



BEN FRANKLIN'S WORLD

Episode 412: Joyce Chaplin, “The Franklin Stove”

[00:00:00] **Announcer:** You’re listening to an Airwave Media podcast.

[00:00:04] **Joyce Chaplin:** But he did think that there should be better stewardship of the resources, and conserving trees with something that all colonists should be engaged with. So in one of his almanacs he publishes “The Scheme of a Friend” to really have kind of modern forestry that certain kinds of trees are preserved or even planted, and then harvested very, very carefully. So this is an ongoing concern of his. How many trees do we have left? What is the fuel situation?

[00:00:42] **Liz Covart:** Hello and welcome to episode 412 of *Ben Franklin’s World*, the podcast dedicated to helping you learn more about how people and events of our early American past have shaped the present-day world we live in. And I’m your host, Liz Covart. Actually, I’m not your host today. Instead, this episode was produced and hosted by my friend and colleague, Joseph Adelman.

Now, you may remember Joe from several of our earlier episodes, where he was the first person besides myself to host an episode. He did this with episode 156, “The Power of the Press during the American Revolution,” which was back in 2017. Now, Joe has helped out a lot over the years. So when I decided to make this podcast an independent production again, I asked Joe and our friend and mentor Karin Wulf if they would help out, and they both said yes.

So every once in a while you’ll hear an episode produced by Joe, which frees up my time to work on other important elements of this show. Plus Joe brings a very different historical expertise to this podcast. Now, like me, he’s a scholar of the American Revolution, but his research expertise is different. Joe is a historian of media communications and politics of the Atlantic world.

He published a book on these subjects in 2019 called *Revolutionary Networks: The Business and Politics of Printing the News, 1763 to 1789*, which you can hear more about in episode 243. Joe is a professor of history at Framingham State University in Massachusetts, and the associate editor of the *New England Quarterly*.

It’s also important to note that Joe is a real expert on Benjamin Franklin’s life and work. So he’s the perfect person to host today’s episode, which is about Benjamin Franklin and his Franklin stoves. So with that, Joe, please take it away.

[00:02:28] **Joe Adelman:** Hi, I’m your host for today, Joe Adelman. Did you know that colonial Americans were also worried about climate change? During the eighteenth century, people around the world were dealing with the Little Ice Age, an era that lasted over three hundred years, in which global temperatures fell more than one degree Fahrenheit from their long-term average. People were therefore interested in all sorts of ways to make themselves,



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and even the climate, warmer. But they also realized that they were chopping down wood to burn for fuel at a rate that wasn't sustainable.

Benjamin Franklin thought he had a solution. In this episode we'll chat with Joyce Chaplin. Joyce is a professor at Harvard and an expert on both Benjamin Franklin and the history of science in early America. She's also one of my mentors, going back further than either of us would like to admit.

During our conversation, Joyce reveals how Franklin came up with five different designs for a stove to heat indoor spaces, the different ways that Indigenous peoples and European colonists thought about fire as part of their lives, and how she believes we should compare the Industrial and American Revolutions. Are you ready to hear more about the podcast's namesake and his famous stove? Let's go meet our guest expert.

Our guest this week is a historian at Harvard University. Her research and teaching focus on the history of science, climate, colonialism, and the environment. She's written or edited ten books including *Subject Matter: Technology, The Body and Science on the Anglo-American Frontier, 1500 to 1676*, *The First Scientific American: Benjamin Franklin and the Pursuit of Genius*, and *Round About the Earth: Circumnavigation from Magellan to Orbit*.

Her research has taken her to archives across the United States and Europe, as well as several expeditions on the Atlantic Ocean to retrace Benjamin Franklin's measurements of the Gulf Stream. Welcome to *Ben Franklin's World*, Joyce Chaplin.

[00:04:41] Joyce Chaplin: Thank you so much, Joe. It is wonderful to be here.

[00:04:44] Joe Adelman: Thank you, we are glad to have you here. So to start, *The Franklin Stove*, the book that you've just published, is your third book study of Franklin. You've written a biography of Benjamin Franklin, as I mentioned in the intro, as a scientist. And also edited his *Autobiography* for publication. So what brings you back to Franklin for another round?

[00:05:04] Joyce Chaplin: I am surprised myself that I had another book on Benjamin Franklin in me, since I thought I was completely done with him having done these two other books and a lot of essays and other things about him.

I had moved on to kind of set of studies about climate history, and was reading about the Little Ice Age this period of cooling, the biggest change in climate before our own. This was not caused by humans, but a period of cooling from about 1300 to 1850. And I was reading about a particularly bad winter, 1740 to 1741, which was very bad. A lot of harbors froze over: Philadelphia, London, the Venice Lagoon froze. The winter caused a harvest failure and led to the deaths of as much as a fifth of the population of Ireland, so a bigger toll than during the great hunger of the 19th century, the better known period of famine.

So I'm reading all about this kind of disastrous winter scenario and thinking, you know, I know these dates from somewhere, 1740 to 1741. And I finally remember that that is when Franklin was busy inventing his stove. I talked about that in my earlier biography of him and



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annotated that material in the *Autobiography* that I did for Norton Critical Editions. But I'd never really drawn that out as a kind of dramatic detail.

So at first I was kind of embarrassed. It was like, you know, I missed a big spot in that man's engagement with science. And then I consoled myself. I said, "well, you could do a little essay about it, right? And fill in that gap." So I started doing the research about it. And it went on and on and on, because I discovered that he didn't just invent the stove from this period. He invented five stoves over the course of his life. So an ongoing project, not linked to any one iteration necessarily. Franklin kept improving them.

So as I did the research over these five different stoves that he invented and why, and the different circumstances under which he did each model, the little essay grew and grew and grew, and now I have a whole book. So that's how it came about is originally something I missed, and an attempt to fill that gap and now a bigger story than even I'd anticipated.

[00:07:22] Joe Adelman: Well, I think we're glad that it's a book, and the Franklin stove is something that is on the litany of Franklin inventions that sort of everybody is at least vaguely aware of. But I know even for someone like me who's also spent a lot of time with Franklin, I didn't really understand until reading the book what the stove was or how it worked. So could you briefly explain what is a Franklin stove and what function does it serve?

[00:07:48] Joyce Chaplin: Okay, so this is an invitation to talk about all five, perhaps, necessarily briefly for each. Let me just say that the big goal of any of these that Franklin invented was to generate greater heat with less fuel. So it was originally a conservationist model to preserve firewood trees in Pennsylvania, especially during a very cold winter when the price of fuel was skyrocketing. And some poor families were being assisted by being given free firewood, kind of necessary. It's like an energy intervention during moments of emergency.

So Franklin was really afraid, you know, if we're going to keep on having these cold winters, we're really going to run out of firewood as the population of Pennsylvania grows. So conservation, generating more heat with less wood. How do you do that?

Franklin's main principle for doing that was convection. Exploiting the tendency of air when heated to expand and rise. So Franklin thought, well, that's a principle that would eventually fill an enclosed space with heat. So that's what you really want to employ to maximize the power of a fire source.

The very first iteration of his fireplace was a six-sided, but open-mouthed box made of iron that would fit inside an existing fireplace. You slide it in, it's a fireplace insert, but it had this lower plate with this protruding lip out into the room that brought the fire further away from the chimney where the hot air would just whoosh right up and never even enter the room.

Franklin was kind of calculating. His principle was that the convection, the hot air's pressure, would prevent smoke from entering the room as well. So you would get this bank of heated air entering the room, keeping people warmer in a greater space with less fuel, and yet also



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repelling the smoke, sending it up the chimney. So that's version one, which probably didn't really work as Franklin admitted by modifying it into version two.

So version two has that six sided box with the fire extended out further into the room than an ordinary fireplace would do. Franklin also installs a kind of metal box in the chimney. These additional plates that have baffles or ridges, so therefore more metal space. And the heat that is being absorbed is connected to two small openings in the fireplace that push warm air out into the room.

So this is interesting. This is a very early version of forced air heating. Taking some of the excess heat that was leaking up the chimney and forcing it back into the room, therefore generating yet more hot air that would be this bank of protection against the smoke, which being cooler and heavier would descend obediently and go back up the chimney. So that was model two.

If somebody looks at the Wikipedia page for the Franklin stove, those are the models. It's actually model two that they're probably going to see described. So those are the classic ones. I guess we would say original, but Franklin had three more to go. So indicating continued dissatisfaction with the design and why not keep tinkering, but those are the classics.

[00:11:09] Joe Adelman: Well, let's actually talk a little bit about the tinkering. So how did he design his experiments? What was his research method for figuring out across these five designs what he wanted to do to make changes?

[00:11:21] Joyce Chaplin: I think step one, maybe in his research method, I like calling it that. Step one in the research method would be the fact that he is aware of the Pennsylvania iron industry. And I really do wonder, he's originally from New England, and if he'd stayed there, would he have ever really thought about doing this? I mean, New England produces some iron, but not on the scale Pennsylvania where just this material is all around him.

And Franklin is aware that all the iron makers are making stoves. They're making back plates for fireplaces to radiate out more heat. So he's surrounded by these people who are already doing this kind of tinkering and invention.

He reads about European stove improvers or designers. So he reads that scientific literature from specialists on heat. So those are, I think the first two steps in terms of his becoming aware that there are ways to tackle this problem. How do you generate more heat with less fuel, and what materials he might have to hand.

It seems like the first materials that he used were not made of iron however, he invests in steel sheet metal, very expensive during this time. It was something that you didn't just buy every day, but lighter and easier to kind of maneuver. So if we imagine Ben Franklin down on hands and knees trying to get something in his fireplace to see whether some configuration or some part would work, he's probably doing that with these pieces of steel that he orders to see whether creating a different kind of box that can go in and out a fireplace would work. And if so, how the heat could be optimized.



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And once he has a prototype that he thinks, “okay, this looks like it would do it.” Then he goes and talks to one of his iron merchant friends to have that cast in iron, and that presumably was model one.

[00:13:07] Joe Adelman: Is there a relationship between how he’s thinking about heat, and what we’re also familiar with, are his experiments on electricity, does he see those as part of the same universe of research? Does he see them as two separate bodies of research?

[00:13:21] Joyce Chaplin: He does the experiments with heat, as I am going to call them, first. So they are his first scientific experiment that yields an invention. And I do think that there is an intellectual connection, that encouraged by his success with controlling heat, which he would’ve conceived as a flowing substance. Hot air is a kind of fluid that waves around and eddies through rooms. And that was the way that he and others would think about electricity, that it was another fluid substance that existed and then could sometimes coalesce gathering strength under certain circumstances to become even more apparent as when you’re shocked by something or when you see lightning.

So yes, there’s an intellectual connection, but it is interesting that the heat comes first and Franklin helpfully publishes—he self-publish, meaning he prints at his own print shop—a pamphlet that describes some of his experiments leading to the invention of this stove. And then where somebody can buy it and then how to assemble it.

So you received the first models of the stove as a flat pack kind of stack of these sheets of metal that you then have to get somebody to help you get into the fireplace and configure correctly. And then mortar around the edges to seal it and so on. So this is the pamphlet that he publishes. It’s like IKEA instructions, but also with scientific footnotes. And the Allen wrench was the bricklayer or technician that you hired who came with his tools and materials to make this into an actual sort of sealed box that you could put into your fireplace.

Franklin sends a copy of this stove pamphlet to a friend in New York who very obligingly sends it on to a scientific contact in the Netherlands, who arranges to have it translated into Dutch. So it is Franklin’s first scientific publication that circulates in Europe and in a non-English language.

Franklin would move from there to examine electricity, which likewise is invisible except under certain circumstances where you can see or feel it like lightening. And he would likewise publish his findings. This time he didn’t print them. His experiments and observations on electricity are published in London by someone else, so it looks a little bit more vetted by authorities and perhaps experts. So he’s moving up in terms of his scientific ambitions, but the experiments with heat and the publication of those experiments and the device that verified what he had done, he does that first with heat.

[00:15:58] Joe Adelman: Since you raised the question of printing or Franklin’s profession as a printer, can we turn to that for a second? Because as we’ve discussed, in many *Ben Franklin’s World* episodes, people in colonial America spent lots of their time reading printed documents. Sometimes pamphlets, but very much almanacs and newspapers, which Franklin famously printed regularly from his printing office in Philadelphia.



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So how did Franklin's work as a printer shape how he talked about the weather and climate? And I guess also, how did the weather and climate shape, how he worked as a printer?

[00:16:33] Joyce Chaplin: Like most colonial printers, he would have published a lot of information about weather and climate. So there weren't sort of like daily weather reports in newspapers, but for extraordinary conditions, obviously printers would want to report on those and tell people what had happened, particularly elsewhere.

So Franklin can kind of assume that his local audience in Philadelphia knows what's happening there, but they might not know what's going on in the Western interior. So he publishes information about, "well, the winter was bad here, but how bad was it in the interior?" And then as a Native Bostonian, it's almost unseemly the way he's always reminding people in Philadelphia, "but it's worse in Boston." So he's always commenting on the weather being much colder, the harbor freezing, much more solidly, et cetera, et cetera, et cetera.

So yes, there's a lot of information about extraordinary weather. And some assessments of climatic patterns. So not just the weather happened to be bad on this day or this season, but trends. Adding up to eventually a science of climate, which examines climate as a complex system, not just a kind of set of things that happen to happen, but ways of understanding the complexity within it.

So Franklin does that both in his newspaper and in his almanacs. And definitely in how he justifies the need for conservation of fuel, that this is not a momentary or one winter's problem. It seems to be something that has lasted for over a century, this extremely cold weather, and therefore the need for greater planning. So, yeah, as a printer, he's engaged with climate and weather a lot.

And you know, Franklin is all about the feedback loop in this case. I love how in his little stove pamphlet extolling his invention, he says that one of his advantages is that if an entire room is warm, not just the area around a fireplace, someone could sit by a window and read. And he doesn't add, you know, "they could read my newspaper or almanac," but as a printer, he would really appreciate how indoor comfort and stability could generate greater time for reading.

[00:18:43] Joe Adelman: And as someone who skipped many an event to read, he definitely seems like someone who would be interested in sitting by the window with a book. Broadening out our scale beyond Franklin a little bit to think about Pennsylvania, William Penn in 1681 received a grant from the English King Charles II for the land that would become the colony of Pennsylvania.

But of course, neither Penn nor King Charles II paid any attention to or asked the permission of the many Indigenous peoples living on that territory when they did that paper exchange. Can you tell us more about who those Indigenous peoples living on the land in that period were and how were they experiencing the Little Ice Age?



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[00:19:26] Joyce Chaplin: Yes. So there were a lot of different Native people who lived in or had some contact with Pennsylvania. The two largest groups within what Penn described as his colony would have been the southern Lenape groups who lived along the coast. Further into the interior, there was greater population from Shawnee people.

And so Penn would have dealt, first of all with the Lenape along the coast, and Penn assumed that this colony belonged to him, but he insisted that there would be payment to Native people for the land that colonists would take up. This is different to, and maybe better, than what some other colonies did in terms of just assuming that the land would belong to them.

Penn did seem sincere in saying, “no, we’re going to offer compensation for that.” Of course, this is not something that Native people would’ve recognized as possible or ethical to do with land, that you could alienated from somebody. It’s likely that they thought the kinds of payments that Penn was offering were more like rent you know, as a contemporary thing, or tribute, a gift given for good diplomatic relations.

It’s only slightly later when Lenape realized, “no, this means that we’re supposed to remove entirely”—and from substantial sections of land, not, maybe, just a little foothold along the coast, but entire hundreds of acres—there begins to be real trouble and conflict between settler populations and Native populations about what that is supposed to mean. So the removal, which depended on easy and kind of un-brokered set of understandings, sets up an inevitable conflict.

[00:21:18] Joe Adelman: And we usually think about those conflicts as being about the land itself. But those conflicts were just as much based on reading *The Franklin Stove*, about wood, right?

[00:21:27] Joyce Chaplin: Well, everything on the land. That, I don’t think Indigenous people thought that, right, we alienate the land in all things, all the animals, any kind of plant material that is above the land, or minerals below. So the extraction of resources as part of a colonial project was likewise a kind of foreign imposition on a terrain that had an original population that would never have thought of land that way.

Native people thought of natural things often as forms of kin, things that resembled family members that they expected to help sustain them, and had a kind of political and emotional affinity with. So likewise the sense that, “okay, this acreage now belongs to settler people and they can do whatever they want. They can take out all the trees, completely deforest it. They could mine anything below and never kind of repair what that had done to the landscape. They can kill any wild animals on it.” So these likewise would’ve been kind of dismaying tendencies.

And it’s the trees that Franklin worries most about, right? That the law had actually said, we’re transferring this land from Native claims to ownership by the proprietor, the Penns—William Penn, and then later his sons—and then they would sell title onto settlers who could do whatever they wanted.



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And Franklin never confronts the sort of background problem with this. He's not going to contest that any of that was to his mind legal or correct but he did think that there should be better stewardship of the resources and conserving trees with something that all colonists should be engaged with.

So in his almanacs, he publishes "The Scheme of a Friend" to really have kind of modern forestry, that certain kind of trees are preserved or even planted and then harvested very, very carefully. So this is an ongoing concern of his. How many trees do we have left? What is the fuel situation? And likewise, it's not just the fuel. If all the trees are going to be taken down to be burned, well, so much in this era is constructed of wood. So the loss of timber is going to have very, very severe knock on effects for this society.

[00:23:48] Joe Adelman: Which makes this a good segue to actually fill in some information that I know I felt embarrassed not to know earlier or not to have thought about earlier, which is how much wood are people actually using? Because I know once I thought about it, of course they have fires going every single day of the year. It's not simply a heat source for warming your body in the winter, it's your source of heat for cooking. So every single day of the year, you are consuming wood through flames and to produce heat. So do you have a sense of how much wood we're talking about on any sort of scale?

[00:24:25] Joyce Chaplin: In the British colonies in North America, this is amazing, but an average colonial household was burning somewhere between twenty to forty cords of wood each year. Now, for people who don't burn firewood and have no idea what that would mean, that's 128,000 cubic feet. That's a lot of firewood.

Many people would probably not have the outdoor space now or like a basement to hold even all of that. That's a lot of wood. And it's even more, if you think about what this means in terms of the number of trees that have been taken down. So each household burning twenty to forty cords of wood is consuming more than an acre of woodlands a year.

So I don't know what you would consider the number of households of the people you know, a hundred? So that's a hundred acres. Just those households are extracting from an environment. And if you think that Boston is growing, Philadelphia is growing, New York is growing, these are populations in the thousands. So that's just a lot of acres. That's a very technical definition, right? A lot. But thousands and thousands of acres being taken out, and that's faster than a lot of trees can grow, obviously. So this is in some places clear cutting with no real plan to ever replant.

So this is what Franklin is concerned about, that the demand for fuel is constant. As settler populations grow, the number of households are growing, and thousands of acres of woodlands therefore falling to the ax.

[00:26:01] Joe Adelman: That's so much wood.

[00:26:03] Joyce Chaplin: It's a lot of wood. It's just unfathomable. I mean, in part what this shows as well is that our sense of energy consumption is invisible. And one very distinctive thing about Franklin's era was people could see that this was going on. And he wasn't the



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only person to be able to see it. A lot of people are kind of worried. Where is wood in the future going to come from?

And there are already long distance trades. People in Boston, for instance, are bringing in wood increasingly from parts of Northern New England. And in an era before steam travel, that's expensive. So it does seem like, especially for cities or more densely populated places, the cost of heating and cooking as well. I mean, no one is doing cooking without kindling a fire at some point. So the cost for the energy that is necessary to do that is just constantly rising.

[00:26:53] Joe Adelman: And as you pointed out a little earlier, and as you point out in *The Franklin Stove*, wood is also being used to build up most, if not all of the houses. It's also being built to construct the ships that are carrying the wood from Maine to Boston and other places. There's a lot more wood consumption, even just than for fuel, and the fuel is quite significant.

[00:27:13] Joyce Chaplin: Indeed, and it's not just that a household can take out a hundred so acres in annual consumption of woodlands, but a good size ship would be using somewhere between one- to two-thousand trees. Just that level of consumption, again, we consume stuff all the time, but it's less visible. But people in this era would've been perfectly aware the cost of making things, from any old shed on up to the biggest warship, the cost that that would extract from woodlands.

[00:27:46] Joe Adelman: So as one more follow up on this line, the later versions of Franklin's stove, were they a little more successful at conserving wood? Do you have a sense of, in an individual case, how much they might have, have saved?

[00:28:00] Joyce Chaplin: Well, here's the thing. The woodlands were saved probably not by more efficient stoves, but by the fact that people were starting to burn coal.

Now, this is quite the trade-off, right? That yes, that would mean that you're extracting wood not for fuel, but still for every kind of construction. But burning coal—as we now know—that starts the whole slippery slope into fossil fuel dependence. And in the end is not, I mean, I would be very, very reluctant, I think most people would be reluctant to say, “oh, that's a solution.” It's not. It's in some ways substituting one problem for another.

Franklin invented his final three stoves in Europe and in places where coal was becoming necessary or was really the only available fuel. So he invents stoves three and four in London, which had been burning coal since the Middle Ages. There was no way to use wood unless you were very, very wealthy, you know, and you wanted to make a point about having a yule log every year just to show off. But otherwise, every day heating and cooking are done with coal supplied from the emerging and even enormous British coal extraction and trade.

So Franklin realizes that that's what he's going to have to improve his local heating in. Even as, interestingly, he always is just aghast at the polluted air in London. He just can't believe people are pretending that that's invisible. It's a kind of tax on urban life, unpleasant. No one likes it, but what are you going to do?



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This in a sense, increases his concern to control smoke from fireplaces. So his last three models, two in London, and then the final one in Paris, burn coal, but also have kind of an increased anxiety about the amount of smoke being emitted. In this case, not just in the room; you want to control the heat in order to expel the smoke so you're not breathing it in. But Franklin wants to minimize the amount of smoke, just even emitted.

And it is this interesting concern over emissions that characterizes his last three stoves. Where he wants to make smoke re-consumed, pointing out that it is actually unburned particles of fuel that are suspended in this sort of hotter or more warm air, and that if you re-burned it, it would be more efficient. You're using the fuel, burning it, even as it's escape you. And then whatever floats up the chimney is going to be that much cleaner and will have benefit for everyone outside. So that's what he wants to do in these final three stoves.

[00:30:37] Joe Adelman: That points to a question I'd like us to shift to in terms of thinking about energy, energy production, energy use, and the relationship to human labor, which you talk about at some length in the book.

So you make clear that energy comes not just from wood and coal, but also from the food that people are consuming, and then from the people themselves who are doing labor at various points in this process, from chopping down the trees and creating the firewood to actually tending the fire to cleaning the chimneys as they get dirty.

So can you talk to us a little bit about the relationship in this energy cycle with human labor, both free and enslaved men and women, and how they're playing roles in this process?

[00:31:25] Liz Covart: Actually, before Joyce answers Joe's question, let's take a quick moment for our episode sponsor.

[00:31:32] Ad Break: Do you ever find yourself wanting to talk more about what you just heard on this show? Perhaps you have a burning follow up question or your own "Time Warp" question that you'd love to ask and have other's think through?

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[00:32:15] Dynamic Ad Break: Audio varies and may shift timestamps in the second half of this episode by 1-2 minutes. Thank you for supporting *Ben Franklin's World*.

[00:32:16] Liz Covart: And now Joyce answers Joe's question about the role that human labor, both free and unfree labor, played in the process of the energy cycle.



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[00:32:23] Joyce Chaplin: This is an important thing to remember about Franklin's era. Before the Industrial Revolution and the age of steam, which would create a different kind of motive force for performing labor, before then, most of the motive force in the world was generated by human bodies.

Everything, I mean, animals did a little bit obviously. Wind, water power, yes, these things are involved. But most of it, the vast majority, is being done by the human body with some kind of food. Often not enough food really. But this was an organic form of energy. That you grew the food, you put it in human bodies, and the human bodies did the work.

They constructed things, they pulled things, they carried things, they created other people. The female body is incredibly important in this regard. So that is how labor was performed and everyone's aware of that.

This is an era when laboring people would have been pretty visible. You would have seen the sailors that it took to keep a ship on course. You would have seen the people building, and especially in early America, everyone building houses and so on for newer settlers. You would've seen people growing crops, and that's perhaps the most direct, speaking of feedback loops, the people growing food to feed other people, sometimes animals, but mostly other people to keep that labor cycle going.

Now, Franklin lives in an era when there are beginning to be new questions about the justice of using certain kinds of labor and exploiting certain kinds of bodies; most markedly with questions about enslavement of Black people. Franklin is famous for this moral trajectory that his life sketches out. That he, at some point with his wife had owned enslaved people. By the end of his life he no longer owned individuals he claimed as his property, and in fact, served as the head of the first abolition society in the United States, the one formed in Philadelphia toward the end of his life.

So that's always been a very interesting way of looking at, well, how do people rethink things that are wrong? And that's an important question. In any historical era, how do you identify what the wrong things are? How do you reject them, and then how do you lead other people to reject them? So Franklin does that in relation to enslavement. I mention this because there's an argument now that because of fossil fuels and modern industrial energy, that was what really freed people. There was a kind of a working steam engine and an imagination like, "well, that could lift burdens from human beings." It wasn't until that happened that you see any argument for abolition. Now, fortunately, this isn't really true. You don't need a new energy system and new technology to imagine that exploiting other people is wrong.

Obviously the Black people who had been enslaved never needed to see a steam engine to think that maybe they were being exploited. And in terms of Franklin's own kind of cause-effect, he really doesn't talk about steam power or use of new energy in any of his arguments for emancipation or abolition. It's just not a mental or actual connection he really thought about. And this seems to be true of a lot of arguments for abolition, is that they don't rely on any kind of confidence in the end of the eighteenth century that steam power was going to be the motive force to do this.



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[00:35:54] Joe Adelman: Can we talk also a little bit about, thinking about, the central piece of the energy cycle, where the energy is being consumed in fire and about the role of women and the household economy in all of this? Because the cooking, the heating, a lot of that physical work, in addition to the mental load of making sure that that's happening is being done by the women of the household. So can you talk a little bit about their contributions to this process?

[00:36:19] Joyce Chaplin: Yeah, let me start with the kind of western, the European traditions about this that would've really characterized and shaped how colonists felt about fire.

In the Western tradition a household fire belonged to the patriarch. It was the kind of central part of the household under his control. And this is reflected in English tax law. For instance, that might tax people in terms of their property, their wealth, by counting chimneys or fireplaces, and the male head of the household paid those taxes. As intended, I mean, there would be occasional cases where maybe a widow would do that, but the expectation was, this is a tax on the male citizens as reflected in their buying power, their level of wealth.

So the idea was a patriarch who controlled a household, including its fireplace or hearth, was very, very, very ingrained. And Franklin reflects this in his stove pamphlet where he talks about, you know, "his fireplace, his chimney," well kind of also his wife's, but she's invisible even as she probably was making a lot of decisions about, well, what is the cost of firewood and how much are we going to buy this year? How much is going to be used for cooking and how much for heating? When are we going to have the chimney cleaned?

So this really takes a lot of labor on the part of women for granted. That they're always there around the fireplace. And if you think of all the kind of variations on Cinderella. This is kind of ingrained. It's assumed, yes, the woman is always going to be there, but it's not her fire. And so again, instances where there is a widow or a woman operating alone because a man is away on business or because a war, those were regarded as exceptions. But the rule was the fireplace was under the patriarch's control and belonged to a specific household and its collected people that the patriarch allowed to live there.

[00:38:12] Joe Adelman: That's a fascinating way to think about the Euro-American perspective. It seems obvious in some ways that the Indigenous perspectives on the use of fire, the way in which it has a relationship to the household, to the family, is somewhat different. Can you build that out for us as a contrast to what Europeans are thinking about?

[00:38:31] Joyce Chaplin: Oh yeah. This is a big contrast because along with the idea of the patriarchal control over a space, an interior space, would be the sense that fire and domestic spaces were proprietary. They did belong to specific households or specific groups, the fireplace or a heating system in building for political representation, the colonial House of Assembly, the Houses of Parliament. Not everyone was welcome there to gather around the fire.

And this is again, very, very different from Native practice. And I call out in the book, I really draw attention to the Indigenous custom of the council fire, to be a fire generally established



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out of doors, it could burn indoors, but out of doors where people would gather together from different political groups, different Native nations, different European or colonial delegates, they would gather around the same fire, which was shared. It didn't belong to anyone.

The idea that firewood cut from trees would belong to anyone. Again, different from how Natives would think about how you use trees or regard them. And certainly the council fire was a way of bringing people together from different households, different political traditions, different nations for a common purpose.

I think therefore, the council fire is the greatest antithesis to the way domestic fire is used and thought about by colonists and by Europeans. And it is very different. The representation of natural resources is providing something to people. That's where the council fire seems most different from a domestic fireplace.

[00:40:10] Joe Adelman: Is that something that's relatively common across the Indigenous groups that Franklin would've interacted with, the council fire?

[00:40:16] Joyce Chaplin: Yes, so he was also aware of diplomatic relations with the Haudenosaunee, the so-called Iroquois Five, eventually Six Nations in the Great Lakes area, stretching over to Western New York. Possibly the most powerful Native political assembly during the period of time when Franklin is really involved in politics in the colonies.

And so as official government printer for Pennsylvania, he's involved in diplomatic negotiations with Indigenous nations first in Pennsylvania, but that involved the Haudenosaunee for instance, who had claims to Western Pennsylvania. So Franklin's very aware of more local Lenape or Shawnee practice with council fires. That's probably how he first learns about them. And then he's aware that this is a wider kind of assumption among other Native groups, including the Haudenosaunee

[00:41:14] Joe Adelman: And something that's, if you'll, pardon the pun, picking up steam as a trend in the later eighteenth century is Indigenous removal from the land. It seems from what you're saying and from what you've said in the book, that trees and energy consumption are a key piece of that in Pennsylvania in terms of the desire for control of more land further west into the Allegheny Mountains in Pennsylvania, into the Ohio River Valley. Is that something that's a key piece? How does that play into Indigenous removal debates?

[00:41:46] Joyce Chaplin: Certainly the kind of, not only constant, but rising settler demand for land and natural resources is a constant feature of the colonial period and obviously continuing to the United States.

The real bad part of this story, I mean, I don't want to let William Penn off the hook for saying, "well, we can just buy land from them" with kind of obliviousness of what this meant. But the first betrayal came with something called the Walking Purchase of 1737, where Pennsylvania presented to Lenape leaders a false document stating that their earlier leadership had agreed with William Penn to cede a stretch of land extending as far as a man could walk in a day, in a direction where land had not already been ceded.



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And rightly suspecting that this document was a forgery, reluctantly the Lenape say “ok, so let the land be walked out.” And the Pennsylvania authorities, of course, hired runners and cleared a trail in advance to maximize that. And eventually generating a line that extended so far that the territory in question that was to be ceded was about the size of Rhode Island. So this was an overt fraud. A lot of the property transfers, as they would’ve been described from Native populations to colonists, would not have been so overtly fraudulent, but this really, really was.

And in fact, it was exposed as a fraud in Franklin’s lifetime, and by him. He serves on the commission for the House of Assembly that looks into the matter and says, “yeah, this was absolutely cheating those people. This was not actually a good land transfer.” So there’s already a kind of sense, like “we don’t have to observe any kind of proprieties or legal procedures to take land away from Indigenous people,” but also beginning realization that, “hey, maybe that wasn’t right.”

The realization of that is always more muted in the background. And in a sense, violence and the expropriation of land moves westward without any kind of second thought, with very, very little second thought. Moving clear across to western Pennsylvania to the area around Pittsburgh and running into Appalachia where the colony had originally had boundaries and where the state would assert its rights to land and settlement up to that line.

[00:44:13] Joe Adelman: We’re coming towards the end of our interview, so now it’s time for a new segment called “1776 in Context.” Now that we’re in the midst of the 250th anniversary of the American Revolution, Joyce, in your opinion, how does thinking about Franklin’s stove and climate change help us understand the American Revolution? Or do we perhaps have that relationship backwards?

[00:44:35] Joyce Chaplin: I do think that it’s important for us to remember, even as we go into a moment of intense commemoration of 1776, 250 years ago, as of next year. The American Revolution wasn’t the only thing going on, and obviously every nation looks at their founding and may celebrate it. This is not something that no one should ever do, but 1776 and moving into the late eighteenth, early nineteenth century, this is an intensely important period for the Industrial Revolution.

The movement away from reliance on organic energy—burning wood, using human bodies—to using fossil fuels to create things, to have energy sources, for mode of force, for transportation, for all kinds of everyday and more ambitious activities that have led to the overabundance of CO₂ in our atmosphere that we are now having to do something about. And that is a crisis. This is something where we are on a timescale, where we really need to act quickly to bring down that level, to minimize at the least the amount of carbon that keeps getting put into the atmosphere, and to modify our energy consumption back into sustainable resources.

So that transition into fossil fuel dependence that’s going on in Franklin’s lifetime, I think most early American historians and most Americans think of that as like a background event, right, “yeah, that’s going on.” But the more manifest political events, Lexington and Concord, the Declaration of Independence, the achievement of independence by the United States, the



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writing of the Constitution, the establishment of the federal government—I don't want to say that those things don't matter, obviously they all matter incredibly—but I think that understanding that these background events now might be more of our foreground. There are things that we can't say, "well, that's just going on and that's great, and maybe we can think about that part of the time." We need to think about that more of the time.

So that's where I do think that Franklin's life is fascinating, as being significant in both of these stories, right? He's an American founder. He's one of the original revolutionaries. But he's also in some sense, especially in the stoves that he creates to burn coal, a participant or encourager of this transition.

[00:47:06] Joe Adelman: Sure. So we're thinking about the American Revolution broadly, but also the podcast is *Ben Franklin's World*, and we both think a lot about Franklin.

How does he fit into this thinking about the climate and thinking about the ways that the past and the 250th can inform how we're dealing with the present and the future.

[00:47:25] Joyce Chaplin: Well, I think above all, he's a very important case of somebody who was thinking about both of these revolutions, right? We're not imposing a kind of ex post facto realization about, "hey, coal is coming." He would have been the person witnessing that and commenting on that at the time. It's not that what we consider background was background for him. It was part of everyday life, he commented on that.

I love how in his surviving papers at the American Philosophical Society in Philadelphia, he saves two trade cards from merchants that his household dealt with in London. These elaborate, you know, cards that you got from whoever supplied your household with certain things. And the two trade cards he preserves are from, I guess the most important substances that the London household kept going on, were cheese and coal.

So the way in which coal is just a very, very central part of his life. And his realization that that is what people are burning, and that is what is being extracted, and that is what is going to save the trees. We're not reposing these ideas on him going back in time and saying, "this must have mattered." It did matter. You can look at his correspondence and that's what he is talking about.

I'll just mention as well that when the famous steam engine entrepreneurs, Boulton and Watt, are inventing the very famous steam engine, their separate condenser model, Franklin is living in London and they call him in as a technical consult. So he's right there at the heart, present at the creation, and decades before he becomes president of the creation of the United States.

So it's not just that these revolutions are going on, both of them, during his lifetime, it's that he comes and is very engaged in the Industrial Revolution first. That's where he's originally a kind of a founder



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[00:49:12] Joe Adelman: So many connections to so many things. Before we conclude, Joyce, would you tell us about what aspect of history you're researching and writing about now?

[00:49:23] Joyce Chaplin: I am not writing another book on me, Benjamin Franklin, I swear. I swear and affirm. But I am working on a project about colonial printing, so he will be in there somewhere. The project I'm working on is about early American almanacs and specifically the notations people made about the weather in the almanacs, so not the printed prognostications, "fair weather today." This is where people actually recorded, was there fair weather that day.

And I'm using these to examine how early Americans of all kinds, not just the famous ones that we might have heard of, but all kinds of early Americans were thinking about weather and climate. And were engaged as kinds of citizen scientists. I mean, they were recording data. And some of that data is done through scientific instruments. There are people who have thermometers and they give degrees for various days. A lot of people just note the ambient conditions. And it's the way they do that; the words they use, the way they correct themselves, the way they might use very unusual words depending on where they are.

And the patterns of recording; when they record things, is it only unusual weather events, do they like everyday reoccurrences, are there certain seasons that they're more interested in and certain phenomena? So it is a project about citizen science. It is a project about the circulation of information because the almanacs are acts are doing that. And it is a project on weather and climate.

I'm not very far into it since I just finished a book. I haven't made all that much progress except to compile the database. So that part I've done. I now have a database of 10,661 almanacs with the information that contain, but it's analyzing the information that I'm only just starting to do.

[00:51:10] Joe Adelman: That sounds amazing. Where's the best place for us to look for more information about you, your work, and how to get in contact with you?

[00:51:17] Joyce Chaplin: I think that would be my departmental website, the history website for Harvard that lists pretty much everything including contact information and kind of what I'm working on now.

[00:51:28] Joe Adelman: Well, Joyce, you and I have been talking about Benjamin Franklin for a long time at this point, and I'm very glad we got to have this conversation. Thank you for joining us.

[00:51:37] Joyce Chaplin: This was so fantastic to have this conversation and to be back on *Ben Franklin's World*. Thank you.

[00:51:44] Joe Adelman: Benjamin Franklin loved to tinker and experiment to solve problems in his daily life. When it came to the temperature inside his house, he wanted to find a way to make the house warmer and less smoky, while at the same time using less



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wood. Because he lived in Philadelphia in the 1740s, he had access to some of the first iron manufactured in North America, which allowed him to design an iron stove that would channel heat better throughout a room and carry smoke out.

As Joyce Chaplin revealed, Franklin's experiments were part of a larger scientific project to understand the climate and how the world worked, including both heat and electricity. Franklin's stove wasn't just a clever device, in other words, it was a solution to a serious problem of climate change.

The need for wood to burn for heat also fueled colonial expansionism. As colonists clear cut forests closer to the coast, they began to seek out more land further west with fully mature trees that they could convert into fuel, not to mention use for their houses, ships, and many other uses. Their views of wood as a heat source challenged not only Indigenous land sovereignty, but also their way of thinking about fire as a way to build and represent community.

Today we face another challenge for the earth's climate. Though this time, of course, the earth is too hot rather than too cold. Joyce Chaplin points us to think about this problem as part of a longer term question about how humans take care of the planet. You can find information about Joyce, her book, plus notes, links, and a transcript for everything we talked about today on the show notes page, benfranklinworld.com/412.

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What other historical people, places, or events would you like to learn more about? You could email me at joe@benfranklinworld.com.



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