

Ask-a-Biologist Vol 047 (Guest: Edward O. Wilson)

**Edward O. Wilson Science Rock Star - Part 2**

Dr. Biology continues his conversation with biologist Ed Wilson. Just what does it take to be a great scientist? What would he do to encourage students to become scientists? These are just a few of the things we learn in this show as well as what Ed Wilson would do or be if he were not a biologist. Some of the answers might surprise you.

**Transcript**

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**Dr. Biology:** This is Ask-a-Biologist, a program about the living world, and I'm Dr. Biology. We're continuing our conversation with Ed Wilson. Since I introduced you as a science rock star in the last show, I thought I would ask you what you think it takes to be a really great scientist.

**Edward O. Wilson:** Let me put it this way. It isn't brains. It isn't intelligence. [laughter] That may come as a shock to hear that. When I was a boy, I scored 123 in IQ. That sort of depressed me because I wanted to be a scientist. I thought maybe I would be better at doing something else, just going into farming, or whatever, but I stuck with science because I couldn't think of doing anything else. I subsequently learned that two of the greatest scientists of the 20th century - one is regarded as one of the two or three best theoretical physicists in the world, and another one, one of the great pioneering molecular geneticists - have IQs of 121 and 122.

What's going on here? We always thought that the great scientists would have to be 160, 170. If you find a child that's got a 160 IQ, then you direct them toward, maybe, science. But, that turns out not to be the case.

Where have all the 160s and 170s gone? I'll tell you. They joined the Mensa Society and work for the IRS.

[laughter]

**Ed:** I've decided that there is an ideal IQ for a scientist. That's, basically, remembering words, putting words together, working out puzzles, doing crossword puzzles - at which I'm lousy - and so on. There is an ideal intelligence, and that is bright enough to see what needs to be done, to select important problems in science, but not so bright that you get bored doing it. I've often thought that when you get somebody that can put things together and do things real fast, they get "As" without much effort. They get bored with ordinary puzzles, and the like. Then they get bored with science because 90% or more of science is just plain hard work: repeating, testing, going through routine possibilities one after the other into unknown territory for which there is no answer - not at first.

**Dr. Biology:** It sounds like an important part of being a good scientist is to be possessed, or to have a passion for science.

**Ed:** Passion is absolutely essential. You have to have a passion for the subject. You really want to cast your imagination into the far galaxies. You just got to know if there are Earth-like planets going around other stars and whether life will be there. You just have to know what the life was like on the bottom of the sea. Or you just want to know everything about those orb weaving

spiders in your garden. Passion. You care and you just stick with it. People may even think you're a little eccentric. But, there is much more.

**Dr. Biology:** So, what do you think we should be looking for in ourselves or students that would make them successful in science?

**Ed:** A really good scientist is an entrepreneur. He or she wants to create something new. She wants to make her own little abode, practice a way of doing things, a way of thinking about things. That's what good entrepreneurship consists of. The important lesson here in education is: don't depend on ordinary intelligence tests. Don't depend on consistent good grades. Look for the passion in the student.

Lay out an array, if you can do it in schools, the way the Boy Scouts do it, for example. If we had a way of laying out subjects, a whole array of subjects, in addition to ones that are required... It always has to be the fundamentals that are required, in which the student needs to memorize and practice, practice, practice. That's language, English, arithmetic, elementary math, statistics.

You just have to learn it, and the student cannot be allowed to escape. That should only take a fraction of the time of even a person with an average amount of intelligence.

But then, you lay out a whole series of other subjects. They can be various forms of music, instrumentation, music appreciation, criticism, history. It can be different aspects of science that are near the entrance places for the actual disciplines themselves. It can be marketing. It can be visual arts.

Let the student travel along and look over the possibilities. I think, you'll find that if we did that, even as early as nine or ten years of age, a student who has the potential to do extremely well - and most students do have the potential to do something extremely well - they will tend to settle on it. Then, you give them free play and encouragement, along with the other requirements.

That would be my prescription for education. Maybe this has been thought about, and tried and discarded, but somehow I feel it hasn't been. It hasn't been, for the reason that you asked that question. We really haven't come to understand what makes a human being want to do something on their own and do it well.

**Dr. Biology:** On this show, I ask three questions of all my guests. And it turns out that a lot of people enjoy listening to these answers. If you weren't a biologist, what would you be?

**Ed:** I believe that I would want to be an "Underwater Explorer." One who from a ship, explores the depths of the sea, and maps it, or who dives to look at coral reefs and ship wrecks, and other hidden objects in the sea.

**Dr. Biology:** Do you recall when you first knew you were going to be a scientist?

**Ed:** Yes, I was nine years old - looking through copies of the National Geographic, going out on little trips away from my home to nearby vacant lots and little wooded places, and catching insects, and then dreaming of someday studying them.

**Dr. Biology:** Now, when you were 13, you were the first person to discover the Fire Ants in Alabama. I don't know if people realize that Fire Ants weren't native to the United States, they're what's called an "Invasive" species. Were you able to publish that work at 13?

**Ed:** No, not at 13, at 19, but when I was a 13-year-old boy, I was living in Mobile, Alabama. Our family was only five blocks from the shipping docks. We know that a number of insect species have come up from South America, hidden in the cargo, over the years. In 1942, I was just a 13-year-old boy. I was doing a Boy Scout project. I was seeing all the different kinds of ants in the neighborhood, and it was then that I found one of these strange mounds, the Fire Ants. The introduced one, and it had come up on a boat for certainty, that is that species, that kind of ant, in shipping from Uruguay in South America. I made a note of it, and it was spectacular nest of ants.

By 1949, when I was a student in college, the University of Alabama, that ant had already spread out and become a serious pest - I mean that kind of ant. Even when I found that nest, probably there were many other nests in Mobile, although I was the first to see that kind of ant. I just happened to be in the right spot.

So, when I was 19 years old, I got my first job as an "Entomologist," and the State of Alabama put me to work trying to find out all I could about this 'new' pest.

**Dr. Biology:** Tell me, since I introduced you as a "Rock Star of Science," and you actually mentioned you like Soft Rock, do you have a favorite Rock Star yourself or musician?

**Ed:** That's a tough question, because I rarely paid attention to the individual singers. I had individual songs, melodies, background music, I enjoyed watching. Mostly what I did was to focus, while I was doing the microscope work, on the soft, easy music of Soft Rock during that period. It's just an incidental, but it really helped provide a sense of peace and concentration while I was doing detailed work in sorting out all these 600+ species.

**Dr. Biology:** Well, I find it interesting that it's Soft Rock that was bringing this peace and calm to you, rather than say "Classical Music" or something like that, which you might stereotypically pick for a scientist. OK, so you can't remember the names of your favorite Rock Star or musician? That's OK. Do you have a favorite Rock Star Scientist?

**Ed:** I don't know any other Rock Star Scientists. [laughter]

**Ed:** I know Rock Star Science writers, but not Rock Star Scientists.

**Dr. Biology:** OK, who is a Rock Star Science writer?

**Ed:** Well, those would include people like Stephen Jay Gould and Richard Dawkins, and before them Carl Sagan. They weren't scientists, in the sense that they were working in making scientific discoveries and doing research, seriously. They didn't engage themselves with that, but they were writing about science for broad public, and they were writing about real science. They didn't make it up, it wasn't Science Fiction.

**Dr. Biology:** Now, do you have any advice for a young scientist or someone who would like to become a scientist?

**Ed:** Yes. Find out what you would really like to do in life, what you would like to look at, place you would like to visit, things you would like to see, and then see if you can go into science from that point of departure. In other words, maybe you like to take hikes in the woods, with the Scouts or with your parents, or even alone. During that time, you like to watch for animals - most do when they're out hiking like that. Maybe searching for animals, and looking at all the plants around them and the forest, and seeing what they're doing, is going to point you to a life as an Ecologist, or as a expert on rabbits, or as someone that's really beginning to understand how many different kinds of mosses there are, and how the mosses make up the ecosystem; those are just examples that's coming from my head.

Maybe you like music, and most of the time that means if you made a job of it, you'd be a musician of course, or composer. On the other hand, who knows? Maybe your love of music will lead you - as one of my students who got his doctoral degree with me, with my help - it will lead you to studying how music works inside the brain.

This student, his name is Andy Patel, he's got a position in California now, has made wonderful discoveries to figure out what's happening in the brain when people listen to music.

**Dr. Biology:** Oh, so what's happening in your brain when you're drawing your ants, and listening to music, right?

**Ed:** I'm looking at the ants, and I'm dreaming of where that ant lives, and which one that looks the most like, and what on Earth it could do in life, and I'm saying, "I'm going to go there. This one I've got to see in life, this one I've got to study. Why does it have that strange looking spine on its back, what's it doing with that? Why is the head so long instead of round like most of them?" I'm thinking those things and then I realize that if I follow up any one of them, I'd be doing real science. I'd probably in time, make some important discoveries.

**Dr. Biology:** Have you done a lot of traveling?

**Ed:** I've done a lot of traveling, yes. I've traveled. When I was young, I traveled around the world. My dream while I was a boy searching around through the swamps of Alabama and North Florida, my dream was to go to the big tropics. I mean, not just local forests but to go to the Amazon, to go to the South Pacific, into the big jungles and do real exploring, way up river, seeing things that nobody had ever seen before.

The first opportunity was in my, actually I was in my early 20s and I had enough money to do it, I got fellowships from the university. Off I went to Cuba and then onto Mexico and then onto the South Pacific. I got to go into REAL jungle, especially on the great island of New Guinea.

I found myself realizing a boyhood dream that is trekking across a mountain range and to the center of a mountain range that nobody, except local people had ever climbed before; seen places that no one had ever seen before, finding new species of ants and frogs. Taking photographs of places where nobody had ever set foot before. It was a dream realized and I wish every person could have that dream like that and then find a way to see it realized.

**Dr. Biology:** Of all the plants and animals that are on the Earth, you picked ants. Why?

**Ed:** I just got fascinated with them when I was a boy, nine or ten years old. There were good articles on ants. There was one in the National Geographic and I had read a few other books that had mentioned ants in them. They were so abundant. When I went out on my little expeditions in Alabama and Florida in the woods there, I knew I could always find ants and they would all be different kinds. By the time I got to college I was 17 years old when I started. It was just very natural then that I would take a research project with a professor there and start doing serious ant studies.

**Dr. Biology:** If you don't mind, I'd like to give you one more two minute drill.

**Ed:** OK.

**Dr. Biology:** In 2009, it's going to be the 200th birthday of Charles Darwin as well as the 150th anniversary of his famous publication "On the Origin of Species." This is the first such book that applied a scientific approach to explain how we have such a large number of different kinds of plants and animals and how they changed or evolved over time. Can you explain why Charles Darwin was so important to the theory of evolution?

**Ed:** He invented the theory of evolution that turned out to be correct. There had been a couple of them before then. People had believed in evolution and they saw evidence of it, but it was Charles Darwin that really figured out how it works. Very simply that is, so simple. It's so simple that you can easily understand it in 30 seconds. You get in every kind of plant and animal you get a lot of variation. That variation comes from mutations that are inherited. Some mutations survive better and the animals, plants that have them reproduce themselves better and those are the ones then that become more abundant in a given population. Therefore, evolution is occurring.

**Dr. Biology:** You know, I wish we had more time to talk because there are so many things that I'm sure people would like to ask you. Is there ever a chance that we might get you to come to ASU?

**Ed:** Maybe, although right now, I guess partly because of the Darwin event and I'm also in the middle of the novel and then moving onto a major work on social evolution I'm planning. I get so many invitations now that I have to be very careful. Also I'll be 80 next June.

**Dr. Biology:** A very young 80.

**Ed:** Well, I feel very young, but I know when you get to 80, something can go pop and you know I just never know. I just, that's why I'm working at a furious rate, doing what writing I want to get completed now because I never know when something will happen to bring it to a halt. I know that sounds a little fatalistic and grim, but that's the way I look at it. Therefore, I'm sort of; I'm trying to cut back on my travel.

**Dr. Biology:** So, maybe I'll be able to come visit you someday.

**Ed:** Yes, that sounds like a good idea to me. We could manage that easily, I think.

**Dr. Biology:** Professor Ed Wilson, thank you so much for visiting us today.

**Ed:** Dr. Biology, it's been a pleasure.

**Dr. Biology:** Now, before I sign off and in case someone missed the web address in the first part of this interview, the Encyclopedia Of Life which is a wonderful program that you have to check out. The web address is real easy, eol.org. And if you want to learn more about the really cool activity called the “Bioblitz”, you can type in bioblitz into your favorite web search tool. I think, you'll find the results will pull up a whole bunch of information about these 24-hour living treasure hunts. How to participate and or create your own bio blitz and if you do have a bio blitz and you want to let us know how it went, send your information to Ask a Biologist. We'd love to hear about what you're finding.

The Ask a Biologist podcast is produced on the campus of Arizona State University and is recorded in a grass roots studio housed in the School of Life Sciences, which is an academic unit of the College of Liberal Arts and Sciences.

And remember even though our program is not broadcast live you can still send us your questions about biology using our companion website. The address is askabiologist.asu.edu or you can just Google the words, "ask a biologist." I'm Dr. Biology.