

Resolutions of Respect

Robert Treat Paine III, 1933–2016



Dr. Robert T. Paine writing field notes on Tatoosh Island off the coast of Washington State, in April 2013. Photograph credit: Anne Paine.

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Robert T. Paine (Bob) passed away on 13 June 2016 with his three daughters gathered around him, only two months after being diagnosed with acute myeloid leukemia. He was working on papers up until the last few weeks, and even in a weakened state could be roused by interesting natural history or a provocative ecological conjecture. Born and raised in Cambridge, Massachusetts, Bob ended up loving the Pacific Northwest and especially Tatoosh Island where he conducted most of his research.

Bob served on the University of Washington's Zoology faculty from 1962 to 1998. As an undergraduate at Harvard, he was mentored by Ernst Mayr, and as a PhD student at the University of Michigan, he was mentored by Frederick E. Smith. He often talked fondly of Mayr and Smith and perhaps that is why he himself became such a great mentor.

One way of remembering Bob is to talk about his iconic research, which opened ecology's eyes to the role of predators and trophic cascades, to the notion of keystone species, and to the need for getting

out there and manipulating systems. One could pay tribute to Bob for his service on Editorial Boards, as president of the Ecological Society of America (1979–1980), and on numerous National Academy Panels. Of course, there were also many honors bestowed on Bob: Robert H MacArthur Award (1983), election to the National Academy of Sciences (1986), Sewall Wright Award (1996), and International Cosmos Prize (2013) to name just some. But Bob did not care about awards or positions or fame. He cared about students and the fun of science. We (a motley sampling of official and adopted students of Bob) want to honor him by sharing some stories that are a model for inspiring great science in ANY field. “Voice” is a challenge in writing something like this—so we decided to do what Bob would have done—forget convention, and have some fun at it. Our voices shift from paragraph to paragraph, but if you are an astute scholar you will know who wrote each section. Game on.

With Paul Dayton, Chuck Birkeland, and Gretchen Lambert, I was in the first cohort of students to be admitted to Bob’s laboratory. I began my thesis research on the ecology of the small six-armed sea star *Leptasterias hexactis* in fall of my second year and was trying to determine the best way to measure individual body size. Bob suggested volume might be the least variable metric, and we designed a device for measuring volume in the field. The device fused a glass chamber holding seawater into which the sea star would be placed to a calibrated tube to a bulb reservoir. The device was completed just before we headed out to Makah Bay, and, although I planned to build a cushioned case to protect the device, there was not time before we left. It was fall, and rainy, and the plan was to camp out, using the station wagon as our “tent” so we had more rain gear, jackets, and other stuff in the back. I don’t remember the exact sequence of events, but I think Bob asked me to hand him something that required that I lean across the seat toward the driver’s side of the back seat. As I did so, we both heard a “snap.” I had broken the device! Bob snapped his head around, gave me a look (might have been interpreted to mean “I can’t believe you broke it” or maybe “what an idiot”), but said nothing. We then worked the tides and headed back, and despite ample opportunity to berate me for my clumsiness, not a word about the device was said (until I brought it up years later, when we both had a good chuckle about it). His restraint in not criticizing or even really acknowledging my “mistake” was an important lesson that has carried through to this day; doing research is full of false starts and screw-ups and is just part of the learning process.

I was in the early 1970s cohort of Paine students. My first introduction to field work with Bob was a trip to Tatoosh Island in 1973; I was not warned about the mode of arrival at Tatoosh, being hoisted off the deck of a bucking Coast Guard boat in a wooden box dangling a hundred feet in the air then swinging in the wind onto a platform on top of the island. I learned to cook on Tatoosh, and I still cook the same way; what’s in the larder and what can we make with it? (The maple garlic cobbler was a fail). Cooking on Tatoosh had some similarity to how Bob went about helping his students identify their thesis questions. He’d shoot down ideas as uninteresting, ask you whether your system was the right place for asking your question, or conversely ask whether your question was really the most interesting thing to explore with your system. It was okay to scrap the question once you found that your system was a better vehicle for exploring completely different concepts. It was also okay to ditch the system when you found another one that was better for testing your initial ideas. Another highlight of my time with Bob was our two trips covering the long coast of Chile in 1975 and 1976. Even though Bob did almost all of his research in the Pacific Northwest, he knew the value of exploring other systems around the world. He was also probably the greatest ambassador for marine ecology the world has ever seen. I remember so well Bob traveling through Chile, trailed by an entourage of students, whom he kept constantly entertained and inspired.

Bob was a unique blend of wise scientist and great humanist. He had an amazing sense of place such that one could spend quality time with him from Alaska to McMurdo and from Makah Bay to the Colorado Plateau. He could rub elbows with Boston Brahmins or the local tavern owner and immediately understand their motivations and their role in the world. He could hold forth at length about natural history observations and then seamlessly slide into a knowing discourse about the relative migratory patterns of Snowy Owls and Least Terns to the great whales and then into a discussion of gray whale migration and its role in the cultural evolution of the Makah Indians with a very sensitive understanding of their challenges. Through it all, he had the fastest, most wonderful sense of humor I have ever seen. No matter what the conditions, the people around him were giggling and laughing. He had a unique ability to see the irony and humor in everything around him and importantly to communicate this to everybody.

Large ... Bob was large in every sense of the word. His large physical and academic presence could be a canopy under which he protected his students and colleagues. Those of us lucky enough to fall under his wing knew that he would not hesitate to use his stature, along with his wisdom and experience, in our best interests. My trust in his mentorship led to total trust on every level and I knew I could always turn to him for advice, both academic and personal. I think often of coming into Bob's laboratory when I was in the early stages of my relationship with Megan. With a very serious look on his face, he said he wanted to talk with me about an important matter over beer at the College Pub. Following him there, wondering what I had done wrong, he sat me down and looked at me with his power glare: "David, you are now in a relationship with Megan, a gem and rising star..... DON'T SCREW IT UP!" His look turned to a broad smile, and I knew we had his blessing. We were so lucky to have a father figure with clout! One more angle about the personal side of his mentorship. Bob encouraged my love of natural history, trained me in intertidal techniques ("no, you cannot cage rocks out of tidepools"), and bludgeoned my writing into concise mode, but the single most important training he did, and he boasted about it for decades afterward, was that he "bullied" me into being assertive.

I am one of the lucky epifauna on Bob's academic family tree. Although I was never formally his student, he was one of the great mentors in my life. Bob was open-minded to the idea that quantitative studies of organismal-level function and hydrodynamics could help us answer ecological questions. He welcomed me to work on Tatoosh, in spite of all the electronic gear I schlepped out there. Bob showed so many of us the importance of being in the field with the organisms if we are ever going to unravel nature. I learned more ecology sitting by the campfire on Tatoosh with Bob, cups of "Chateau de Box" wine in hand, than I ever got in a classroom. By example, he showed us the importance of camaraderie when doing field work in cold, wet, smelly, slippery, but spectacularly beautiful places. Bob exuded the fun of doing science. For example, to make a tedious van ride amusing and to teach some ecological surveying techniques, Bob had us conduct a quantitative study of the spatial distribution of the lawn fauna on the Olympic Peninsula, the points on the transect line being the mile markers along the road to Neah Bay. The "ecological dominant" on these lawns was the plastic flamingo, which inspired us to smuggle plastic flamingos out to Tatoosh to plant on Bob's intertidal research sites. For years thereafter, flamingos large and small appeared unexpectedly in Seattle and Berkeley, and a mysterious field assistant named F. L. Mingo was acknowledged in papers and grant proposals. "F. L. Mingo" is my code word for all the lessons about both the joy and the scientific rigor of doing field research that I learned from Bob.

While Bob's best-known work involved starfish and mussels, the attention he gave to birds offers insight into his remarkable mentoring. As a prospective student, I expressed interest in combining

my childhood interests in birds and mollusks into some sort of experimental thesis project, only to be rebuked by a gruff “too hard.” Nonetheless, he dumped some 40 reprints having to do with birds in marine systems into my lap and asked me to contemplate the possibilities of the laboratory dish rack as an experimental device. Bob always let his students find their own way, insisted on a deep knowledge of the literature as a prerequisite for exploring new ground, and reminded everyone that experimental science need not be high-tech but did demand creativity. Bob exhorted his students to vigorously question ecology’s “sacred cows,” which his students took to include him. At Tatoosh, Bob identified every bird that made itself known. This habit led to one of the more memorable of the many practical jokes played on Bob in the field. Ladd Johnson spearheaded a plan to put three bird songs, one expected and two from distant parts of the country, onto a tape recording that was hidden in brush and see what would transpire. Bob fell for the Swainson’s Thrush as hoped, but the Bachman’s Warbler song was too faint to be heard. When the last song came through loud and clear, Bob leapt to his feet and proclaimed that a Chuck-Will’s-Widow was on the island, certainly a first for the Pacific Northwest. The accuracy and certainty with which the “identification” was made was truly impressive, but no less memorable than the laughter as the introductory bars of Beethoven’s Fifth followed through the speakers only seconds after Bob made his call.

Although Bob’s long tenure on Tatoosh embodies long-term data collection, he was deeply suspicious of efforts that simply monitored or described nature. He always pushed his students to get out in nature and start doing research, while cautioning against “boring monitoring” and railing about well-funded projects lacking in hypotheses. It was sometimes puzzling to observe Bob’s attention to recording the weather, counting bird species, or tallying dead urchins on the beach while being challenged about what hypothesis your own efforts were testing. It took some maturing to appreciate the differences between good natural history in an ecological context and mere recording of events. With students, Bob could shift on a dime from observer to interpreter to prognosticator. The constant in all of this were his never-ending questions: “Why are we collecting these data?” and “How can we better test our idea?” Of course, for Bob Paine, the alternative to simple data collection was experimentation.

Bob was a hoarder and kept many bits and pieces of the materials that he and his students used for rocky intertidal experiments. He called this collection his “museum” and would trot it out on appropriate occasions to make the point that experiments are cheap and easy. He used his museum to regale students with the history and delight of ecology: the dog dishes used by Paul Dayton in the 1960s to exclude limpets; the elegant fractal surfaces molded by Ladd Johnson in the 1980s to explore the response of red algal spores to cracks and crevices; and Bob’s own putty patties adorned with large blobs of marine epoxy to anchor coralline crusts, which would then duke it out in competition. The museum brims with stainless steel, Tupperware containers, anchoring devices, copper to exclude grazers, and cages of all sorts. Mussel mimics show how it is possible to separate the effects of living mussels from their physical structure, and a tethered wiffle ball shows how to measure wave force. Bob used the museum to provide glimpses into the past as a way of motivating and inspiring new experiments.

Anyone who came into contact with Bob was humbled by his excellence in natural history, ability to design field experiments, and attention to broad ecological theory. But what made his remarkable knowledge so special was his commitment to intellectual “mischief”—finding natural history tidbits that ran counter to theory. If you thought you had come up with something new, he would playfully roll his eyes and cite an experimental paper that had just barely scooped you—my favorite being manipulative

experiments along the French coast in the 1930s. He smiled and would say, “try again.” Bob was inclined to adopt students, post docs, and young professors who challenged conventional wisdom and in doing so encountered obstacles. He always encouraged persistence and was confident the data would eventually win out if it were clearly enough presented and if the experiments were sufficiently well designed. If you had encountered resistance to your ideas, Bob would pour you a bourbon and a bowl of junk food and then playfully turn the problem over every which way in conversation, asking probing natural history questions that always made your research better. Bob asked for nothing in return, just that you helped others, whether your students or not.

Professional societies such as the ESA exist primarily for students. On Tatoosh, at home in University of Washington’s Zoology Department, as a guest speaker at universities, and when traveling internationally, Bob’s focus and joy was always students. He was a great scientist, but an even better mentor. Science citation classics are certainly a wonderful legacy for any ecologist. But even more long-lasting is mentorship, and the lessons of curiosity, generosity, and questioning that can be passed from generation to generation. We believe mentorship is Bob’s greatest legacy.