

Grain and transport

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This is the first proper episode in a trilogy with Scott Reynolds Nelson based on his new book, Oceans of Grain. We're starting with transport in large measure because that's where the story of grain starts, as a food that can be kept in good condition as it moves around the place. That movement probably began with people called *Chumaki* in what's now Ukraine. These were the first organised traders, moving wheat long distances along routes known as the black paths. And they were there, shifting grain, thousands of years ago. How do we know?

Scott Reynolds Nelson: That was really about the spread of *Yersinia pestis*, the plague, and using next-generation genome sequencing, they look inside the teeth, they identify how the plague travels, and it does travel from basically, just south of Kyiv, all the way to Manchuria, all the way to Sweden. It does so in a short period of time. We know, from the next-generation genome sequencing in the teeth of the people who we've recovered along those routes, that no people have traveled that far, that there's no evidence that humans have traveled nearly that far.

There must be some other way that this little pest, which has to live inside the stomach of a rat or the stomach of a human, running through the bloodstream, that it has to jump a short distance. To me, the logical explanation for that is grain. That was the explanation made in Science and Nature, these two breakthrough pieces. What it suggests to me is that we've been trading for longer than we've been planting, longer than we've been farming, longer than we've been emigrating. That, in a certain sense, trade may actually be, as Adam Smith says, the tendency to truck and barter might actually be something that's very deep in our DNA, I suppose.

Jeremy: If the plague is moving, the rats are moving, feasting on the wheat that's moving, but the people are not moving, that suggests that I might take it to the village over there, and somebody else would take it on from there?

Scott: Exactly right.

Jeremy: How was that organized?

Scott: [laughs] We have no idea. Luckily, oxen are available in this period, 2,800 BC. It's quite clear that something like auroch and oxen, descendants of auroch, are the things that are carrying this from place to place. I would guess that the trade is actually a little bit longer distance than just the next town. That it moves relatively quickly over 500 years, that suggests that there are perhaps longer trade networks, but nothing more than say 40 or 50 miles.

That tendency to truck and barter is interesting because it's not traditionally the way that Marxists think about trade. They think about trade ... modern Marxists think about trade as being something that's associated with capitalism. I think that this tendency to truck and barter is also deep in what makes us human.

Jeremy: Is it possible then to see traces of the actual routes that the grain was taking?

Scott: Yes, we have the Varangian Corridor ... in the eighth and ninth century, we've got other routes. Precisely where those routes are, is difficult to say, but it is clear that there was long-distance trade.

I think this is, to me, the story of the Chumaki, part of Ukrainian folklore. In the 1860s, a folklorist travels around Ukraine. The people that they interview say they have Chumaki songs, they have burial traditions, they have horns that they play when someone dies and they tell him that the Chumaki are older than the Greek empire. That they've been traveling these paths forever. If you visit the kurgans that are the burial sites, these big mounds, it's clear that there are people who are something like traders in the pre-historic period, and certainly, in historic periods. What are they doing? They're taking grain over long distances, along with leather, along with slaves, along with other goods over these long distances. Those black paths as they're called -- *chorni shlyakhy* -- are, to me, the foundation of the world. That they're really how humans interact.

Some anthropologists have suggested that gossip is one of the reasons we have language. [chuckles] An ability to retain information about people and to categorise and sort people that are larger than a single group. I think connected with gossip is also this way in which

we pass on information and goods and things like that, that are also fundamentally part of what it is to be human.

Jeremy: One of the things in the book that fascinated me is that the Ukrainian word for the Milky Way ...

Scott: It's Chumats'ki. Partly it's I think because the Chumats'ki Way is Interviewee... it's these Chumaki who are traveling, are using the Milky Way to orient themselves, to identify which direction to go, so they don't lose their way at night when it's very dark and you can't quite find the black paths. Of course, the other thing that's remarkable is that *chuma* — the word for plague — has the same root as Chumaki. Chuma is the word for plague. Chumaki is the word for a person who carries things from place to place, and also we now know carried the plague from place to place.

Jeremy: Amazing. Coming forward, I guess the next big move is that it's not moving over land, but it's moving by sea. You say that the Greeks had ships that were capable of carrying 400 tons of grain, something like that.

Scott: Right. The Ten Thousanders, they were called and they were designed for carrying grain from the Black Sea region, where there was lots of flat plains, lots of fresh water, to the Greek city-states, to the Aegean Sea. The *aristoi*, the people that are the leaders in this environment also make their money from this trade. You can think about the *Iliad* and *Odyssey* as being stories that are trying to plump up the *aristoi* to a certain extent. That they're telling their side of the story because there are plenty of Greek stories about how awful these traders are.

There aren't ships that large that are traveling the Black Sea and the Aegean Sea until the 16th century, with the Spanish galleons. This period of the ancient Greek world is distinctive, and it has very large ships that are designed primarily for shifting wine and grain over long distances.

Jeremy: In Greek times, the grain is moving from the edge of the empire to feed the centre of the empire.

Scott: Right. The way that many empires work — the Qing Empire, the Roman Empire, the Byzantine Empire — is that there's usually a circle of grain areas that provide food for the centre. In return, the

centre provides — besides "the leadership", effectively forcing these people to produce grain — it provides leather and pottery and other things like that. Then the outer edge of that grain region tends to be where the arms of the empire are, its armies. The grain in most empires that I'm familiar with have this measurement, and the grain, of course, comes into the centre and then is measured out.

This is what the milestones are in the Roman empire; how far away is this site? How costly is it to get to this site? It's 57, it's mile marker 57. That's a lot harder to get to than 37. You know the cost, effectively in terms of grain, about what it's going to take to dominate this part of your empire. The milestone is simultaneously a measure of distance, cost, and power of the empire. Armies take grain from that core and move outwards. Roman soldiers had a sword and a scythe. The scythe was for impromptu harvesting of the places that you happen to be dominating.

Jeremy: Jumping rapidly forward, we've gone from overland to sea, and then we come back to overland with railroads mostly, I guess. What causes that kind of shift?

Scott: Friction is the key thing to think about when you're... if you think about grain as stored energy and you think about water, it's a perfect ... it's an excellent way of distributing energy over a long distance because the friction is so much less. A railway is a kind of adjunct initially to water. You want to build a railway to deep water so that you can bring goods to the water and put them in. Even today, 90% of international trade takes place in container ships. Water is still our primary method of delivering things from place to place.

Railroads are a funny thing because they're a monopoly corridor. Unlike roads, unlike the sea, you have an institution that builds the rail, and that institution is simultaneously the one that's operating along the rail. There are all sorts of peculiar economic functions that it happens to serve. It's given the dynastic right to take rights of way to build from one place to another. There's often a question about whether you nationalise these or not, whether the empire takes control of them or whether they allow private citizens to do so. The United States allows private citizens to do so, and those people end up running the country [laughter]. Germany ends up dominating most of the major corridors, as does Russia. It ends up strengthening the

army and in some ways, shaping very fundamentally how it is that people consume grain and where they get their grain from.

Jeremy: In the book, you're very keen on nitroglycerine. It's almost a hymn to nitroglycerine. [laughter] Clearly, that has major effects on the movement of grain, primarily, but all sorts of other things too. How does that work? What does nitroglycerin deliver?

Scott: Nitroglycerin is discovered, I want to say the 1730s, something like that. It's initially used for expanding the heart, you ingest it and it's stabilised. Nitroglycerine though, once it finally stabilised around 1868, becomes a very powerful instrument for penetrating the lithosphere. Basically, human capacity to penetrate our lithosphere depends fundamentally on nitroglycerine because it can exert 125,000 atmospheres in a very brief instant. It's more than 50 times the power of gun powder. It's fantastic. It's of course incredibly explosive. You shake it and it leads to a chain reaction that is really just an impossibly powerful chemical reaction.

We know it's 1868 that it's finally stabilised because every mountain in Europe and the United States and much of South America are penetrated between 1868 and 1872. In the space of four years, humans have created these tunnels through the major mountains in the world. That's where you get *Around the World in 80 Days*, which comes out, I think around 1877 78 ... is a story really about the world that's been created when you can go through mountains for the first time.

Of course, it's also very important for ports because we're talking about friction, we want to eliminate the friction for delivery. If you want to collect grain, you want to be in a place that's got the deepest port that's most accessible for relatively large ships. Not only that but also allow those ships to pour out the grain into lighters or something like that and immediately turn around, make it very attractive.

Antwerp terraforms Antwerp. The Belgians terraform Antwerp, they cut through the Scheldt [River], they tear down almost all the city walls, they blast until they get very deep canals that surround Antwerp. Antwerp in the 17th century, it's a powerful place, but it's a minor city in the 18th century. By the 19th century, by 1871 72, it's the biggest port in Europe, and it becomes the place that feeds much of Europe. The Netherlands, not to be outdone, does the same thing

in Rotterdam and blasts Rotterdam, blasts through the Hook of Holland. They blast another canal route from Holland to Amsterdam and then Germans can eat their bread that comes from Chicago.

It's possible to get this very cheap food and it can come along the Rhine, which is very important. It means the Rhine has been canalised, initially to allow the internal movement of food. It ultimately becomes a place for moving external food, food from very far away. Again, it's water all the way. It's quite cheap to send that grain.

I think that the shocking thing about nitroglycerin is no one in the 17th or the 18th century would've thought that you would go 2000 miles away to get your grain. It's like the idea of starting in New York, shoeing your horse in Scotland, and then bringing it back; it just seems impossible. No one would do that. Why in the world would you get your bread from that far away? It becomes possible to cross the Atlantic cheaply and easily. That's revolutionary.

Jeremy: Do Suez and Panama figure into this?

Scott: Suez is actually very important here because the Suez Canal of course shortens the route from Britain to India, from Britain to China, and shortens the route from Europe to those places. The thing about the Suez Canal though, is that you can't send sailboats through the Suez. Steamships can go fine through that. There's all these East India men and very large ships, five masts, that previously had traded between Europe, mostly Britain and India, for bringing tea and things like that [and] that had previously gone all the way around Southern Africa to get there. Now, they don't have to do that, but there's an excess of these very large ships that are suddenly rendered redundant by the Suez Canal. Once that happens, the US is the beneficiary to this, effectively, because these very large ships can now go back and forth between New York, Philadelphia, Baltimore on the west coast and London, Liverpool, and Antwerp on the east coast. There's just a tremendous number of ships that are available suddenly to fill the oceans with grain.

Jeremy: They're not going back empty because they're taking all the people who want to leave Europe and find the promised land in America.

Scott: Right. A peculiar force of all of this grain is what I call Ricardo's paradox. (Other historians and economists call it this too.)

Ricardo's paradox is, why would anyone improve the capacity to produce grain because it's only going to make rents go down, which is going to hurt landlords? Why would landlords do this? This is a serious problem. All of this cheap grain, the 40% drop in the price of grain in the 1860s and 70s brought on by nitroglycerin, has this effect of lowering rents, which leads to unemployment in the countryside in Europe.

You've got these ships that have brought all of this grain from the United States to Europe that go back sometimes empty. That's where we get steerage from. It's a very cheap journey from Europe to the United States in the very same compartments that have brought grain from the United States to Europe.

Jeremy: This is a detour, but they don't convert the ship in any way, they just put people where the grain was?

Scott: [chuckles] They sweep it out, I suppose. Initially, I think that there are some walls that they have to take down and put back up and things like that. Yes, people are basically traveling in these very large parts of the ship that had been previously filled with grain.

Jeremy: I'm gobsmacked by the ramifications ... but the Trans-Siberian Railroad is built for wheat?

Scott: [laughs] Russia very much wants a warm deep water port. Odessa is an excellent one. It's part of the Russian empire. But it is blocked by Istanbul and Russia sees Istanbul as a real threat to its power. The Russians rename Istanbul in their own heads Tsargrad and the plan is to take Istanbul. They fight 10 wars to get it. [chuckles] The idea that you can produce grain in the eastern part of Russia, which does happen, and then drop it in a deep port in Manchuria is very attractive. The Trans-Siberian Railway, initially the formal plan is for it to go all the way East, but the secret plan is for it to go to Port Arthur in Manchuria. It's very exciting for Russia to have this deep water port that can unload its grain and sell it to the world again.

Jeremy: But it doesn't go anywhere.

Scott: [laughs] It actually goes quite well. Russia does a great job building Harbin Station, which is one of these convergence points, the place where it ships off into Port Arthur. It builds a highly centralised railway corridor. It's beautifully maintained but Japan is not too happy

about this because Japan, it turned out, had been forced to give it back to China — Manchuria, back to China — and it turned out it was Russia's doing. Russia just waltzes in and effectively buys this Manchuria.

And so Japan declares war on Russia and attacks Port Arthur and shuts it off. That whole area, Manchuria, is very very important. You can't get industrialisation in Japan without Manchuria. That's where you get your steel. That's where you get your iron. That's where you get chemicals and things like that. It's an amazing place for other things besides wheat. The plan for Russia is for it to be a wheat port, it becomes very much more than that.

Jeremy: Does the Trans-Siberian railway continue despite the inability to move wheat or does wheat move to Vladivostok and on from there?

Scott: It doesn't move to Vladivostok. Partly, it's a timing issue that Vladivostok is only open part of the time because of the ice. No; Port Arthur would've been a great place to release grain and Manchuria would've been a rather nice place to grow grain but that doesn't happen. Russia's invested millions and millions of rubles in this plan to go all the way to Manchuria and the funds are coming primarily from French investors, many pensioners, and things like that in Paris, who have bought these railway bonds and they'll never be paid off. They'll never be paid off once Russia loses Manchuria to Japan.

Jeremy: We're going to deal with that in another episode of the podcast, but just coming back to this whole idea of getting the grain out, what we see right now in the Black Sea is an echo, a mirror, of the way things were during the Great War, even before that, where the Bosphorus is a choke point and where they could, Turkey could, close off exports of grain. What can we learn today from how that played out before? I know there weren't mines in the waters around Odessa before, but what do you think that tells us about where we might see things going in the Black Sea now?

Scott: If you think about the world not as nations, not as capitals but primarily as black paths connecting one region to another for the delivery of food and things like that, the centre of the world from 300 AD forward, if not earlier, is Byzantium, Constantinople, Istanbul. It's the centre of the world. It's the way things get from the Black Sea to Europe. It's the way food comes to feed the whole Mediterranean, it's

vital, it's crucial. The fact that Erdoğan stopped military transport into the Black Sea once the war was declared, really foiled Putin's plans because he probably would've put more ships in the Black Sea, more military ships in. At that point, no military ships could go in through the straits of the Bosphorus.

If you could clip the pulse of the world, the place that you would clip is Istanbul. There are a tremendous number of container ships that pass back and forth through Istanbul every day. There have been ships that have been passing back and forth through that route for a very long time. You can tax it, you can stop it.

What does this say about the present? If I were Erdoğan, I would be a little bit concerned that Russia's increasing excitement about controlling all the northern part of the Black Sea is just a prelude to Russia's 2000-year-old dream of controlling Istanbul. I say that ... You know, that seems impossible, Russia's not even 2000 years old. But Prince Oleg nails his shield to the gates of Istanbul in 982. The Varangian Corridor ... what the predecessors of the Russians are obsessed with, this important and critical port.

Jeremy: So how does the grain get out of Ukraine? How does Ukrainian grain get out of Ukraine next month?

Scott: That's a serious problem, and of course, the potential is, you want to make a humanitarian corridor that moves grain from Odessa through the Bosphorus straits to North Africa, to Nigeria, to Egypt, to all of these places that need the grain desperately. The difficulty is, if the UN were to enforce this corridor for the delivery of grain, it might be seen as comparable to a no-fly zone in pushing the UN a little bit further into the conflict with Russia. There are the mines to deal with of course as well.

For a while, Russia was saying that the only way that it would allow grain to leave the Black Sea is by abolishing all the sanctions against Russia. There seems to be some movement on that but I don't know. I'm not sure. There's been talk of a green corridor that sends grain by rail through Europe. Because grain is so cheap per pound, because the railway corridors are somewhat different, because you really can't send that much grain by rail. You can send 500,000 tonnes a month by rail. A single grain ship can do that in a day. We're talking about measures that aren't really going to fix this fundamental thing — which is, you need a deep port on the Black Sea which passes through

the straits of the Bosphorus and feeds the rest of the world, as it has since the days of Constantine.

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