



## The Cultural Importance of Spiders

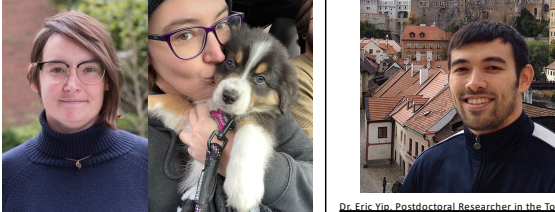
Codey Mathis & Dr. Eric Yip  
Pennsylvania State University

January 4, 2023  
Ohio State University Extension




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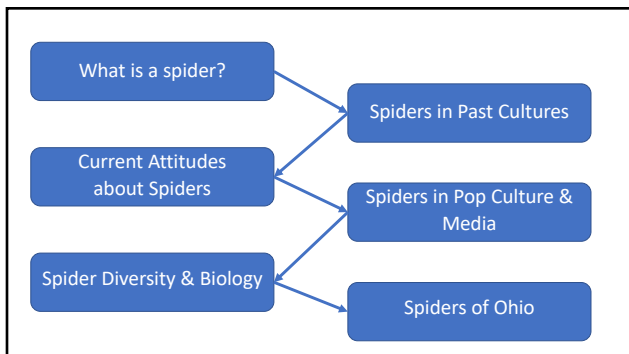
### Who are we?



**Codey Mathis** - PhD Candidate in the Skvarla Lab.  
Pollinator Conservation & Management – Bees, Wasps, Syrphid flies

**Dr. Eric Yip** - Postdoctoral Researcher in the Tooker Lab.  
Previously: Group living & Sexual Selection in Spiders  
Now: Plant-based effects on sexual selection in goldenrod gall flies

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### What is a spider?

Phylum Arthropoda

**Characteristics:**

- Molting
- Cuticle strengthened by chitin
- Articulated appendages

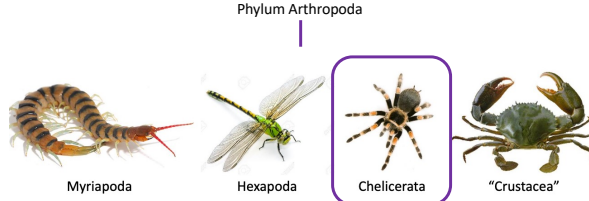


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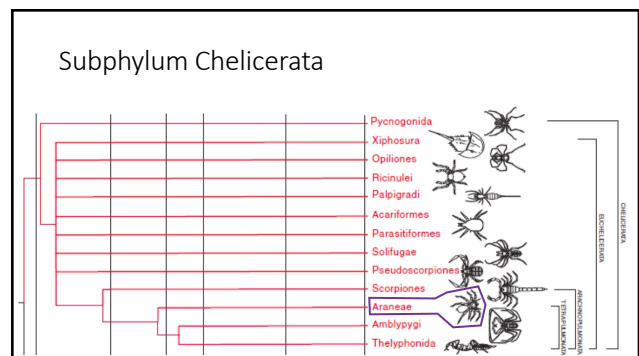
### What is a spider?

Phylum Arthropoda



Myriapoda      Hexapoda      Chelicerata      "Crustacea"

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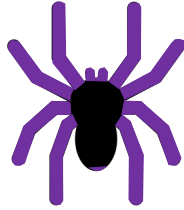
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## Order Araneae – True Spiders

Eight legs

Chelicerae with fangs that inject venom

Spinnerets



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## Order Araneae – True Spiders

Eight legs

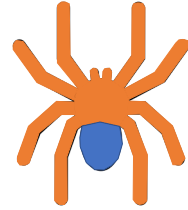
Chelicerae with fangs that inject venom

Spinnerets

Two body segments:

**Prosoma** (head/thorax)  
pro (forward), soma (body)

**Opisthosoma** (abdomen)  
opistho (back), soma (body)



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## Near East

Uttu – Mesopotamian goddess

Weaving – often depicted as a spider

God commanding a spider to save a holy believer  
Islamic oral tradition – a spider wove a web  
across a cave opening when Muhammad was  
hiding from soldiers that were pursuing him

Jewish oral tradition – a spider wove a web  
across a cave opening when David was being  
chased by King Saul



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## Ancient Greece / Rome

Weaving competition between Athena and Arachne  
Arachne was a human woman who thought  
that she was a better weaver even than the  
goddess Athena, so she challenged her.

Athena's tapestry – the gods are virtuous  
Arachne's tapestry – the gods are unethical,  
abusive, unjust, childish

Athena cursed her to live with extreme guilt & Arachne hung herself

Athena brought her back to life as a spider



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## Africa

Kwaku Ananse – Anansi of the Akan-Ashanti people

God of Stories, Wisdom, Knowledge, and possibly creation.

Trickster god – known to be very cunning

Many Spider tales deal with morality

Hausa people – spiders are the most cunning of all animals & the  
king of stories



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## The Americas

Lakota people - *The "Wasna" (Pemmican) Man and the Unktomi (Spider)*

A man encounters a hungry spider family that trick him out of  
his belongings

Spiders are tricksters

Hopi People – Spider Grandmother

Spider Grandmother thought the world into existence during the  
thoughtful weaving of her web



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## Europe

## Polish folklore

A sorcerer made a deal with the devil to escape Hell and live on the moon – his companion is a spider. He sends the spider to Earth to bring him back gossip

## An Inspiration for Robert the Bruce (Scotland)

Suffering many military failures against the English, he watched a spider fail multiple times to climb her web. She finally succeeds, and he gets inspired to come out of hiding and eventually wins Scottish independence



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## Europe

## Tarantella – Southern Italy's "Dance of the Spider"

15<sup>th</sup> century – one of the most beloved folk dances of Italy

Started as a "cure" for tarantism – when folks get bit by a venomous spider, they would dance wildly to expel venom

Now commonly danced at weddings by couples



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## Historic Global Attitudes

Inspiration (Robert the Bruce, Tarantella)

Cunning / Clever (African & American folklore)

To be respected (Islam)

Friends of God (Islam/Judaism)

Bold, willing to stand against the Gods (Greek myths)

What about  
current  
attitudes?



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## Current Attitudes Towards Spiders

## Venomous spiders prompt University of Michigan library to close

The Shapiro Undergraduate Library closed for two days after three Mediterranean recluse spiders were found in a storage area.

## Yellow sac spiders temporarily shut down Wisconsin school after student, teacher bitten

Wayne Grantham-Phillips  
USA TODAY  
Published 11:15 a.m. ET Dec. 14, 2022

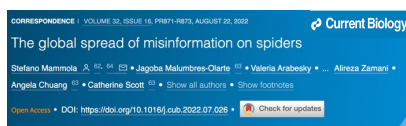


Horrified Woman Finds 20 Venomous Mouse Spiders in Her Pool in Australia

*"The spiders were not in any public spaces, said university spokeswoman Kim Broekhuizen, and staff closed the building due to a misunderstanding and out of an abundance of caution."*

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## Current Attitudes Towards Spiders



Assessed online newspaper articles from 2010-2020

47% of articles contained errors

43% were sensationalist

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## Fear of Spiders – Why?

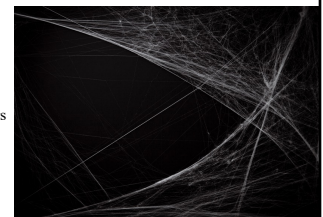
*"It is estimated that less than three deaths per year occur from spider bites."*

– Boston Children's Hospital

Arachnophobia is one of the most common fears

Between 25-50% of the people in the world acknowledges a general dislike of spiders

At least 5% have a true irrational fear



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## Fear of Spiders – Why?

**What Makes Spiders Frightening and Disgusting to People?**

Big Fear of Small Animals: Where Our Fear of Spiders Comes from

Wolfgang Nentwig<sup>1,2</sup>, Julia Amann, Angelo Bolchini, Holger Frick, Anne-Sarah Gieseke, Ambros Hahn, Christian Kriegl & Anna Stransky  
 Chapter | First Online: 05 April 2022  
 408 Accesses | 23 Altmetrics



Indigenous peoples do not show the fear  
 Middle Ages – spiders as the personification of evil  
 Fear is learned from parents/grandparents

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## Ways to Overcome Fears: Increase awareness and appreciation of insects

Counter negative perceptions of insects.

*“Such perceptions can reflect cultural beliefs not grounded in scientific evidence (38) and can be amplified by media sensationalism such as films depicting large, scary insects, or the use of dramatized and misleading headlines.”*

Social media posts about bugs Community Science Efforts

Positive Representation in Pop Culture & Media

Kawahara et al., 2021 PNAS

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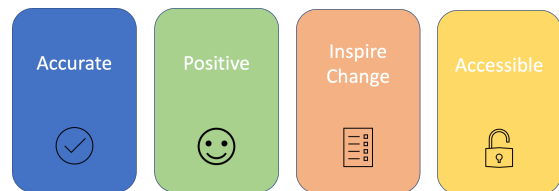
## Pros & cons of pop culture & media attention

Pro	Con
If <u>done well</u> , can raise awareness and appreciation for spiders	If <u>done poorly</u> , can spread misinformation and unnecessary fear of spiders
If <u>done well</u> , helps advocate for spider conservation and increasing their biodiversity	If <u>done poorly</u> , leads to calls for extermination that may harm non-target taxa

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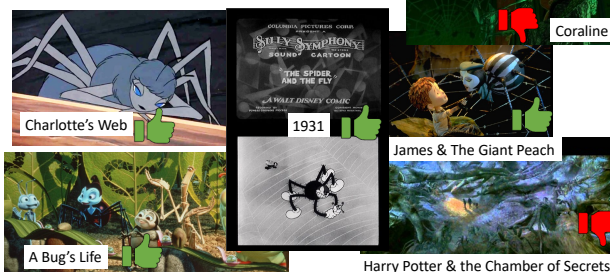
## Goals of pop culture & media attention

Overarching Goal: Increase awareness and appreciation of arthropods



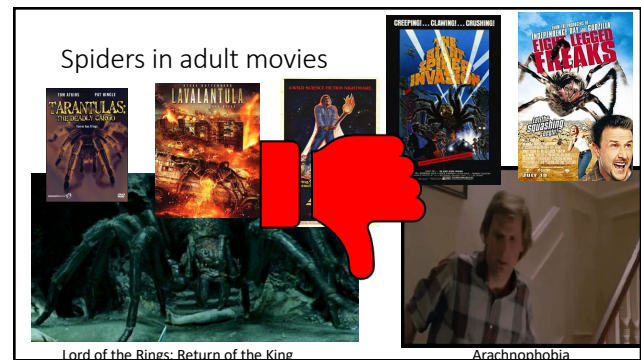
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## Spiders in children's movies



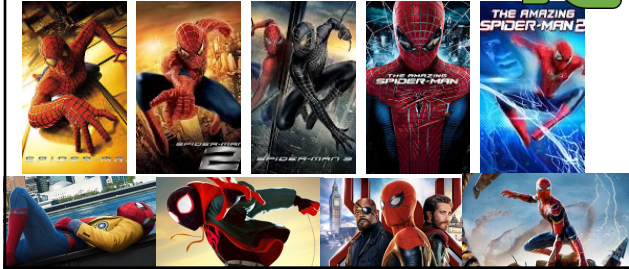
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## Spiders in adult movies



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## Spiders in adult movies



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## Spiders as Technological Inspiration

### Spiders inspire double-sided sticky tape to heal wounds

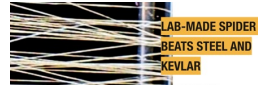
© 31 October 2019

#### Spider venom key to pain relief without side-effects

Date: April 14, 2020

Source: University of Queensland

Summary: Molecules in tarantula venom could be used as an alternative to opioid pain killers for people seeking chronic pain relief.



July 2019, 2021  
Image by: University of Queensland



POPULAR

#### This amazing body armor is made from spider silk

Blake Stillwell

Published April 29, 2020 16:43:07

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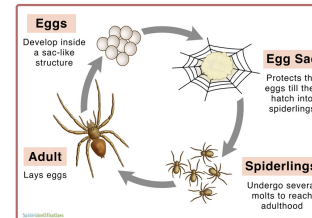
## Let's learn about spider biology!



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## Basic Biology of Spiders

### Spider Life Cycle



#### Spiderlings

Molt more often than adults  
Will reach adulthood between 5–10 molts on average

#### Adult – ready to mate

Females are larger than males – take longer to reach adulthood

Will likely only molt annually

Usually live 2 years – some up to 20

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## Basic Biology of Spiders

**Feeding** – most spiders are generalists, but there are some exceptions



Family Mimetidae  
pirate spiders



*Dysdera* spp.  
woodlouse spider



*Evarcha culicivora*  
Mosquito specialist

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## Basic Biology of Spiders

**Feeding** – often predators, with one exception!



#### *Bagheera kiplingi*

Central America

Consumes protein- and fat-rich bits of mimosa trees

May be omnivorous, but the majority of the diet is herbaceous

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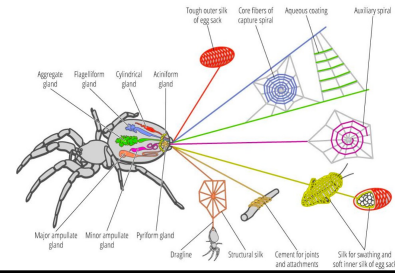
## Parental Care

Defend young



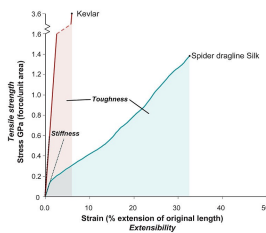
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## Spiders have multiple types of silk



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## Spider silk is strong



Stronger than steel – tougher than Kevlar!

**Spider silk is five times stronger than steel – now, scientists know why**  
Thousands of tiny nanocrystals make up larger silken "cables"

"... if human-sized, it would be tough enough to snag a jetliner."

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## Regrowth of Limbs



Regrow limbs during molts

Limb is initially smaller than the others, but will become larger with each progressive molt

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## Ballooning



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## How to impress the ladies: spider style



Male peacock spider



Nuptial gift from male *Pisaura mirabilis*  
Nature (2016)

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## Floral Mimicry



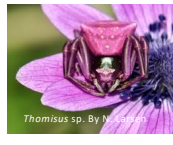
*Misumenoides formosipes*



Spiders in the family Thomisidae will pick flowers to hunt on based on their own color!



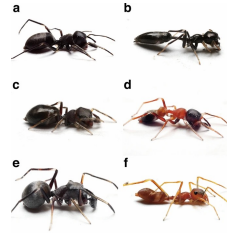
*Thomisus onustus*



*Thomisus sp.* By N

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## Mimicry of Other Arthropods



Hashimoto et al., 2020 Scientific Reports



*Eresus* spp. Raska and Pekar, 2019, Biol. J. Lin. Soc.

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## Spiders as Biocontrol

Spiders consume a large amount of pest insects!!!

To learn more, Register for Dr. Eric Yip's presentation on March 29<sup>th</sup> 12-1pm EST!

**"SPIDERS AS IMPORTANT AGENTS OF BIOLOGICAL CONTROL"**



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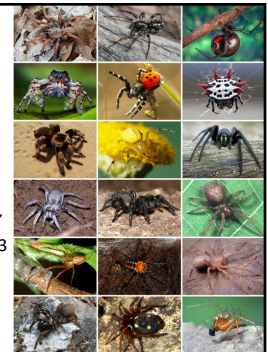
## Diversity of Spiders

132 families  
50,000 species (described so far)

*"We would not be surprised if true spider diversity, in the early 21st century, described and undescribed, exceeded 200,000 species."*

- Agnarsson et al., 2013

The diversity of spiders in an area can be an indication of how biodiverse the whole arthropod community is!



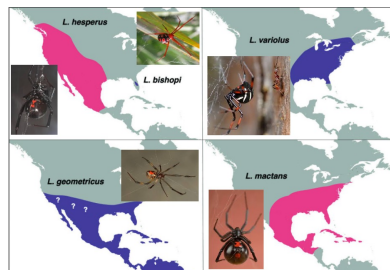
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## Medically Important Spiders

Widows - *Latrodectus* spp.

Causes release of neurotransmitters and prevents resorption

**Symptoms of bite:** pain (local, radiating, or specific to back, chest, and abdomen), sweating, and less commonly fever, hypertension, paralysis, cardiac effects, renal failure



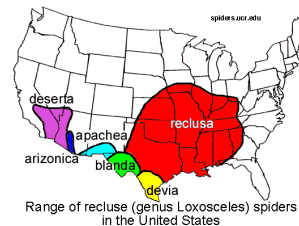
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## Medically Important Spiders



Brown Recluse - *Loxosceles reclusa*

**Symptoms of bite:** mild reddening to large necrotic ulcers; in rare cases (<1%) destroys red blood cells, causes intra-vascular coagulation, renal failure, and death in 12-30 hrs (mostly in children)  
Most systemic effects chills/sweating and malaise



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## Spiders of Ohio



Ohio Spider Survey Project  
Dr. Richard Bradley - OSU

Mission: Enhance the understanding of Ohio Spiders

Promote public education

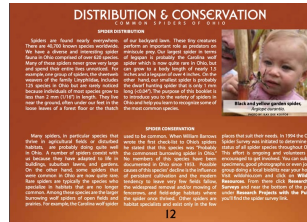
Conduct surveys & create database

Develop materials for the public

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## Spiders of Ohio

682 species of spider recognized in Ohio – Dr. Richard Bradley - 2021

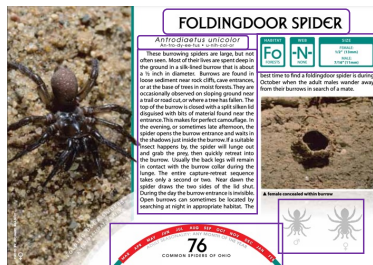


Only 4 of these species are medically important (recluse & black widows)

Some spiders that were historically quite abundant are now rare

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## Common Spiders of Ohio – Great Resource!!



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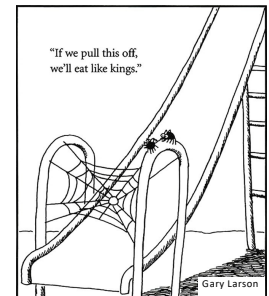
## Conclusion

Spiders are an amazing and diverse group of organisms

Spiders have been respected in human culture for thousands of years

Though some current pop culture & media sources have highlighted positive associations with spiders, there is an overwhelming fear & propensity to negatively sensationalize them

Education & respect for spiders is pivotal to overcoming negative perceptions



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