating to the Middle Ages, and also the skulls of walruses in which the tusks were traded. At the moment, the farthest south and east that there are discoveries of these skulls, from Greenland, is Novgorod and Kyiv,

Nancy: but there are also records of walrus ivory in Istanbul.

James: And there are historical records that so-called fish teeth, by which the sources meant walrus tusks, were also then traded from Eastern Europe, into Central Asia.

And so the likelihood is that the whole of Eurasian demand, during the Middle Ages was heavily focused on Western Greenland.
That was quite a shock, actually, when we discovered that, because the assumption understandably in the past was that Eastern European finds of Walrus ivory were probably coming from places like the White Sea and the Barents Sea.

Nancy: In fact, Ottar's description of walrus hunts that he shared with Alfred the Great *took place to the east, in the Barents Sea.*
But there's more. Most of the skulls….

James:... most of them date to after Greenland was settled by Scandinavians. And that happened about 985 AD and most of the walrus finds in Europe date after that, they start picking up around 1000 and are, really, really abundant after about 1100.

Nancy: There were also Vikings who had settled in Iceland, beginning in about 870 AD. But ancient DNA also helped another team of researchers see that the Icelandic population disappeared not long after the Vikings had arrived there. And that had a not altogether surprising effect, James said.

James: When the Vikings settled in Iceland, the walruses there disappeared very quickly. So they probably were overhunted in Iceland. *And that would be one of several variables that led to the settlement from Iceland of Greenland in the late nine hundreds.*

Nancy: At this point you are probably wondering, why was the walrus tusk trade so important to these far flung Norsemen in Iceland and Greenland? Why go to such great efforts to catch these beasts, and sail from Greenland for weeks or more, across the wild North Atlantic to Norway to trade?

James: Once we get to Greenland, then we have to think, okay, how is it that the walrus from Greenland ended up coming into Europe in such large numbers? There are two things to think about in that regard.

One of them is that, of course, the Greenlanders wished to maintain contact with Europe. Walrus tusks, also actually, the hide of walruses, which was used to make the strongest ropes, which existed in the Middle Ages, is used for ship rigging, church bells, things like this, there's historical records to them being sold in Cologne, for example, in the 1200s. So walrus tusks and walrus hide rope was the main thing they had to export of high value.

Nancy: But more importantly, these far-flung Vikings were religious! And they needed to pay church taxes!!! One thing you need to understand as you listen to James explain this next bit is that Trondheim was an important pillar in the history of Catholicism in Norway. And at that time it was called Nidaros.

James: A bishopric was established in Greenland in the early 1100s. And in 1153, an Archbishopric was established here in Trondheim, in Nidaros,
with the Greenland bishopric being part of that church province…. There were economic transactions, including the payment of church tax, from the bishopric in Greenland to Trondheim. And that was paid in very large measure, in these early years, in walrus tusks. And that's directly historically documented.

There was also commercial trade of walrus tusks from Greenland, coming into Trondheim and into Bergen, for instance. But, one of the key mechanisms was this involvement of the church, and particularly the Archbishop of Nidaros. And then from Trondheim, of course, the tusks were then distributed all over, and also from Bergen, of course, where they were being traded commercially.

Nancy: There's one more interesting piece of the puzzle of the walrus trade, one that signals how much pressure the Greenland walrus population was under as the walrus hunts intensified. That brings us back to Katrien.

Nancy: One of Katrien's main responsibilities is to measure the walrus skulls that are scattered throughout Europe, in different museums and natural history collections.

Katrien:My part in the project is to really understand the ecomorphology of walrus. So that means how does the size, the shape of the walrus skull and the diet of the walrus relate with human activities in the past? So I do that in two ways. So I study the walruses in a morphometric way, I measure them, I scan them, but I also take samples that we then analyze in the lab to study the isotope data.

Nancy: There are a lot of important reasons why walrus skull sizes and shape might change over the centuries.

Katrien: So the size, especially in also shape, varies of course throughout a species existence through time. It has to adapt to its environment. Environments are always changing. So we try and see if there's any changes in size through time to see if there's been any impacts with climate. For example, we know that the medieval period was quite warm at some point in time, but then at the end of the medieval period you had a little ice age. So did walrus go through any natural, changes there in terms of size but also shape- but also related to humans? Like if humans always hunt the big males, because they of course have the nicest pieces of ivory, then you would expect maybe that the big males start to now become smaller and smaller through time and then eventually you end up with smaller walrus through time.

Nancy: Katrien is still analyzing her measurements — she's measured and 3D scanned roughly 800 walrus skulls from Europe and North American collections – but even before she began her work, the researchers uncovered one clear trend.

James: T hrough time the walruses were getting smaller through the Middle Ages. In addition to that, they were of a genetic subgroup, which was more common in the very far north, rather than more southerly areas in Western Greenland.

Nancy: Now the plot really thickens. Because as walruses became scarcer in the south, it appears that Scandinavian hunters decided to get help from the local talent.

James: In addition to that, it's in the very end of the period of known walrus hunting in the 1200s and 1300 that medieval Scandinavian artifacts begin to show up in Inuit sites in the very, very far north of Northwestern Greenland and Ellesmere Island.

And putting all of these things together, it's suggesting sequential depletion.
So the hypothesis is that the Norse were hunting the walruses and demand in Europe was very high, of course. And then gradually, they hunted them further and further north, and then they reached the farthest north one can go. In fact, then they also began to trade for them with the Inuit.

James: So putting it all together through time, they're having to harvest smaller and you're having to go farther north. And if you're living in southwestern Greenland and you have to row or sail, and it's a short season, then this is not a trivial issue. And eventually, the journey just became too long to be realistic.
So this is perhaps one of the reasons why, particularly the northern, most of the of the Greenland settlements was abandoned in the 1300s.

Nancy: At the same time, two things are happening that will have a big effect on the walrus tusk trade. One is the arrival of (elephant sound) the elephant tusk trade. The second is a shift in artistic styles, from the Romanesque to the Gothic style, and the way ivory carvers worked their craft. Elephant tusks were bigger and longer than

those from walruses of course, but that allowed for the Gothic style of religious carving, which tended to be more intricate and naturalistic, than the Romanesque style. I'll put some examples of both styles in the show notes.

Nancy: You might think the demand for elephant ivory rather than walrus ivory would cause the Scandinavian hunters to try to find other sources of income. But instead, James says, hunters doubled down.

James: The fact that it seemed, based on these measurements and the genetic information that more walruses were being hunted at the very end of Norse Greenland to begin, was a very big surprise, because the received wisdom prior to that, which was very sensible, was that the walrus ivory trade must have dropped off starting about 1250, because that was the point when elephant Ivory began to flood into Europe, and walrus ivory was no longer the really desired raw material for sculptors. To begin with, we just couldn't put two and two together.

Nancy: And, James said that there is clear historical documentation showing that walrus ivory was less valuable than previously.

James: Walrus ivory stopped being valuable in the 1200s and 1300s, and the reason it stopped being valuable was that elephant ivory entered Europe in such large amounts at exactly that time, and it did. We know from the historical documents that the value of walrus ivory declined. There was a letter from the Pope to the Archbishop of Nidaros, Trondheim that is, that actually specifically said, please stop sending us walrus tusks, send us money instead for the church taxes. And so to begin with, these things were telling totally different stories, because previously we thought, OK, trade with Greenland declined because people didn't want walrus tusks any more. And that made life in Greenland very difficult.

James: But instead, it actually seemed that at exactly the time period when the value of walrus tusks was dropping, that the hunt was increasing, and maybe they were being over hunted. But of course, it does make sense, because if you're in Greenland, you want to maintain your contact with Europe. And if the price per tusk has decreased, then rather than hunting fewer walruses one actually has to hunt more walruses. And so we see that the Greenlanders were caught up in quite complicated, market dynamics, in what was a global commodity.

Nancy: Complicated market dynamics in the Middle Ages, who knew! And we thought global trade was complicated now!

TRANSITION MUSIC…..

Nancy: When I introduced this podcast, I said that part of the goal of the 4-Oceans project was to try to develop a crystal ball so that researchers could look into the

future for walruses. We know that Arctic sea ice is already shrinking at a perilous rate because of global warming. So… how will less sea ice affect walruses? That's where the (03:30)) gas chromatography isotope ratio mass spectrometer and (00:59)Erin Kunisch, a postdoc working with James, come in.

Erin: (15:20) So there's a lot of organisms in the Arctic, specifically that we associate with sea ice, because we always see them in pictures with ice. ….But in fact, there's a lot of organisms within the Arctic ecosystem that can do just fine without sea ice. They can live on beaches. They can live in open water, things like this. That's something we really need to look at in this time of serious ice decline. And so my interests are in the plasticity, the adaptability of organisms and what they can do in terms of an absence of their presumed habitat.

James: One of the questions… is the degree of association of walruses with sea ice in the past, because… walrus used to have a much more southerly distribution in eastern North America than they do today.

Nancy: Essentially by studying the chemical tracers, such as different isotopes, inside marine mammal bones, scientists can figure out the feeding habits of animals, and how they relate to one another within a food web.

A little review for those of us who may be a little rusty on our chemistry. Isotopes are atoms of the same element that have the same number of protons, but a different number of neutrons. Every element has its own number of isotopes, and the isotopes vary in weight based on the number of neutrons.

For example, the isotopes of carbon are all carbon,of course but some carbon isotopes are a little heavier than others. And that tiny weight difference functions as a chemical tracer in bones or teeth, helping scientists figure out a creature's diet, where it lived, and how the environment was changing around it.

The elements of interest to the researchers here are carbon, hydrogen, nitrogen, and sulfur, which are all found in organic matter – essentially food that the creatures of interest eat.

Nancy: But to get even more precise, researchers like Erin can zoom in to analyze individual amino acids—like going from a wide aerial view to a street-level close-up. It's part chemistry, part detective work.

Erin: The idea is that you have these isotopes that you're interested in and you're just basically opening it as a book. And you're saying, what else is in there that can give us a little more information about where they are within the food web, what baseline is supporting them? Is it sea ice associated? Is it open water? Is it benthic? Is it a combination of, of, of some of those ecosystems?

Nancy: Erin is still in the early stages of her research, so she doesn't have any results to share yet. But it all adds up to getting a better understanding of the relationship between sea ice and walrus populations.

James: There is a question, of course, about whether their more northern distribution is entirely environmentally driven, or whether it is in part a retreat due to past hunting pressure, so that the walrus may have been less dependent on sea ice in some portions of the range, or among some populations in the past than they seem to be at present, because, they've simply been driven north….

Nancy: There was a walrus population in the Canadian Maritimes – which the Canadian government called the Nova Scotia Newfoundland Gulf of St Lawrence population but it was hunted to extinction in the 1700s. Given that that particular population was so much farther south than the walruses in Greenland and Svalbard, it could be that the population wasn't completely dependent on sea ice.

James : We don't really know the degree to which it was or was not dependent on sea ice in the same way that walruses are today.

Nancy: There much more to the story of the walrus tusk trade than I can fit into this episode, unfortunately. But if you happen to be in Trondheim this year, there's a fantastic exhibition called "Sea Ivories" at the NTNU University Museum that's been organized as part of the 4-Oceans project. Among the objects on display are some of the Lewis Chessmen, loaned to NTNU by the British Museum. They were made from walrus ivory in the 12th century and were almost certainly crafted in Trondheim! I'll put a link to the exhibit information in the show notes.

OUTRO MUSIC

I'm Nancy Bazilchuk, and you've been listening to 63 Degrees North, an original podcast from NTNU, the Norwegian University of Science and Technology. My guests on today's show are James Barrett, a professor of Medieval and Environmental Archeology at the NTNU University Museum and Katrien Dierickx and Erin Kunisch, both postdocs working on projects associated with the 4-Oceans project.

If you want to learn more, you can see some of the publications from the research we've talked about today in the show notes. And if you've enjoyed today's show, leave me a review, and even better, tell your friends! We're on all major podcast platforms, so we're easy to find.
Writing, editing, sound design and production by me, Nancy Bazilchuk.
Thanks for listening