

Ask-a-Biologist Vol 046 (Guest: Edward O. Wilson)

**Edward O. Wilson Science Rock Star - Part 1**

Dr. Biology sits down with biologist E. O. Wilson to talk about science, his writing including his book, *Superorganism*, and future new novel, as well as his art. Along the way they discuss the *Encyclopedia of Life* web project and a very cool outdoor activity called a "Bioblitz."

**Transcript**

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**Dr. Biology:** This is "Ask-a-Biologist," a program about the living world, and I am Dr. Biology. To start us off today, let me list a few names; Elvis Presley, The Beatles, U2, Gwen Stefani, and E.O. Wilson. Why these names? Well, they've all been called rock stars. And even though you may not know all their names, you certainly know some of them. My guest today is one of the rock stars in the world of science, Edward O. Wilson, or for those that follow rock stars of science as well as they follow rock stars of music, he's known as simply "E.O. Wilson." If you haven't heard of him, try typing in "Edward O. Wilson" into the search engine Google, you'll end up with millions of results.

So just who is E.O. Wilson? Well, he's a biologist, author, and an artist who's been observing life on our planet with a particular interest in ants. Bu his interests extend far beyond these six-legged insects to include all living things. In fact, he's one of the main persons behind the Encyclopedia of Life web project, as well as a very interesting activity called BioBlitzes.

Today we get a chance to talk about the Encyclopedia of Life, BioBlitzes, his scientific work, and his art. Welcome to "Ask-a-Biologist," Professor Wilson.

**Edward O. Wilson:** I'm delighted to be here Dr. Biology.

**Dr. Biology:** Would you mind if I call you "Ed"?

**Ed:** I prefer it. When I was a kid, I was known variously as "Bugs" or "Snake" Wilson. I just mentioned that, because to tell you that I started my interest in outdoors pretty young.

**Dr. Biology:** You did, and actually we get to talk about that a little bit later, because I think it's fascinating to know how a lot of the scientists do start young, and you had a really interesting find I would say, at a young age. We'll talk about that, but before we get into that let me start by giving you a test, something different. Biodiversity is a word that is being used a lot, well it's being used a lot these days. We often hear it in the classroom, as well as in the media, you might read it in a local newspaper. In two minutes or less, can you explain what 'biodiversity' is, and why it's important?

**Ed:** I better be able to, I introduced the word. [laughs] Biodiversity is short for biological diversity, it means all the different species, and all of the different ecosystems, habits that species live in, and it just means the totality, the whole life on Earth, but studying from a point of view of variation, variety among different life forms, different kinds of snakes, different kinds of plants, and so on.

**Dr. Biology:** So why is it so important?

**Ed:** It's so important, because our lives depend on it.

**Dr. Biology:** So you mean to tell me that if we lose a few hundred plants, it could be a problem?

**Ed:** Big problem, especially if they include the plants that we get all our food from, but even if they didn't, you'd have all sorts of things go wrong. You need a lot of different kinds of plants to collect the water up on the mountainsides and let it trickle down slowly, so we just don't get washed out every time. You need plants that support animal life of all sorts. You need plants of a great variety to give you enough oxygen in the air to breathe, and so on. The same is true with different kinds of animals that we need. Some of those animals incidentally, are very small, you never see them. They're there in huge numbers, in the soil, in the dirt in your feet, and up in the trees and so on.

Most people don't even know they're there, but it turns out that we need them up there and down there, doing all the things they need to circulating the materials, the nutrients, the things the soil consists of, and generally keeping the whole system we live on working. We need all of them, we can't start just letting too many of them get extinct, and throw them away.

**Dr. Biology:** Alright, well now that we have a basic understanding of biodiversity, let's shift to an activity that you were one of the pioneers of, it's called a BioBlitz. If a person didn't know any better, they might think it's something to do with football or some other sport. So what is a BioBlitz?

**Ed:** A BioBlitz is a great big celebration. It's a great big treasure hunt. To have a BioBlitz you get a lot of people together some time in the day, you can start in the afternoon or start in the morning; who are interested in finding different kinds of plants and animals out in nature, like a treasure hunt. They all gather together, and there are experts, and then there are just anybody, families and others who want to come along and be a part of it. The idea is to see how many different kinds of plants and animals you can find in a 24-hour period.

**Dr. Biology:** Oh, so it's got a time limit.

**Ed:** Yes it does, and actually you can even have contests, different towns having different BioBlitzes and competing. The idea then is to see how high you can get the score, and you have to verify that you did see this, and you saw that. You can easily get in a 24 hour period, if you have enough folks working, like over 1,000 different kinds. It's so interesting, because not only do you see people having a lot of fun, they're turning up rare species, that experts say, "We haven't seen one of these in 20 years around here," or, and it happens all the time, new species. The expert may be an expert on butterflies or an expert on dragonflies or something like that, says, "Well heavens! That's a new species! Let's get a specimen of that, and we'll get it in there. We'll get a scientific name put on it, because we need to know about that in the future."

**Dr. Biology:** I just think that's so cool that you can go out and explore, and you might during this treasure hunt, discover something for the very first time. From an earlier show, we got to talk to Quinten Wheeler, who runs the International Institute for Species Exploration, and it's easy to find. It's called species.asu.edu. One of the things he mentioned is not only do you get to discover them, you get to name them. Can you talk about some of the names you have put on some of the ants that you've discovered?

**Ed:** Yes. Well usually it's the scientist that you get them to, who knows all the different kinds, and knows that it's a new species, who names it, but he could name it after you! I named a lot of species of ants after the people who found them.

**Dr. Biology:** OK. Now I'm motivated. I need to go out and do this. Which brings me to the point of, can you do a BioBlitz in your backyard?

**Ed:** You can. Yes. It would be kind of tough on your backyard if you had 100 people showing up to just do a BioBlitz on your backyard. But you could do with two or three people. And you would be amazed at what you can find in a backyard. Even if you have sort of a scrubby little backyard with not a lot of plants in it, pretty soon, you would probably be getting dozens of different kind of insects. And if you've got a magnifying glass and start looking at the soil, the dirt down there, pretty soon you'll see other things there. But generally speaking, when you have a BioBlitz, we like to have a few square miles and a few 100 people searching through them.

**Dr. Biology:** Now, is there any special equipment besides, you mentioned a magnifying glass, is there any other kind of equipment you'd need?

**Ed:** Well, if you're interested in looking for certain kinds of things. Most people are. They don't want to just go out and look for everything that moves. Even just families who want to be part of it will join in and say, "Well, we just love butterflies. And we think we want to just see how many different kinds of butterflies we can get." And they ought to be able to get a butterfly net to do that. If they want to see all the different kinds of birds they can find, they'd want binoculars. And of course, if you want to see how many different kinds of ants or how many different kinds of little spiders and so on that live in the soil, you bring along a trowel. But it doesn't take much more than that.

**Dr. Biology:** All right. So when did you start doing the BioBlitzes?

**Ed:** Dr. Biology, we started it 10 years ago, 1998. And this is the 10th anniversary of doing that. I might add that it's so popular. I don't know the number of states around this country, but a large number of them have BioBlitzes. One year Massachusetts had BioBlitzes in every school district in the state. And then when you go abroad, you find a number of countries having BioBlitzes. It's now up to about 19.

**Dr. Biology:** You also are a champion of a project called the Encyclopedia of Life, which is a web-based project. Can you talk just a little bit about Encyclopedia of Life?

**Ed:** Yeah. First of all, I invented the idea five years ago, and I suggested that we have an Encyclopedia of Life. It's on the web. The web address incidentally is eol.org, and I recommend it to anybody, eol.org. And we have a lovely introduction to the whole project. It is an electronic encyclopedia which is being built up now by a lot of scientists. It will have, does have already for many species, information on every kind of plant and animal, including right down to bacteria, known in the world, and everything known about each one in turn, with new information constantly being added. And information that's found to be wrong, taken out, and going on indefinitely. And available to every person, everywhere, anytime, free.

**Dr. Biology:** Wow. 24/7 Encyclopedia of Life. But when you talk about the Encyclopedia of Life, there's a lot of discussion about how many species we already know about. I see the number about 1.7 million species, and some say that might be only 10% of the species on this Earth. How are we going to make this really happen? How are we going to get everybody involved in your Encyclopedia of Life? And can we participate if we're not a scientist?

**Ed:** Well you certainly can participate. And the figure, you're right, is somewhere a little under two million. I say 1.8 is a good figure, but it's true that probably only roughly... This is my guess - 10% of all of the different kinds of plants and animals and bacteria or fewer are known to science. In other words, 90% out there are still undiscovered by science. It's no big deal to find a new species. Well that means that we're on a little known planet. We need to explore this planet as though we're landing on Mars, and then get a way of understanding all of that life, because our life depends on knowing it.

And that's why I and a number of other scientists are really anxious to get people interested and get them involved. Because just people who haven't been trained at science even can add to this. Certainly, we need the support of everybody in promoting the idea of the Encyclopedia of Life and other scientific endeavors that help us explore this little-known planet.

**Dr. Biology:** I'm very hooked on the website myself, and I'm encouraging anybody who has not been there to go look at it, because it's right now in its infancy even though it was conceived five years ago. We've got a lot of work to do, and I think we're going to need a big army. So, let's see if we can get people out there to do it.

I had the pleasure of having Bert Hölldobler as a guest on "Ask-a-Biologist." He is one of the preeminent ant specialist, myrmecologist, and your co-author on several books, which brings us to writing. We talk about science and scientists. You can't do science without communicating. So one of the things I like to talk about is the craft of writing. So, how important has writing been to your science?

**Ed:** It's very important. Throughout my life, I've worked as a scientist, but let me tell you that when you get to writing up your results, especially if you want to make a lot of people aware of what you've found or what other scientists have found, which is so important in modern times. Then the better you can write, the more effective you'll be as a scientist.

**Dr. Biology:** What's your favorite part of writing?

**Ed:** Well, I'm going to surprise you. All my life, I've written what's called non-fiction. That is, I don't make anything up. Everything is fact. Writing about fact is an art in itself, to make it clear, to make it organized, to get it right.

**Dr. Biology:** Make it interesting.

**Ed:** And to make it interesting. But most recently, since you asked me my favorite kind of writing, I decided I'd try to do a novel. I know a lot of people try to do novels. But I said to myself and my editor at the publishing house I use... I said, I think that if I use biodiversity and the search to save it and the fight to save it and to show how a young boy, in this case in the South, grew up determined to be part of the effort to study it and save it. This would be a book a

lot of people would like to read. Also, it would help bring attention -- just a novel like that -- to what the whole subject is all about.

So I started writing it, and I've discovered that I really enjoy writing fiction, you know a novel. As anyone who undertakes it will discover. On the one hand, it's just a tremendous amount of fun to create your own world in your own head, your own people saying the things you want them to say. On the other hand, I'll tell you it's real hard work. I was surprised at how hard it is, writing a novel.

You really have to do a lot of thinking and a lot of imagining, and select your words just right to describe people and how they live, and what they look like, and what they're trying to do, and even what they think. So that's what I'm finding right now, and I think that overall, I'm having the most fun writing a novel.

**Dr. Biology:** So is there a part of writing that you don't enjoy?

**Ed:** I don't think so. Oh, wait a minute. Let me take that back. The kind of writing I do not enjoy doing is possibly to a department store, when I write and I say, "Are you sure I haven't paid that bill?"

**Dr. Biology:** [laughter]

**Ed:** [laughter] Most kinds of writing, I enjoy doing. Creative writing, both non-fiction and fiction.

**Dr. Biology:** You set your novel in the South, or at least your character's a young boy in the South. It turns out you were a young boy in the South, and it sounds like, to me, you're doing one of the best things you can do when you start to be creative, is to write what you know.

**Ed:** That's exactly right, yeah. People have said that the best novels, the ones people most enjoy writing, and also most enjoy reading, are autobiographical. They're about the life of the author. But since they're fiction, and since you want to make them maybe more exciting than most of the life you actually live, then you are obligated to change things around. However, people you know, incidents that occurred, settings that you lived in, are valid background. You just don't try to present them literally, because this is fiction after all, and you need to combine them and break them up and add to them in ways that give them maximum amount of fun and drama in the work that you publish.

**Dr. Biology:** Right, and if you're writing a novel, now you're dealing with dialogue.

**Ed:** And you're dealing with dialogue. That's both tough and easy. For some people, they just can't get it down on paper the way they talk. But others--and I've found it fairly easy myself--can write just the way people talk. You've got to be willing to write some poor English once in a while, and sound a little dumb once in a while. But I find that it's very easy to sound very dumb, at least for me.

**Dr. Biology:** [laughter] All right, I hate to do this, but we're going to have to switch back to your [non]-fiction, because you and Bert Holldobler have written a new book. It's called Superorganism. Can you talk to us a little bit about this book?

**Ed:** Yes, certainly. This is a big book. It's non-fiction, it's real science, it has over 1,000 footnotes, and thousands of references from the literature and so on. And it's very complete, but it's all about social insects. Ants, a little bit of termites, some wasps, some bees. And why we call this Superorganism and why that's important in biology -- in life generally -- is that a colony of ants or honeybees, to take an example, is made up of a lot of little members--many ants in a colony, many bees, 50,000 maybe in a hive of bees. But they're so well organized, and they so depend on each other, and they're so altruistic, that is, self sacrificing and taking care of one another, that they've been able to build up very complicated and highly organized society, more than the ones humans have.

The results of that is that a colony of ants, or a hive of bees, almost acts like a single unit. The whole colony, all of the 10,000 harvester ants, or all of the 50,000 bees, acts almost in unison. So it's like one great big organism. It's a superorganism. And that's where that title came from.

**Dr. Biology:** Is this going to be a book that the average person's going to pick up off the shelf and want to read?

**Ed:** Well, yes. It's beautifully illustrated. I say that because, without being immodest, it's mostly the work of my co-author Bert Hölldobler, who is really creative as a photographer, in rendering art, and so on, showing exactly how these creatures look and how they live. It's not as easy going as many books written for a broad audience, but it is very readable. Especially when it's connected up with the illustrations that we have. You can figure out what the ants -- mostly ants, but also bees really -- are like, how they live, and why we call them superorganisms.

**Dr. Biology:** Well, you've helped me move right along into my next question. I brought in the studio another one of your books, talking about *Pheidole in the New World*. Now *Pheidole* is the genus of ant that you have a particular passion for, I'd say. Right?

**Ed:** Yes.

**Dr. Biology:** And this book, we can talk about the science and your passion, but I also want to make sure that we talk about not only the writing that's in here, but your illustrations. You illustrated the entire book. From what I know, I think there's well over 600 species of ants in here. So how many illustrations do you have?

**Ed:** 624 different kinds of ants in that one genus. 344 were new to science, I had discovered them. And to illustrate all of them, all 624, over 5,000 drawings that I did myself.

**Dr. Biology:** 5000 drawings.

**Ed:** Yeah.

**Dr. Biology:** How long did it take?

**Ed:** Well, off and on, 18 years. But when you do a scientific project like this, you're not sitting and doing it all the time. In fact I did this one just at leisure, sometimes on a Saturday afternoon, or early Sunday morning before the paper arrived, or a weekend when I just wanted to do something relaxing like do a lot of drawings. And gradually it came into existence.

**Dr. Biology:** So it's something that you consider relaxing for you, and the process, because we are drawing ants... I've seen a picture of you in front of a microscope. So are you using a microscope, and then drawing the ants?

**Ed:** That's right, and listening to soft rock.

**Dr. Biology:** And listening to soft rock! OK, well that brings up another question I'll ask later. I like to hear that.

**Ed:** Yeah.

**Dr. Biology:** All right. The illustrations are simple, they're clean, but I know the word that I love the most about them. I consider them elegant. Why are they drawn this way? Is it purely for art purposes? Or is there a science behind this?

**Ed:** Mostly science, but a bit of art. I design the whole layout so that each one of the 624 species--by the way, there are at least 624 species that make up about 20 percent of all the known ant species in the Western hemisphere. So in order to make it possible to identify them and look at their traits neatly, I arranged all the figures in the same way. Each species has, say, 10 or so drawings, or a little less than that, in many cases. But they're all drawn exactly the same way, so that you can compare species by species. But then, what I did was to take them exactly as they look--in different poses, different directions, different parts of their bodies. I drew them with very simple lines, and I drew in the traits--the exact shape of the head, the length of the little spines on their bodies that they had, the sculpturing as we call it, the little dots they have on the outside of their bodies and lines that run through part of their body.

I did those in a minimal manner, that is accurate, but in a way, that just highlighted what they really look like and why they're so different, one from another.

So basically, I suppose it does approach art, in that it requires the interpretation of the form, and how it's placed, and how it's depicted. But it's not imaginary. This is the exact way the ants look.

**Dr. Biology:** The thing I find interesting is, this day and age, when you can snap a picture in a second, you're still doing drawings. And after going through the book, I can tell why. Let me give my interpretation. If I look at a photograph, I get so much information that I'm often going to miss the subtle details or differences between different ants. With these drawings, I think I can see them almost instantaneously.

**Ed:** I think you've got it exactly right. What the artist does--or, in this case, the scientist in using art--is to depict exactly what makes that ant a different species. We see that used in caricatures, in cartoons of people and so on. And the art there is to show those traits that make the person in that cartoon immediately recognizable. I do that here, too, except that everything is accurate, it's not a distortion, not an exaggeration. It's exactly the ant looks.

**Dr. Biology:** So this brings us to the world of the taxonomist. The ones that are actually looking at these different parts of the insects, or plants, or whatever animal you might be dealing with. Being able to isolate those differences. Is there a particular species of *Pheidole* that you enjoy drawing more than another?

**Ed:** I enjoy drawing them all. The reason is that in most cases, when I was drawing, I was drawing something that was being seen for the first time. Very gratifying to be drawing something that no one has ever seen, this new species, and you're introducing it to science, you're giving it a name that will be there for all time. But I guess if I had to pick one out that I thought was the most fun, it's the moustache ant. And I had the one specimen collected in Mexico, and it's a soldier ant for that particular one, a great big head. And it has bristles that stick out on either side from where the jaws are. And it makes it look like it has a moustache!

I enjoyed really depicting that. Of course, I did it exactly as it looks. But when it came out, it's such a strange looking ant. So I called it--this is the full name--it's *Pheidole*, that's the genus name that they all have. But then I added a name: *Mystax*, which means moustache. So it's the moustache ant.

**Dr. Biology:** Right, that's the Latin for it, right?

**Ed:** That's Latin, yeah.

**Dr. Biology:** OK. Is there a part of drawing that you don't like or maybe that you get frustrated with?

**Ed:** I think probably just the more routine parts of the body. You have to get them right. But it's when you get to the distinctive parts of the body that make that creature that you're drawing absolutely unique, and it makes it stand out from all else. Just as a portrait artist doing a human face arrives at those features that allow, at a glance, the identification of a person, that's when it gets really interesting.

**Dr. Biology:** Is there anything that you draw, other than ants?

**Ed:** Actually, no. I have to admit. You caught me on that one! That's why I say I'm not an artist. I put my creative work in writing. That's where I do my best and most enjoyable work. I do say I so much enjoyed doing those thousands of drawings of these ants on this one occasion.

**Dr. Biology:** Well, maybe, if it's OK with you, we'll have to check and see if we can do a short article on you that includes just a couple of these plates, maybe even the moustache plant, on the "Ask-a-Biologist" website. I really would like people to see these things.

**Ed:** Sure.

**Dr. Biology:** And explain just a little bit more about them. Because they really are just exquisite drawings.

As I look down my sheet of questions, I can see that it looks like we should take a break, and we'll return for part two of our conversation with Ed Wilson, science rock star.

The "Ask-a-Biologist" podcast is produced on the campus of Arizona State University, and is recorded in the Grass Roots Studio, housed in the School of Life Sciences, which is an academic unit of the College of Liberal Arts and Sciences.



And even though we don't broadcast our show live, you can still send your questions to us using our companion website, which is [askabiologist.asu.edu](http://askabiologist.asu.edu), or you can just Google the words "ask a biologist." I'm Dr. Biology.

And don't forget, tune into Part Two with Ed Wilson, science rock star.