I just read a book that made me see the world differently. It's about an environmental upheaval that I never realized existed, and it dates back to Christopher Columbus.

I knew his voyage was the start of an era that brought slavery, smallpox and syphilis to the Americas. What I didn't realize was that the ships carrying the European explorers, traders and colonizers also brought to the Americas plants, animals, insects and other infectious diseases that permanently changed the biosphere. And when those Europeans returned to their own countries with plants, birds, insects and microorganisms from the Americas, it altered the environmental makeup of Europe.

My guest, Charles Mann, is the author of a new book about these radical environmental changes called "1493: Uncovering the New World Columbus Created." It's a follow-up to his book "1491." Mann is a correspondent for The Atlantic and Wired.

Charles Mann, welcome to FRESH AIR. Why do you see 1493 as the year that changed everything? What was unprecedented about Columbus' voyage or voyages and how they connected the globe's two hemispheres?

MR. CHARLES MANN (Author, "1493: Uncovering the New World Columbus Created"): Well, if you think about it, you know, there's been a tendency in textbooks now to kind of downplay Columbus because they say he was a bad guy, and he mistreated Indians, and he discovered the Americas by accident and so forth.

But to ecologists, he was this super-important figure, and the reason is that 200 million years ago, as you remember learning in school, the world was a single, giant land mass they call Pangaea, and geological forces broke it up, creating the continents we know today. And over time, they developed completely different suites of plants and animals.

And what Columbus did was bring the continents back together. He recreated Pangaea, in effect, and as a result, huge numbers and plants and animals from over there came over here, and huge numbers of plants and animals from over here came over there, and there was a tremendous ecological convulsion, the greatest event in the history of life since the death of the dinosaurs.

And this underlies a huge amount of the history learned in school: the industrial revolution, the agricultural revolution, the rise of the West, the collapse of China - all of these were tied in what's been called the Columbian exchange. The term was invented by this wonderful historian, Alfred Crosby. The Columbian exchange sort of underlies them all.

Mr. MANN: Well, Columbus started off, he brought wheat. He brought cattle. He brought horses. He brought all kinds of, you know, plants that are in our gardens today. But almost as important, or even - and in some cases more important, were the things that he brought over and didn't realize.

He brought over a whole plethora of diseases, he and his followers. I shouldn't say Columbus, just, you know, the Spaniards who came after him brought all these diseases that didn't exist in the Americas. And they brought all kinds of insects. The list is just absolutely enormous. One of the things that they brought over were plantains, or bananas, which are, you know, basically the same species. And they planted them because they - the Spaniards liked them. And they didn't realize it, but as the entomologist Edward O. Wilson, this famous entomologist, has postulated, they brought over some of the plantain's pests, which are these tiny little insects called scale insects that live on the roots of the plantains. And when they planted these big, you know, banana plantations all over Hispaniola, which is what the Dominican Republic and Haiti, the Spanish colony, it was - led to this huge boom in the population of these scale insects.

Now on this island, already, was an ant, a fire ant, Solenopsis geminata, and it turns out to really, really like scale insects - particular the excrement of them, which is very sugary. And it led to this huge population boom...
of the fire ants, which in turn led to something out of Gabriel Garcia Marquez, where there's this ant plague that drives Spaniards effectively off the island, and the few remaining are, you know, praying to the various saints to drive them away, and they're, you know, living on top of the roofs of their houses because their places are swarming. **And this is the kind of ecological convulsion that I'm talking about, you know, magnified 100-fold and spread across the world that's created and set off by Columbus.**

Mr. MANN: You know, the histories, you read about these, you know, this in the Spanish chronicles, and basically they're saying in, you know, sort of dignified 16th-century Spanish, oh my God, you know, just over and over again at these strange results.

GROSS: So you mentioned that these ants were on Hispaniola, the island that has the Dominican Republic and Haiti. It was that island that Columbus first tried to colonize. This was in - he founded La Isabela, named after the queen, who was funding him, in January 2nd of 1494. This was supposed to be, you say, a permanent bastion in the heart of Asia.

(Soundbite of laughter)

GROSS: A headquarters for exploration and trade for Spain. So describe what actually happened when Columbus got to La Isabela.

Mr. MANN: Well, it was kind of a catastrophe. I mean, it only lasted for a few years. He set up this whole town, and he forced everybody to build a big mansion for himself and, you know, plant it with all kinds of European crops. And then he sent everybody off to discover the gold that he was absolutely sure was in the hills. And meanwhile, he went off to find China. And **they didn't find much gold**, and they of course, didn't find China, and **the whole thing dissolved into squabbling and Indian wars**. And it would've been pretty much a thorough failure except that about that time, the Spaniards accidentally imported diseases, particularly **smallpox**. And these kind of didn't exist at all in the Americas. This whole range of what they call crowd diseases - diseases that can be spread from person to person - didn't exist in the Americas at all by a **quirk of history**. And the reason is that when the continents broke up and various other things happened, there was no domesticable animals in the Americas. There were no, you know, horses. There were no cows. There were no sheep. There were no goats. There were no ducks. And one of the things that happened in Europe and Asia was that people lived, **for thousands and thousands of years**, right next to these domesticated animals, you know, the cows and the horses and so forth. And every now and then, an animal disease can do what scientists call jump the species barrier and become a human disease. And so the most recent example would be bird flu, which everybody knows is a disease that, you know, started in some kind of bird and has now become a human disease.

Well, **all of the great diseases, you know, from smallpox to measles to influenza, are this kind of disease, and none of them existed in the Americas because they didn't have any domesticated animals.**

**And so when the Europeans came over, started by Columbus, it was as if all the deaths over the millennia that have been caused by these diseases were compressed into 150 years in the Americas.** And the result was to wipe out, you know, somewhere between two-thirds and 90 percent of the people in the Americas.

And this had just, in addition to enormous human effects - I mean, it was the worst demographic catastrophe in history - it had enormous ecological effects, because these people had been tending the landscape, managing the landscape, and suddenly it reverted into wilderness.
Charles C. Mann’s *1493: Uncovering the New World Columbus Created*

One of the ironies of this is that, you know, I think we learn in school that Europeans came over to the Americas and sort of wrecked the wilderness. And what they in fact did was, in the most awful way possible, they created it. And this is part of the ecological convulsion of the Columbian exchange.

GROSS: That's such a different way of looking at things. When did historians start seeing the explorers bringing these epidemics, which destroyed populations and thereby created wilderness?

Mr. MANN: Well, it's the Spanish accounts and the English accounts and the colonial accounts. If you read, you know, William Bradford's account of Plymouth, you know, the first colony in New England, he talks about how just before they arrived, there was a huge epidemic that swept away the people and made room for them. **So if you look in there, it's quite clearly in those accounts:** they were aware of it. It sort of got forgotten, and then in the 1960s and 1970s, the knowledge kind of got resurrected again. And there was a couple of historians, there's a guy named Henry Dobyns, there's a guy, Alfred Crosby, that I mentioned, who really brought it to attention. And when you start adding up everything that we know, it becomes very evident that there was just an enormous catastrophe that took place. And a lot of it took place outside of European eyes because Native people didn't have these kind of diseases. They didn't have the idea of quarantine. And back before there was antibiotics, what happened if you had a contagious disease, you were kind of fenced off, right. So the people in plagues, you know, like in Boccaccio, would, you know, would hide away from this. None of that happened in the Americas. So somebody would get smallpox, and the whole village would come around and try to comfort that person. They would all get sick, they'd flee in panic, they'd run to the next village. They'd spread it there. And so these diseases exploded like chains of firecrackers across the landscape.

GROSS: So in North America, when the settlers were fighting wars with the Indians, the Indians that they were fighting with, the Native Americans they were fighting with, were survivors of these plagues?

Mr. MANN: Yes, they were, by and large, people, you know, who were in a state of complete cultural shock because, you know, two-thirds of the people that they knew had died. And **there is just no culture that can resist foreign invasion**, even by small bands of people like the Europeans were, when you've just had this enormous, shattering experience.

Alfred Crosby pointed out in "The Columbian Exchange," that if Genghis Khan had arrived right after the Black Plague, you and I would not be speaking a European language. He would have just swept in.

(Break)

GROSS: So you were talking about how Columbus and subsequent explorers brought with them to the New World domesticated animals like horses, cows, pigs, chickens, and, you know, how on the one hand, you know, this brought a lot of disease, but at the same time, it created, you know, opportunities. You point out that for instance people in the Americas had no other - had no form of transportation or of, you know, moving things, carting things except for other humans. But what confuses me about that is I always thought that there were always wild horses in North America and that Native Americans had horses or ponies before the European settlers got there.

Mr. MANN: Well, they did in some cases, but they were - it was a recent innovation. What happened is the Spaniards brought horses to Mexico in the early 16th century, and it took the Native people no time at all to realize what a great thing this was. And they began stealing them, you know, basically as soon as Cortez arrived and funneling them up into the north. Meanwhile, in North America, in the American West, Native people also realized what a tremendous advantage people with horses had over people who didn't, and there was a kind of an arms race as they raced to the south to get control of the horses, and it was a complete...
convulsion in Native culture as people gave up their farms, adopted the horses, and this whole, you know, horse-riding culture that you see celebrated in these great photographs of Edward Curtis and, you know, is in countless cowboys and Indian movies was, in fact, a complete cultural adaptation to the arrival of this foreign animal.

GROSS: What are some of the other ways that domesticated animals changed life in the Americas?

Mr. MANN: Well, there were no grazing animals of the sort, you know, like cows or sheep that people had. And so ecosystems throughout the Americas were completely unused to them.

I have to put a caveat in there. There were some in the Andes with the llama and the alpaca, but basically they didn't exist, and so there are large parts of the American landscape that sheep and goats and cattle so forth nibbled down to the ground and radically transformed. And there's a woman named Melville who has written a couple of books about this - she's dead now - and talked about how the Mexican landscape - you know, the sort of Sergio Leone Mexican landscape - is in many cases a modern creation. Before, it was much, much lusher. It just simply got eaten down to the ground by these creatures that hadn't existed there before.

GROSS: Let's talk about Jamestown because it has a really interesting ecosystem subplot. Now, the colonizers came to Jamestown looking for silver and gold and expecting to find it. They didn't. But they started growing tobacco, and tobacco became really big there, they brought it back to England by ship, and here we start getting some really interesting, surprising ecological consequences. What happened?

Mr. MANN: Well, as you say, tobacco was this craze. It was, in fact, the world's first, you know, global commodity craze. Everybody all over the world, sort of simultaneously, went nicotine-mad. And obviously Virginia, one of the main supply places, this is a great thing, they start sending over huge quantities of tobacco. And the way they do this is by leveling the forest all over Chesapeake Bay and planting tobacco. And this has a couple of effects. The first is that tobacco is absolutely notorious for exhausting the soil. Basically when you harvest tobacco, you harvest the whole thing, and so you're just essentially taking all the nutrients in the soil, putting them into this big plant and then putting it in barrels and sending it on ships. The other thing that happened was that European ships would come in, and they would have ballast that would be necessary to balance the ship, and when they took in all these heavy barrels that would weigh, you know, half a ton or so, they would throw out the ballast, and the ballast had lots of soil in it, and the soil almost certainly carried earthworms. And the interesting thing about that is that all over the northern part of North America, there were no earthworms. They were destroyed by the Ice Age, so far as we know, and so all the earthworms that are now in the gardens of - you know, my garden in Massachusetts are imported. They're exotic species. And in the thousands of years since the Ice Age, an ecosystem had evolved in which earthworms didn't play a part, and the leaf litter, which is what earthworms eat, sort of piled up on the soil, and plants and trees, sapling sought their nourishment in that.

The earthworms move in, they eat all the leaf litter, they stick it under the soil in the form of castings, which is good for your garden, but it's terrible for all the other creatures. And in fact there's a kind of a rear-guard earthworm-fighting action that's taking place in the remnants in the old forest, in places like Minnesota and Alberta and Ontario, where they have - there's this great place, the Minnesota Worm Watch, where you can get all these posters about, you know, contain your crawlers. If you're a fisherman, you're not supposed to dump them. And they're still trying to preserve the remnants of the pre-Columbian forest. Where I am in Massachusetts, it's pretty much gone, and it's been transformed by the presence of these underground engineers.

GROSS: Now is it Jamestown that also brings malaria into America?
Mr. MANN: Yeah. No, there was no malaria in the Americas. And this is a tremendous thing for Native people - of course, they didn't know it - because malaria is this tremendously wily parasite. It's a single-celled creature that has proven just extraordinarily difficult to eradicate and has had huge impacts in places like Africa, where, you know, there's all kinds of calculations by economists that if malaria hadn't existed in Africa for the last 200 years, it would just be fantastically wealthier than it is now because so much of the continent's human capital goes into being sick all the time.

And so what happens is that there are - malaria is this parasite that needs these particular mosquitoes to survive. They exist in the Americas, different species, but they're compatible with malaria. And Europe has malaria at this time, particularly southeast England, and they - it comes over in the bodies of colonists, gets picked up by the mosquitoes and makes this broad band of the coastal Americas - from Chesapeake Bay down to, you know, the southern border of Brazil - just full of malaria, and it becomes quite inhospitable for European colonists.

And in places like Virginia, they have to go through this process, it's called seasoning, which is you bring over an indentured servant and then you sit around and wait for a year to find out if he's going to survive or not. And death rates are up to, you know, 40 percent. So you bring over these servants, and 40 percent of them kick the bucket the first year, and many of them are sick for long periods thereafter. It's hugely expensive. And at that point, people start looking around and they start seeing Africans. Now the interesting thing about Africans is that they're - in a sort of a strict Darwinian-type sense - they're genetically superior to Europeans because their bodies contain - particularly people from West Africa - certain mutations that make them the most immune to malaria of any people on Earth. I'm skipping a lot of technical details. There's actually two types of malaria, and so on. But the basic thing is that Africans are much less likely to get sick. And so people who import them have an economic advantage over people who import Europeans. And the result is that in malaria areas is kind of, the Columbian exchange, bringing over this parasite, the malaria parasite is actually kind of nudging these societies toward slavery. Now it doesn't mean that malaria causes slavery. Obviously, people are moral agents and make their own decisions. But we all know what the lure of the market is, and you just have a better chance of making a success out of your operation if you bring in people who won't get sick immediately.

GROSS: And also, I would imagine if a lot of the people they were bringing in as indentured servants were dying, that slavery seemed to the plantation owners to be an economically favorable system. Not only weren't the Africans dying, but, you know, you didn't have to replace them as quickly, because they had this immunity - not that the Europeans understood the concept of immunity yet.

Mr. MANN: No, exactly. It's - you didn't have to understand it to have the economic advantage. It's sort of weird, you know, in a way, to be talking about slavery - which is this awful thing - in this kind of cold-blooded way. But, you know, at bottom, it was an economic institution. And the Columbian Exchange - in the form of bringing over these diseases - favored its creation in this broad belt of the Americas. It's striking to me that the area in which the worst kind of malaria - which is called falciparum malaria - can survive, you know, regularly, in a routine way in the Americas, stops right about Chesapeake Bay, right about Washington, D.C., actually. And that's where the Mason-Dixon line is.

Societies north of that - you know, where I live in Massachusetts - had slaves much more than people in New England like to acknowledge. But the societies south of the malaria line are really slave societies in ways that New England and places like that are not.
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GROSS: Well, doesn't the malaria surviving south of the Mason-Dixon line have a lot to do with the climate, because mosquitoes survive better there?

Mr. MANN: Yes. Absolutely. Exactly. Exactly. And also the parasite doesn't, if it gets too cold, the parasite slows down - you know, it's just a single-celled creature - and it takes so long to, you know, reproduce and do its business inside the body of the mosquito, that it effectively - the mosquito dies before it can finish reproducing. And so you have this area in which the mosquitoes can survive, but the parasites can't. And that's, you know, sort of north, right around Washington, D.C.

GROSS: I love the story that you tell in your book about guano, bird dung.

(Soundbite of laughter)

GROSS: This is, I think, one of the real high points...

(Soundbite of laughter)

GROSS: ...of the book. And you said, you know, bird dung, guano, was discovered, you know, in South America to be a great fertilizer. And when the Europeans came and they realized what a good fertilizer it was, they wanted to bring it back to Europe. So how did they go about doing that?

Mr. MANN: Well, guano came from these islands off the coast of Peru, the Chincha Islands, which had been the home for seabirds for, you know, millennia. And the seabirds had built up these enormous kind of mountains of guano. You know, some of them two or three hundred feet deep. And effectively, what they set up was guano mines, complete with mining carts and people with pick and shovels. Now, this is just about the most awful work you can imagine. And so, of course, no Peruvians wanted to do this. So what they did was they brought over Asian slaves. Thousands of them were essentially abducted in southeast China and brought over, thinking they were going to go to the California gold fields. And lo and behold, they ended up in probably the most awful place on Earth, digging this stuff. And the mining conditions for the guano were just - I mean, no matter how ghastly they are, the more you read about it, they're more ghastly than you imagined. You know, each part of it is worse than the next, no matter which order you take it in. And so, for instance, my favorite little sort of horrifying detail is that in the guano are little crystals of ammonia. So when your ax was, you know, whacking into this, you know, the cliff wall of guano, there's little bomb bursts of - tiny little minute bomb-bursts of ammonia going off, and then you would load it into these carts and dump it down this long chute several hundred feet into the hold of a waiting ship. And there were - more slaves would be down there, more Chinese slaves. And this stuff would just explode, and they would be completely naked, with cloth wrapped around their face, trying to shovel out this stuff. It was just horrifying.

GROSS: That sounds really horrible. And it ended up being a big scandal.

Mr. MANN: Right. No - it's even for the 19th century, this was a bit much. We're talking - and there were, I'm happy to say as a journalist, there were enterprising reporters who exposed this, and there were efforts to reform it - mostly ineffectual. What really happened was the Peruvians exhausted the guano deposits, and then moved on to deposits of nitrates in Chile.

GROSS: So as horrible as this, like, slave colony of guano miners was, you write that the guano trade also launched modern agriculture...

Mr. MANN: Yeah.

GROSS: ...and some of its worst pitfalls. But...

(Soundbite of laughter)

GROSS: ...so how did guano trade launch modern agriculture?
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Mr. MANN: Well, you know, the way that a modern farm works is that, you know, the land is kind of like a Petri dish, and you pour in nutrients in the form of, you know, high-intensity fertilizers, and you plant in the crops you want to grow, and then you spray on, you know, the pest protection that you need. And it's a scientific way of farming that was really invented in the 1840s, and it's totally dependent on high-input fertilizers on, you know, heavy fertilization, to get these fantastic yields. And there's just no question about it, modern agriculture has been this tremendous boom. And, you know, famine is basically - compared to what it was - you know, it's almost eradicated in the world. Obviously, there's still very many hungry people, but it's just absolutely nothing like what it was two or three hundred years ago. But it depends on this system that was invented in Peru and brought over to the Americas in the 1840s, and it has serious pitfalls.

GROSS: Like?

Mr. MANN: Well, one of the things that happened was that Peruvians brought over the fertilizer and was, you know, spread all over European fields. And with it came some Peruvian potatoes. Potatoes are, you know, from Peru, and they were infected with a fungus-like organism - it's called an oomycete - that causes potato blight. And in 1845, we had the first - you know, right after the, you know, shipment of the first guano, we had the first modern agricultural disaster when the potato blight exploded over Europe and, you know, sort of wiped out the potatoes in a 2,000-mile range from, you know, Ukraine all the way to Ireland. And there's these studies that the average Irish person ate, you know, some fantastic amount of potatoes a day, like laborers ate 20 pounds of potatoes a day, or something absurd like this. Anyway, there were - 40 percent of the people in Ireland, or something like that, ate nothing but potatoes for solid food. And all that vanished in a matter of weeks, and there was massive starvation. It was horrifying. And about a million Irish people died; many, many more fled the country. And as a result, Ireland - it was such a huge disaster for Ireland that the country still hasn't recovered today, 150 years later. And Ireland today has fewer people now than it did 150 years ago. And it's got to be the only country in the world that's in the same borders that has fewer people now than it did 150 years ago.

GROSS: So your new book "1493" is about how the world was environmentally changed, how ecosystems were changed after Columbus and subsequent European explorers came to the Americas. So what's one or two of the things you wish students were being taught in school now about Columbus?

Mr. MANN: That - I would wish that students were taught what a tremendous landmark in human history 1492 was. That, you know, it was the beginning of the modern world. And that two huge things happened as a result of it, to the human race itself. The first was that the things we've been describing, there was this tremendous die-off of Native people. And it's been estimated that, you know, one out of every five people on the planet died in the next hundred years as a result of this unintentional bringing over of diseases. And the second thing is that what happened after the Europeans came was not so much that Europeans came, but the Africans came. The number of Africans who came to the Americas up till about 1840, 1850 far outweighed the number of Europeans. There were three Africans for every European who came to the Americas in those first couple hundred years.

GROSS: And this is because of slavery.

Mr. MANN: Because of slavery. And so the Europeans who came, like, you know, many of my ancestors in the later part of the 19th century came to landscapes that had been radically changed, but they had - and to new cities. But those cities had been built African hands, the landscapes had been reworked by African hands, the boats that were going up and down the rivers were piloted by African crews. And so that - there was a tremendous change in the very distribution of the human race on the planet as a result of Columbus.