

BOOKS AND IDEAS PODCAST

with Ginger Campbell, MD

Episode #14

**Interview with Astronomer, Teacher, and Podcaster, Dr. Pamela Gay,
Co-Host of *Astronomy Cast***

Aired October 30, 2007

[music]

INTRODUCTION

This is *Books and Ideas*, and I'm your host, Dr. Ginger Campbell. This is Episode 14. You can find the Show Notes for this episode and other episodes at booksandideas.com, and you can send me email at docartemis@gmail.com. Today's episode is a conversation with Dr. Pamela Gay of the *Astronomy Cast*.

Before we get into the interview I want to apologize for going so long between episodes. I'll say a little bit more about that after Pam's interview, but I want to thank all of you who have been so patient and continue to subscribe to my feed. I hope that you will enjoy meeting Pam as much as I did. Be sure to check out her podcast at astronomycast.com

[music]

INTERVIEW

GC: Today my guest on *Books and Ideas* is Dr. Pamela Gay of the *Astronomy Cast*. Hi, Pam.

PG: Hi, Ginger. How's it going?

GC: Pretty good. I'm sure glad to have you on my show today. Have you recovered from Dragon*Con?

PG: Oh, I've recovered from Dragon*Con. And I've actually gone on a couple more trips since then—because I'm just a little bit insane.

GC: Well, I went to the Podcast and Portable Media Expo in California. That was good.

PG: Oh, that must have been a great conference to attend.

GC: There was nobody dressed up as any *Star Wars* character there.

PG: Yes, but the personalities involved in podcasting are some of the neatest, smartest, craziest people, all at the same time.

GC: Yes, I met several really interesting people. It was a great place to meet people. I met Kirsten from [This Week in Science](#). And it turns out she's got a thing for bird brains. It turns out she actually did her degree in something with neuroscience, so I'm going to try to get her on a show in the future.

PG: There are some of the smartest people hiding in the oddest of places.

GC: Pam, can you start out by just telling my audience a little bit about yourself?

PG: Well, I'm currently a research professor at Southern Illinois University Edwardsville, which is just outside of St. Louis. We're nowhere near Chicago. That's a mistake everyone makes: 'Oh, it's Illinois; you're near Chicago.' No, we're near St. Louis.

My research focus is on both variable stars and looking for ways to use new media—use podcasting, blogs, wikis—to communicate astronomy to the public: to get anyone with an Internet connection learning about space, stars, galaxies, and this crazy universe that somehow created everything that we know and can see.

GC: What's a variable star?

PG: Shakespeare got it right when he said that there are inconstant stars in the heavens. He said it far more poetically. There are stars out there that don't give off the same amount of light all the time. The most famous are perhaps supernovae, which vary once very violently. Those aren't what I study. What I study are smaller stars. They're about 60% the mass of the sun, and a little bit bigger in terms of radius.

These are stars called RR Lyrae's that over the course of just a day will get significantly brighter and then fainter again. They do this in a systematic way that's sort of like a sine wave, and the way they do this is defined by their density. If you look at them long enough—and, luckily, people here on earth have been looking at them for over a hundred years—you can actually watch the star change with time. And it's how the stars change—how they evolve—that is one of the things I like to study.

GC: Wow, that's pretty complicated stuff. It sounds complicated to me. But I don't know very much about astronomy, to tell you the truth.

PG: In this case it's a lot of complicated math taken out of very pretty pictures. So, you get this great combination of you're out there at the telescope taking gorgeous pictures of the heavens, and then you're going back to your office and you're chewing through this really atrocious math, in some cases. We're doing Fourier transforms to try and figure out mathematically, OK, how do you combine sine and cosine waves to get the shape of the star's variation? So, you're

combining both sides—the artistry of astronomy, and then the mathematics of the physics behind it all.

GC: How did you end up becoming an astronomer?

PG: I guess in some ways I wasn't smart enough to know when I should go off and get a real job. I've been doing astronomy my entire life. Some of my earliest memories are looking through a little tiny handheld spyglass in my backyard when I was five or six years old, and lying to my dad that I could see Russian cosmonauts walking dogs on the moon. I mean it was just total BS, but my dad let me get away with it.

And I continued. I remember getting dragged out of bed when I was little to see the Voyager images that were getting sent back to Earth. I had subscriptions to *Odyssey* magazine and *Sky and Telescope*. And I just grew up reading about the stars and the galaxies, and broke my teeth on Timothy Ferris's book, *Coming of Age in the Milky Way*.

I never quite thought that I had the physics know-how to actually become a professional astronomer. I started off college as a dual degree international relations at James Madison College at Michigan State University, along with the astronomy, figuring I'd just get a minor in astronomy and go into patent law or something like that. And then I realized I liked the astronomy classes a lot more than I liked the international relations classes, and just kept going.

I got my Master's degree, got my PhD, and now I'm on the faculty of a university. It's been a wild ride. And the science has always been a thrilling search to try and find out what new things can we learn about the universe. That's the cool thing about astronomy—the universe is a big enough place that there's a new discovery waiting for anyone who takes the time to look.

GC: Do you identify with that character in Carl Sagan's book, *Contact*? I mean doesn't she start out—I forgot what the character's name is—but she starts out as a little girl.

PG: Yes. That book really resonated with me with just all the stupid things that you catch yourself doing as a woman in the sciences. Just like in the book there's the realization that the women with really high-pitched voices, no one takes seriously. So, you learn to change how you pitch your voice to get the men to listen.

If you look around, the women in many sciences—not as much astronomy anymore—but in many of the sciences you see them dressing like the men so they fit in better, and just trying to blend in and be one of the boys. Carl Sagan somehow managed to really identify a lot of what women go through when they're in the sciences.

And he also identified correctly the fact that it's one of those things you go into because it's something you fall in love with. It's not something you go into because it's a paycheck. It's not something you go into for basically any reason other than loving to solve the puzzles and loving to just chase all the information you can get out of a telescope.

GC: And you have to like math, too, to do astronomy?

PG: You don't have to like math—you have to be able to do math. I hate math. Oh, I hate, hate, hate math. Hate it. But I can use a computer and I love programming. And so, this provides a different answer. When all else fails, you need to be able to do the math, but there's a lot of stuff that you can do in astronomy that requires day-to-day mastery of computer science, and you don't have to do day-to-day calculations. So, it's a matter of finding the area that suits your personality.

GC: So, you basically have to understand the math well enough to use it as a tool.

PG: Yes. Theoretical astronomers—which I am not—they truly do have a passion for math, and for them the chase isn't the chase with the telescope, it's the chase through the equations. And so, there are many different directions you can go in astronomy. There are even places for people who are really interested in biology.

Nowadays, as we're finding planets circling other stars, we're working to try and figure out what does it take to identify life on other planets. And there you have to know that bacteria give off certain gases that otherwise don't occur in atmospheres naturally. And so, you figure out how do you use astronomy tools to look for those biomarkers in the atmospheres of other planets.

GC: So, there are a lot of different things you can do in the field of astronomy.

PG: There are a lot of different things.

GC: What kind of students come to your classes at Southern Illinois?

PG: Well, here we don't actually have an astronomy department. It's a physics department that has astronomers within it. And so, the astronomy that we're teaching is mostly service courses. It's classes for people who aren't science majors—or they might be, but it's mostly non-science majors who need to take a science class—and we provide astronomy as an alternative for them. In those classes I've had a lot of medical students. And a lot of the elementary and secondary education majors take astronomy because it's something they're going to be teaching later on.

And so, we go through and we teach them the history of astronomy, we teach them how to understand the science that's necessary to read *Sky and Telescope*,

that's necessary to keep up with the newest discoveries that NASA's putting out in its press releases. And to hopefully give them an interest in astronomy that then they can carry on through their lives that keeps them reading and enjoying all the new discoveries that we just keep making.

GC: One of the things I enjoyed about the book, *Origins* (the one they made the PBS show off of, or visa versa) was that he did a really good job—and I apologize, I can't think of the author's name—of showing how the scientific method was applied to how people had ideas, and then how they used those ideas to make predictions, and then what was found either proved or disproved the predictions and led to new predictions.

One of the things that disturbs me is that TV, even when it claims to be covering science, does such a bad job of distinguishing between real science and all that pseudoscience. Do you have to spend a lot of time teaching your students what real science is?

PG: Yes. And it's even more complex than that sometimes. There's this problem with multiculturalism creeping into places it just doesn't belong. One of my science teachers, Gene Capriotti, when I was at Michigan State, told me that when he was teaching astronomy back in the 60s he had a student raise her hand in the back of the classroom and say, 'Well, if we were in India, what would we be learning?' Because she thought Newton, who's a dead white guy, gave a European perspective on physics, and they must learn different physics in other cultures

And science is one of the few places where, no, really it's true wherever you go on the planet. And not only that, but science is the same no matter what world you're on. Physics is true here and it's true on the other side of the cosmos. But in the classroom we do a lot of trying to overcome this bias that, well, the Big Bang is just a dead white guy theory. No. The Big Bang is our present-day

understanding based on multiple lines of evidence of how our universe evolved to the point where it is today.

And so, I have to somehow get past this idea that there are multiple valid cultural perspectives, and that in the science classroom I should be teaching the creation myths side by side with things that come out of scientific data. And that's a hard one to overcome because there are places to teach myths, there are places to teach the different creation stories. But those tend to be English classrooms, and History, and Religion classrooms. And in physics there's only one answer.

There are sometimes things that we don't know the answer to. The stars that I study, some of them don't vary the exact same way month to month, but one month they do one thing and the next they do something different, in a systematic way. We don't know why. We have two different theories. And I can say, here are the two theories, here's the evidence for them, and here's how I test which one is true. But I don't have the ability to do that test right now.

GC: Right. And I think the thing that disturbs me is that so many people don't understand that intelligent design is not a scientific theory, because it doesn't give you anything testable, ever—not something that you would test in the future with better instruments, but it's just by definition untestable.

PG: Right.

GC: That seems like a basic principle of the scientific method that's not getting taught.

PG: Yes, and it also cherry-picks through the data. And it doesn't allow change. A real science theory leaves space for modification. Right now I can tell you Einstein's theory works in certain regimes, but it doesn't work in the innards of black holes and it doesn't work in the innards of atoms, where I start entering quantum regimes.

So, just as Newton's theory of gravity is completely valid on the surface of the planet Earth and pretty much everywhere in the solar system that we deal with, I have to modify Newton's theory of gravity when I start reaching extremely high speeds or getting near extremely massive objects. Then I have to jump to using Einstein's theory of relativity, which builds on Newton's theory.

And so, these theories are growing and building one on top of the other. We generally don't throw things out, we simply say, OK, this is only true in this situation, and that's a special case. Just like a square is a special case of a rectangle, Newton's laws are a special case of Einstein's theory of relativity.

With ID you don't get that ability—that flexibility—to build on knowledge, and confront new evidence, and have a flexible theory. They start with the theory and then find the data that fits it.

GC: Yes. That's called 'you already know the answer'—or you think you do. I didn't really know when I started podcasting that this would evolve to be a priority to me. I realized that trying to just communicate how science really works to people is something that I can do and really want to do. And I think that's something you and I share in our podcasting.

PG: Yes. I agree with that.

[music]

GC: I was just wondering if you would tell me a little bit about how you happened to get into podcasting. I know you're almost one of the pioneers. I think we determined that you might have been in the first science podcast.

PG: I was in what was the very first science podcast listed in the original Podcast Directory that Adam Curry was working on. And I was with a show called [Slacker Astronomy](#) at the time. It was an idea of Aaron Price's. He'd been reading—in, I

think it was *Parade* magazine, back in January of, I think it was 2005—he had been reading about how there were many evangelical Christian churches that were using this brand spanking new technology, called podcasting, to reach out to the technologically literate.

And Aaron figured, well, if it works for the Christians it should work for the astronomers, as well, as an educational tool to get astronomy out to the technologically literate. And so, he asked me and he asked Travis Searle—who is a radio major from a really good college—and all three of us worked together through the [American Association of Variable Star Observers](#) on multiple projects. And Aaron pulled the two of us together, and the three of us released our first show on Valentine’s Day.

GC: What year was that?

PG: That was 2005.

GC: That’s pretty early on.

PG: It was pretty early on—well before iTunes. We were out there when it was all iPodder, and iPodderX, and the big yellow lemon; when the technologies just still weren’t there. GarageBand didn’t have podcast features yet, and so we were trying to force it to do things against its will. And Travis did a spectacular job with all of that. He was our technology guru. And we had a good ride. We went for about a year-and-a-half.

And then there were a bunch of different life changes that went on. I got married and moved across the country, Aaron started graduate school, and he took [Slacker Astronomy](#) in a completely different direction with [Slackerpedia Galactica](#). They moved to having a whole bunch of different people talking on topics all at once, instead of the old scripted format. And I moved to working

with Fraser Cain of [Universe Today](#) on [Astronomy Cast](#), and I've been with that ever since.

GC: And so, how often do you put out your show?

PG: Every single Monday—unless there's an Internet SNAFU, in which case it's on Tuesday. We just finished our 13th month, I think, and so we're up in the mid-50s on our number of episodes. We haven't missed a week yet. It's 30 minutes. It's a facts-based journey through the cosmos, where we take on a different subject and talk about what is known, and what questions are open, and what tests need to be done to find the answers.

GC: And your website is [astronomycast.com](#)?

PG: [astronomycast.com](#).

GC: And you've got a place there where people can send you questions about astronomy?

PG: Yes. Our email address is info@astronomycast.com, and that will get email to myself, to Fraser, and to our producer, Rebecca Bemrose-Fetter. And every few episodes—and it's unfortunately somewhat random—we will go through listener questions and answer those live on the air. If people can send us audio files, we'll use those audio files in our show, as well.

And we've gotten some really neat and really complicated questions from listeners, asking questions about the earliest moments in the universe, about black holes, about life emerging on other planets. It's been amazing to see how thoughtful so many of our listeners are, and how much they want to hear the hard science instead of just the fluff of the pretty pictures.

GC: Yes, I've gotten feedback from my listeners of the [Brain Science Podcast](#) about how they appreciate the fact that I don't talk down to them. You know sometimes I think I might not explain enough—I'm not as good with the analogies as you are—but they seem to really appreciate getting the real science.

PG: I think people are a lot smarter than the media generally give them credit for.

GC: That's definitely true.

PG: And with the power of Google you or I can accidentally use a term that no one knows, and then there's Google to find the answer. So, if we occasionally slip up, we have the safety net where an interested listener will go out and find the answers. And I think that's cool, as well.

Because we'll talk about things on our show—and you probably have the same thing happening—we'll talk about it, and it will cause people to go on a Google quest to learn more and read more. And then they'll send us their questions based on the stuff they've been reading. And that's just cool.

GC: Yes. I love getting emails from listeners. What is the most surprising place that you've gotten an email from?

PG: Saudi Arabia.

GC: Wow!

PG: That was just a cultural shift for me to get this email specifically to me—a female scientist in the United States—from a male native to Saudi Arabia, praising us for the quality of our show. It was just like all these stupid stereotypes that we hear aren't true. That was so cool to hear that we're reaching into countries that are so very different. And the language of science, as long as

you're honest and as long as you give good information, gender doesn't matter and nationality doesn't matter.

GC: Do you have a hard time juggling doing your podcasting with your teaching and your research?

PG: Yes, I have to admit. And I also maintain a blog at starstryder.com. Yes, there are a lot of really hard long nights. My husband is starting to get embittered towards my laptop, I have to admit. But I'm also trying, along with variable star research, to do research on how podcasting is impacting the people who are listening—how is it causing them to choose to learn more about science, even though they're no longer in school in many cases.

And so, for me podcasting has become a part of my research program. And it's the whole 'you should never try and maintain two research programs at the same time'. But to stay focused on science, to stay interested in astronomy, I need to be doing some astronomy research just for my own goodness of heart. And I have to admit, I'm not doing as much variable star astronomy as I probably should.

But the research that's coming out of our podcast has been extremely exciting. We just got a new paper published in the journal, [Communicating Astronomy with the Public](#), which is put out by the [International Astronomical Union](#), where we talked about how listening to podcasts—and it's not just *Astronomy Cast*, it's any astronomy podcast—can touch someone who otherwise would never be interested in astronomy.

We've had people come to our show because they're learning English. Our show has transcripts, so they can read the transcript while listening to us, and it helps them learn English. And they've come to us for this non-science reason, listened to our show, and gone, 'Wow, astronomy is cool!' And they've started getting

involved in local astronomy clubs; they've started wanting to go to public lectures at their local colleges.

I don't know where all of our listeners are coming from. That's a question we stupidly forgot to ask. But I do know from our results that the people who end up listening to us, about 30% of them (and I'm rounding numbers violently because I'm working from memory) initially don't really have an interest in astronomy—it's something they only pay attention to if it just randomly ends up in front of them.

And of those 30% we're taking more than 50% (and I think it was 70%, but again, I'm working off the top of my head here) of those people are then becoming people who actively seek astronomy content independent of our show, independent of other astronomy shows, after listening to podcasts.

And that's the coolest thing for me, is we're taking people and entertaining them, and as a result of the entertainment we're making them want to learn. How many people want to go to science classes? Well, podcasting has the power to take people and inspire them to want to take science classes.

GC: Yes. I got an email from a college student who said after listening to the [Brain Science Podcast](#) he was thinking about doing neuroscience graduate work. And I was like, wow!

PG: Yes.

GC: You have a better idea of your impact because you're doing the research into it. I don't have very much. But those emails keep you going when you're working those long hours, don't they?

PG: Yes. And the ones that are so amazing to me is about once a month we get an email from someone who says, 'I was always interested in astronomy. For

various life reasons I didn't get an astronomy degree in college.' They either didn't like the math or they needed to earn more money—just all sorts of different reasons.

And then they're saying, 'I'm now in my late 30s, early 40s, mid 50s, even. Now I want to go back and get the astronomy degree. How do I do it?' And that in itself is cool—that people are willing to take the risk, and fall so much in love with astronomy that they change their life path.

GC: I'm just going to say to any of my listeners who haven't heard your show yet, they should give it a try, because your enthusiasm for astronomy—and Fraser's—really comes through on your show. And I think that makes a big difference.

PG: That's such a compliment, because we really do enjoy what we're doing. There are days where – We just did a show on inflation that what you don't hear in the show that went live, is the more than one time where Fraser asked a question and I went, 'Oh, hold on. Let me go find my textbook,' and we paused the recording, and I had to look up the answers and work through things, and find journal articles.

And some of the topics we go through, it's like a new education for both of us every week, where we're pulling new facts out of the literature, and going back to things that I haven't seen since I was in graduate school. And we're having so much fun. It forces us to stay current in what's going on in astronomy, to stay current with the new and exciting discoveries that are being made by people other than us. And it takes a community to understand a universe.

GC: And it makes a difference having a co-host, doesn't it?

PG: Yes. I don't know how you do what you do; because Fraser and I need each other's feedback. And occasionally we'll have Rebecca. She listens to the shows

and just laughs at the two of us. And having the group of three of us giving each other encouragement and feedback really helps.

GC: Yes. And then I don't even work in the field that I'm making my podcast on, so that's another level of challenge.

PG: Fraser's not an astronomer, either. He's actually an engineer and an amateur astronomer. He's not out there with telescopes. He's an armchair astronomer, is perhaps the best term for it. He's a journalist. He has a degree in computer science, and has had an entire career in Internet corporations. And he's doing [Astronomy Cast](#) for the passion, and he does [Universe Today](#) for the passion, and tries to earn money doing things—and is successful. But his knowledge comes strictly from a love that has led him to read everything he can read.

GC: Yes. I think the advantage I have not being a specialist is at least I have some clue of how to communicate it to a regular person. I mean sometimes you can get so specialized in your knowledge that you can forget what the man on the street, so to speak, knows.

PG: Right. No, that's entirely true.

[music]

GC: I know we used up quite a bit of your time. Did you want to talk at all about the challenges of being a woman in science? Any advice to women that may be intimidated about the idea of going into science, even though they love it?

PG: It is something where you have to grow really thick skin. I've heard some of the strangest things over the years—the types of things that you don't want to believe can happen. I've had the number of years I've spent teaching compared to some male who has spent less years teaching, where they talked about, oh, the

man has so much experience, and then mine doesn't count for anything. And I had someone as a joke say, 'Well, yes, that's because you're a girl, and girl years are worse than dog years.' And I was just like, 'Thanks. Thanks a lot.'

There's the little girl attitudes that you end up with, where all the guys in the class are like, 'Oh, here, we'll help you.' And it's like, 'Really, I can kick your butt at doing this problem set. It's OK.' And being everyone's little sister gets exhausting.

There is this amazing blog called [Female Science Professor](#), and she's made some very astute observations that when you think about them you realize, wow, that's actually true. One of the things she points out is that in a lot of meetings, if a woman makes a suggestion, and she's the only female in the room, the guys just blow past it, ignore it, it never happened. But if a guy in the room makes the exact same suggestion, or champions her idea, suddenly it's listened to.

GC: Yes, I've had that experience. I'm sure you have had it too.

PG: And so, you have to somehow figure out how, without being louder, to make your voice more hearable. And then there's just the stupid things that happen. I was at a conference a number of years ago that almost made me leave the field of astronomy, where I was sitting next to a very senior female professor, and a woman I really respect had just given an extremely clean presentation on her science topic. It was beautiful.

After she was done talking—and I think she was the first female to talk at that presentation—all these men just started asking her these questions that were along the lines of, 'Yeah, there was something wrong with your research. Let's try and find the trap that you fell into.' And I asked the senior faculty member who was sitting next to me, 'Why are they doing this? Why are they attacking her like

this?’ And the woman who was sitting next to me said, ‘You just watch: They’ll do that to every single woman.’ And they did.

It was like the women’s research, if it was new and cutting edge and exciting, they assumed that something had to have been done wrong. It is getting better, in terms of when I look around the astronomy community it’s filled with dynamic women, who are making an impact, who don’t look like men—who have trendy haircut, trendy clothes, who could fit into a marketing corporation just as well as in a university.

But their numbers are small. There’s not 50%. And when you deal with little kids, half the little kids are girls. And all the little kids love astronomy. So, we need to figure out how to keep all that excitement of the little kids with the adults who are choosing their college degree. And then, with the girls we have to say, ‘Look, for a few generations—and unfortunately that means your generation too—there are going to be these bigotries.’

There’s going to be, ‘if a woman gets married in graduate school, she’s been wasting her time on men,’—that’s one I heard—‘if a man gets married in graduate school he’s being responsible; he now has someone to take care of him.’ Just stupid things like that, that you hear, that people say without realizing it’s gender discrimination. You just have to suck it up and live through it. And you have to be willing to fight twice as hard.

GC: Yes. Did you have a woman mentor early in your career?

PG: No.

GC: Because I didn’t have any.

PG: No. I had a woman who almost scared me out of the field. And in retrospect what she said was so exactly right. I was initially assigned a female

advisor, and I wrote this bubbly freshman email to her my first week or so of undergraduate life, saying, ‘Hi, I’m dual degree international relations and astronomy.’

And I’d actually been doing research for two years at that point. I’d worked at [MIT’s Haystack Observatory](#) in high school, and I’d worked as a foreign exchange student at an observatory in the Soviet Union. And I wrote her all about my research and what I was interested in doing. And she wrote back this very terse email that said, ‘If you’re interested in international relations, you don’t have what it takes to hack it in astronomy, and you should go into that.’

In retrospect, what she meant was, if you are the type of friendly, outgoing person that loves talking about politics, interacting with humans, trying to benefit society, the weirdnesses of—I have to say it, it’s true—the socially non-graceful scientific community may not be the place that you’re going to be happiest. And what she was saying in telling me to jump fields was, if you are the stereotypical happy, bouncy, outgoing IR student—and it is a stereotype—then –

GC: (Most stereotypes are based on something.)

PG: (They’re based on something.)

– then the fight, the determination, the underlying seething anger you end up having to keep buried deeply, periodically, while dealing with insulting men—and in some cases, insulting women, who make it twice as hard on other women (women are the worst judge of their own gender in some cases) –

GC: Absolutely. That’s unfortunately true.

PG: – unless you have that fight—bale fields. And I have to admit, after graduate school I was so tired of fighting that I became a magazine editor for a year, and then worked my way back into academia after that, because I realized I

really liked the research. But I baled for awhile. And a lot of women just one day say, 'I'm just tired of the fight.'

And it's not that the science is too hard; it's not that they want to have families. There are many women who are very successful who have families. And if families were a concern, nursing is about the hardest field there is in terms of demands on the body, and hours, and that's a female-dominated career.

What you get sick of is you get tired of the men getting in your physical space, because they're taller, speaking down to you, and informing you you're wrong, just because. You get tired of the fact that everything's designed for people the size and lifting capacity of a man. You get tired of the gender bias in the discussions, and the fact that a woman with children is 'wasting her career' and a man with children, that's fine.

GC: Yes. When I was in medical school there was a woman ahead of me who ended up becoming one of the pioneers of in vitro fertilization. But at the time, she was the chief resident of OB/GYN at my medical school. And she was just a normal chief resident. And the guys were all, you know, 'She's a bitch.' And it was just because she was demonstrating leadership. I mean a woman demonstrates leadership and they call her a bitch—the same thing they call leadership if the guy does it. It's really annoying.

I'm lucky, though. There weren't that many women in medicine when I started medical school. It really has come up to almost a 50% thing, so our problems aren't quite as bad as they are for the women in hard science now. But I started out in engineering, so I've also been on the really minority end of things. You're younger than I am—I'm a little bit disappointed to hear that things haven't made more progress.

PG: Well, the problem is how much time it takes.

GC: It just takes more time than a generation.

PG: And there are stupid things like, astronomy is such a small field that there aren't a lot of job openings. I saw a study last year—and I want to say it was Lynne Hillenbrand who did it, but I could have the name wrong—if you replaced every single person who left Caltech's astronomy department with a woman (everyone who retires naturally, who leaves to take a better job somewhere else) if you take their normal rate of job openings, and every single time there's a job opening you put it with a woman, it's still going to take decades to make that department 50/50.

It takes so long to cause significant change in astronomy because we don't have enough jobs for everyone who gets a degree to eventually end up working in astronomy. And you literally have to wait for people to die for jobs to open in some cases. And, yes, it makes it harder to change the ratios.

GC: So, you would definitely say that one should go into astronomy for the love of it, right?

PG: There's no other reason to go into it. You don't get paid that well. Industry pays better. Journalism pays better in some cases—and that's not a high-paying field. The hours are terrible. A normal work day for any of my colleagues is 9 a.m. to 7 p.m.—or the moral equivalent shifted through the day, depending on if you're observing or not—at least six days a week. I've worked with a lot of people that work 12-hour days, 7 days a week. And that's what it takes to teach the classes, to do the research, to do the travel to conferences, to write the research papers.

GC: And that's true for a lot of fields in science, isn't it?

PG: Yes. You're asked to do a lot. You're asked to do the same job that a high school teacher does. Now, admittedly, you may not have as many classes. The

normal load at the university I'm at is three classes every semester. And then, on top of that, you are meeting one-on-one with students who are your research students, two, three, four hours a week. Then, on top of that, you have office hours for the students who are in your classes to come ask questions.

You have to, on top of that, find time to write grants. A typical grant will run at least 20 pages. On top of that, you have to find time to write journal articles. Journal articles—the length of the paper is in no way corresponding to the amount of effort that it takes to produce the paper in number of research hours.

GC: It's probably inversely proportional.

PG: I don't know. I don't think there's any relationship. It all requires time.

GC: And so, how do you find time to podcast?

PG: Fraser taught me a very important lesson, and that is, no moment wasted. He has two kids. He and Phil Plate have been a really good inspiration to me. I'm young, I don't have kids yet. Both of them have kids, have careers, have wives who are working. And if we're just shooting the breeze and a kid comes in, I'm dropped; I no longer exist. The kid gets their full attention.

And so, you have priorities. During your work hours, you only work. I'll catch myself talking too long with the person who has the office across the hall from me—it's like, no, can't do that, must work. Every moment is spent doing something. I have to be willing, when someone tries to interrupt me, to say, 'No, I'm sorry, I'm working on this. Can we talk...?' and then set a time that is one of my set aside times, so that I'm not getting distracted. Time management is essential.

And a very patient spouse is also essential—if you don't live alone.

Chandrasekhar—he's a famous astronomer—his biography (it's just called *Chandra*, and the author's last name was [40:34 Mukerji sp?]) talks about how

Chandrasekhar's wife had a Master's degree in astronomy—I believe they've both passed away—and she was not only his research companion, helping proofread things for him, but she understood his genius and was willing to pick up the slack, and do the dishes and take care of the children, and free him from a certain number of the household chores.

I'm not Chandrasekhar, but I think my husband matches his wife's willingness to pick up the slack. My husband, when I'm working on grants is – he's a fabulous cook. He loves to cook. And he'll cook dinner every night of the week if I'm in the middle of a grant. He picks up the slack that frees me to do things that I love. And I hope I get to repay him periodically.

GC: Yes. My husband actually just retired from 30 years of teaching electrical engineering. He can help me out, too. And since I don't have a co-host or anything, he's an important source of support for me—that's for sure.

PG: Oh, that's great. You're lucky.

GC: The only computer thing he actually does for me is my Discussion Forum. But every little bit helps.

PG: Oh, I understand that. My husband's a software engineer, and he has more than once found solutions to some different technical problems that we've been having. And it's good to get that technical support, as well as the nice food to go home to.

GC: Well, Pam, I really appreciate you being here—now especially that you've told me how much you're doing with those few hours of every day. It's really special that you were able to spend time with me, and I hope we will get to see each other in person again soon.

PG: Oh, I hope so, as well; and definitely at Dragon*Con again next year.

GC: Yes. OK.

PG: Well, it's really been my pleasure. Thank you so much for having me on your show.

GC: Thank you for being on the show, Pam.

[music]

I hope you enjoyed our conversation. I really appreciate Pam taking the time to be on the show. She also recorded her end of the Skype conversation, which is why she sounds so good. I will have links to the [Astronomy Cast](#) and to her [blog](#) in the Show Notes at [booksandideas.com](#). I hope you will take a minute to drop her an email.

If you have listened to this podcast for awhile, you know that it seems to be in a state of constant evolution. It's still my goal to put something out about once a month, even though it's been three months since the *Harry Potter* episode. Even though this podcast doesn't come out as often as I'd like, I do try to post something on the website almost every week, so you might want to subscribe to the feed.

Meanwhile I am continuing to focus most of my time on the [Brain Science Podcast](#), which is a pretty big challenge, since it's in addition to my job as an emergency physician. If you have any ideas or suggestions, please don't hesitate to send me an email at docartemis@gmail.com.

When I first started [Books and Ideas](#), back when I was trying to put it out every week, I talked about things like television, books—whatever was going on in my life each week. Which I discovered really wasn't my style. However, here in the United States we did just start a new TV season, so I wanted to mention my favorite new show, which is called *Pushing Daisies*.

It's the creation of Brian Fuller, who did *Dead Like Me*, which was on Showtime, and *Wonderfalls*, which was one of those shows that was cancelled by Fox—which is what Fox does to almost every good show they get. Anyway, if you liked either one of those shows, you don't want to miss this one. It has Fuller's very unique, wry sense of humor.

In the last episode I mentioned that I'm a huge Joss Whedon fan, and especially a fan of *Buffy, the Vampire Slayer*. There's a new audio drama available in podcast form that I highly recommend. It's called [Buffy Between The Lines](#), and it represents the voluntary efforts of over 100 people working under the direction of Tabitha Smith.

The story takes place during the summer, between Seasons 5 and 6—that's during the period when she was dead. I haven't met anyone who's a *Buffy* fan who's not impressed with both the writing and the cast for this podcast. And remember, they're working completely for free, since that's one of the rules of fan fiction that you have to follow so you don't get sued. Anyway, you can find it on iTunes or at [buffybetweenthelines.com](#). If you like it, be sure to drop Tabz an email; and tell her I sent you.

Well, I guess that's all for now. As you know, I always love to get email, so please write to me at docartemis@gmail.com, or post a comment at the website, [booksandideas.com](#). There's also a section at the bottom of the Brain Science Podcast Discussion Forum devoted to the *Books and Ideas* podcast. That forum is at [brainscienceforum.com](#).

Thanks again for listening. I hope to talk to you again really soon.

[music]

Books and Ideas is released under a Creative Commons 2.5 No-Derivatives Attribution license.

[music]

Transcribed by [Lori Wolfson](#)
All errors or omissions responsibility of the transcriber