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Science AMA Series: We're Morgan Jackson, a Ph.D. student in entomology, and Sophia Spencer, an 8-year-old bug enthusiast, and we co-authored a research paper about using social media to support young, aspiring scientists. #BugsR4Girls. AMA!

BUGSR4GIRLS [R/SCIENCE](#)

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My 7 year old is crazy about wildlife/mammals, and environmental conservation (every lemonade stand she does goes to help our local wildlife rehab facility). On the other hand, she falls into the "eww bugs!" response similar to her peers. It's frustrating because I worked very hard teaching her the importance of all creatures (especially bugs, as I'm a big fan). What's more frustrating is hearing other mom's freaking out themselves over insects in front of their children, creating a learned fear and in-turn a lack of appreciation of their importance (and just over all coolness). What can we do on a "grassroots" level in our communities to educate kids and their parents in bug appreciation?

[cwittyprice](#)

[M] Mammals are the gateway drug to much cooler animals, so I wouldn't worry too much yet. I didn't get into insects and entomology until my third year of university, and I've been hooked ever since. Sometimes it just requires the right opportunity for them to take a look at an insect in a different way than they have before. And yes, parents' behaviour very much can influence a child's response, so trying to remain neutral (or better yet positive) is important. I'd just keep trying to show them insects when you find them around the house, and encourage them to watch them while they go about their business. Moths and butterflies are also pretty good entry ways into entomology because they're more "socially acceptable" than others, and lend themselves well to comparing the similarities and differences between insects. Hope that helps!

This seems like almost a silly question, but it's always fun to ask: what are y'all's favorite bugs? (Personally I love mantids because honestly, how could one not?)

[ich-mag-Katzen](#)

[M] I love flies, but with 170,000 named species and several hundred thousand more left to discover, I don't think it's fair for me to choose just 1!



My six year old daughter loves bugs and creepy crawly things. Any advice on how to keep her interested and to feed her curiosity? Any good children's books you could recommend that I could use to help teach her?

[Skuzzd711](#)

[M] I'm sure Sophia & her mom will have more advice for you on this, but really the best thing I can think of is to just encourage your daughter to follow her interests, even as they change, and to get out there asking questions about what you're seeing together. Insects are an awesome entry point because you can go outside and find hundreds of different species doing all kinds of things right in your own backyard, and you can pick them up, look at how they run through your hands, study them in a little jar for a few days, or just keep track of all the different things you've seen. You don't need to go to Africa to go on safari, or the rainforest to experience biodiversity!

As for books, I don't know of any particular children's books, but there are a lot of good identification books that have plenty of illustrations and photos to help you and your daughter start figuring out who your neighbours are. If you're in North America, I'd try this one https://www.amazon.com/Insects-Natural-History-Diversity-Photographic/dp/1770859624/ref=sr_1_1?ie=UTF8&qid=1507051637&sr=8-1&keywords=insects+their+natural+history+and+diversity (transparency: my PhD advisor wrote it) or start exploring <http://bugguide.net/> which is an awesome resource if you're looking for more information about the species you're finding. But, I wouldn't get too hung up on perfect identifications; just going out and keeping track of the "red butterfly" or the colony of black ants will get you and your daughter hooked.

Extremely cool! I have a simple question; what got you interested in insects and bugs, and why do you think they are important/fascinating to you?

[cancerinventor](#)

[M] I went to university with the intention of being a large animal veterinarian, but took a third year course on insect diversity on a whim and ended up being totally and completely enamoured with the diversity of forms and behaviours that I had been overlooking for so long. Now I'm interested in exploring the unknown: finding new species of flies and figuring out how they're all related to one another.

Extremely cool! I have a simple question; what got you interested in insects and bugs, and why do you think they are important/fascinating to you?

[cancerinventor](#)

Sophia: My mom took me to see butterflies and then bought me a bug catcher and net. Being able to find bugs and take care of them and finding out their special abilities is cool.

Hello Morgan and Sophia!

What would you say was your primary take-home message of your paper?

Also, is your paper available to the public?

[britty5096](#)

[M] My take home message is that the internet can be used as a source for good, that scientists have the ability to broadly influence perceptions of their research and field by using social media effectively, and that entomology twitter is best twitter. And yes, the paper is freely available to read and download from the journal! Give it a read and let me know what you think –

<https://academic.oup.com/aesa/article/110/5/439/4103474/Engaging-for-a-Good-Cause-Sophia-s-Story-and-Why>

Hello Morgan and Sophia!

What would you say was your primary take-home message of your paper?

Also, is your paper available to the public?

[britty5096](#)

Sophia: That loads of people like bugs and not bullies.

Fantastic work you two are doing!

Morgan, I've always been fascinated with academic publishing. What has been the biggest challenge seeing your and Sophia's work to print? Any future projects or directions you're interested in?

Sophia, asking as a supply teacher, what do you think would grab your attention right away for a mini-science lesson? Bug related or non bug related?

And for both, what is your favourite non-bug animal?

[GerryGreyhound](#)

Sophia: Being able to get to do the experiment and not just watching. My mom does kitchen experiments with me and she lets me help. But she always makes me guess what will happen first. I like it when she says "Where going to make a mess today!"

Fantastic work you two are doing!

Morgan, I've always been fascinated with academic publishing. What has been the biggest challenge seeing your and Sophia's work to print? Any future projects or directions you're interested in?

Sophia, asking as a supply teacher, what do you think would grab your attention right away for a mini-science lesson? Bug related or non bug related?

And for both, what is your favourite non-bug animal?

[GerryGreyhound](#)

[M] For me, the biggest challenge was diving into the social media analytics and trying to put them into a context that would convince other scientists who don't use social media that it's not all trolls and celebrity gossip. The actual process itself was relatively smooth compared to other papers I've published, so that was nice!

Non-bug animal? I still get excited when I see vertebrates in the wild, so I'd have to go with whatever creatures I can find and geek out over.

Do you have any advice for biology student applying for a PhD program?

(Also I was totally an 8 year old bug enthusiast 13 years ago)

[Koraxtheghoul](#)

[M] Understand why you want to do a PhD first. If it's because you think you need one for the job you think you want, make sure that's actually the case. If it's because you want to challenge yourself and earn a doctorate and some exclusive letters after your name, even if they're not necessary for what you want to do with your career, don't be afraid to admit that (and make sure you and your potential advisor are on the same page regarding that).

Other than that, read recent papers by profs who you're interested in working with so you can show that you've invested some time in understanding what they do (they'll appreciate the gesture), speak to their current and past students to figure out what expectations and attitudes are for working with the group, and don't be afraid to re-examine your goals and pathway as you learn more along the way. Good luck and enjoy yourself!

I heard you both on NPR and was especially impressed with Sophia. Keep it up! #BugsR4Girls!

But Morgan, really? The fly is your favorite? I'm sure there are fascinating reasons why, but I can't figure them out myself.

So, I guess the question to Morgan is, why fly?

[wacojohnny](#)

[M] Flies are the best, but terribly under-appreciated. A few legitimate bad apples like some species of mosquitoes, black flies, and house flies tend to influence our thinking that they're all pests or disease vectors, but honestly there are more than 170,000 species that we have names for and which contribute to life on earth in so many complex ways that we're just starting to understand them. I'm a taxonomist and am working to help us discover more species, figure out how they fit on the tree of life, and begin to understand what roles they may play in the ecosystem, and get to spend every day looking at their beautifully endless forms under a microscope and finding the little details that tie them all together. I'd give them a shot; there's a lot more to them than an annoying buzz in your ear!

Are there any bugs that you just nope out on? Like, a specific bug or bug type? I'm Australian so we have some really dangerous spiders, and other horrible things, but it's spit-fires and caterpillars that I loathe the most. :)

[elephant_earthship](#)

[M] Earwigs. When I was a kid I accidentally drank a bunch of them when I didn't clean out the spout on my baseball water jug, and I've never really gotten over it. I don't run away when I find them nowadays, but I do still get a tingly feeling...

Are there any bugs that you just nope out on? Like, a specific bug or bug type? I'm Australian so we have some really dangerous spiders, and other horrible things, but it's spit-fires and caterpillars that I loathe the most. :)

[elephant_earthship](#)

Sophia: I do not not fire(red) ants. We had a nest in our backyard last summer and they kept biting me

when I was playing. The hurt a lot

I love to inspire EVERYONE to learn more about science.

Should we be encouraging our children to pursue a career like this? I read a recent article on reddit that about how much it costs to get a PhD and how hard it is to get an actual job in your field, especially professorship.

[opendomain](#)

[M] A PhD is definitely not required to have a career in entomology. Many of the entomologists I work with in industry and government don't have PhDs, and they're doing important scientific work and enjoying it. If doing a PhD is something you *want* to do, then go for it, but unless your dream job absolutely requires it (and make sure you do some research before hand on whether your dream job is actually the job you think it is), don't feel compelled to go after a PhD.

Also, particularly for entomology, there is a huge community of "amateurs" who make valuable contributions to our field every day. These are people who have day jobs as bankers, plumbers, teachers, etc, but who go out on weekends and test hypotheses, or spend their evenings with a microscope and the insects they collected in the summer. Entomology is very approachable and open to anyone who has an interest in it, and professional scientists depend on the contributions of passionate "amateurs" all the time.

I'm majoring in entomology at UC davis so it was fun seeing the Bohart museum picture pop up when I opened this thread! Morgan, what originally got you interested in entomology? If you've always liked insects, when you were younger did you ever feel bullied or rejected by other kids for your interest in insects? Sophie, do you think that any of your classmates have changed what they think about insects after your story went viral?

[deepfriedsquid](#)

Sophia: Yes I know have friends that know I love bugs and when they find something they come and get me at school. I show them how to handle them and tell them stuff about the bug. My teacher also now lets me bring my bugs into class and she at lunch she looks about information to tell my class

I'm majoring in entomology at UC davis so it was fun seeing the Bohart museum picture pop up when I opened this thread! Morgan, what originally got you interested in entomology? If you've always liked insects, when you were younger did you ever feel bullied or rejected by other kids for your interest in insects? Sophie, do you think that any of your classmates have changed what they think about insects after your story went viral?

[deepfriedsquid](#)

[M] I visited UC Davis and the Bohart Museum a few years ago to sort flies for my research; lovely place and people there, you're lucky to be studying with them! Personally, I didn't get into insects until my third year of university when I took our intro entomology course on a whim. I was hooked after seeing all of the incredible ways insects were going about their life and influencing ours, and haven't looked back since.

A practical question regarding publication: did you encounter any difficulties from the journal with one

of the authors being 8 years old or listing Sophia's grade school as an affiliation?

I ask because I have occasionally had similar ideas for atypical authorship and wondered if it would be difficult.

[Silpion](#)

[M] Nope, no one even questioned it. Sophia contributed a section of the paper, and thus was rightfully considered as an author. The only minor thing was her mom needed to sign a copyright waiver on her behalf, and I asked the editors not to publish her email address in the correspondence section. Other than that, no issues whatsoever. I'd love to see more scientists involve students in the publication process!

I don't have a question, but I heard you on NPR a little while back, and I thought you both sounded like very nice people. Congratulations on your success, and I hope you continue doing good things!

[foofus](#)

[M] Thanks so much!

Have you (or Sophia) been active in child-friendly entomology online communities like [BugGuide](#)?

[greybeardthegeek](#)

[M] I use BugGuide everyday, either to help with outreach, or for my own research! It's the most important resource ever created for the field of entomology!

As a parent of a 9 month old little girl, how can I introduce bugs to a toddler who tastes everything first?

[ornery_epidexipteryx](#)

[M] I have 2 toddlers currently, so I'm pretty familiar with the "taste first, think second" philosophy. My kids have begun finding and playing around with insects around the house, and so far no bad reactions (the insects have taken the brunt of the damage via curious-yet-blunt fingers). Most insects in your house are pretty innocuous, and shouldn't cause any issues for your child. Lady bugs do produce and expel nasty-tasting chemicals to ward off predators and over-curious toddlers, so your child might get an early introduction to chemical ecology and a lesson that tasting everything isn't necessarily a good thing, but other than that I wouldn't worry too much. Never too early to encourage curiosity and experimentation with insects!

Morgan, where did you go to college, and what made you decide on entomology?

[karin_parke](#)

[M] I went to the University of Guelph (Ontario, Canada) for a degree in Zoology with the intention of going on to veterinary college afterwards. In my third year I took an intro entomology course on a whim, and got totally hooked (I actually know the exact image my prof showed where I knew this is what I wanted to do from now on). I ended up doing my Master's and now my PhD at the same university with the same prof who taught that 3rd year course.

The course I took that literally changed my life was so important for me because it opened the door to a huge segment of biodiversity that I had literally been overlooking for entire my life, but which functioned and evolved in even more ways than the birds and mammals I had previously been interested in did. For me, it was simply a realization that there were way more insects to get excited about than there were vertebrates, and I've been chasing them ever since!

My dream is to become an entomologist and I'm still pursuing that dream till this day. I truly believe feeding on insects could really benefit our environment significantly. What are your thoughts on insects being one of the main food resources for us in the future? Thank you!

[gummypepsi](#)

[M] I think it's a direction that western society is headed, and the course will probably follow that of sushi (initial hesitancy->experimentation->totally normal lunch). I'm excited to see where entomological agriculture and culinary artists go with insects as food, and look forward to tasting the culmination of their efforts!

Sophia, if you could name a species, what would you name it and why?

Morgan, what is your favorite group of beetles and is it the Monotomidae?

[monotomidae](#)

[M] There are a lot of beetles out there and that I couldn't possibly choose one family at this time. Besides, they're all inferior to flies.

My 8yo daughter is very self conscious about her interests (she's fascinated with aerospace and computers) I've been able easily foster her interest in computers, but my lack of knowledge about aerospace has made that a little more difficult. What are somethings to do help facilitate her pursuing what she loves?

Also thank you for everything done for Sophia and Girls everywhere. As a single father it's encouraging to not be alone in supporting my child to do what she loves.

[sendinugoodvibes](#)

Nicole: My advice would be to do a little research on your own so you can have conversations with her about what she is interested in. Sophia loves when I ask her a question about a bug because it gives her a chance to share her knowledge with me. If she doesn't have an answer she will have me google it. I may already know the answer to what I asked her but it shows that I am interested and care about what she likes. Sometimes as parents we have to get creative to encourage Sophia I have taken her to insect museums, built bugs out of clay, pretended I was a bug, read a lot about bugs.

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Also thank you for everything done for Sophia and Girls everywhere. As a single father it's encouraging to not be alone in supporting my child to do what she loves.

[sendinugoodvibes](#)

[M] Try getting in touch with a local university or government research facility that does something related to what she's interested in and ask if there's someone willing to speak with her. Almost every scientist I know would jump at the opportunity to share what they do with kids (or adults!) when they're asked (just be respectful of their schedules and allow some flexibility in how or when they get back to you). Many universities also have programs and camps for children that are interested in science and that can help expose them to new ideas and areas of science that they may be interested in. If local options aren't available, take a look online via social media. More and more scientists are signing up and sharing their research and experiences on Twitter, and usually have particular hashtags and communities that can be joined in by you on behalf of your daughter.

More than anything, keep up the good work! You're setting your daughter up for success just by doing what you're doing and looking for ways to help enrich her interests. Thanks for helping inspire the future generation of scientists!

Don't you think that a campaign slogan like "BugsR4Girls" sort of casts girls into the role of "them" within social identity?

I get that being a member of a certain group is important to self-esteem and that an event of bullying can dissuade someone from following their passion... but I think it might be more helpful for girls if the campaign wasn't just girl-centric because it still puts girls in a position of being excluded.

Maybe a "BugsR4Everyone" campaign could show girls that it's cool to be an entomologist regardless of your gender?

[paross](#)

[M] No one at any time suggested that insects are *only* for girls. Had the hashtag read #BugsR4Sophia, would you be offended that I was saying that entomology wasn't for Steves, Sarahs, and Sams, or would you have realized that maybe the conversation wasn't specifically about them this time?

Congratulations with the paper! I am from an entomology department abroad and here about half of us are women and we are definitely bug crazy!

Question for both of you: what part of the research paper are you most enthusiastic about?

What entomology related activity do you enjoy to do most? (catching bugs, behavior, microscope etc)

Sophia: did you like participating in a real study? What did you like most?

[polistes](#)

[M] I really like Sophia's section of the paper, not only because it's her chance to have her say, but because it's in her voice and vocabulary. Scientific papers have evolved or been forced to evolve to a very specific tone & language, but I like that it demonstrates you don't need a PhD to publish your enthusiasm for science.

And I love collecting about as much as I love identifying insects at the microscope. Part of the total package for me really!

What is the most interesting, and least known or understood, fact about the inhabitants of my

backyard?

[AFLoneWolf](#)

[M] Probably that there are more species of insect that visit or can be found in your backyard than there are mammals, birds, & reptiles in your state or province. No need to go away on expensive wildlife watching tours when you have a safari just waiting to be explored in your backyard!

A lot of students I work with especially girls are intimidated by mathematics and don't see any clear use for it.

What would you say to them? Where was mathematics useful to you in your research?

[LeChevalierMal-Fait](#)

[M] Math is important for my research, but not in ways that require me to do equations and calculations every day at my desk. A lot of the theory behind my research area (phylogenetics) is heavily dependent on math, statistics and probability, but I don't need to dive into the weeds to do my work; I can get by just by understanding the basics of those methods, and applying those methods appropriately to my data. So, I'd say that don't let math get in the way of your interest in science. I have plenty of friends who were similarly nervous about math but who have since found the particular fields of math that they love, and who are now making important contributions to human knowledge by applying math and statistics to the questions they're interested in.

Just don't give up on it; if you're interested in following a career in science, you're going to have to do some math along the way. It might be challenging at times, but that challenge can help point you to questions and answers you may never have considered before.

Hi! My question is, as an entomologist and I'm assuming an entomologist to be, what are the various types of jobs that fall in your field and area of interest? I'm aware of the research aspect but are there other similar careers for a bug enthusiast maybe not focused on research?

[DrAjax0014](#)

[M] Absolutely! Insects influence almost every aspect of our lives, so entomologists are involved with almost every aspect of our lives too! If research isn't your thing, there are plenty of positions in agriculture that involve scouting for insects, collecting data on them for others' research, dealing with pests as necessary, or educating others about the role that insects play in the production of food. Outside of agriculture, insects are important in many aspects of human health, and there are plenty of places where you can work with insects in support of research. Finally, insects are just starting to be appreciated by conservation organizations, and so there are going to be increasingly important roles to be played in the conservation of insects that won't involve research directly. If you like insects and are interested in working with them, don't worry that research will be the only option out there for you!

Hello! I am a Chemist and I am very excited about what you are doing!! What advice can you give to "professional" scientists who want to help in supporting and encouraging young scientists? Are there programs out there that we can get involved in? What, in both of your perspectives, needs to be done to bridge this gap?

[AlyCooper](#)

[M] Hi! In my experience there are a lot of programs out there that help to connect children and

developing scientists with mentors and science-minded role models. Some of them may be institution-based, some of them might be national or international with chapters at your institution serving your local area. Have a look around online to see if there are any programs that are supported or acquainted with your institution, or with your preferred professional society. If there aren't any options available, you can always contribute online via social media, and volunteering some of your time to help provide context or further information about topics or news items that you're familiar with, or by making people know you're open to talk to about your field. I think this direct, personal connection enabled by social media is a really valuable way to make a difference that can be fit into busy schedules. Good luck!

There's a lot of talk lately about using bugs as food, as a protein source. Have either of you ever eaten a bug? If so, which bug(s) taste best? Do you have any ethical concerns about eating bugs?

[am4zon](#)

[M] I've intentionally (and unintentionally) eaten insects many times, and have colleagues working on the use of insects for food who are making some really great arguments for why we should be doing it more often. I've had whole crickets flavoured in a variety of ways, as well as mealworms. Both were OK; not as satisfying a snack as peanuts or potato chips, but not something I'd pass on. I've also had a variety of products made with cricket powder, which are usually much better (although protein-y cookies aren't necessarily the best choice). As for ethical concerns, I think the evidence is building rapidly that we should be starting to have ethical concerns of *not* eating bugs given the comparative resources necessary for rearing them versus other protein sources. It's going to be an interesting field and conversation to watch in the coming years!

How would you suggest introing a kiddo to bugs? we have a great bug zoo here that I want to take her too when she's old enough but I feel there could be some prep work I'm missing.

[drpestilence](#)

I introduced Sophia early at the age of two, to butterflies at a conservatory. I think it is important as parent's not to place our own feelings and thoughts on insects and bugs in our kids. Even going for a walk to explore your backyard and finding a bug and holding it for them to look at is a great way to introduce local bugs to kids.

Dr. Jackson: What are your thoughts on using social media as a means to bridge the divide between the scientific community and the general public in terms of scientific communication?

Sophia: Bugs are cool and so are you! Do you have any pet bugs?

[JediHotcakes](#)

[M] I'm pretty biased because I've been doing online outreach via blogging & social media for a long time now (I started reading and commenting on blogs in 2008, and started my own in 2010), but I think it's one of the most important things that scientists who are interested in outreach can do. IRL events are still vitally important, but I think the day-to-day interaction and availability that scientists active on social media create is increasingly going to be needed as the world moves toward the social web. In the early days I don't think many scientists really appreciated this, but in the last few years I've seen a big shift in attitudes, and I think science and society are both better off for it.

(Also, thanks for the confidence in my PhD thesis, but I'm not quite done my degree yet)

A large percentage of women, up to 40% in some fields, leave STEM and quit their jobs within 5-10 years after earning their STEM degree. Encouraging girls to enter STEM is important but how can we encourage girls to *stay* in STEM?

[stathicus](#)

[M] Research is increasingly showing that access to women mentors in their field is incredibly important for retaining women in STEM (<http://www.pnas.org/content/114/23/5964.long>), so it's important that we work to ensure that women are provided opportunities to work as mentors in and outside of the STEM system. Of course there are many other factors that influence retention and the reasons women are forced out of science (<http://www.tandfonline.com/doi/abs/10.1080/03075079.2014.929102>), all of which need to be addressed and improved upon by scientists, administrators, and society in general.

Hi

Thanks for participating in this AMA. It's a great story, and has inspired my own daughters, who are also excited about science.

I have a couple of questions.

1. How do we as parents and other "older" researchers continue to engage, inspire and encourage the next generation of scientists, in particular young girls, so that they are more interested in STEM?
2. How did the peer review process for that paper go? Was it blinded peer review? Did Sophia get involved in subsequent edits? Is she the youngest published author in a peer-reviewed journal (if you know the answer)?

Thanks in advance!

[mvea](#)

[M] Glad to hear your daughters are interested in science, and that Sophia's story has helped. That sort of trickle-down effect has been amazing to see. 1) Honestly, I think we can do a lot for them by doing as little as we can to get in their way. Encourage their curiosity, let them experiment with the world around them (especially with insects; there's a safari awaiting them in their backyard or neighbourhood park), and help them find answers to their questions. Sophia's mom did a great thing by reaching out for help when she couldn't find answers to questions she was being asked, and there are more and more professional scientists reaching out and making themselves available to engage with via social media. Scientific societies (like the Entomological Society of Canada) are a great place to start looking for connections and for finding scientists in your local area who are probably more than willing to speak with you and your children about what they do.

2) The peer-review process went really smoothly. It was not double-blind, so the reviewers knew my & Sophia's names, but it was anonymous, so I don't know who they were. Both reviewers and the editor provided valuable feedback, and didn't even bat an eye at the prospect of Sophia being an author. The only thing they really asked us to change about Sophia's section (if you haven't read the paper yet, Sophia shares her personal experience in her own words in her own section of the paper) was to make it more obvious in the heading that it was Sophia's voice, and that we clarify early on in the paper that the little girl referenced in the original tweet was the junior author (pun not intended but appreciated). Sophia's mom read over the paper before we submitted and after revisions, and signed off on Sophia's behalf. As for her being the youngest author, the journal can't conclusively say that she's the youngest, but think that she probably is.

Sophia: How did you help with the paper? What's it like being the youngest person publish in such an important scientific journal?

[JesusIsMyZoloff](#)

Sophia: I talked to Morgan over Skype and we talked about how being bullied made me feel bad and how I feel now since the #BugsR4Girls reached so many people. I think it's pretty cool that I got to help Morgan with the paper.

We build (mostly) honey beehives, but what are some of the things we can build to help other pollinators? We'd love to get into helping some of our native solitary bees, but it's harder to sell customers on the idea of buying sand and setting aside an area of their yard for those little guys. We're working on Mason Beehives, but that's pretty common.

[BespokeBeeSupply](#)

[M] Encouraging people not to mow their lawns, or letting wildflowers and other plants grow in certain parts of their properties will go a long ways to providing resources for native pollinators to use, even if it's not directly nesting habitat. This way you'll also be helping the other 50% of pollinators besides bees as well!

My niece is 5 and loves insects, especially grasshoppers. I am quite squeamish around insects but love encouraging her scientifically, we usually do science experiments together. Are there any fun activities I can do with her to continue her love for insects?

[mandaclarka](#)

Sophia: My mom prints off colouring pages with bugs and helps me label the names of body parts. We also go for hikes and I bring my bug catchers and try to find new species I hadn't found before. Nicole: Anything new she finds I look up on Google for her and we sit and read about what she has found. I get the whole squeamish factor but I have learned to push it down and regularly get dirty for Sophia by lifting rocks, moving items and digging in the dirt. The more involved you are with what they enjoy the more they enjoy it.

I'm always thrilled to see more girls involved in STEM.

How do you overcome the "ick" factor when introducing children to bugs? My kids (all boys incidentally) like to look at bugs but absolutely freak out if they have to touch one.

[shadywhere](#)

[M] My experience so far is usually its the parents that are influencing the kids reactions (no offense intended), and that if I can just get one kid in the group to try it without their parents freaking out behind them, usually all the other kids will see its no big deal and start lining up to try it out. Insects are so incredibly different from us that they can seem alien, but if we can leave our prejudices at the door for a few minutes and let ourselves try experiencing them for the first time again, I think anyone of any age will become enamoured with them once they get up close and personal and really let their childhood curiosity take over.

That being said, I'm totally fine with people wanting to stay hands-off and stick to looking at them.

Usually those people slowly start getting closer and closer as their curiosity kicks in, and often they end up reaching out and making contact in their own way, however they're comfortable. Seeing someone look an insect in the eye and realize they can see a little bit of themselves in these amazing little animals is one of my favourite parts of outreach!

A question for both of you. What was the most interesting thing you learned while working together?

Edit: spelling is hard

[Karina Ivanovich](#)

[M] That experiencing entomology from the perspective of an enthusiastic child provides limitless inspiration to keep doing what I'm doing!

Have you ever been to the Purdue Bug Bowl?

[TheFiredrake42](#)

[M] I haven't, but I have friends who help organize it. I'd love to take part in the Cricket Spitting competition one day!

Hi Sophia! Congratulations! Although it's very early to start thinking about this, I'm wondering what you're interested in doing as a career! You have a bright future ahead of you- want to know if you know what route you want to take.

[amygdalaaa](#)

Sophia: I really do want to be an Entomologist and study Grasshoppers. It was also be amazing to get to work with Morgan and study flies. My mom says I am a smart girl and as long as I work hard and focus I can do anything.

As a woman in entomology I just want to say thank you for doing what you're doing!

Do you think the potential benefits of using social media to support enthusiastic kids outweigh the (IMO) obvious drawbacks of the kind of vitriol one may find on social media? I like the idea of using social media for good, I do! But people can be extremely cruel, even when it makes zero sense to do so. I suppose, obviously, you do think it's worth it. So my real question is: how do you ensure the social media experience for these interested kids are kept, for lack of a better term, clean? Or do you just let it take its natural course and are totally transparent with them?

[Hindu Wardrobe](#)

[M] This is really important, because you're right, social media can be a particularly cruel and unsupportive place in some circumstances and for certain groups of people. That being said, the scientific community, and particularly the entomological community, online has in my experience been a very positive place. However, I think it's important that parents serve as the gate-keeper for their kids; in this instance I collected all of the correspondence and support from other Twitter users and sent them to Sophia's mom, who then could choose what she showed Sophia. I think it's important to note however that throughout this entire experience (the original viral hashtag as well as the recent media attention since the paper came out) that I have seen very little to no abusive or trolling behaviour from the internet in response. I don't have a good answer as to why we've been spared, but I'm grateful that

it's been such a good experience from the start.

Hey Morgan & Sophia!

What you guys are trying to do is great as I'm sure most young scientist will be inspired.

Q: Is Sophia that knowledgeable on Entomology or is it that she just likes bugs? I find it incredible for young kids that can already understand (& love) the science of the world around us & even if she just likes bug for the look of it, that's okay too.

I really do hope that her interest & love for science, specifically in Entomology will continue in the future.

[Garooru](#)

Yes Sophia know a lot about different species of bugs. She is always coming out with random facts and information. She loves reading and learning new information on bugs.

Do you have any advice on how to encourage a child's curiosity with bugs without letting their experiments bring harm to the bugs, for those who are drawn to that? Some of my students tend to squash, shake, or try to force critters into doing things when trying to investigate them, and the critters end up killed and discarded :(

[qrseek](#)

Sophia Tell them not to do that. Bugs have feeling just like us, they can feel pain. Nicole: I would get some small vials and place your bugs in there. The students can study them close up without removing them from vials or harming them.

I heard y'all's interview on NPR the other day, and I must say that it broke my heart hearing Sophia talk about how she was bullied because of her interest in insects. Bugs are most certainly for girls.

My father was an entomologist, and he used to frequently speak at schools to teach students about mosquitoes. My classmates were always excited to learn about what he would speak about, so it makes me happy to see such a young child take such an interest in the insect world.

Have y'all thought about, or visited, the various schools in your area to give brief lessons to different classes on the importance of insects in our world?

[bagel-it-up](#)

[M] Thanks! I've visited a few local schools, as have other people from my department, although we don't have a formal outreach component like some land-grant universities in the USA have. Some grad students did recently organize a full day entomological open house here on campus recently, and had a great turn out of more than 800 people, most of which were families with young children. It was an awesome opportunity to share what we do so broadly!

I'm 16 and I wanna go on with zoology with entomology in it. I do raise a ton of animals/mantises as well as read up on them. How can I further it? I take hard classes but the only one that seems to cater towards my interest is bio and art,

[kevinswither](#)

[M] Stick with it. When I was in high school I can remember being frustrated that I didn't get to learn more classical zoology either. Once I got to university it got better though, and I really was able to learn not only about the things I liked, but also learn about things I didn't know I was going to like. One other piece of advice: don't brush off your English courses like I did. Writing is the single-most important aspect of my job now that I'm a scientist, and the one that I wish I had spent more time developing during my education.

I don't have a question, just wanted to say thank you for what you're doing! You're awesome people and hopefully plenty more will follow your example!

[Batoideus](#)

[M] Thank you, and I hope so too!

Yay, this makes me so happy!

I have 2 questions for Sophia and her Mom!

1. What is your favorite bug, Sophia?
2. How do you think I can help my 2 nanny kids (9 year old girl, 7 year old girl) be more interested in bugs and science in general?
3. I myself am very into the ocean and a lot of creatures. I own multiple fish tanks which house a variety of snails, believe it or not! They're very fun to watch, and they are constantly laying eggs which means lot of a baby snails for me to watch grow! It's quite fascinating.

Thanks so much for answering any questions today, even if you don't get to these ones!

[Qwertyowl](#)

Sophia: Grasshoppers, crickets, roly pollies, butterflies Nicole: Talking about science and being interested in a topic your kids are talking about. Sophia loves having science days. I will look up kitchen experiments, buy ingredients and then we make an afternoon of doing experiments. I will ask questions but I have fun doing it too. Showing excitement (if if you aren't feeling it) encourages kids.

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Bugs are for everyone! It began to help a girl bullied because it wasn't seen as normal for her to do by her peers.

Why do you think a social media campaign is an appropriate channel for communicating with children? This looks like a cute and eye-catching solution that doesn't really address the underlying problem.

[atzenkatzen](#)

Nicole: This is one particular case where the bullying did stop in an unconventional way. Once Sophia saw that there were people with similar experiences she realized that her liking bugs and wanting to be

an entomologist wasn't a bad thing. It gave her the courage to stand up for herself and tell her peers that she wasn't weird because of it. She gained back her confidence and her smile. It was not ever a media campaign to communicate with children it was an outreach to find someone Sophia could connect with to have a support system other than myself as her mom. It succeeded because it was a experience many people can relate to on different levels.

No question here, just want to say from one bug enthusiast to another, you both rock!

[Antnommer](#)

[M] Thanks!

What do you have to say to reports that your 'BugsR4Girls' program is scaring away confused boys that also like bugs?

[BigbirdSalsa](#)

This is the first time I had heard of the hashtag scaring away boys. This began to help one little girl not feel as if she had to give up something she truly loved because of bullies. It turned into something that no one expected and in no way was ever intended to "scare" away boys from enjoying bugs it was meant to simply encourage, inspire someone. In the end bugs aren't detonated to one sex anyone of any age or race can love bugs. The message was not to let bullies interfere with what you love.