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An Ecological Whodunit: The Story of Colony Collapse Disorder

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Abstract

As life on Earth becomes increasingly precarious, it becomes ever clearer that, while some nonhuman losses are perceived as tragic and controversial, many more are left to slip away, unnoticed and unmourned. The purpose of this study, then, is to determine what renders a nonhuman animal life as significant and why. Specifically, the story of colony collapse disorder is traced, illustrating how the loss of honeybees became framed as an ecological whodunit. This framing incited widespread interest in and anxiety about the disappearance of honeybees. Moreover, the controversy surrounding colony collapse disorder encouraged the preemptive mourning of honeybees' extinction, a fact which has consequently increased their chances of survival. Therefore, I argue that the stories told about nonhuman animals have influence. This article contributes to literature that recognizes extinction as a distinctly biocultural process, shaped as much by cultural values as it is by scientific fact.

Keywords

extinction – absence – grief – bees – colony collapse – stories

Introduction

Life on Earth has become precarious. Specifically, it is evident that we have entered into the sixth mass extinction, a process that has been triggered almost solely by human behavior (Ceballos et al., 2015; Kolbert, 2014). Even attempting

to fathom the scale of loss underway might be enough to leave one “doubled up in pain” (Confino, 2014). Thus, it is perhaps not so surprising that ecological grief for the extinct and endangered is often channeled through those few species whose lives have captured public interest.

While the reality of the sixth mass extinction is becoming increasingly recognized in the public domain, extinction narratives are still dominated by the few species whose lives—or indeed deaths—capture headline attention. Yet all around the world, more-than-human lives are slipping away unnoticed, ignored in any known obituary and passed over by headlines of controversy (Rose et al., 2017). In this article, therefore, I pursue the question of what renders a life, and thus a death, as being seen to matter and why: how and when do we choose to invest our care in the fate of a threatened species, what might the stories we tell about them reveal, and when and how do we choose to respond to the call of responsibility that extinction demands of us?

In pursuing these questions, I follow the story of a species whose potential loss has generated significant controversy. To be precise, the story of bees is traced, with a specific focus on honeybees. Similar to many insect species, honeybees' health is generally suffering (Potts et al., 2010). This article outlines how knowledge of honeybees' plight became disseminated through public consciousness with the arrival of a syndrome known as colony collapse disorder (CCD). By exploring the stories which surrounded this case of loss, I show how the details of this phenomenon led to the rendering of the loss of honeybees as spectacular, newsworthy, and mournable. Fundamentally, I contend that CCD became framed as an ecological whodunit. In its traditional literary form, a whodunit story refers to a genre of detective novels in which the plot is centered around uncovering who is responsible for committing a crime, typically murder. Pyrhönen (2005) explains how the “desire to find out ‘whodunit’ combined with the suspension of the answer act together as the structuring force of the plot” (p. 104). In this ecological whodunit, the plot is centered around uncovering which mysterious assassin is responsible for the disappearance and death of honeybees.

The framing of CCD as an ecological whodunit inspired extensive advocacy on the behalf of honeybees, as well as bee species more generally. I further show that this circumstance led to the preemptive imagining and mourning of bees' extinction: an act which has served to continue people's desire to challenge, and thus potentially change, the direction of bees' futures. Thus, I argue that this specific story illustrates the integral role of stories in shaping how the endangerment or extinction of nonhuman animals is imagined, narrated, prioritized, and challenged.

A Species in Decline: The Threats Facing Bees

In the modern world, many species of bees are struggling to thrive or survive (Goulson et al., 2015). The statement that bees are in trouble will likely no longer come as a shock to many. Over the last decade or so, their struggle has been splashed across headlines around the world, reiterated across hundreds of books and articles, and been the topic of many well-intentioned campaigns. The various causes of the decline in bee populations have stemmed from multiple, deeply entrenched social and environmental issues, many of which have developed over years of irresponsible behavior towards the Earth's environments. Threats facing bees include, but are not limited to, the impacts of climate change (Balfour et al., 2018; Memmott et al., 2007); exposure to chemicals such as pesticides (van der Sluijs et al., 2013); the loss of suitable habitats (Goulson, 2013; Kremen et al., 2002); and the global spread of viruses, parasites, and predators (Goulson et al., 2015).

While in recent years, these myriad individual factors intensified in terms of their effects, collectively exacerbating one another, the roots of many of these threats can be traced back generations. For instance, although it does not have a determinable start date, anthropogenic climate change is a problem which began to occur centuries ago (Coen, 2018). Hence, human behaviors responsible for bringing these threats into existence continued for decades before many leading threats to bees were even comprehended. Reflecting on this, Swan (2017) suggests that bees have been victims of slow violence.

Slow violence, a term originally coined by Nixon (2011), refers to a violence that is not spectacular, but that has been enacted over a significant period of time, sometimes through multiple avenues and in seemingly invisible ways. In line with Nixon's definition, the plight of bee species has not been caused by a single or spectacular act of harm. Rather, it has been produced through a systematic process of violence that has unfolded through years of seemingly small but certainly not inconsequential acts of harm towards the Earth's environments.

If the threats facing bee populations have been propagated through decades of environmentally damaging behaviors, it follows that it is impossible to define a specific moment in time when bees became threatened. However, it is possible to pinpoint a moment of time when the topic of the decline burst its way into our consciousness—to pinpoint precisely when the slow violence being enacted toward bees shifted into the realm of the spectacular and the controversial. Although evidence of bee declines began to be documented from the 1990s onwards (see Watanabe, 1994), during the mid-2000s a specific

set of events occurred which led to the world waking up to the urgency of the crisis: a set of events which, in defiance of their invertebrate classification (Hanson, 2018; Moore & Kosut, 2013), framed bees' lives as worthy of care and, fundamentally, grief.

The events that led to such a dramatic shift in our knowledge of the decline of bees center around honeybees specifically. Honeybees are not necessarily as threatened as solitary or sub-social bee species, predominantly because their health is more intensely monitored than other bees. Furthermore, in Britain and Ireland, for example, they are only one of approximately two hundred and seventy species of bees (Falk, 2015). However, that this story centers around honeybees is unsurprising. Honeybees' role as pollinators, coupled with their social natures and willingness to live inside human-made hives that we are able to observe and take substances from, has established them as an important part of both the cultural and environmental landscape (Hanson, 2018; Maeterlinck, 1901; Preston, 2006; Ransome, 1937). It follows that the events which spectacularized the loss of bees in the public imagination center around the species of bees with whom we have the most intimate relationship, as their loss would be most visible to us.

Colony Collapse Disorder: The Mystery of the Disappearing Bees

The story of how the bee decline became an international fascination begins with David Hackenberg, who, on November 12, 2006, had a deeply troubling experience when he went to his apiary to inspect his hives (Benjamin & McCallum, 2009). Just as he had done for the past 42 years, Hackenberg had migrated that autumn from his summer home in Pennsylvania to his winter home in Florida, so that his bees could catch the last of the Floridian Spanish needle nectar flow. When Hackenberg had last checked his hives, he was happy to see they were "boiling over" with bees (Cox-Foster & vanEngelsdorp, 2009). Thus, he was in no way prepared for what he found on this particular November day (Suryanarayanan & Kleinman, 2017).

As he began to smoke his hives, a technique used by many beekeepers to make the bees drowsy, he realized that he could not see any bees buzzing around. Puzzled, he opened the hives and to his horror found that, while the honey stores were rich and plentiful, over half of his 3,000 hives seemed to have been deserted. Although he could sometimes see a queen and some drones, the worker bees had nearly all disappeared: the colonies were silent. Yet, no obvious signs of conflict had occurred, and there were no dead or dying

bees in sight. Hackenberg was completely mystified as to why these bees had vanished, seemingly into thin air.

Today, we know that Hackenberg's discovery was the first reported case of CCD. Hackenberg's apiary quickly became labeled as ground zero for the CCD epidemic (*The New York Times*, 2014). Following Hackenberg's initial discovery, many more instances of CCD were reported across the USA and, to a lesser extent, in some European countries (Cooper, 2007). CCD, which causes apparently healthy bees to fly away from the hive and never return, was causing the loss of millions of honeybees. By February of the following year, CCD had become international news (Oldroyd, 2007). It was being reported that, across the USA, beekeepers were losing between thirty to ninety percent of their colonies, a shockingly high number compared to the previous average of fifteen percent (Suryanarayanan & Kleinman, 2017). The CCD crisis of the mid-2000s rapidly became a disaster few beekeepers would forget.

Although CCD is an alarming phenomenon, it would be misleading to present it as responsible for the mass decline in honeybees. The specific symptoms of CCD remain relatively confined to hives in the United States and Europe. Furthermore, in the past few years, the rate of bona fide cases of CCD has dropped significantly (Hanson, 2018). Today, we know that there are a variety of factors threatening honeybees, many of which have little or no connection to the CCD epidemic. Therefore, what is particularly fascinating about the CCD phenomenon is just how much attention it garnered; the extent of the reporting on this one epidemic was unprecedented.

The excitement surrounding this loss was undoubtedly driven by the bizarre way that, for many years, the specific cause of CCD appeared to be a complete mystery. Over the years that followed Hackenberg's discovery, many theories were suggested for CCD, including diet deficiencies (Sharpe & Heyden, 2009), a premature aging syndrome (Stindl & Stindl, 2010), and habitat loss (Naug, 2009). Yet, almost two years after CCD was discovered, it was described by Watanabe (2008) how, although some possible causes had been ruled out, "the cause of the bee colony losses remains unknown" (p. 384).

Thirteen years after CCD was first discovered, the debates regarding its cause continue. However, it has been generally accepted that CCD is likely to be caused by a multitude of interrelated yet separate factors. Suggested factors include, but are not necessarily limited to, the spread of pathogens and parasites such as the *Varroa* mite,¹ poor nutrition exacerbated by monocrop

1 The *Varroa* mite is a parasitic mite that attacks and feeds on honeybees. The attack weakens the bees and can result in diseases such as Deformed Wing Virus.

cultures, the use of chemical products inside hives, and the application of pesticides to crops (Lu et al., 2014; Suryanarayanan & Kleinman, 2017). As such, while we certainly have a clearer idea of the stressors which result in CCD, our knowledge of CCD remains incomplete.

The search to find out what causes CCD was undoubtedly impeded by the lack of animal remains in the hive. Without any biological evidence of the bees that were affected by CCD, it became significantly harder to isolate any clear pathogens or conditions responsible for it. As Oldroyd (2007) explains, in cases of CCD, there “are no bodies, and although there are often many disease organisms present, no outward signs of disease, pests, or parasites exist” (p. 1195). The material loss of honeybees from the hive denied people a chance to easily understand and categorize their loss. Thus, CCD could not be easily filed away as a regrettable but explainable phenomenon. Instead, the crisis began to stir up controversy, quickly growing into a compelling mystery that proved a source of inspiration for those hunting for headlines. Undeniably, the idea that the bees had literally disappeared was thrilling: “Did they leave purposefully—simply walk off the job? Were they forced out of their hives?” (Moore & Kosut, 2013, p. 45).

In the years following the initial CCD outbreak, prominent media platforms were littered with stories about this alarming and mysterious bee phenomenon. In an article for *The New York Times*, Barrionuevo (2007) wrote how “in a mystery worthy of Agatha Christie, bees are flying off in search of pollen and nectar and simply never returning to their colonies. And nobody knows why.” Likewise, in an article for the *BBC*, Rohrer (2008) wrote of the essential mystery of CCD. Taking inspiration from Carson (1962), Rohrer (2008) described a world in which the “hedgerow is deteriorating, the birds are silent, the orchard is disappearing and the countryside is changed. Why? The hives are empty. Their once-buzzing occupants mysteriously vanished.” Hanson (2018) described how in the USA media, CCD earned the catchy nickname “the Beepocalypse” (p. 186). Not to be outdone, in Britain, CCD became colloquially known as the Mary Celeste Syndrome, in reference to the *Mary Celeste* ship which was discovered in 1872 completely intact but without a soul on board (Haberman, 2014).

The search for answers, which continued throughout the next decade, did little to deter public excitement around this bee decline mystery. If anything, the persistent lack of satisfactory answers only served to fuel public interest in the case of the missing bees. Four years after Hackenberg’s initial discovery, Johnson (2010) describes CCD in *The New York Times* as still being “one of the great murder mysteries of the garden.” Likewise, writing for *National*

Geographic, Holland (2013) describes CCD as a “mysterious killer condition.” The inherent mystery of CCD eventually inspired feature-length documentaries, such as *Colony* (Gunn & McDonnell, 2009), *Vanishing of the Bees* (Henein & Langworthy, 2009), *Queen of the Sun: What Are the Bees Telling Us?* (Siegel, 2010), and *More Than Honey* (Imhoof, 2012). Numerous TED Talks were given on the subject, advertised with titles such as *The Case of the Vanishing Bees* (Bryce, 2014) and *Why Bees Are Disappearing* (Spivak, 2013).

Not to be excluded, writers also flocked to the subject of CCD, with the crisis being studied in books such as *The Beekeepers Lament: How One Man and Half a Billion Honey Bees Help Feed America* (Nordhaus, 2011) and *A World Without Bees: The Mysterious Decline of the Honeybee—and What It Means for Us* (Benjamin & McCallum, 2009). CCD was even explored in two recent fictional works: Lunde’s (2015) novel *The History of Bees* and Paull’s (2014) novel *The Bees*. CCD had inspired a global search for answers—a search which both familiarized people with honeybees’ predicament and served to spectacularize the violence being enacted towards honeybees.

The sensationalist narratives surrounding CCD explicitly framed the crisis as being a mystery that required solving. This served to fuel the impression that bees were not just dying due to natural reasons but were in fact being murdered by some terrible assassin (Moore & Kosut, 2013). In this way, the narratives reporting on the CCD crisis began to resonate as whodunit stories, feeding on the suspense which surrounded this apparent mystery. As such, I propose that the CCD epidemic became an ecological whodunit. Just like in a traditional whodunit story, the “murderer” responsible for the mass die-off of honeybees was a mystery that, despite global efforts, was incredibly difficult to solve.

The willingness with which people identified honeybees as victims in their own whodunit story was facilitated by their positive cultural representation prior to the honeybee loss. As Hanson (2018) describes, “no other group of insects has grown so close to us, none is more essential, and none is more revered” (p. 3). Our entangled histories, and general admiration of bees prior to their decline (see Preston, 2006; Ransome, 1937), undoubtedly facilitated the public willingness to consider honeybees as somehow persecuted. Public sympathy for honeybees has also been furthered by the degree to which honeybee survival is known to be connected to our own existence; it is popularly known that honeybees play a fundamental role in agriculture.

Moreover, around the same time that stories about CCD burst onto the global news scene, a quote was also floating around which suggested that without bees, humans would only have four years to live (Benjamin & McCallum, 2009). This quote, which has been falsely attributed to both Einstein and

Maeterlinck, stirred the idea that this mysterious CCD killer was also a threat to humans. Thus, the outrage incited by headlines over CCD was no doubt partially fueled by anthropocentric fears about the impact of honeybee losses on human survival.

In a conventional whodunit narrative, the perpetrator of the crime will eventually be revealed, providing readers with a sense of closure to the story (Pyrhönen, 2005). As no specific culprit of the CCD crisis was ever determined, perhaps unlike a traditional whodunit, we never really got a truly satisfactory answer to the CCD mystery. As Winston (2014) contemplates, the “honeybee collapse has been particularly vexing because there is no one cause, but rather a thousand little cuts.” However, the idea that we may never truly find a satisfactory answer to this ecological whodunit is a fact which only continues to fuel this mystery narrative.

Storying Extinction: Responses to the Decline of Bees

This story, or ecological whodunit, demonstrates the degree to which the endangerment or extinction narratives shape how the loss is addressed (Heise, 2016). While it might be easy to be very cynical of this whodunit narrative, due to its irrefutable sensationalism of an issue that is both upsetting and indicative of the widespread grief that humans have caused other species, this phenomenon resulted in an outpouring of care for bees. In recent years, there has been a substantial amount of public support for bees, both at individual and organizational levels (Moore & Kosut, 2013). In her book *Imagining Extinction: The Cultural Meanings of Endangered Species*, Heise (2016) stresses how the stories we choose to tell, and the stories that are told about extinction, matter.

More specifically, public engagement with endangered species is influenced by the stories that are told about them and the significance these species are given through these stories. The stories surrounding the bee crisis framed honeybees as the innocent targets of a mysterious killer, rendering them as creatures that have significant value, whose deaths would have a disastrous impact on our own lives. Thus, honeybees were culturally established as a species which is eligible for our care and grief. Adopting the approach of Butler (2004, 2009), it might be suggested that the stories surrounding CCD framed bees' lives as valuable. Fundamentally, the stories surrounding the bee crisis inspired people to begin mourning bees.

The mass campaigning for the protection of bees' lives which followed the CCD crisis, particularly across Euro-American cultural landscapes, is well-evidenced through the headlines, documentaries, books, campaigns, and

artworks which were responses to this loss. Social media platforms, for example, have been inundated by campaigns around the bee decline, some of which have proved hugely successful in generating support for both behavioral and policy-based changes. For instance, the campaign organization *Avaaz* has been credited with helping trigger a ban of pesticides known as neonicotinoids (Carrington, 2018). Similar online campaigns targeting neonicotinoids were run by platforms such as *38 Degrees* and *SumofUs*, which collectively drew over half a million signatures. Today, more than ever, people are rushing to engage in bee-friendly behaviors such as buying local honey or planting wildflowers (Moore & Kosut, 2013; Wignall et al., 2019).

Although the degree to which beekeeping actually helps mitigate the loss of bees is widely disputed (Norfolk, 2018), urban beekeeping has had an unprecedented rise in numbers, a fact which has been explicitly linked to the outcry around CCD and impending fears about the future of bees (Lorenz & Stark, 2015; Wright, 2017). A similar interest in bee decline can be witnessed across the arts sector, which has become punctuated with creative projects responding to the idea of bee endangerment² (see Moore & Kosut, 2014; Swan, 2017).

Moore and Kosut (2013) clarify how CCD not only caused bees to become trendy and fashionable creatures, but their decline became a buzzword in the contemporary environmental movement. In a survey conducted by the global public opinion and data company *YouGov* (2014), which drew on results from 1,936 adults living in Britain in June 2014, people considered the dying of bees to be more critical than climate change. The same survey documented that a noteworthy proportion of participants would choose to save bees over other endangered species. A similar concern for bees has been observed in other locations across the globe: as Phillips (2020) writes in her study of Australian beekeeping communities, “the anxiety over bee losses, and the accompanying drive to save the bees, travels, becomes felt even in places yet to live such losses” (p. 317).

The widespread lamentation for the loss of bees has supported extensive research into the health of honeybees, generating a far greater understanding of the threats that honeybees are struggling against (Hanson, 2018). Biologist Wilson-Rich (2015), for example, reflects on how the “public concern that CCD generated was enormously gratifying to researchers like me, since it built support for our work on how to help honey bees survive.” Furthermore, while CCD is an issue solely affecting honeybees, the funding it has generated for

2 Recent creative projects inspired by honeybee decline include *The Hive* by Wolfgang Buttress, *Bee Composed* by Lily Hunter Green, and *Swarm* by Laney Birkhead.

broader research into bee declines has had an overwhelmingly positive impact on knowledge about sub-social and solitary bees as well. Many of the issues that were theorized to be triggering CCD, or honeybee deaths in general, are interlinked with issues threatening other bee species (Mallinger et al., 2017).

Certainly, the positive impacts of the CCD hype have not been confined to honeybees. Although we are no doubt more attuned to the circumstances facing honeybees, the fears around honeybee loss quickly broadened in scope to become about declining bees more generally. This broadening focus was not only due to an increased understanding of the stressors that wild bees face; it is still relatively common for people to not differentiate between honeybees and other bee species. As Strawbridge Howard (2019) writes:

Mention the word ‘bee’ to most people, and images of hives, beekeepers, and honey are the most likely things to come to mind. However, if you were to give the same people a sheet of paper and a box of coloured pencils, and ask them to draw you a bee, most would draw something shaped a little like a rugby ball with striped yellow, white, and black banks, to which they might attach a head, six legs, two antennae, and a pair or two of wings—something that looks, essentially, like a bumblebee rather than a honeybee. (p. xvi)

Hence, while CCD centered around honeybees, the knowledge disseminated through public platforms tended to, rightly, frame all bees as in trouble. Even more expansively, Mathews (2010) suggests that the controversy of CCD served to signal the greater ecological unravelling of the Earth’s biosphere, and adopted the phrase “planetary collapse disorder” (p. 353) to describe how CCD was a shocking indicator of the mass extinction underway.

While narratives around species decline have no doubt broadened in recent years,³ bee populations have remained a focus of popular attention. Ball and Haynes’s (2013) statement that “we have been losing sleep over bees” (p. 1) still rings true today. Yet, while the decline in bee populations has indeed garnered global attention, I do not wish to advocate that the bee crisis has been satisfactorily mitigated. The challenges that bee species face in the present day are

3 For example, in the past few years, there has been a significant increase in studies on insect decline (Saunders et al., 2020). More broadly, the world has been enriched with studies that report on a vast tapestry of endangered or extinct species, from little penguins (*Eudyptula minor*) (van Dooren, 2014), to golden frogs (Kolbert, 2014), to birds of paradise (De Vos, 2017).

greater than ever, with the various threats both growing in force and exacerbating one another. Rather, although it is not always necessarily effective, the bee decline has had sustained attention. The endangerment of many other species has not received such attention.

Therefore, as Hanson (2018) suggests, there has been a silver lining to the dramatizing of the CCD phenomenon: one characterized by the mass investment of energy and care into the now global phenomenon of bee decline. Fundamentally, CCD set the wheels in motion for a “save the bees” campaign which has sustained its popularity for over a decade. Although CCD’s grip on the headlines has decreased, approximately thirteen years after Hackenberg went to open his hives on that fateful November day, the fight to challenge the plight that bees face is not only still ongoing, but is arguably stronger than ever.

This brings us to the second reason why this story is important. This story demonstrates how powerfully a nonhuman animal can become intertwined with narratives of extinction long before the population decreases. Traditionally, when extinction was mentioned, it was more common to focus on whether the species in question was still alive as an indicator of whether the animal might be categorized as extinct. But as the sixth mass extinction becomes an increasing feature of contemporary life, it is clear that extinction has become more complex than this. A species may be lost far before their literal extinction has actually occurred; extinction can come to plague a species before it actually ceases to exist. This has been noted by Rose (2013), who wrote about how survivors of a species may be understood to be in a death zone: “the place where the living and the dying encounter each other in the presence of that which cannot be averted. Death is imminent but has not yet arrived” (pp. 3-4). The threads of a life might unravel before they have unequivocally been broken.

However, nonhuman animals who are in the death zone rarely have hope of returning from it; they are the last representatives of their species. Although many bee species are indeed seriously threatened, if not extinct, as a collective species, they are not yet confined to a few dozen, clinging on to life only through the last of their survivors. Bees remain visibly present in our landscapes and gardens. However, similarly to species we might say are in a death zone, bees have become attached to extinction while they are still living. Through the sensationalism of their decline, bees’ bodies have become symbolically plagued with extinction long before they are actually disappearing. Their loss has been spoken of, imagined, and lamented time and time again. Thus, the extinction of bees has become a preemptively mourned event.

The extent to which the extinction of bees has become preemptively imagined and mourned is illustrated well by recent Extinction Rebellion protests (Figures 1, 2). Extinction Rebellion, an international organization which uses



FIGURE 1 Lubbock, J. (2019). Extinction rebellion protesters in London 03 [photograph].
 WIKIMEDIA COMMONS. RETRIEVED OCTOBER 23, 2019, FROM
[HTTPS://COMMONS.WIKIMEDIA.ORG/WIKI/FILE:EXTINCTION_REBELLION_PROTESTS_IN_LONDON_03.JPG](https://commons.wikimedia.org/wiki/File:Extinction_Rebellion_Protests_in_London_03.jpg).



FIGURE 2 (2019). Lubbock, J. (2019). Extinction rebellion protesters in London 07 [photograph].
 WIKIMEDIA COMMONS. RETRIEVED OCTOBER 23, 2019, FROM
[HTTPS://COMMONS.WIKIMEDIA.ORG/WIKI/FILE:EXTINCTION_REBELLION_PROTESTS_IN_LONDON_07.JPG](https://commons.wikimedia.org/wiki/File:Extinction_Rebellion_Protests_in_London_07.jpg).

nonviolent civil disobedience to challenge extinction and other environmental concerns, draws extensively on images of bees in their propaganda. As shown in Figures 1 and 2, the bee symbol was featured heavily among the flags and placards of a ten-day protest which took place across London in 2019. Polonsky (2019) even describes a sub-protest that took place during this event, specifically drawing attention to the bee decline. More widely, images and stories of bees have regularly been featured in narratives about extinct or endangered species. For instance, in Wallace-Wells' (2019) recent book, *The Uninhabitable Earth: A Story of the Future*, the front cover is a picture of a dead bee. Thus, although the death of bees is not yet imminent, as a collective species, they have become a posterchild of extinction.

To clarify, this is not to argue that this preemptive mourning is unjustifiable. On the contrary, I encourage it; as Cunsolo (2017) reveals, despite the pain, the mourning process can serve to inspire, to motivate. Instead, I highlight how sympathy for bees is so powerfully rooted in public consciousness that their continued physical presence does not necessarily overshadow the imagination of their absence. If anything, bees' presence inspires people to keep being concerned about them and keep challenging their potential loss.

I suggest that the understanding that Rose (2013) notes, that extinction can arrive before the last of a species passes, can actually be extended even further—through the stories we tell, a nonhuman animal can become attached to death long before they are actually on the brink of extinction. A species does not need to be confined to the very last of its numbers, trapped in a death zone that it cannot return from, to become wholly marked by extinction. The threats that endanger bees, while serious, have not yet to kill bees to the point that there is no hope for their survival. However, this is still a possibility; someday bees may truly enter the death zone (Rose, 2013). Furthermore, it is important to note the bee species that have already become extinct or that are on the verge of disappearing. As a collective, bees have entered into a preemptive death zone: a place where the living might encounter the dying, but are not yet in the presence of that which cannot be averted. Death has only truly arrived in the imagination.

Although bees have become inexplicitly intertwined with extinction, they are still a species that retains the possibility for a hopeful, or perhaps not entirely tragic, future. Moreover, this is a possibility which is made increasingly likely through the continued resistance to their decline. It is perhaps paradoxical that it is through the preemptive mourning of bees that there is an increased, although certainly not guaranteed, possibility that we will never truly have to mourn their literal extinction at all.

Conclusion

The inherent mystery of the CCD epidemic, which was driven by the literal disappearance of honeybee bodies from hives, framed the loss of honeybees as an ecological whodunit. The frustrating disappearance of honeybees' bodies, immobilizing our ability to obtain answers to the case of the vanishing bees, led to the framing of honeybees as victims of some mysterious killer. This observation of honeybees as victims was furthered by both their inherently charismatic natures and observable role in the sustainment of human life. Principally, the whodunit narrative which surrounded the CCD crisis served to sensationalize the loss of bees, preemptively implying their extinction and subsequently fueling widespread fears about the loss of bees. In a world where so many species are fading away without notice, slipping into the realm of the forgotten, bees' plight has become a well-documented and openly challenged phenomenon.

While this attention has not necessarily guaranteed many bee species a future, it has contributed to actions towards saving bees, such as the banning of neonicotinoids. Thus, this story demonstrates the extent to which the stories we tell about a species truly matter; the narratives surrounding a species loss can deem that species as worthy of attention and grief, as opposed to just being another name to cross off on an ambiguous taxonomic list. As van Dooren (2014) emphasizes, extinction stories can serve to "add flesh to the bones of the dead and dying," inviting both curiosity and a sense of protection for those fading other worlds (p. 8). Accordingly, the knowledge of honeybees' peril has evidently inspired many to try and respond to the call of responsibility that extinction might demand of them.

Naturally, this is a statement which does not apply to all individuals; undoubtedly, there are many who do not feel personally invested in the survival of bees. However, particularly across Euro-American societies, this whodunit narrative helped develop a general understanding that not only are bees in decline, but that this is a crisis we might try to engage with. I suggest, therefore, that future research might consider how extinction stories could be utilized to help people engage with longer-term strategies of change.

This story further proposes that, because of the extent to which bees' lives have become culturally intertwined with extinction, bees have been entered into a preemptive death zone. Extinction has come to be a plague of the living, extending its reach to those whose presence still appears abundant. Yet this rendering of bees as being in a preemptive death zone has also led to greater action towards the protection of bees. It would be a step too far to think of them as a more fortunate species—this might only serve to inflate our ego as

“saviors.” However, we might think of bees as having more of a potential for survival than those less charismatic, but equally valuable, victims of human behaviors whose futures are hurtling towards extinction. Thus, the imagining of loss is as powerful a force to engage action as the actual physical loss of a nonhuman animal.

The attention on the bee decline demonstrates the degree to which we—humanity—can attempt to take responsibility for the violence we have inflicted on nonhuman species. The question, therefore, is no longer whether we can take responsibility, but how we might extend this responsibility to the non-charismatic and invisible—whether we can learn to mourn beyond those who have obvious value to us, and offer care to those species we do not visibly depend on, but whose lives are still in need of, and are deserving of, protection.

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