The Emotional Lives of Mammals, Birds, Fish and Insects

Bob Armstrong

I have been pleased by all the information that is available now on the emotional lives of mammals, birds, and fish.

Lately I have noticed good information on the emotional lives of Insects. This inspired me to put together this pdf and try to illustrate what I have seen and summarize some of the latest information about insects.

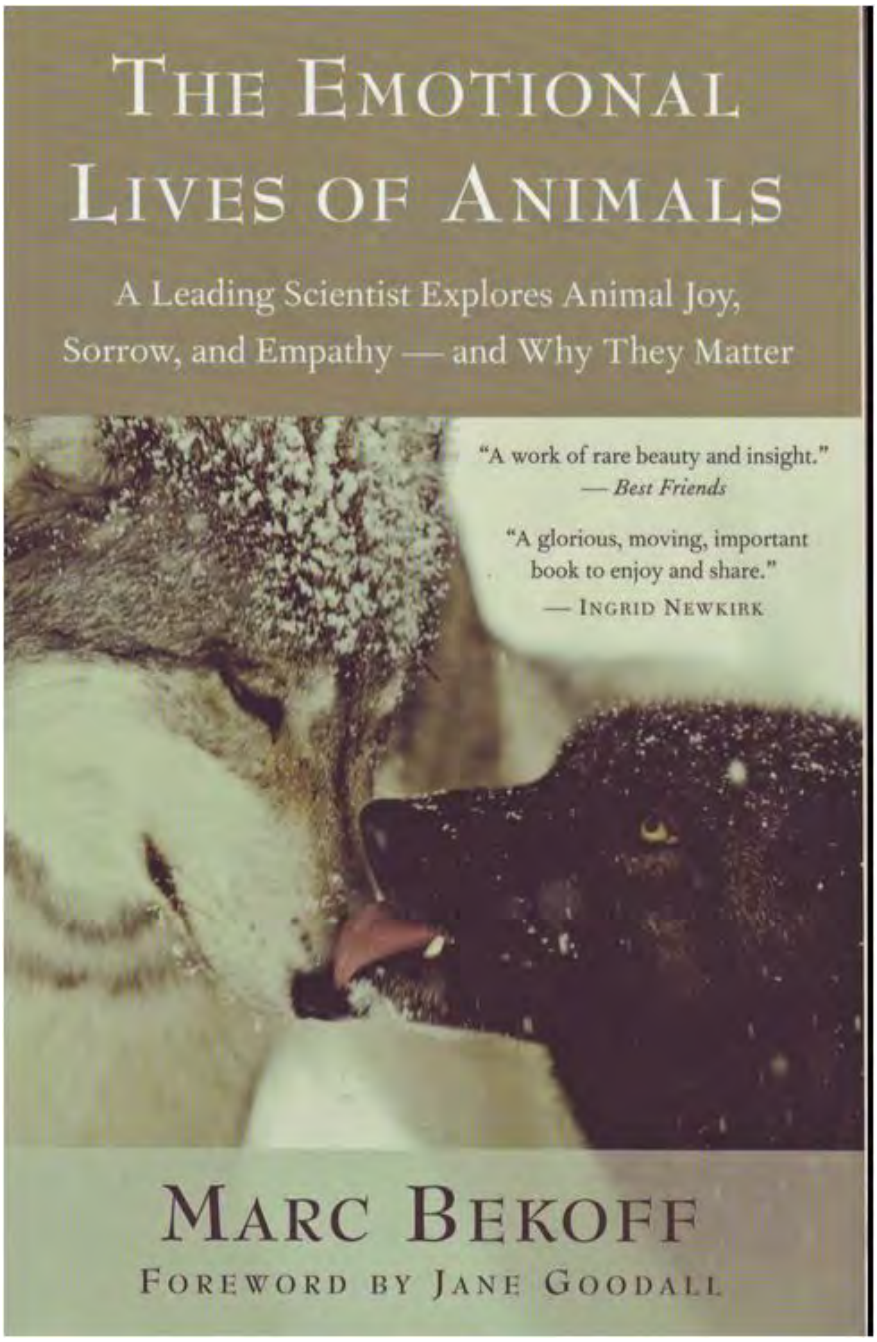
Before I try to discuss what we now know about insects I think its important to briefly review what is known about the emotional lives of mammals, birds and fish.

I once gave this power point presentation on their emotional lives

https://vimeo.com/245339955

Mammals

Living with dogs throughout most of my life has certainly convinced me that their emotions are very similar to us human mammals. Our current partner is a Laberdoodle named Apollo. He seems to always want to please me. If I take him with me to watch and film wildlife he sits next to me and just looks and never chases them. He especially likes to watch Steller sea lions playing with each other in the water.



In my opinion this book is one of the best ones to help understand the emotional lives of animals.

I often spend months and sometimes years trying to understand the behavior of certain mammals in the wild. And eventually write a book about what I have observed. Here are a few images and short stories that have impressed me the most.

Hoary Marmots that live along our beaches and in the alpine really like to play with one another. When they get separated and return they often "touch noses" which sometimes appears that they are kissing each other.

Watching beavers in their lodge I was impressed with how they sleep with each other. Also I would often see them grooming each other. Outside the lodge I would occasionally see a probable parent holding and "cuddling" a youngster.

I once helped rescue a stranded Harbor Seal pup. When I lowered myself to photograph it the seal started "crying" and moved towards me. When filming seals underwater I was amazed at how long they would sleep (about 20 minutes) and often together.

Birds

Ravens may be the best birds for us to observe interesting behavior. When skiing on Mendenhall Lake this raven would land in front of our dog in "hopes" that the dog would chase it. We taught this dog not to chase birds. So the raven eventually landed behind the dog and pulled its tail. The dog still would not chase it. Finally the raven landed in front of the dog and waved a stick in the air. Still not being chased the raven flew away in "frustration".

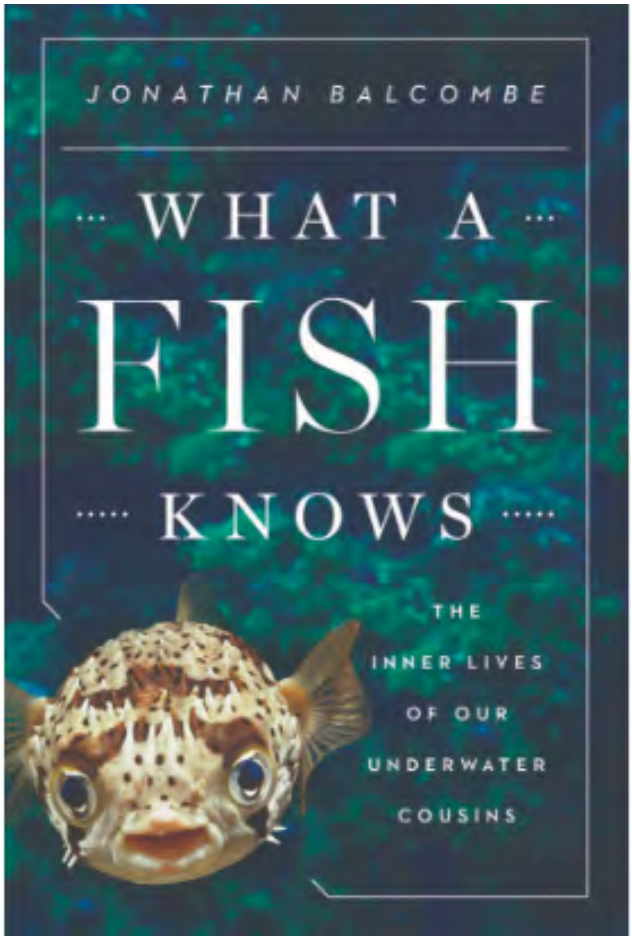
In the Juneau alpine I watched ravens passing rocks to one another. If the raven receiving the rock did not "like" the rock it would attack the other raven. Weird behavior!

One day I drove out to the Mendenhall Glacier area and saw some eagles feeding on a salmon carcass. I stopped the car to watch them and they flew away. Then this Great Blue Heron came out of the brush and ate the carcass. Afterwards it walked up to my car and stared at me from about two feet away at the open window area. What was it thinking?

Another time I was walking near the covered observation place at the glacier where several Barn Swallows were nesting. This heron flew in and landed on the roof. Immediately this Barn Swallow started "attacking" the heron and eventually drove it away.

Fish

When doing research on the behavior of Dolly Varden I came to the conclusion that fish have similar emotions to mammals. The young Dolly Varden live in streams for 3 to 4 years before migrating to saltwater. During this time each individual often establishes a territory in the stream for feeding on drifting insects. In these territorial areas there is usually a "despot" fish that occupies the best spot for catching insects. If another dolly enters its territory I would see the "despot"cruise throughout the feeding area and attack the other fish and then return to its territory. In filming the spawning behavior of Dolly Varden I was amazed at how much the male would "vibrate" next to the female to stimulate her to spawn.



This is a great book to help understand the emotional lives of fish. The author did an amazing amount of literature research and talking to biologists throughout the world.

What I found most interesting is that fish probably experience more pain than mammals. It appears they have less ways of coping with pain in their brain.

Anyway after reading the book and looking at the literature citied section I had no doubt that fish experience emotions very similar to mammals.

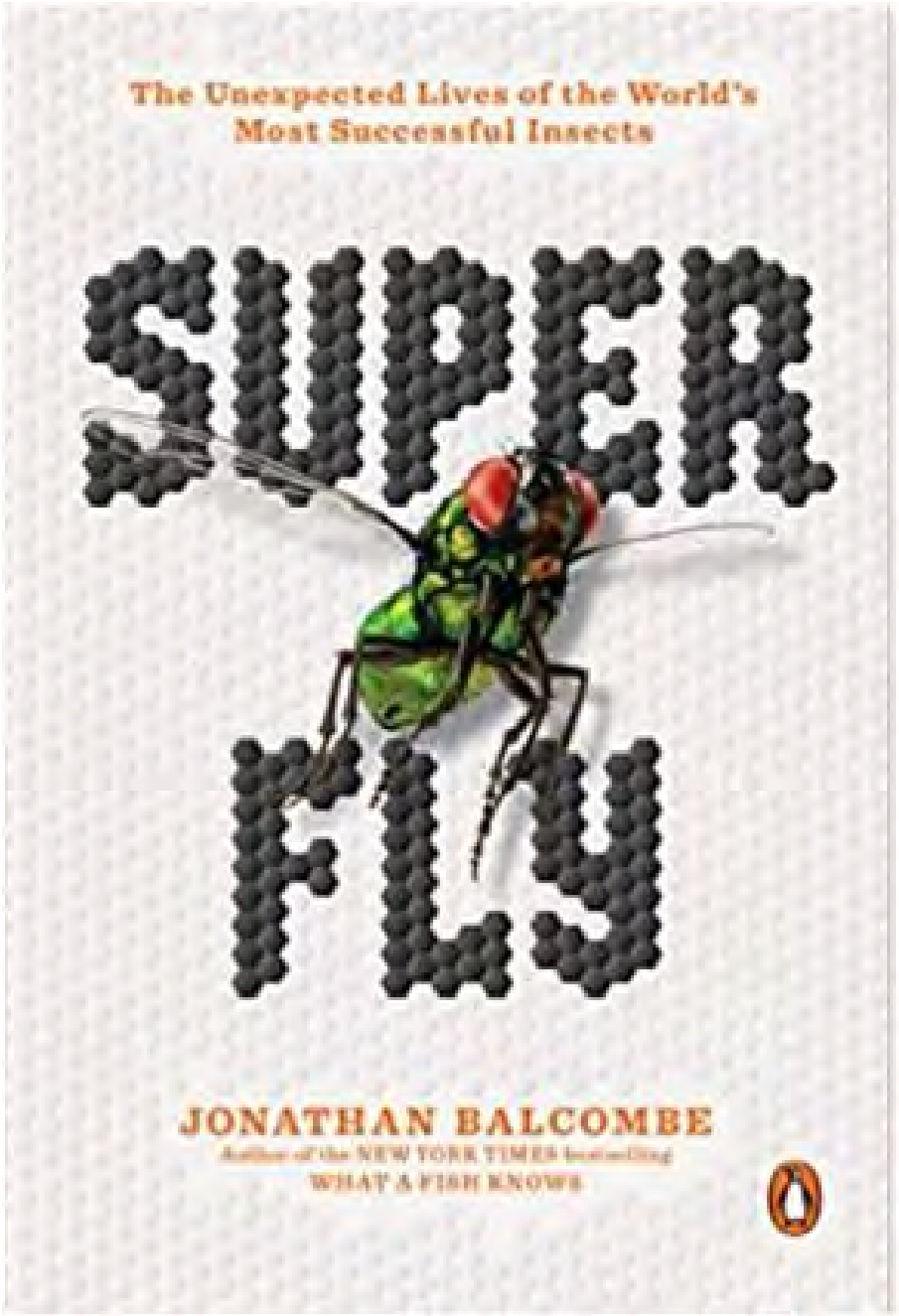
I have done quite a bit of filming the underwater behavior of Three-spine Sticklebacks in the Juneau area. The amount of effort that the males do to protect their nests, eggs, and young is very interesting. The photo above shows a stickleback about to attack a Staghorn Sculpin that settled near the sticklebacks nest. It did this several times and the sculpin would attempt to eat the stickleback, which would successfully dart out of the sculpins mouth. Eventually it was successful in driving the sculpin away.

There is scientific report that documents the ability of sticklebacks to recognize the faces of the numerous other ones in their colony. I would lower a mirror underwater with a gopro camera attached. Every stickleback that approached the mirror would attack its image. Since they cannot recognize their own face they obviously thought it was one outside of their colony.

To see what a male Dolly Varden does when courting a female look at https://vimeo.com/387180933

Insects

In watching and photographing insects for our books on Aquatic Insects of Alaska and Dragonflies of Alaska I began to realize that they had emotions and even individuals of the same species appeared to behave differently. And then I recently read this book and concluded they have emotions just like all other creatures in the world.



One of the most interesting chapters in this book is on the sex life of flies.

Again, like in his book on fish, Jonathan looked at scientific publications about insect behavior throughout the world and contacted many entomologists for information.

The above photo shows a male Dance Fly with its prey, a springtail (on the snow in Juneau).

Only the male Dance Fly is capable of preying on other insects. But the female needs the extra energy in order to lay her eggs. For mating the male will bring the female an insect to eat wrapped in silk. While she is unwraping her gift the male mates with her. Some males give the female a gift with no insect inside. This enables him to mate with her without going to the trouble of catching prey for her.

I hope to eventually get a video of Dance Flies mating.

These sawfly larvae (from the subfamily Nematinae) were found eating the leaves on one young cottonwood tree on August 16, 2022. When disturbed they typically extend their body outward and wave it about. When I was watching them this parasitic wasp was approaching the group (lower left photo). Eventually it came up to one of the larva and appeared to begin laying an egg on or in the larva (lower right photo).

I spent close to three hours attempting to get a photograph of this Phantom Midge larva. Whenever I would make the slightest movement the insect would dart into a corner of the aquarium and hide. I almost felt as if I was bonding with it and that it had a real personality as it would always stare at me. Finally it seemed to accept my presence and posed perfectly. As you can see, however, it still kept an eye on me.

There is an entire book written about these spiders that really helps one learn about their behavior (Predator Upon a Flower by Douglass H. Morse).

I watched and filmed crab spiders in the Juneau area for three summers. These spiders do not build webs. To catch prey they hunt on the flowers that insects visit.

I learned a lot about their behavior and emotions. And the behavior of other insects that visit these flowers and how they react to the spiders.

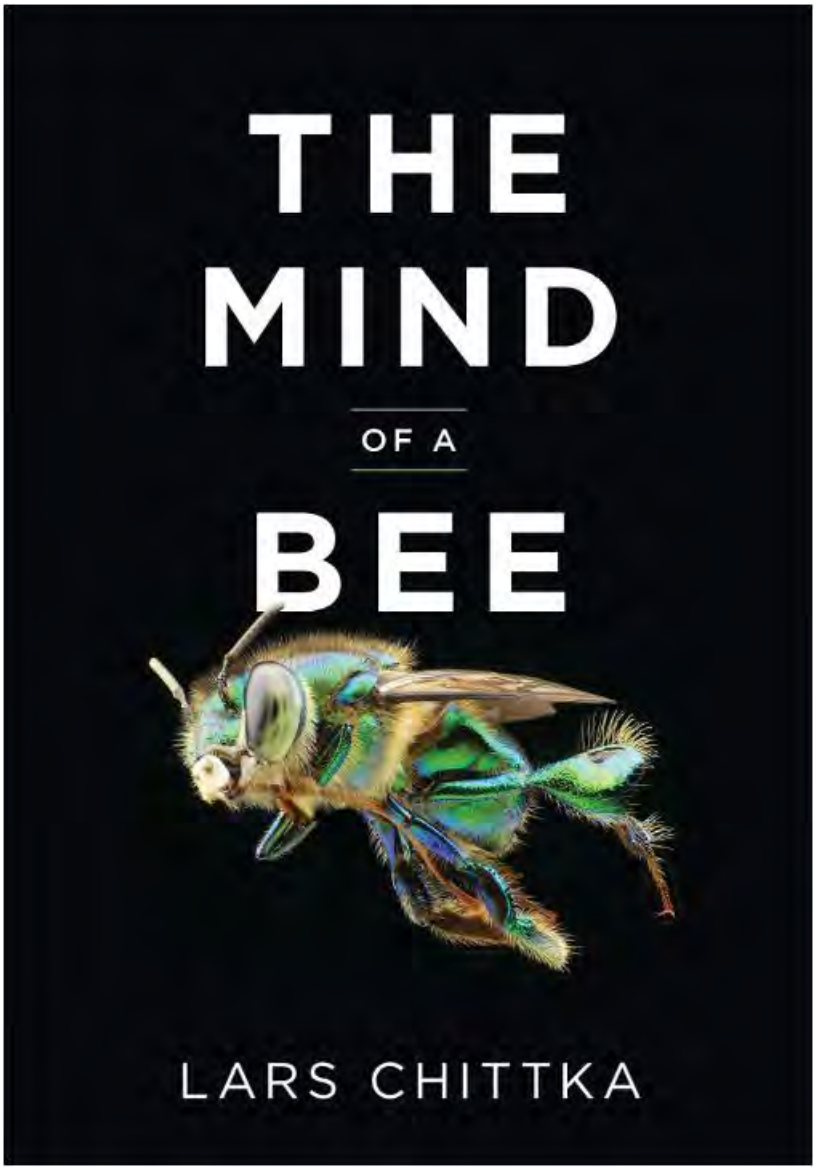
The most exciting event was filming the mating behavior of the males. The females typically will grab and eat a male that approaches her. So the males have to be extremely careful and use special techniques to mate successfully. What I filmed was a female eating one male and another came and mated with her while she was busy eating.

Filming and watching insects coming to flowers that had crab spiders hunting on them was quite interesting. Individuals of the same species often behaved quite differently. Some would land on the flower and crawl about eating nectar and pollen and pay no attention to the spider. Others would immediately leave or go to another flower once it spotted the spider.

The photo above shows a honey bee approaching a Nootka lupine flower with a crab spider eating a moth that it had captured. The bee spent a few seconds hovering and looking then it quickly darted away and visited another plant.

Our neighbor had a honey bee colony on the third summer that I was working with crab spiders in a natural area in Juneau. Since these bees are non-native to Alaska it was interesting to watch their behavior. The bee colony was about 200 feet away from the place I was working with crab spiders. Each bee that visited the area seemed to behave a little different.

The common plant in the area was a Nootka lupine. In order for an insect to gather nectar or pollen it had to land on the lower lip of the flower in order to open the area for nectar. Local bumblebees had no trouble doing this but most of the honey bees could not figure it out. I watched one bee that was successful and it then spent at least one half hour visiting the same plant and flying back and forth to its colony. It was also fascinating to watch the behavior of the bees in their colony. Each one seem to have a special job to do. The mouth to mouth transfer of nectar between bees was neat to watch.



This book by Lars Chittka is a must read to learn about the individuality of insects within the same species and their behavior differences.

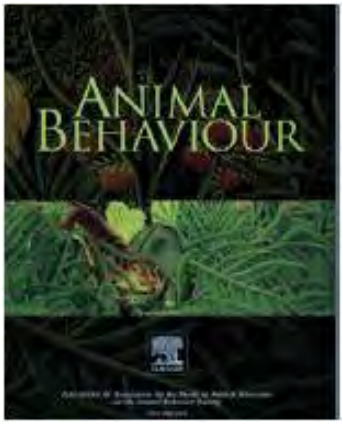
Lars Chittka is professor of sensory and behavioral ecology at Queen Mary University of London. He is the coeditor of Cognitive Ecology of Pollination.

Here are two exerpts from the book:

"The moment bees are marked in ways that make them recognizable as individuals (for example, with number tags), a wholly new perspective on their nature opens up. It becomes instantly obvious that different individuals of the same species behave very differently. Some bees are more aggressive than others, some are harder working, some more intelligent; some make fast and sloppy decisions while others are more careful, and so on."

"To conclude, we have seen that there are immense differences in sensory systems, behavior, and learning among individual bees and between colonies. Viewing bees as beings with unique "personalities," possessing individual preferences, learning abilities, and memories also lends a new perspective for the need of their conservation."

Galpayage Dona, H. S., et al., Do bumble bees play?, Animal Behaviour (2022), https://doi.org/10.1016j.anbehav.2022.08.013



Another must read. Their list of references at the end provide links to most of the articles.

Their Conclusions:

"In this study, we systematically described a behavioural phenomenon in bumble bees resembling object play. Bees rolled inedible coloured balls repeatedly. This activity did not result in an apparent immediate function, such as gaining food; however, bees' repeated interactions with balls suggest that the behaviour was rewarding. This rewarding aspect of ball rolling was further supported by bees' ability to form a positive association between a neutral-coloured stimulus and ball rolling. The amount of ballrolling activity varied within and between individuals, showing that the behaviour was not stereotyped over repetitions. Similar to vertebrate play, age and sex differences were found where younger workers and male bees rolled balls more often and for longer, respectively. We suggest that the behaviour observed here has actual hedonic value for bumble bees, which adds to the growing body of evidence of a form of sentience in these insects (Bateson, 2014; Birch, 2020; Held & pinka, 2011; Solvi et al., 2016). Further work should explore the possible ultimate advantages of such behaviour, and the ways in which play behaviour might benefit early brain development."

XERCES SOCIETY for Invertebrate Conservation

Insects Are A Lot Like Us

By Sarah Foltz Jordan on 1. August 2022

A version of this article originally appeared in the Spring 2022 edition of Wings magazine.

What's the best thing to do with a banana peel? According to my Grandma Foltz: set it out on the front stoop for a few days to feed the ants. Same story for bread crumbs, apple cores, and pretty much every other kitchen scrap.

While I don't exactly follow that prescription in my own home (we feed our leftovers to our chickens rather than our ants), I think often of my grandma's tenderness toward these small creatures. She passed away almost thirty years ago, presumably unaware of insect decline or insect-conservation strategies, yet still, she understood these basic facts: insects (like us) deserve attention, and insects (like us) need to eat.

Bees can be picky eaters, too

Here at Xerces, helping people address the dietary needs of invertebrates is, in fact, a very large part of what we do, particularly when it comes to our work with bees, butterflies, and other insect herbivores. We design habitat projects that support the foraging needs of at-risk species, and that have enough diversity to be climate resilient and resistant to competition with weeds. We work with farmers, foresters, and fellow community members to create green spaces that aren't just green, but are *the right kinds of green:* flourishing with native plant communities that our insects, songbirds, and other wildlife have coevolved to coexist with.

We gather information on the feeding preferences of endangered bees and use this to inform our work. We remind our audiences that while some bees are generalists and you may see them flitting about any number of ornamental flowers, many others are specialists, and able to collect pollen from only a limited number of native plant taxa alongside which they have evolved. Although the number of bees exhibiting

this “picky eater” syndrome varies regionally, often the number can be quite high. In the central United States, roughly 30 percent of the approximately eighteen hundred bee species that can be found in the region are specialists on particular pollens.

For example, females of the pale fairy bee *(Perdita pallida),* one of the smallest bees here in Minnesota, collect pollen to feed their offspring from nothing but *Dalea,* a genus of native plants in the legume family generally known as prairie clover. At least two of our plasterer bees *(Colletes)* collect pollen specifically from *Physalis* ground cherries, unassuming little plants that also support specialist leaf-miner moths, who in turn feed specialist parasitoid wasps.

Even insects without highly specific dietary requirements often have preferences. Thanks to a robust database managed by our bumble bee team, we know that the rusty patched bumble bee *(Bombus affinis)*, a species federally listed as endangered, has been documented on at least 138 different plant genera over the years, but roughly a fifth of the known occurrences, including the only one I’ve ever seen, have been on bee balm *(Monarda).*

Although rusty patched bumble bees have been recorded foraging on more than a hundred plant species, the bees have a distinct preference for bee balm. (Photo: Xerces Society / Sarah Foltz Jordan.)

To protect invertebrates, pick the right plants

Moving beyond bees, these types of dietary specializations are the norm rather than the exception. The vast majority (roughly 90 percent) of plant-feeding insects are specialists, adapted to digest only a limited suite of plant chemistries, often corresponding to a particular plant family or genus. Milkweed longhorn beetles (*Tetropes* spp.), beautiful insects that I appreciate for their uncanny tendency to look right at my camera rather than hide or fly off or play dead, have a larval stage that feeds strictly on the roots of milkweed (*Asclepias* spp.). Forked fungus beetles *(Bolitotherus cornutus)* spend their entire life on *Ganoderma* mushrooms, the familiar rounded shelf or bracket fungi seen growing on trees. The beetles use these fungi for virtually everything: egg-laying substrate, larval and adult food, pupation sites, overwintering protection, location of prospective mates, and (my favorite) a nice flat stage for their courtship behaviors and displays. The Oregon plant bug *(Lygus oregonae),* a rare and declining species in the West, is known to feed on just two unrelated plants, silver beachweed *(Ambrosia chamissonis)* and coastal sand verbena *(Abronia latifolia),* both of which are limited to coastal sand dune habitat. Xerces' surveys for this bug in 2009 documented the species at just one of forty-nine beaches visited, even though thirteen of the sites had appropriate food plants present.

Which reminds us: the occurrence of suitable and abundant food is, unfortunately, usually not enough to support the long-term persistence of a sensitive species. In addition to the loss of food plants, many insects are threatened by regular encounters with pesticides in the places where they eat, drink, swim, fly, and nest. In our increasingly developed and ecologically degraded landscapes, many insects struggle to meet their basic needs for shelter—including sites for nesting, overwintering, oviposition, and protection from weather and pesticides. And many insects, particularly those with limited dispersal abilities, require some degree of habitat connectivity in order to find appropriate mates, to maintain genetic resilience, to respond to climate change, and ultimately to sustain or expand their populations.

Banded hairstreak sipping from butterfly milkweed, one of its preferred nectar sources. Hairstreak caterpillars feed on oak, walnut, and hickory. (Photo: Sarah Foltz Jordan.)

Insects are more like us than we realize

My introduction to the Xerces Society many years ago was through this very magazine, Wings. What drew me in were the fantastic photographs and stories about obscure insects with behaviors that are sometimes so bizarre (like tortoise beetle larvae carrying their own excrement above their head all day to deter predators!), and sometimes so familiar (like leafcutter bees creating bedrooms for their offspring, and with lovely wallpaper, even!). All of these years later, I still find it wonderful that there are so many ways we humans can relate to insects. Think of the care a bumble bee queen takes in selecting her new nest site, sometimes checking out dozens of potential options before settling on the perfect place to call home. Think of the ingenuity of leafcutter ants who not only cultivate their own fungus for their colony to feed on, but also utilize antimicrobial bacteria for pest control and nitrogen-fixing bacteria for fertilizer in their mushroom-farming endeavors. Think of the creativity of a male dance fly bringing silk balloons (sometimes with a little edible treat inside) to his prospective lover.

Like us, insects are parents, siblings, homemakers, farmers, community members, and innovators. Like us, they can be resourceful, insightful, decisive, and prone to copy their peers. To take this notion still further, recent research on fruit flies and other groups suggests the unsurprising but long-denied potential for insects to have feelings, including fear, anxiety, excitement, and motivation. Does a caddisfly, for instance, feel frustration when exposure to pesticides in a stream causes her to have difficulty building and repairing her ornate underwater home? Or perhaps a better question is, "How could she not?"

As we continue to energize more people to act on behalf of insects, these similarities matter. The stories and struggles of insects can help us to recognize their inherent value, regardless of their relationship to us—sometimes useful, sometimes inconvenient. When we understand more about the day-to-day lives of insects, we see them with greater interest, admiration, and concern, and ultimately we are more inspired to help out—even if that simply means feeding our resident ants.

Like people, leafcutter bees are homemakers, creating a protected space for their offspring. Whereas we might use sheetrock, they use carefully trimmed leaf pieces. (Photo: Clay Bolt.)

Authors

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Based out of central Minnesota, Sarah leads Xerces' upper Midwest native bee and monarch habitat restoration projects, working closely with farmers, agencies, and conservation groups to promote pollinators on farms and in natural areas. Sarah provides habitat restoration support to hundreds of farmers and farm agency professionals across the upper Midwest, with an emphasis on the testing of new, cutting-edge restoration methods on a wide range of fruit, vegetable, and grain farms.

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Some Videos Illustrating what I have Observed

Beavers

Beaver Family Sleeping in their Lodge https://vimeo.com/546936282
Beavers Putting Mud and Sticks on their Lodge https://vimeo.com/302626288
How Beavers Fall Large Trees https://vimeo.com/642835185
Inside the Beavers Lodge https://vimeo.com/304274450

Dolly Varden

Courting Miss Dolly Varden https://vimeo.com/387180933
Dolly Varden in Winter https://vimeo.com/259191699
Dolly Varden with Partial Albinism https://vimeo.com/117019537

Insects

Crab Spider catches a Bumblebee https://vimeo.com/571390019
Crab Spider rejects Beetle https://vimeo.com/338393550
Female Crab Spider eats a Male and another mates with her https://vimeo.com/336949136
Those Amazing Crab Spiders https://vimeo.com/357288176

Marmots

A Concerned Mother Marmot https://vimeo.com/175192622
Marmots Like to Play https://vimeo.com/121555397
Marmots Love to Play https://vimeo.com/105204645
Marmots on June 1 https://vimeo.com/219789239
Taking Care of the Kids, Hoary Marmot https://vimeo.com/132940566

Ravens

A Very Smart Raven https://vimeo.com/331592632
Raven Digs up Sculpin and https://vimeo.com/275170677
Raven Harrasses Eagle over a piece of Wood https://vimeo.com/104948718
Raven Kids Intracting https://vimeo.com/586894530
Raven Kid trying to hide Food https://vimeo.com/586862779
Who's Smarter Crow or Raven https://vimeo.com/130071974

Seals

Harbor Seal Behavior Underwater the Bedroom https://vimeo.com/321936488
Harbor Seals Interacting https://vimeo.com/261957379
Seals A-Hunting https://vimeo.com/237156995

Useful References

Aquatic Insects in Alaska

Beavers by the Mendenhall Glacier

Dragons in the Ponds

Dragonflies of Alaska

The Mendenhall Wetlands

Natural Connections in Alaska

Southeast Alaska's Natural World

Whistlers on the Mountains