Judith Cahoon

ENG 102

11 Dec. 2024

Bees and Their Relationship With Humans

It's a relatively warm day in the middle of May and beneath my gloved fingers I feel the smooth wood of the beehive and the sticky mounds of hard, sweet-smelling propolis. My arms shake as I lift one frame after another from out of the hive. There are so many bees crawling around my hand. I don't want to touch them but they don't give me a choice. My fingers brush against hundreds of small fuzzy bodies. They're so alive, moving together to the beat of a soft, thrumming buzz.

My first hive inspection, completed under the watchful eyes of my instructor, Pat, as part of a Beekeeping Workshop, was short. I saw two hives and was stung once. It took less than an hour and as I walked back to my car afterward, hot and sweaty, I couldn't stop thinking about the next time I would open a hive.

My desire to become a beekeeper was a spur of the moment. I never once gave it thought, in my eighteen years of life, until the eve of 2024, when I suddenly told my mom I had decided to learn beekeeping. I have never liked being near insects, even bees, but—perhaps subconsciously encouraged by my sibling's niche interests—that did not stop me from wanting to learn about them. In the following months, I was comically surprised to learn that honey bees were not the only bee on the planet. Of course, I knew about bumblebees, and deep down I must have realized there had to be more bees, but the amount of variety under the umbrella term "bee" shocked me. Bees are a complex insect with tens of thousands of individual species, each with monumental impacts in regards to agriculture and the sustained biodiversity of their native

environments. The lack of knowledge and understanding surrounding bee diversity and a negative perception of native bees help prevent positive environmental changes regarding the adverse effects humans have on the environment.

Despite what many people may believe, honey bees are not native to the United States. What we call the honey bee—*Apis mellifera, also* commonly called the western honey bee or European honey bee—originated from the Afro-Eurasian landmass. They were brought across the Atlantic by early colonists in the 1400s to pollinate new farmlands and support new settlements in the Americas. Over the course of American history as honey bees spread across the continent the practice of beekeeping has become highly commercialized and closely tied with commercial agriculture. However, *Apis mellifera* is only one bee and only one pollinator out of thousands.

The popularity of honey bees among the general population ignores the sheer diversity of native bee species and their impact on the environment. When I look out into my garden, I see only a fraction of the 4000 different species of bees native to the United States. With my phone camera, I photograph scraggly black bees, big bees with fuzzy bodies, and even bigger bees with shining black abdomens. They land on the purple-pink blooms of oregano and lemon balm, on the wilting cone flowers, and on the few remaining dandelions still peaking out from the dew-covered grass. Without native bee pollination, most, if not all, of the produce section of the grocery store would be empty, in addition to many shelves of non-perishable goods. The flowers blanketing hills and bursting from gardens would not grow. The blossoming trees would not show their colors in the spring. Plants of all kinds would diminish until the organisms that rely on them begin to diminish also. Edward Clark Jr., president and co-founder of the Wildlife Center of Virginia, emphasizes that pollinators, including bees, “are essential for creating and

maintaining habitats on which many animals, including humans, depend" ("The Importance and Function of Pollinators" 00:02:27-00:02:34). We rely on plants for food, medicine, shelter, and beauty, and those plants rely on pollinators to maintain their populations and genetic diversity ("The Importance and Function of Pollinators"). However, native pollinators, including bees, are rarely given the respect and attention they deserve.

Despite the important roles native bees play in pollination, the general public focuses its attention nearly exclusively on honey bees. Bumblebees, too, have some popularity, as seen by the Transformers character, Bumblebee, however, much of today's media on bees focuses on honey bees, such as the classic *Bee Movie* or the 2024 American film *The Beekeeper*. Indeed, according to several researchers working at the University of Palermo in Italy, "to the general public, honeybees are considered to be the primary pollinator" (Leto et al). In a study regarding children's perception of honeybees, the researchers argue that most people are not able to distinguish between the different species of wasps and bees included under the superfamily Apoidea (Leto et al.). Most people aren't aware of the diversity of bees, thinking only of honey bees as they repeat the environmentalist motto "save the bees." However, while honey bees face many issues, such as disease, increasing varroa mite populations, and exposure to pesticides, their populations are kept high by humans. While problems honey bees face should continue to be addressed, it is important to recognize that honey bees are also the least likely of any "pollinator species on the planet to be at risk of extinction" (Leto et al). The populations of native pollinators, such as the rusty patched bumblebee (*Bombus affinis*), are at a greater risk of decline because of humans.

Humans heavily affect the population decline of pollinators, including bees, through widespread pesticide use. I live in a suburban area, where everyone has a similar-looking house

and a well-kept lawn. Pesticide application warning signs are common, especially in the spring. They always scared me. As a child, I believed that one step onto the grass would leave me dead. As I got older, I recognized that this was not necessarily true. However, pesticides, including insecticides and herbicides, are still dangerous and continue to negatively affect the environment. In middle school, my class learned about the effects of the insecticide Dichlorodiphenyltrichloroethane (DDT) on peregrine falcons. While falcons were impacted by a build-up through the food chain, bees directly feed on the plants that are being sprayed. According to university researchers D. Susan Willis Chan from the University of Guelph and Sabrina Rondeau from the University of Ottawa, pesticide exposure is "one of the multiple interacting drivers of wild bee declines globally" (Chan and Rondeau). Bees can be exposed to pesticides in the soil, from chemically coated seeds, and through the nectar and pollen they collect (Chan and Rondeau). Though many scientists agree that pesticides negatively affect honey bees, there is not enough research surrounding pesticide effects on native bees.

Despite the variation of bee species that come into contact with pesticides, honey bees are almost always the only bee used in research about the effects of pesticides on bee populations. Honey bees are domesticated and—compared to other bee species— are easy to breed, easy to care for, and easy to observe. However, as Chan and Rondeau conclude in their study regarding the pesticide risk among certain native bees in North America; honey bees do not represent all the traits various bees can have that can put them at greater risk to pesticides (Chan and Rondeau). For example, a majority of bee species (and by extension a majority of native bee species in North America) are solitary bees, while honey bees are social. In addition, many bees are ground-nesters, putting them at greater risk from the negative effects of pesticides in the soil, while honey bees are not (Chan and Rondeau). If only honey bees are being used in pesticide

research, especially in research intent on creating bee-safe pesticides, then that research is not helpful to the many other native bees that come in contact with the pesticides. By not considering native bees, or even other beneficial pollinators, such as flies and wasps, the true extent of the harm pesticides can cause will remain unknown. Despite the challenges it will have, native bees must be added to research efforts so that their livelihoods will be taken into account when people are discussing ways to reduce the environmental harm pesticides can cause.

Another issue remains that inadequate research methods used in pesticide research with honey bees are unable to properly evaluate the effects of pesticides. Sainath Suryanarayanan and Daniel Kleiman—both experts in the scientific field—argue that the controlled field experiments used by "university, government, and industry scientists" to evaluate the effects of lower, more "field-realistic" levels of insecticides (a type of pesticide) on honey bees do not take into account the complexities of the behaviors and factors affecting honey bee health (Suryanarayanan and Kleinman 36-41). While honey bees may be easily maintained by humans, they still have instincts that cannot be suppressed. A single honey bee will not be convinced to forage for food in a single field. The variety of factors affecting honey bee health in pesticide research can skew the results—results that farmers, beekeepers, conservationists, agricultural companies, and politicians rely on when they tackle environmental concerns and bee population decline. In addition to the lack of variation of research subjects, the current practices and methods used by scientists in pesticide research harm the conservation efforts for native pollinators, specifically native bees.

Bee conservation efforts are also harmed by negative perceptions of bees. As with most insects, bees incite fear in many people. Common sense seems to dictate that bees are to be avoided. The sting from a bee brings pain. My own sting from an irritated honey bee worker was

swollen for weeks. Although I've learned to stay relatively calm in the face of lone insects, deep down I always feel the urge to flee. It's instinctive: to want to get away from the danger, thus avoiding pain, or worse. Most people only experience a "local reaction," with pain and swelling around the area of the sting, but some may experience a "systematic reaction" or go into "anaphylactic shock," where the "mouth, throat, and/or airways" close, affecting breathing (Sanford and Bonney 10). It's as if humans have "a biological predisposition that alerts us to potentially dangerous species" (Leto et al.). Yet, honey bees are not usually aggressive, despite what many people have been conditioned to think (Sanford and Bonney 8). As stinging (for honey bees) results in death, it is a last resort defense. Most bees will not bother you if you don't bother them. Knowing this, of course, does not diminish the fear. Continued exposure to bees does not diminish the fear either, as one beekeeper writing in the beekeeper magazine Bee Culture points out (Bishop). Even today, knowing what I know now, my eyes open to the wonder of the insect world, I instinctively flinch when I hear a soft buzz on the wind or see a small blur out of the corner of my eye. Though I mentioned honey bees, this fear extends to all bees, and especially all insects. As another writer for Bee Culture observes: "Generally speaking, people do not like insects" (Roberts 80). The negative connotations resulting from fear further harm efforts to study and alter the factors affecting native bee populations. Negative associations "towards an animal influences people's willingness to protect it" (Leto et al.). Our "thoughts, values and beliefs" heavily influence how we view the world (Roberts 80). When people fear something, they are less inclined to help it.

Like many organisms across the globe, bee populations are at risk. This includes honey bees, whose numbers fluctuate throughout the years due to various diseases and pests. Honey bees support a large agricultural system in the US. They may be one species out of thousands of

bees, but they showed me a wider world of small insects that help support the health of the world's ecosystems, as well as the societies humans have built today. They illustrate to us how we change our environments, often for the worse, and how much we rely on the planet. Honey bees are still pollinators and understanding how pesticides affect them will help further understand how humans affect other species of bees. However, in the United States, honey bee populations are supported by human efforts due to their direct role in agriculture. Honey bees are not at risk, but many native bees are. Honey bee populations may decline, but they have humans to bring them back up. Native bees, however, aren't given the same attention.

Some may also argue that bees are too small to have such a big impact on agriculture and the environment. While it is true that the impact of an individual bee is too small in the grand scheme of the entire Earth, bees do not act alone. Even solitary bee species number in the millions. In such large numbers, bees can do so much, especially with regard to pollination. But if, due to human-caused issues, native bees' numbers decline too much, then they will no longer be able to support the vast majority of plants that rely on outside pollination, which could be devastating to everything on Earth.

Others may argue that we should continue to focus on honey bees over native bees, yet native bees provide "pollination services" to agricultural crops the same as honey bees (Chan and Rondeau). That being said, I never realized the impact of bees until I heard the roar as I uncovered my first honey bee hive. It was a deep droning echo that reverberated through my entire body. Each honey bee is half the size of my thumbnail: a minuscule, insignificant size on its own. But together they speak in a voice louder than my own. Yet even in appreciating honey bees, we must give notice to the other 20,000 bees worldwide, including the 4000 native bees

living in the United States. Bees give us so much; they deserve our respect. Still, many people fear and misunderstand them. But in order to help bees thrive, these attitudes need to change.

Not only does the lack of diversity in pesticide research and lack of comprehensive research techniques harm the conservation efforts of native bees, but so do the negative perceptions and lack of knowledge surrounding them. Native bees are pollinators and they support the complex ecosystem humans rely on to live. Respect and awareness are necessary for the positive environmental change that must occur if we do not want to lose native bees. I started my journey with a hive of honeybees, but it is my wish to end my journey with the unknown bees that I share a home with. There are ways people can coexist with nature, but if people do not know about their effects on the environment and how that will in turn affect themselves, they will not know they should change; and without change, there will be no future.

Works Cited

Bishop, Stephen. “To Bravely Run Away.” *Bee Culture,* Vol. 152, Iss. 6, June 2024, p. 25. *ProQuest,* login.ezproxy.oswego.edu/login?url=https://www.proquest.com/trade-journals/bravely-run-away/docview/3063809067/se-2?accountid=13025. Accessed 23 Oct. 2024.

Chan, D. Susan Willis, and Sabrina Rondeau. “Understanding and comparing relative pesticide risk among North American wild bees from their association with agriculture.” *Science of the Total Environment,* Vol. 951, Article 175378, Aug. 2024. *ScienceDirect,* https://doi.org/10.1016/j.scitotenv.2024.175378. Accessed 23 Oct. 2024.

“The Importance and Function of Pollinators.” *Untamed,* season 4, episode 7, VPM Media Corporation and Wildlife Center of Virginia, 2 June 2022. *PBS*, www.pbs.org/video/the-importance-and-function-of-pollinators-fabtsf/. Accessed 23 Oct. 2024.

Leto, Emmanuelo, et al. “Less Known is More Feared-A Survey of Children’s Knowledge of and Attitudes Towards Honeybees.” Insects, Vol. 15, Iss. 5, May 2024. Gale Academic Onefile, http://dx.doi.org/10.3390/insects15050368. Accessed 23 Oct. 2024.

Roberts, Lindsey. “Buzz Off or Bee Kind.” *Bee Culture,* Vol. 149, Iss. 2, Feb. 2021, pp. 79-81. *ProQuest,* https://login.ezproxy.oswego.edu/login?url=https://www.proquest.com/trade-journals/buzz-off-bee-kind/docview/2492714871/se-2?accountid=13025. Accessed 23 Oct. 2024.

Sanford, Malcolm T. and Richard E. Bonney. “Beginning Beekeeping.” *Storey’s Guide to Keeping Honey Bees.* 2nd ed., Storey Publishing, 2018, pp. 1-15.

Suryanarayanan, Sainath and Daniel Lee Kleinman. “Keeping the Research Disciplined: Entomological Understandings of the Controversy over Insecticides.” *Vanishing Bees: Science, Politics, and Honeybee Health,* E-book ed., Rutgers University Press, 2016, pp. 34-51.