

Ask A Biologist Vol 085 (Guest Gail Morris)

Insect Infatuation

These fluttering icons of North America are a favorite of many people across the world, but they may be having some population problems. Don't worry though; there are ways you can help. Conservation specialist Gail Morris talks with our student guest host Kayna Lantz about these colorful insects, their identification, migration, and the many groups that are working to better understand them.

Transcript

Kayna Lantz: This is "Ask a Biologist," a program about the living world. I am Kayna, an undergraduate student studying sustainability, sitting in for Dr. Biology.

As you walk through your backyard, or maybe your local park, you notice a large caterpillar. It is very colorful, with stripes of yellow, black, and white covering its whole body. It is munching on a medium-sized green plant. When you see this caterpillar, you might not realize that it will soon transform into a bright orange butterfly.

If you are lucky in school, you may have watched this change occur. Can you guess which creature I'm talking about?

If you haven't figured it out, I'm talking about the Monarch butterfly. Hundreds of millions of Monarch butterflies live in the United States today.

Our guest, Gail Morris, is a monarch specialist. Based on all the work she's done, you could even call her a bit of a monarch maniac.

She works locally, in Phoenix. She is joining us today by phone to tell us more about the Monarch butterfly and some current efforts that are being done to protect this beautiful insect.

Gail Morris, welcome to the show, and thank you for visiting with me today.

Gail Morris: Thank you for having me.

Kayna: Gail, I know that Monarch butterflies are one of the most common butterflies in North America, but I don't think everyone is familiar with the Monarch butterfly. What makes the Monarchs special?

Gail: I think one of the most outstanding features of the Monarch butterfly is their incredibly long migration that they embark on every fall. We have many different butterfly species in Arizona but also around the entire United States. They all cope with cold weather in winter in a different way.

Monarch butterflies are really tropical. They cannot take freezing temperatures for long lengths of time. So they embark on this long migration that many of us witness every fall.

Kayna: Where do Monarch butterflies migrate?

Gail: This is something very interesting. For a very long time, it used to be believed that the Rocky Mountains were a dividing line. Those east of the Rocky Mountains would fly all the way down to sites in Mexico. Those west of the Rocky Mountains would fly to the California Coast for the winter, where the weather conditions, they're very comfortable to the situations in Mexico.

We have learned by tagging Monarchs here in Arizona, that a large number of our Monarchs also fly to Mexico. A smaller number fly to the West Coast.

Kayna: Did you say you tagged Monarch butterflies? What is that like?

Gail: [laughs] We use a little circular tag on a special cell on their wing, and we call that the discal cell. It is almost shaped like a tiny mitten on their lower wing, on their hind wing, and we put the little tag on that, and we let them go.

Sometimes we use a net to catch them. Other times we can go up behind them and just pick them off of the flower with our fingers and put the tag on, and then we note whether they're a male or a female, and what the conditions of their wings are, and what they were doing in our record books before we let them go.

In that way you tagged that Monarch and it appears in my backyard, I can contact the email on that tag and they will tell you that you tagged it and where you were, and I could tell you what it looked like when it came here, what were the conditions of its wings, did it look healthy, and it would give us a progress on its flight.

Kayna: How do you tell the difference between a male and female Monarch butterfly?

Gail: Everyone asks that and the easy way, and, this is funny to say, is a female has thicker veins than a male does, but if you only see one Monarch in front of you, how are you going to get which one has the thicker veins? The easiest way outside of that is male butterflies have a thick dot on their lower wing.

When their wings are open, when you're looking at a Monarch...so you're looking at the orange part of their wings, say they're feeding on a flower, on the lower wing there's a little black dot. That's a pheromone dot on each of their lower wings. Those would be the males.

The females do not have those and the veins are thicker, so if you saw them side by side, you'd be able to see that difference very clearly.

Kayna: Are Monarch butterflies poisonous?

Gail: They are in an interesting way. Monarch caterpillars, their larvae, only feed on milkweed, and milkweed has a chemical in it that makes them poisonous to predators. There's different kinds of milkweeds which have different amounts of chemicals they ingest.

As a result of that, birds, if they take a bite of their wings and try to feast on an adult Monarch, will often get very sick and throw up, and they learn not to eat Monarch butterflies in any way, but

because that amount differs in milkweeds, it depends on which kind of milkweed that Monarch caterpillar fed on.

Kayna: It's neat that such a small creature can be that powerful. [laughs]

Gail: Right, and that orange color is a coloration that is supposed to be a warning to birds. I am poisonous, stay away.

Kayna: Caution, right?

Gail: Mm-hmm.

Kayna: Are there other butterflies that mimic Monarchs?

Gail: There are. I think we probably all remember learning a long time ago about Viceroy's. Three common ones that get mixed up for each other is, of course, the royal family, the Monarch, the Queen and the Viceroy.

The Queen butterfly is in the same family as the Monarch. We see a lot of them in the Southern United States, and a lot of them here, in the lower deserts. They have little white dots in the orange. It's a different...They also use milkweed as a host plant. They are the same family.

The Viceroy actually mimics the colors, and in most of the United States, they mimic the Monarch. But if you look at the picture of a southwestern Viceroy, there's an extra black line along the lower wings, which is common in all Viceroy's, but in the Southwest you'll see little white dots along that black line. That southwestern Viceroy is actually mimicking our Queens because there's more Queens than Monarchs out here. Their host plant is now milkweed, so they are a mimic.

Kayna: That's really cool. Monarch butterflies are, of course, some of the most well-known and loved butterflies in our country. Are Monarchs important to their environments, and what about the American Southwest specifically?

Gail: Monarch butterflies, like all butterflies, are pollinators. They are not as effective pollinators, perhaps, as bees and other pollinators that we've heard about. I have many photos of Monarchs, we've been out in the field, monitoring them and we pick them up to tag them, with pollen grains all over their feet and along their proboscis. They are pollinators as well, and they do have that role in our environment.

Kayna: How do you see monarch populations changing today? What are the causes of some of these changes?

Gail: That's a big question. I think a lot of people have likely heard much about Monarchs in the news. Their populations have been declining over the last years. In California, that population along the western coast has dived, and then more or less stayed stable the last couple years. The eastern population, in particular, has nosedived down pretty low. Everyone's very concerned about that.

There's several factors that come in. Some have more weight than others. For example, we all know the weather extremes that we have all experienced in different parts of the country. When it's too hot or too cold, it's like the old "Three Bears" story that we used to hear when we were younger, not

too hot, not too cold, just right. It needs to be at a just perfect temperature for their population to expand.

The other problem is the increased use of herbicides, which kill weeds and things in our yards and in farm crops, and pesticides. We forget, when we're spraying for unwanted creatures in our yard that we don't, perhaps, feel welcome, to realize that butterflies are insects as well, so it affects them as well.

In particular, in the midwestern part of the United States, the use of some types of seed crops that allow that kind of spraying weeds also harms the milkweed, which is so important to the lifecycle of the Monarch butterfly. That is their only host plant, and a host plant is a place that a butterfly can lay their eggs.

Kayna: It's interesting to hear by maybe using an herbicide in your front lawn, you can really be impacting the Monarch butterfly populations.

Gail: And all butterflies. It'd be all butterflies, as well.

Kayna: Do you know why the milkweed plant is the host plant for the Monarch butterfly?

Gail: Every species of butterfly has at least one host plant, if not more. Monarchs have developed with the only host plant being milkweeds. Luckily, there's a lot of different kinds of milkweed.

Kayna: I'm curious. You mentioned bees earlier. Does the declining honeybee population have anything to do with the declining monarch population?

Gail: Many scientists are studying the similarities and differences, and at this time I have not heard that link, although it could be linked perhaps in the future with more studies with the types of insecticides that are used on plants that we buy at the stores.

No one likes to buy a plant that has been chewed perhaps with chewed up leaves, but a lot of times that's because those are the caterpillars of different butterflies.

They will put chemicals on those plants to keep them looking nice, but that could harm other butterflies that are feeding on it.

We don't know the relationship with that and the bees, which we've heard could be linked to those very same chemicals. There's a lot of studies going on right now to determine precisely.

Kayna: I'm excited to see what comes out of those studies, because I think there might be something there [laughs] but I guess we'll find out.

From your perspective what can Arizona residents do to help promote the survival of Monarch butterflies and keep their populations from declining?

Gail: That's a great question, and the fun thing is if you do these things I'm going to suggest you can see Monarch butterflies in your own backyard, or where you work, or at your church, or your social organizations.

Ask A Biologist Vol 085 - Topic: Insect Infatuation - (Guest Gail Morris)

By growing milkweed...we have several species of milkweed that grow really well in Arizona. For example, here in the lower elevations we have one called Desert Milkweed. Its Latin name is *Asclepias subulata*.

We see it in many places. It's on the ASU campus. It's at University of Arizona. We see it at the Phoenix Sky Harbor Airport. It is around town around shopping centers.

If you look at that plant when the Monarchs start here in town oftentimes you'll see Monarchs flying and Monarch larvae there.

That's something we can all do as part of our landscaping. It loves full sun. It loves the heat of summer. It's a win/win for all of us.

You can also plant other what we would call nectar plants, plants the butterflies would feed on during their migration to draw them to your yard.

One of the biggest and kind of fun for all of us to grow is sunflowers. Monarchs love sunflowers as do other butterflies, so that's a great one to grow in your yard.

We have several of these actually listed on the Southwest Monarch Study website, and that's swmonarchs.org. Anyone is encouraged to look at the list of plants you can grow to encourage both Monarchs and other butterflies to visit your yard.

Kayna: Could you tell us more about the organizations that you're working with and how they protect Monarch butterflies?

Gail: What I look at my role is to be an educator of different groups, whether it's government agencies or just some local people who live here, to encourage them to learn the plants we can grow to encourage the growth of the monarch population.

Here's an example. We have learned that every year there is a small number of Monarchs that spend the winter right in downtown Phoenix along the Salt River at the Rio Salado Habitat Restoration Area. They have been there ever since 2008 when I started monitoring that site.

We've worked with the city. We've worked with Project West, with Arizona Audubon to increase their habitat there by planting more trees, more milkweed, more nectar plants.

Those are things we can all do together by learning from each other and instead of removing habitat, adding habitat.

Kayna: That's great, especially hearing about how Phoenix is one of the fastest developing cities in the country.

A lot of time I think people think about that's physical buildings and roads, and skyscrapers and stuff like that, but I think part of that has to do with the kinds of things that you're talking about with restoring habitats and really looking at the city holistically, I suppose. That's sustainability, right? [laughs]

Gail: That is exactly it. The city of Chandler has been adding desert milkweed to their city parks. We worked with new development of a gated community in Paradise Valley who worked into their HOA that every house had to include at least five milkweeds. Then they added it to their roadways and to their park within this gated community as well.

We know we need roads. We know we need houses, right? There's ways we can add back in what we've taken out.

Kayna: That's awesome. That's really exciting. You said that the butterflies are in Rio Salado. Is that during the winter?

Gail: Yes. They actually arrive around November and they stay there through March. We usually see breeding in February which is exactly when breeding starts in California and in Mexico.

Kayna: Gail, could you tell us more about the specific organizations that you've worked with and how exactly maybe some of their initiatives or projects help protect or promote the Monarch butterflies?

Gail: Sure. One of my first ways of being involved was with Monarch Watch. It's a conservation specialist, and when I first became involved more heavily, when I had the time to get involved let me put it that way, in tagging Monarchs, I naturally became more curious as to their life cycle and how we could protect them here in the state, how we could see their numbers increase.

There was limited information available here and you'll see that we have a new paper out that will be published, actually, in June so you'll all have an opportunity to read our findings.

But at the time there wasn't much information available so I turned to Chip Taylor of Monarch Watch, Karen Oberhauser of Monarch Larva Monitoring Project, and others, and went to some national meetings to learn more about them.

Through those meetings and conversations that ensued from them they helped me along in my understanding and also trained me in different areas concerning monarch biology. That led to Dr. Chip Taylor of Monarch Watch asking me to be a monarch conservation specialist here in Arizona.

Monarch Watch is pretty much east of the Rockies for tagging, but they work across the United States in monarch conservation so this helped with my interactions with government agencies here in Arizona.

That also led to my involvement with the Southwest Monarch Study. Chris Kline started the study back in 2003 and moved back to Ohio about five years ago.

During that time of transition I became the coordinator of the study here locally along with a board of directors that are all volunteers in the field. We here monitor the Monarchs specifically in Arizona and the nearby southwest states.

They dovetail together. The study we've done here benefits when we interact with the larger monarch community across the United States, because our findings here are a little different, and yet they fit.

It's like a big puzzle that we have to find how Arizona and southwestern states fit into that monarch puzzle.

Kayna: It sounds like you've been very busy. So, just out of curiosity, are there any really cool projects coming up in the future that you'd like to tell us about?

Gail: One of the things that we have every fall that I'd like to encourage everyone to participate in is tagging. We have public tagging events in September that are usually in Southeast Arizona; because that is the place we see the most butterflies. Southwest Monarch Study has a Facebook page where we list those events, as well as where we're seeing Monarchs right now.

We also are continuing a multi-year study of over-wintering Monarchs in Arizona. We all know Monarchs are supposed to migrate, but some of them don't, and so we're trying to learn more about them. Are they breeding all winter when they're here, or are they in a state of what we would call reproductive diapause? Big words, but that means that they are acting biologically the same as migrating Monarchs would in Mexico or California where they're not breeding.

So we're trying to learn a little more about their behavior. I can tell you, it's really exciting. There's a little bit of both here in Arizona, depending on the location. And we'll have to see what we learn more about in the next couple years.

Kayna: I think that a nonprofit organization is a group that works toward a mission instead of making a profit. Do you agree with this and what is the role of a nonprofit organization in promoting conservation and biodiversity?

Gail: I think a lot of times it is the nonprofit that takes the leading role in it because the people who are involved in it do it as a matter of their heart, their mission that comes from who they are as a person, believing in the environment. They aren't worried about dollar figures. They aren't worried about publicity, so to speak, except for the publicity of the species they're trying to protect. They want to see that species thrive.

In our case it's Monarchs. We'd like to see that population decline stop and instead, we know insects are going to go up and down, but we want to see them thrive more than they have been. So I think the role of nonprofits there are very important. It's a whole new way of looking at involvement as, what we call, citizen scientists. Trained people who can go out in the field and work alongside of academics and bring new insights that they might not have been able to see otherwise.

Kayna: Do you think that citizen science is as effective as research just done by scientists?

Gail: You know that question pops up time and time again. There's been a lot of conversation about that over the years as well. Dr. Karen Oberhauser is actually having a new book coming out based on discussions and talks at the last Monarch and Biology Conservation Meeting a couple years ago back East.

In there, there's a whole chapter about citizen science studies. In it she mentions that she feels that citizen science studies often are very detailed and offer more information than other studies can offer. Partly because the people that are involved in it are very engaged. They're doing something

that they want to do. They're not doing it because they have to do it or that they're getting paid for doing it. They're doing it usually covering their own expenses for any materials they need. They have a personal investment.

I think, for me, the best way for citizen science studies to work is working alongside of academics. We definitely do. We have Dr. Ron Rutowski from Arizona State University on our advisory board. We have Scott Morris, another PhD, as an advisor to our study. I think it's working together. I think academics and citizen scientists working side by side have a richer experience.

Kayna: With all that being said, how do you think the future looks for the Monarch butterflies?

Gail: I'm hopeful. I'm very hopeful because so many people are now interested in growing milkweed and growing plants. You'll see if you go to our web page we actually had to add a link about where you can buy milkweed. Any plant nursery in the Southwest can submit their name and the species they're carrying. We carry that because we get so many requests for, "Where can we find milkweed?" So there is an interest in learning more about the Monarch butterfly and doing what we can from the grassroots level, from the bottom up to provide habitats, sometimes in our very own backyards.

Kayna: So there are three questions that Dr. Biology asks every guest and we're going to go over those. I'm wondering if there was a specific moment when you realized that you really want to be a conservationist.

Gail: I actually... I'm smiling when you're saying that. I was a person who worked 50 hours a week, if not more, full-time and took a sabbatical from my position. I thought I would take a few months off for myself after going through some family illness concerns. It was during that time of being away from working in an office all the time and being out in nature all the time, identifying Arizona milkweeds, being out in the, what I'll call the wild areas away from town, that I realized how important everything is besides what we do in an office setting.

For me, we made a decision with my family that we would devote our time to learning more about Monarch butterflies, spreading information about it and try to get other people to care a little bit more for what's happening in their world. Like I said, oftentimes in their own backyard, you can make a sanctuary in your own yard to have a little respite from the stresses of life. I think I had that moment as well. I think whenever you talk to anyone about these defining moments it's difficult to put a finger on because, when you talk about it, it doesn't seem to have the full impact like it did when we're experiencing it. It's difficult to put into words.

Kayna: Well that is definitely nice to know as an undergraduate, hearing about your experience and having your moment, because I think that's something in my time, my experience, and other students in my class, that's something that we wait for. Some of us have had it, some of us not so much. Like you said, it's really the experience. Now I'm going to take it all away and if you could not be a conservationist, if you could not work to protect the Monarch butterflies, what do you think you would do?

Gail: That's a real interesting question for me because the interesting thing is this is my second option because I walked away from another position. I was actually a pastoral associate at a church.

Kayna: Essentially, you are on your other career path.

Gail: Mm-hmm.

Kayna: What advice would you have for young conservationists who are looking to get involved and possibly pursue a career like yours?

Gail: The best thing to do is to join people that are on butterfly walks. Many places, like Boyce Thompson, features butterfly walks once a month so they can be exposed to different species. Join us in tagging Monarchs in the fall. We'll have a new program in the fall available for monitoring Monarchs during the winter months wherever you live if you happen to see any.

Get involved in these citizen science projects; the Monarch Larva Monitoring Project whose program you can work online with. Getting your feet wet in all these different areas can help you see which portion of interest in Monarchs or butterflies or any other species you enjoy most.

Kayna: Absolutely. I think if you're interested in it just run with that and go get involved. Definitely can make a big difference.

Gail: And a lot of times you won't know what you'll enjoy unless you do it. You might think, "I've always want to do this and I think if I do it it'll be great," and then maybe not so much, but you'll try another thing you find and you'll just love.

Kayna: Absolutely. If you have that small inkling, go for it. Right?

Gail: Mm-hmm.

Kayna: Gail Morris, thank you for visiting with me today.

Gail: Thank you very much.

Kayna: You've been listening to "Ask a Biologist" and my guest has been Gail Morris, a Monarch butterfly conservationist in the Southwest United States. The "Ask a Biologist" Podcast is produced on the campus of Arizona State University and is recorded in the Grassroots Studio housed in the School of Life Sciences, which is an academic unit of the College of Liberal Arts and Sciences.

Remember, even though our program is not broadcast live, you can still send your question about biology using our companion website. The address is askabiologist.asu.edu. Or you can just google the words ask a biologist. I am Kayna, filling in for Dr. Biology.

Transcription by CastingWords