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Awards and Citations

Response by Conrad C. Labandeira for the presentation of the 2022 Paleontological Society Medal

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Dear Friends, Colleagues, and Officers of the Society:

I want to express my deep gratitude for the honor of being the recipient of the Paleontological Society Medal. To the Committee that nominated me, and colleagues too numerous to mention, a profound thank you! This is a humbling experience for me. I would like to share with you how I became a paleontologist.

It all began on my parent's small farm in the San Joaquin Valley of central California. When I was 12 and 13, I hand-picked cotton during the summer. It was difficult work, but I vividly remember aphids on the cotton plant stems and bolls. These delicate insects were a translucent lime green, and I could see their stylate mouthparts being inserted into plant tissues, revealing tiny dots on the plant surfaces that were puncture sites. I didn't realize it at the time, this was my first memorable encounter with plants and their insects.

Later, I attended California State University-Fresno, spending time taking courses that had anything to do with insects, plants, and fossils. I was especially fortunate in exploring the nearby biotas of the Sierra Nevada, Coast Ranges, and Mojave Desert. It became evident to me that we live in a world of insect damage. Wherever we venture—in a forest or city park—insect damage is all around us. Observing insect damage is one of the cheap thrills in my life.

I took a detour to pursue a Master's and studied the systematics of an upper Cambrian trilobite genus from the Upper Mississippi Valley at the University of Wisconsin-Milwaukee. I was fortunate to have Peter Sheehan as an advisor, who introduced to me to the wonders of research. I then arrived at The University of Chicago.

For a dissertation topic, I proposed a phenetic analysis of modern insect mouthparts, which would reveal their fundamental groupings. I decided that I would track the resulting mouthpart classes and their associated feeding ecologies into the fossil record by recording the insect taxa that possessed a particular mouthpart type. After a prolonged interval of collecting data, I did an exhaustive cluster analysis using BMDP [Bio-Medical Data Package] software and the University mainframe system, but my jobs routinely crashed. After a few frustrating months, I was urged to run the job at 2:00 one Sunday morning when mainframe use was at a low ebb. The job ran, and a nine-inch-thick fanfold output resulted. It turned out that there are 34 fundamental mouthpart classes of modern insects, and almost all, as well as their associated feeding strategies, had a fossil record.

Dave Raup was my advisor, and my committee included Jack Sepkoski, Dave Jablonski, Leigh Van Valen, and Steve Ashe, a curator of beetles at the Field Museum. I recall that earlier, when I proposed my dissertation topic to Dave Raup, I was very apprehensive that my dissertation topic would be perceived as a bit on the wild side, overly interdisciplinary, too big a picture, and thus not feasible. I was pleasantly surprised by Dave's response to my proposal as I sat in his office—his eyes lit up and he liked the proposal—a far cry from his typical taciturn demeanor. The proposal was accepted, with some qualifications, by the rest of the committee. In retrospect, this acknowledgment from the committee was a crucial event in my career. It allowed me to explore the limits of what is possible in the modern and fossil records.

After Chicago, I did a postdoc at the University of Illinois at Urbana-Champaign, where I studied three-dimensionally preserved coal balls of Pennsylvanian age, examining patterns of detritivory and herbivory revealed by exquisitely entombed coprolites and exceptional plant damage. Tom Phillips was an excellent mentor—taking a different approach than Dave Raup—as I explored the world of coal swamps in a warehouse at the University's South Farm.

At the National Museum of Natural History, I took a different tack, examining insect damage on younger compression plant fossils. It began, at least in a quantitative way, with postdoc Peter Wilf. I recall that one day we discussed how different kinds of damage could be categorized and used as quantitative data. Peter was working with Paleogene plant assemblages of the Western Interior, and soon the functional feeding group-damage type system was born. Our 1999 paper in Science was the prototype for a series of studies that now has involved ~175 publications using this system. This approach has evolved considerably since then, and includes new metrics for assessing insect damage, methods of quantitative analysis, and sampling strategies. Meanwhile, I expanded interests with colleagues from China and Europe in documenting Mesozoic pollination modes of long-proboscid insects and mandibulate beetles with their gymnosperm hosts and discovered cases involving insect mimicry of plants.

It is an exciting time to study deep-time relationships between insects and plants, and increasingly their links with pathogens and parasitoids. When plants occur in the fossil

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record, they often are abundant, and that abundance is accompanied by a heavy dose of insect damage. The broader study of plant-insect associations can be approached in many ways: from herbivory to pollination to mimicry, and from the insect side of mouthpart morphology to the plant side of damage to plants. There also are important implications for the future, such as, increased insect herbivory as a response to rapid increases in atmospheric temperature and CO_2 content, indicated by Ellen Currano's study of the Paleocene–Eocene Thermal Maximum. Recently, Lifang Xiao's evaluation of herbivory patterns before and after angiosperm diversification is another example. If there is one message that I like to impart: one should be bold in your research aspirations and tackle the major questions in addressing the history of life.

Thank you!

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