‘After Class’

Beer, Bacteria and Bison
A Meeting of Microbial Minds with Bill Hamilton
Season 1, Episode 3

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Ruth Candler: Welcome to W&L After Class, the lifelong learning podcast. I'm your host, Ruth Candler. In every episode, we'll have engaging conversations with W&L's expert faculty, bringing you again to the Colonnade, even if you're hundreds of miles away. Just like the conversations that happen every day after class here at W&L. You'll hear from your favorite faculty on fascinating topics, and meet professors who can introduce you to new worlds and continue your journey of lifelong learning. Thanks for listening.

In today's episode, we'll be talking with Bill Hamilton. Bill joined W&L's faculty in 2001 and is a professor of biology and head of the Biology Department. He studies plant ecology, herbivores and microbes. Most of his current research focuses on large grazing animals like bison and elk in Yellowstone National Park, where he is well acquainted with the ranger staff as well.

You may have had him for Fundamentals of Biology or one of his major-level courses like Medicinal Botany or Experimental Botany, or encountered him in his work with W&L's campus garden and compost system. Outside of his teaching, his many interests include sustainability and beer. We're so glad to have you join us today, Bill.

Bill Hamilton: Glad to be here.

Ruth Candler: So normally, Bill, we'd be in your office recording this podcast, but because of the times we're recording via Zoom, and I have to say that in all the Zoom calls I have taken part in, your background has got to be the most, well, interesting background I've seen, and I have to ask you to describe it to our listeners.

Bill Hamilton: So my background is a rather large bison bull with his tail up, looking dead at the camera. This was with a 100-millimeter lens, so it was far enough away to be safe but still close enough that if he had decided to charge it would have been a problem.

And when a bison bull puts up its tail, it's charge or discharge. And in this case it was discharge. A student was catching a picture of a bison urinating, which I joke about being extra credit because we do focus on the effects of urine hits in the grasslands in Yellowstone. But it's a bigger deal to catch a cow urinating than a bull. So it wasn't full credit.

Ruth Candler: But partial credit. I have to say that is definitely the most unique extra credit work I have heard of. So this subject leads quite naturally to a related topic, and that's beer. You started brewing when you were an undergrad and you're still going strong now, right?

Bill Hamilton: Yes, as an undergrad taking organic chemistry, I thought, oh, I can make a still. And then I realized that wasn't safe. I'd watched enough episodes of M*A*S*H to realize that they explode. So my roommate and I found a homebrew kit in the back of Popular Science that came from Massachusetts. It was a food grade garbage can with two cans of malt extract. And it was not very good beer. But that got us started down the road. And I've brewed continuously—I think there was one year during my Ph.D. that I didn't brew a single batch of beer—but I've brewed one every year since 1991.

Ruth Candler: Would you say that they've gotten increasingly better?

Bill Hamilton: I think so. I managed to sell some at Blue Lab. So I think they've gotten better. That was just literally a no-boil batch. So it had everything going against it. My buddy Brian and I, we then got into all-grain brewing and that's when it gets… it improves. And we got better fermenters and all of the equipment that goes along with it and playing around with all the different types of ingredients and yeasts and additives.

Ruth Candler: So for those of you who don't know, Bill was a co-founder of the Blue Lab microbrewery in Lexington. Bill, can you tell us a little bit about Blue Lab?

Bill Hamilton: Sure. Well, it was… There were about four of us that kind of started a little homebrew club in Lexington. Tom Lovell; Jim Casey, he's class of '91, economics professor; Dave Pfaff, who's the head of the IQ Center, we were brewing in my driveway for about a year with a 20-gallon system, and we kind of said, "Let's take this to the next step." And Tom and I kind of took the biggest interest in it. And we took about a year, largely coming up with a name and a location. And then we got the name but the location took even longer in Lexington. And in November of 2010, we opened up Blue Lab.

Ruth Candler: So what was the most satisfying part about operating a brewery?

Bill Hamilton: Being able to think up a recipe and then have people pay money for it and come back for more and drink it and be able to share the fun that goes along with drinking beer and live music that we had at Blue Lab. That was another really satisfying part of Blue Lab. But just being able to utilize my science knowledge in another way, and bring in a little bit of artistry, because it's not all science. It's thinking about what ingredients might play well together.

Ruth Candler: Well, I can say that from personal experience, I completely enjoyed your time with Blue Lab. Was there anything that was surprising to you?

Bill Hamilton: Well, when we started out, IPAs were unknown, in 2010. And we had to really explain to people why it was worth trying. They heard hoppy. They knew, people knew that hops were bitter, but

they didn't want to try it. You zoom ahead now and IPAs… Each year the brewing industry thinks hops, or IPAs, and high-hop beers will disappear and they don't. So that was a big shift. People were used to drinking commercial lagers and brown ales and easy-drinking beers. And hops are still king when it comes to selling craft beer.

Ruth Candler: What's the weirdest thing that has ever happened when you were brewing at Blue Lab?

Bill Hamilton: There were lots of weird things at Blue Lab, but specifically—in a good way they were weird—while brewing, things like to get clogged in the brewing process. There's pumps and there's things settling out. And particularly in the fermenters, they're conical shaped, and everything tapers down to the bottom intentionally so you can get rid of trub, which is the leftovers of the boiling process, yeast and hops, as they settle out.

And I was cleaning out a fermenter with one of our employees, and unfortunately I opened the valve just as he put pressure on the tank, and I got a face full of probably four gallons of yeast and hops. And then I was due to work that day. So I was rather coated. And you know, yeast kind of… Vegemite is yeast and it… So I kind of had this funky smell for a while and it was in my ears. I was blowing it out of my nose for a couple of days because it really got in there. But that's just… It happens all the time, unfortunately.

Ruth Candler: So did you smell like a brewery when you went to class that day?

Bill Hamilton: I did not. That was a Saturday. I tried to separate church and state as much as possible. But I did… You know, I've always thought that if I got pulled over by LexPo for a broken taillight, I could have said I work in a brewery, because filling kegs you get covered with beer and you don't have … You don't take a sip, but you still reek.

Ruth Candler: What about the weirdest thing in general at Blue Lab? Not just regarding the brewing process, but dealing with the public, perhaps, or employees.

Bill Hamilton: I think the weirdest consistent thing was getting reviews on Yelp or on Untapped where they would… We had a green chili beer. And we had three or four people that commented that it tasted way too much like green chilies and they didn't like it. And odd things like that. We advertised it as green chili beer, but you didn't like it because it tasted like green chili beer. Those little things, and the, you know, you want to answer back but you just avoid it.

Or our water tasted funny. Well, we're a brewery, and the beer tastes alright. The water comes out of the tap. So, you know, little oddities like that were always fun to deal with.

Ruth Candler: When you get a bad batch of beer, what do you do with it? And why … what's the most common reason why it went bad?

Bill Hamilton: Well, in all my years of brewing, I only had one, and it was a small batch when we first started. And it was a batch of amber beer that took me 16 hours to make and it should have taken eight. It was, you know, just one of those days, and I forgot to sanitize the fermenter so it got infected with the souring bugs that you sometimes want in a sour beer, but you don't want in an amber beer. So I actually kegged it off, and we used it to make a sour beer that then aged for another two years, because it was perfectly good beer, but a sour amber with just one—it was lactobacillus that had infected it—it just doesn't sell.

So I made lemonade out of lemons and we then served it as Raspberry Beret. We added raspberries to a wine barrel and put that beer in with a couple other sour beers and aged it for a year in a red wine barrel.

Ruth Candler: Oh, that sounds delicious.

Bill Hamilton: It was good.

Ruth Candler: So a couple years ago, my husband and I were in Salzburg, Austria, and a local recommended a neighborhood pub where we could go and have a beer. And the place was amazing. Beer had been brewed there since something like the 1620s or thereabouts. And with the many different beer halls inside and the outdoor beer garden, the place could serve a couple of thousand people at a time, and I swear I'm not exaggerating on that.

What I didn't realize then, though, was that it was the largest beer tavern in Austria. You walked up to the serving area, you picked up what size stein you wanted: big, bigger, or biggest. And then they poured your beer for you. And they only served one type of beer. These thousands of people were only drinking a single lager.

Even Blue Lab, which was a small brewery, had a wide variety of beer to choose from. Do you know or have a feel for what makes Austria different from the U.S. in that they seemed quite happy with just one choice of beer and why we may want many?

Bill Hamilton: I think in part it's because history and tradition still has a lot of importance in Austria, and that even happens in, you know, Germany and Czechoslovakia, where there's one beer produced. And the U.S. is a melting pot of a lot of those traditions. So that may be a piece of the reason that we want choice. Also, fast food gives us lots of choices. So we like to have choices as Americans, I guess. So it's just always been the tradition in the craft brewing industry.

We had upwards of 14 beers at any one time at Blue Lab, and only four of those were mainstays, the rest were oddball one-offs or seasonal beers. And it just seems like the industry has produced … The next new beer was always the bestseller. And that's still the case at breweries. People are looking for that next new beer.

Ruth Candler: It strikes me that Blue Lab was a pretty good example of the liberal arts in action. You were blending chemistry, biology, graphic design, marketing, along with customer service and business accounting. Was that your impression as well? Or did you ever think about that at that time?

Bill Hamilton: I didn't, although I… Tom and I did lots of interviews with undergraduate students, journalism, business administration, biochemistry. So we were contributing to the liberal arts education—but it definitely was. And my interest had already been kind of cemented in brewing, but then operating a business was a whole new thing.

We actually, you know, we consulted with Jeff Shay from the entrepreneurship program, when we were getting ready to expand and talking about some of those opportunities, and he had contacts in the brewing industry that actually gave us a lot of information that was useful. So it was knowing the right people and Tom's experience with alumni relations, and marketing, and his business administration degree kind of helped.

We had a good synergy between the two of us, because I made the beer and he was good at working on marketing the beer and reaching out to people. I stayed in the back and he was the face of the place.

Ruth Candler: Sounds like a good partnership. Going back on the graphic arts part of that last question, you mentioned that you spent a long time on the logo, which I love. Can you describe it? And what went into creating it, and how logos and design factor into the overall thought process of a commercial brewer?

Bill Hamilton: Oh, yeah. The logo was… We were getting quite desperate, and Tom's brother-in-law worked at the time at UVA, and the graphic designer for UVA athletics had never done a beer logo. And he offered to do it for free. He just wanted some swag out of us when we were done with it.

We gave him some concepts—the logo kind of looks like the PBR logo a little bit. That's the blue label, you know, the winning label. It's a beer cap with the profile of a Labrador Retriever kind of looking over its shoulder, and it's blue. And then House Mountain is in the background. It's a profile picture I actually took from the greenhouse in the Biology Department. And it's, it… We sold a lot of product just because it had a dog on it. So… And I think we probably still could! People came in just to buy glasses. You know, they'd get a six pack of glasses to go, empty glasses, because they wanted to have a Blue Lab glass logo.

So it was… What's amazing is this designer was so good that he only… I think we went through two iterations. And it was done and it really resonated with us and it was a great logo.

Ruth Candler: We had talked a little bit before the podcast about the current vogue for beers with unusual ingredients. What is the strangest beer that you've made? And why did you make it?

Bill Hamilton: I think it was… We called… I called it Squaison. So it was a squash saison. Saisons are beers that are fermented kind of like wheat beers. They can take on those flavors of clove and banana.

But they're fermented at really high temperatures, 80 to 90 degrees. And that's what produces lots of interesting flavors. It can cause problems, but if you control it properly, it works out.

But what I did was, I got a bunch of Hubbard squash and kusa squash from Swisher's up in —where's Swisher's?—up in Fairfield. And one of their… The granddaughter of the Swishers worked at Blue Lab. And I just roasted them in the oven with a bunch of pepper then added them to the mash tun and added the puree to the boil kettle, and it had this backbone of kind of, like, "Oh, that's squash," but it wasn't bad, and we got a lot of free fermentable sugar out of the squash.

We sold out five barrels of that really quickly. And I was kind of concerned because people see squash and beer and they're not… You know, you hesitate. But it was a big seller.

Ruth Candler: Oh, I think I would have liked to have tasted that. So you once told me that the simpler the beer, the harder it is to make. Why?

Bill Hamilton: Well, the classic example of that is a good Czech pils or a German lager or Austrian lager. You can't hide behind other flavors so… And I'm not picking on the beers I'm going to mention, but British ale yeasts, they produce lots of other unique flavors that can hide some of the problems that you might have had with fermentation or with the brewing process. And IPAs, you can cover up a lot of issues with just adding more hops, the bitterness of the hops and higher alcohol. Your tongue doesn't taste as much when it's got more alcohol on it, so you can mask those things.

But a good Czech pils has one or two ingredients in it and a lager yeast—"ingredients" as far as grains go. And it can be hazy and that's not pleasant to the eye. And they get skunky. They actually… A lager when it's fermenting smells like rotten eggs and can taste like it too. The lagering process gets rid of those odors. So there's patience involved with those simpler beers as well. Modern production doesn't like to wait for beer, but it can take up to four months to properly lager a good helles or pils, just waiting for the yeast to finish up cleaning up the beer.

Ruth Candler: So you need to be a patient brewer in those cases. We're gonna migrate to a more academic area now. So everyone at home track down your Latin dictionary and get ready to hear about bacteria. So, Bill, can you explain to us exactly what is a microbiome?

Bill Hamilton: Microbiomes are everywhere. We've heard of them in the human gut and being important for digestion, but they're on your skin, they're in the soil, they're in the air to some extent. A microbiome makes up bacteria and fungi that work together as a functional community.

And in the case of the skin, or the microbiome in your stomach, or in your large intestine, the good bugs, as I like to call them, help fight off the bad bugs, because they're doing well. And when you take antibiotics, those good bugs get knocked out and sometimes you can have issues, and that's why eating yogurt, which has active cultures in it—or yogurt with active cultures should be consumed—restores that microbiome. It's an area of research that's pretty much covering from ecosystem work like what I

do, down to lots of medical work trying to understand the microbiome of humans, and how it affects mental health and just general medical wellness.

Ruth Candler: You shared some fascinating information a while ago about how stress affects the human gut. Could you share that a little bit with our listeners?

Bill Hamilton: Sure. And by no way am I an expert on this, but I've read a lot, and we have actually some faculty in the biology department at Washington and Lee that do work on this in rats. But during stressful times, our body makes a hormone called cortisol, which kind of gives you that feeling of low blood sugar a little bit. And cortisol can affect your microbiome and get rid of some of the good bugs.

And in getting rid of the good bugs, that doesn't mean bad bugs take over, but there's more and more data that suggests that the microbiome in your large intestine has effects on your ability to sleep, mental well-being, as well as lots of other biologically important factors. And it all comes down to this kind of… the stress hormone called cortisol.

Ruth Candler: I'm sure a lot of people can relate to that during this time.

Bill Hamilton: Yes.

Ruth Candler: Sourdough, sauerkraut, sour beer. All related?

Bill Hamilton: Yes. Good sour beers and sourdoughs and most spontaneously fermented sauerkrauts do not have just one bug in them. The one thing they share is lactobacillus, which is a bacteria that makes lactic acid which gives it its sourness, unlike bacteria that make acetic acid that make vinegar taste like vinegar.

But the best ones—kombucha, sourdough and sauerkraut and good sour beers—are five or six different bacteria and yeasts that work together at different periods of time. And one may be around at the beginning and then not show up again until the end when three or four others in the middle have broken down different components within the product to give it unique flavors.

Ruth Candler: Let's move on and talk about your interest in sustainability, and your work on that front at W&L. You were involved in getting the campus composting project off the ground, right?

Bill Hamilton: Yes. I believe it was in 2002, the Associated Colleges of the South, of which we are a member, had grants for campus as a green laboratory. And I put in a grant—as an untenured faculty member, any chance you get to write a grant and get some money, it always looks good—and I proposed to test methods of composting that would work on our campus with the dining hall. This is back when the dining hall was still in Evans, and catering was housed there. So we captured a lot of material. That's when it got started.

And we zoom ahead now to… We have a commercially produced system that is taking even plate scrapings out of the dining hall now, and it's exponential growth with the amount that we have started composting on campus.

Ruth Candler: How long did it take you to get it up and running?

Bill Hamilton: Well, I would say that to get it to the current day, it took 16 years. Fifteen years to get the commercial system up. Until then, it was piecing together components and getting the students that… It's student-run. The students collect the compost from all the different locations. And we now have an employee that's responsible for maintaining the system. So I no longer have to push around compost in my free time, which I kind of miss, actually.

Now with the system that we have, we're seeing that we could actually have more units to do this, because there's lots of compostables on campus. And we're starting to make compost that's of high enough quality that down the road, we'll be able to use it out on the front campus as opposed to just on the campus garden.

Ruth Candler: Wow, that sounds like a win all the way around. I once heard that the campus system could compost a hog. Is that true? It's such a crazy thing to comprehend.

Bill Hamilton: Yes. The system we have is kind of like a cement bunker with three sides that are eight feet high. And then an aerated grate. So there's PVC pipes in the bottom that have an air compressor that blow air in on a known schedule. And the system that we designed is based on one that was used originally for highway mortalities and pig mortalities at hog farms. They could put two hogs in, dead hogs in, and within 20 days, there would be close to nothing left. And that's setting it and forgetting it. Our system, we continuously add for about three weeks, but it has that capability.

Ruth Candler: So what's happening to the system now that there are no students on campus and nothing to compost?

Bill Hamilton: It's sitting there not gaining any more. We were a third of the way through a bin when everything stopped. And that's been now kind of capped off and the system's running. And Mike Tolley, who is responsible for taking care of it, comes out once a week and monitors things and moves piles around, but we're on hold until we can start collecting again.

Ruth Candler: So if you look back over the 15-16 years, what would you say the most satisfying part of that project was for you?

Bill Hamilton: Well, starting with a completely student-run crew in the beginning, and showing that that model could work quite well. And until we got to a mechanized system that—students aren't allowed to drive tractors and things like that—it kept doing that and students are still actively engaged. I think we

have upwards of 12 students that are on the compost crew. Because of schedules, we need a lot of students doing the nightly pickups and the daily pickups.

So when we started the campus garden and started putting compost back into the campus garden, and that food was going to campus kitchen, and some of the herbs, back in the early days, were going into the dining hall and we could say, "Your food scraps grew this basil that we made the pesto out of," when we closed the loop, I think that's when we got the most traction for saying, "This is really something worth doing." Because it wasn't just reducing landfill tipping fees, but it was an educational opportunity where we could really reap the benefits in having not certified organic but truly organically grown produce from our own campus organic waste.

Ruth Candler: And they could see it and they could taste it. Bring it full circle.

Bill Hamilton: Yes.

Ruth Candler: What would you say… You talked about the industrial composting. What is the biggest difference between industrial composting and, say, backyard composting?

Bill Hamilton: Well, industrial composting has an active way or mechanical way of aerating the compost so that it doesn't get too hot. And that it doesn't get… It has enough oxygen to get to 150 degrees to be compost, but then not so hot that it becomes dangerous. Backyard composts tend to be heavy on either carbon—dead plant tissue, wood chips—or really heavy on wet things—green lawn clippings or banana peels. And those things are… It's called putrescible. They're putrid. And those putrescible solids tend to create odors, and then people get discouraged because they have smelly compost and backyard composting doesn't make very much compost.

That's a big difference. You know, I was an aggressive composter at home for many years, and I never got enough to use in the garden bed. But it's a good outcome if you're not sending it to the landfill. It's not turning into future methane when that landfill is capped and going into the atmosphere.

Ruth Candler: So you touched a little bit on this in your last answer, but on the microscopic level, what makes for good compost? And what needs to be happening in that muck to make it useful to plants? I am a composter. I'm also a gardener, and I do have enough compost to use, which is always very satisfying, but I never really, you know… I understand the basics, but not on a microscopic level. So if you could explain that to us?

Bill Hamilton: Well, compost is another microbiome. There are at least 30 different species of bacteria and fungi. And even in some parts of bacteria there are protists—single-celled organisms—that survive in certain components of the compost. And compost is a cycle, just like making aged sour beer. It takes time, and each bacteria has a different role to play.

And for those roles to be played, they need a diversity of food. So a compost that has a wide variety of inputs will then support a better microbiome and then be a healthier compostable unit. Whereas if you're just putting in lawn clippings and dead leaves from the fall, that's just two types of food. But if you put in coffee grounds and banana peels and avocado peels, napkins, paper towels that aren't filled with grease, lots of different—lots of variety, just no bones or oils or meats in your backyard compost, we can do those on campus—that variety then supports that variety within that microbiome of the compost system.

Ruth Candler: What do you think makes for an effective sustainability initiative?

Bill Hamilton: That's a good question. It has to be something that kind of fills the three… Well, in my mind, the three circles that make up sustainability: economics, ecology and social values, so that… It's easy to make economic arguments to conserve energy. But being mindful of the fact that if you're using less energy you may be improving the air quality somewhere else outside of your state or your general area, and it's also having a benefit to the environment. Those are, in my personal view, always are home runs.

Any of those three circles can be the focus, and then the other two just… You have to be mindful of those other two components. When only one of those three areas drives it, it quite often won't resonate with enough people, because everybody can usually get behind one of those three circles. And for it to function, you don't need everybody to totally agree on the importance of those three areas, but if you can come together on two of the three, or just one, you have a lot of positive outcomes.

Ruth Candler: That reminds me of the thermometers that went up around campus a while ago. It was a fascinating glimpse of how an initial disruption can lead to an improved living environment. Can you tell us about those thermometers and how they ultimately benefited the campus?

Bill Hamilton: That was… I can't remember the year, but it was the early years of the sustainability committee. And we were doing the Five for Five plan to save energy. I think it was five years to save $5 million in energy, something like that. I was working with Scott Beebe and Mike Carmagnola, the head of facilities at the time, on the sustainability committee.

Energy usage used to be that you kind of picked your own temperature in your office, or you could, and it wasn't as centralized. And part of the Five for Five was to have it centralized: digital control in buildings where it was possible. And with the renovation of the front campus, the Colonnade buildings, digital control was possible throughout the whole campus. So we came up with the idea of a maximum of 68 in the winter for heating and no cooler than 72 for air conditioning.

And in doing that, in setting those temperature restrictions, we found a lot of failures in the facilities that could be fixed. So in creating this policy, we actually were able to improve efficiencies by identifying places that didn't have their cooling systems operating properly. It actually increased the gain from that

Five for Five, because people would call up and say, “Well, it's 66 in here and you say it's 68.” They were able to find out that that unit wasn't working properly and they could fix it.

Ruth Candler: So you said earlier that you've involved students, and also alumni, in your sustainability work for the university. Is there any project that jumps out to you as being particularly noteworthy in that way?

Bill Hamilton: Well, the composting project is my baby. I think that was definitely the first one where I realized that W&L students in my second year here would dig down deep into compostable material and pull out garbage and be involved.

But a broader kind of a truly educational opportunity was when the consulting group in the Williams School did an assessment with a private contractor of the feasibility of solar power on campus. They brought in a company, Shockoe Solar in Richmond, that did an assessment for them and showed the capabilities, and two years later, that information then kind of translated into, “This is feasible.” And I think it… Just coming from students, and they presented that to President Ruscio at the time … And so that information was available, and I think it helped foster our current solar installation on campus.

Ruth Candler: That's great. So I'd like to have a little bit of fun with you now, as we near the end of our podcast, and we're gonna call it our lightning round. So when I say something, you just tell me what pops into your head.

What's your favorite bacteria?

Bill Hamilton: Well, I'm a microbiome person, so it's kind of hard to pick one, but I'd have to say lactobacillus.

Ruth Candler: It's like picking your favorite child, right? Just tough to do?

Bill Hamilton: Yeah.

Ruth Candler: Bison or beef?

Bill Hamilton: For consumption? Bison.

Ruth Candler: And what for beef?

Bill Hamilton: Well, I eat them both.

[laughter]

Ruth Candler: All right. The best beer you've ever had.

Bill Hamilton: Atrial Rubicite from Jester King in Texas.

Ruth Candler: Worst beer you've ever had.

Bill Hamilton: Probably Meister Brau. Doesn't exist anymore, so it's safe to really pick on it.

Ruth Candler: But you drank it.

Bill Hamilton: Yes.

Ruth Candler: Yes. Weirdest thing you've ever done for a research project?

Bill Hamilton: Get three students in the summer of 2009 to follow around a vet to collect dung directly from cows—dairy cows.

[laughter]

Ruth Candler: I hope that class had extra credit!

Bill Hamilton: It was their idea.

Ruth Candler: Favorite thing about W&L alumni?

Bill Hamilton: They're always welcoming, you know. When I go to alumni events or see somebody when I'm out traveling, there's always that instantaneous connection. Like we all come from the same place. And it's just like, it's like seeing a friend after 10 years where you just step into a conversation. There's always a commonality to have a conversation.

Ruth Candler: I love that. Is there anything else that you would like to share with our W&L community?

Bill Hamilton: I'm looking forward to another 20 years.

Ruth Candler: Excellent. Well, Bill, thanks so much for joining us today.

Bill Hamilton: All right. Well, thank you. It's been fun.

[music]

Ruth Candler: And thanks as always to you for listening. We hope you discovered something new. To read more about today's podcast and check out other ways to continue your lifelong learning with W&L, you can head to our website, wlu.edu/lifelong. You can also find W&L's faculty reading list, "Sheltering in

Place with a Few Good Books," and information on how to join our new W&L Book Club. We hope you'll join us back here again soon. Thanks again, and until then, let's remain together not unmindful of the future.