

Borrowing Limulus: A Horseshoe Crab Story

By

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For whatever we lose (like a you or a me)

it's always ourselves we find in the sea

– E. E. Cummings

Preface

There is a person in this room who has decided to dedicate a significant chunk of their life to better understand the horseshoe crab. You might want to find out why.

– William Cronon

Eminent Environmental Historian, best Storyteller I ever met.

I was thrown a bone by Bill that day. And during the following week, I was more consistently asked about horseshoe crabs than ever before. But I don't recall anyone asking me *why*. It's just as well, because I think that question was mainly for me.

Three years earlier, I was standing in Rensselaer Polytechnic Institute (RPI) in Troy, New York. “Ah, yes,” said a Dean, with a rolling laugh, “but you didn't come here to tell ‘stories’!” And I surprised myself with perhaps the frankest answer of my life: “Yes, actually, I did!” I always loved crabs. I didn't know in the beginning that the horseshoe crab wasn't a true crab, but by the time I found that out I'd already fallen in love. The first living horseshoe crab I ever saw was a sad specimen in a museum in England, but the next several thousand were on the shores of the Delaware Bay, spawning in the high tides of the new midnight moon. I still haven't fully processed that experience, even though it's one I've now attempted to replicate many times; the gushing waves, foam-tipped and certain, the soft knocking of carapaces, glittering in the

black water and moonlight. The smell of salt. Persistent crabs gathered around me, mistaking my booted feet for mates. It felt like a weighted blanket. It looked like the edge of the earth. There was such stillness. Such deep introspection. And for the crabs? There was an urgency that swelled in their silence. And that's when I fell in love all over again. And every time since.

I'm a storyteller, and for the last five years (or seven, or maybe even 40), I've been learning about horseshoe crabs through everything I've encountered. Through crayfish and birds-nests and deciduous trees, through salt and strata, and gold mines in the desert. Through sand in my hands and under my feet; the markers of time. The pendulums of life: mine, and everything else in the universe. During my doctoral years those lessons have also come from labs and libraries, lecture halls and fieldwork. I have uncovered and kept fragments of stories from disparate places: entomology, medicine, environmental history and the history of science, limnology, genetics, art history and ethics; from scholars of ethics, performative theatre, environmental humanities, animal studies, model animals in medicine, and resilience. I've have worked with those committed to hands-on change on the ground: the conservation workers, field researchers and volunteers using their own hands, words and money to better protect horseshoe crabs and the environments they depend upon. I've listened to and experienced their stories. We are all storytellers. I firmly believe that. I think that we get pretty used to justifying our research, our jobs and our funding at universities, but I've grown to admire anyone who can answer these questions not only with literature reviews, statistics and compelling stories about "the problem," but also with the "why." Why are *you* choosing to do *this*? The honest answer is often, I think, because I know that no one else can do it quite like me. And I can't tell you it will make any

difference at all but I'm giving it everything I have to try. That is what I'm willing (and immensely lucky enough) to risk.

“Wouldn't it be better to *do something*, instead of ‘telling stories?’” asked a relative recently, whom I hadn't seen in twenty years. And in a strange way, his words liberated me. It was a redundant question, because everything we do is a form of storytelling. A form of “doing.” I've striven to express a resolved kind of complication through my storytelling. Perhaps more than ever before we need partnership and a flattening of the edges of disciplines. We need to be undisciplined. We need affective stories, equipped with the tools to activate change and hope. I grew up in the UK, so horseshoe crabs were physically absent from the first thirty-two years of my life. But they might still be my earliest project. Perhaps, this story started with the armored sea life in the rockpools of my childhood. But they are also my current project. And it's not done yet—of course—is it ever?

Borrowing Limulus: A Horseshoe Crab Story

the project. *Borrowing Limulus: A Horseshoe Crab Story* is a multi-platform project principally told through arts practice (creative non-fiction and video story), that braids together strands of environmental, geological and scientific histories, genealogies, cultural mythologies and parlance, medicine, industry and autobiography. This Special Committee Degree in Interdisciplinary Arts and Science was formed from an interdisciplinary committee, with support from the Graduate School and the Art Department (4D), for the purposes of creating a project about horseshoe crabs that operates at the intersections of the arts and interdisciplinary research. This research has taken place in formal classes and seminars (Art History, Contemporary Practice and Methods; History of Genetics; American Environmental History; Entomology; Culture, History and Environment Research Methods; History of Biology and Medicine), independent studies (Medical Entomology; Performance and Performance Writing; Video and Media Studies; Animal Studies and the Environmental Humanities, and ongoing Graduate Studies), and lab. meeting attendance (Limnology: Invasive species Lab.; Evolutionary Biology), libraries, archival and collections work (among others: Woods Hole Oceanographic Institute; Chicago Field Museum; Delaware Public Archives; London Museum of Natural History; Oxford University Museum of Natural History; Melbourne Museum; The Australian Museum, Sydney), and field work alongside universities staff and conservation groups in classrooms and on beaches (Florida, New Jersey, Delaware, Connecticut and Massachusetts). This work has also utilized the autobiographical and anecdotal (conversations, correspondences, personal and relayed

experiences from scholars, conservation and pharmaceutical workers, fishermen, birders and others). During the course of this degree, creative work based on this research has been presented through performance, video and sound work.

horseshoe crabs. Horseshoe crabs are believed to have lived, relatively unchanged, for at least four hundred and forty-five million years, outliving mass extinction events that wiped out almost all other life. And there were many horseshoe crab-like forms that came before. The genealogy of horseshoe crabs has posed an historical conundrum (not least of all in their original mislabeling as Crustacea, hence the name “crab”), and continues to perplex. Despite a report this year by evolutionary biologists at the University of Wisconsin–Madison that suggested that horseshoe crabs are most closely related to spiders (of the Class, Arachnida), most still consider them sharing the Subphylum Chelicerata with spiders before splitting off into their own Order, Xiphosura. Horseshoe crabs have interwoven themselves into many cultural stories—perhaps not surprising, given their long geological history. Often called “living fossils,” their names have been many, including “king crab,” “soldier crab,” “helmet crab,” “ugly,” “awkward,” and “heroic.” In modern parlance, however, their image as heroic likely has strong ties to their use in the medical industry. While horseshoe crabs have been used for generations as bait (especially for eel and conch traps), and before that as fertilizer, perhaps their widest industrial use is now by the pharmaceutical industry—the largest utility being their blood. The blood of the horseshoe crab contains a powerful clotting agent that immediately stops bacterial infection—it’s been saving their lives for millions of years. In the 1960s and 70s scientists worked out how to put this to use in human medicine, safeguarding against infection in the manufacture and use of

pharmaceuticals, and it changed the landscape of medicine, saving millions of human lives every year.

Despite the large-scale industrial use of horseshoe crabs, their global population crisis remained unnoticed until the conservation community saw a correlation between a potential population decline and the crashing numbers of the American red knot, a small seabird. In recent years, efforts have been moving towards protection for horseshoe crabs, and their safeguarding from environmental change and industrial use. In America, the Ecological Research and Development Group (ERDG) is at the forefront of that charge, with a primary mission to improve understanding and protect horseshoe crabs both in America and across Asia.

the global. *Borrowing Limulus* also opens a global environmental discussion, enabling conversations about cultural and environmental change, climate crisis, loss, service and hope.

Environmental change over time, both natural and human-caused, has impacted (and continues to impact) the horseshoe crab, providing a starting place to talk about potential mitigation for problems such as the loss of wetlands, coastal preserves, forests, and wilderness, and the emission of toxins and other pollutants. The long-term impacts of actions such as over-harvesting “underutilized” species and the removal of segments of ecosystems are also posed.

arts research and form. While *Borrowing Limulus* is principally a story about horseshoe crabs (taking as its frame the four extant species: the American *Limulus polyphemus*, and the Indo-Pacific *Tachypleus tridentatus*, *Tachypleus gigas*, and *Carcinoscorpius rotundicauda*), the

project also opens an opportunity for discussion around creativity, form and research within the Arts. Realized inside the supportive environment of a Special Committee Degree in Interdisciplinary Arts and Science, this project takes an unconventional final Ph.D. form as video story. Borrowing Limulus: A Horseshoe Crab Story is a 43 minute video story (ProQuest URL: <https://digital.library.wisc.edu/1711.dl/A9Z9E9R9T9Y9AVT>) intended for research and exhibition purposes. It is an original piece of creative non-fiction storytelling based on my primary doctoral research, that considers the wider contexts of landscapes, histories and research that horseshoe crabs (as well as artists, scientists and other kinds of researchers) encounter. This project emerges across a wide swathe of disciplinary and multidisciplinary fields, modes of engagement, observations and story fragments, embracing the reflective, the measured, the activist and the everyday, and also questions the role of truth in creative non-fiction and autobiography.

The Context Model I've used to structure my degree has allowed me not only to ask questions, as with the more traditional Research Question Model, and to reflect upon my own work and that of others, as with a Commentary Model, but also to focus deeply on the various landscapes of horseshoe crab work scattered across a multitude of disciplinary fields.ⁱ

Thickly infused with meta-narrative, this story tells the tale of horseshoe crabs through a deep and tumultuous past, through industrial use for fertilizer, bait and medicine, and questions a delicate and uncertain future. I've been funneling outwards and inwards at once, often asking more questions than I've answered—they have snowballed. And then avalanched. As Thom Van Dooren says, stories “hold open simultaneously a range of points of view, interpretations, temporalities, and possibilities;” that's exactly what those that I work with do best.ⁱⁱ They are

extraordinary storytellers, and I'm learning to be one, too. I want to hold open these possibilities, those temporalities, those discoveries. I want to unlatch the gate(s).

Afterwards

Once we start to act, hope is everywhere.

– Greta Thunberg

Last summer, I watched as the monarch butterflies laid their eggs in the garden. And then I realized, with horror, what was happening. Each butterfly had a soldier following her around: a wasp diligently picking off her eggs. I did what we all do first: I Googled it. But the predominant advice was to kill the wasps. Some suggested covering the milkweed but as that would prevent other butterflies from laying, I raised twenty-five monarch butterflies by hand instead. I set a limit at twenty-five. There were far more eggs than I could possibly have cared for, but by the end of the summer I'd only found one successful monarch pupa in the garden. My twenty-five all made it.

As the days tick by, I know that the horseshoe crabs on the east coast are gathering again. In a few weeks, the spawning beaches will be covered with eggs. Teams of volunteers will be patrolling, flipping stranded crabs, monitoring their health, conducting census surveys. This year, I won't be there. Last year, I owed them everything. After the death of my grandmother in April 2018, and the weeks that followed in England moving towards a place where we could breathe again, my mother, father, aunt and I told her life's story in 40 minutes. And then I went to Delaware to be with them—the horseshoe crabs—to start to heal.

Everything is changed. Since I was born, temperatures are rising faster than ever before: the “post-1980s warming.” In my 40 years, the Arctic ice has shrunk by 40%. When I was

growing up, it all seemed stoppable, but as the wildfires swept the world last year I didn't know how to help. As hurricane Sandy bore down on New York in 2012, two months after I'd moved there, I felt completely impotent. My brother stayed with me all night online. Every fiber of my body wanted to go there—to help—but I didn't because I was supposed to be in school. There's always a reason for inaction.

A few years ago, I watched as journalist/author Elizabeth Kolbert gave a chilling keynote talk about the sixth extinction—our current environmental collapse. But despite the power of her talk, it was the Q&A afterwards that packed the heaviest punch. When asked “What about hope?” her answer floored the audience. Not only had she no hope to offer, but the response felt hostile, defensive, and grief-ridden. It was a slap in the face that I think the entire audience felt. And perhaps we deserved it. Terms to describe this sense of loss, panic or grief have started to surface. In 2017 the American Psychological Association included the term “eco-anxiety” in a report, describing it as “a chronic fear of environmental doom.”ⁱⁱⁱ Despite her rallying calls for actions that lead to hope, Greta Thunberg told world leaders at the World Economic Forum in Davos last January that “Our house is on fire... I don't want your hope, I don't want you to be hopeful, I want you to panic. I want you to feel the fear I feel every day, and then I want you to act. I want you to act as if you would in a crisis. I want you to act as if the house was on fire, because it is.”^{iv}

I type “ecological grief” into the library catalogue and watch as over 1,000 hits scroll down my screen. ‘Ecological Grief as a Mental Health Response to Climate Change-Related Loss’ is top of the list. And I see ‘Eco-anxiety, Tragedy and Hope,’ and ‘Reef Grief.’

These feelings of helplessness, anxiety and grief in the face of environmental crisis have become an embodied response, psychologically and physically, for many of us. This year, as I've moved closer to graduation, I've battled debilitating feelings of helplessness: that none of it matters. That nothing I can do can matter. I have been doing my best to "do something," but I've realized it isn't enough. The realizing matters. I realize now that it was all preparation: the walking, the baking, the composting. The careful studies of seabirds on the Scottish islands, the early mornings, long days and late nights observing, and coming to know the natural world through first hand connections. The rockpools, the woods, the fields, the Great Lakes. My family taught me patience, love, stewardship—the understanding how things matter. The small things that make up the bigger things.

Last week, I shared these thoughts with my father. He confided that he has been feeling a similar sense of loss: "Over recent years it has been of great concern to me that a number of small birds that we used to love have disappeared, and the seasons have changed. We have flowers blooming when they never used to, and there are now so many days where it is windy, many more than previously. But strangely, we now have seen some good news. Over two decades ago it was reported that one of the butterflies that graced our Norfolk woodlands, the Purple Emperor, was extinct. But wonderfully it has now been recorded breeding in Sherringham woodlands. Some of this joy has been credited to farmers who have been working hard to restore local meadow lands and wild areas, and we have had lots of bees in our garden recently." His email resonated deeply.

In the beginning (my beginning), there was Cornwall, and the seashore bore nothing but jewels. Things change. "Why horseshoe crabs?" Because they matter. Because they need a voice;

one among the 8.7 million other species. Because I can't do everything, but they are a part of the answer. Because I owe them—because we all do. Because they allow us to talk in general terms about change, crisis, loss, service and hope. Because they allow us to realize. Teaching is my greatest privilege. I've been learning about care my whole life, and now I want to do it: to teach aspiring students about political and environmental climates, gravity, hope, and service. Do I want them to fall in love with the world? Yes. Do I think it's hopeless? No.

Why horseshoe crabs? Because they've given me this incredible gift: the chance to “do something.”

Endnotes

ⁱ Barbara H. Milech and Ann Schilo, “‘Exit Jesus’: Relating the Exegesis and Creative/Production Components of a Research Thesis,” *TEXT Journal*, Special Edition (2004): 3, <http://www.textjournal.com.au/speciss/issue3/milechschilo.htm>

ⁱⁱ Thom van Dooren, *Flight Ways: Life and Loss at the Edge of Extinction* (New York: Columbia University Press, 2016), 8.

ⁱⁱⁱ Dave Fawbert, “Feeling overwhelmed by the existential challenge of climate change? You’re not alone,” *BBC*, March 27, 2019, <https://www.bbc.co.uk/bbcthree/article/b2e7ee32-ad28-4ec4-89aa-a8b8c98f95a5>

^{iv} *The Guardian*, “‘Our house is on fire’: Greta Thunberg, 16, urges leaders to act on climate,” *The Guardian*, January 25, 2019, <https://www.theguardian.com/environment/2019/jan/25/our-house-is-on-fire-greta-thunberg16-urges-leaders-to-act-on-climate>

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