Foreword

BY STEPHEN JAY GOULD

have long been amused that the "standard" desert island cartoon shows a man, perhaps leaning against a lone palm tree, but inevitably situated on a small featureless space fully covered in sand—with the clear (and mistaken) inference that the "desert" in desert island has the same root and meaning as the Sahara. Same root yes, but entirely different meaning, hence my amusement at the error. As Michael Mares points out, the Latin *desertus* means solitary or forsaken—so desert islands may be lush with vegetation, and humid as could be. Only the lone and shipwrecked seafarer is forsaken and deserted there. But the Sahara and other dry and sandy places are misnamed for a different fallacy based on the same root. We think that they are lifeless and forsaken because we can't take the heat, the absence of the vegetation we know best, and especially the dangerous scarcity of water. Yet, as they say in Jurassic Park, life finds a way.

You may have to look a little harder (and Mares tells some funny stories about his inability to trap mammals in the South American desert until he figured out where they were and what they liked). But deserts teem with life amidst, around, and beneath the surface of these visually bleakest places on earth. And since rodents are, by far, the most abundant and diverse of mammalian groups, we should not be surprised that if any representatives of our "highest" class have managed to prevail in such places, rodents should be the prime candidates. Indeed, by managing to thrill and delight us with a conjunction of the two absolutely least promising subjects for human fascination—rats for creatures and deserts for places—Mares has truly proven, in

this dual symbolic utility, that we live on a most wondrous planet, a place where absolutely every nook of space and every sentient object (even the insentient ones, for that matter) loudly proclaim the truth of Shakespeare's appended examples for his famous proclamation about the sweet uses of adversity: "sermons in stones, and good in every thing."

Michael Mares, the world's expert on the natural history of desert rodents, writes from a perspective and life experience that will immediately resonate with the worldview and practice of any professional natural historian, but that will seem unusual, even exotic or a bit crazy, to many others. Two passions regulate the activities of this wonderful world. First, a love and spirited defense for the most maligned of professional activities in science: taxonomy, or the classification of organisms, so often, and ignorantly, seen as a farrago of Latin mumbo-jumbo applied by beancounters and bookkeepers interested only in placing objects into their appropriate pigeon holes (or rodent holes in this case). But, in nature's ecology, sexual organisms group themselves into species, and species thereby become the true and basic units of biodiversity, the framework of life on our planet. Yes, species require names, just as individual humans want and need distinctive labels. But naming per se (and in Latin) is only a tool for pursuing the real work of understanding how populations of organisms exist, adapt, thrive, die, and interact in nature. Through this book we come to understand why Mares and his colleagues must identify and name the units of life in order to understand the ecology of the desert—and we learn how far astray we can go (often with practically disastrous consequences, particularly in medicine and agriculture) when we haughtily ignore taxonomy, disregard the small but distinctive differences among real species, fail to study living organisms in their natural habitats, and falsely assume that all rodents looking basically alike, and coming from the same broad region, must be the "same" animal. And we learn to appreciate why Mares designates Oldfield Thomas as his hero, the man who named nearly three thousand species and subspecies of mammals, and wrote such a touching afterword, in genuine humility before nature's vast diversity, to the paper that named his two-thousandth species.

Second, and even more distinctively, Mares's first love, and persistently dominant passion, lies in fieldwork, often under the most appalling and

quite dangerous conditions, especially in deserts, with utterly unsuitable vehicles and not a single gas station between Marrakesh and Timbuktu. Fieldworkers are an odd breed—and I say this as someone who has more than merely dipped into this world, but still lives basically outside it, thereby gaining both enough experience to understand the allure and enough distance to recognize the peculiarity. To illustrate the power of Mares's love and true obsession, I need only mention that he devotes virtually every word of this autobiographical book to loving (and sometimes gruesome) details of all his field trips, but then grants only part of a single paragraph to mentioning his genuine "day job" of the last several years—his brilliantly successful directorship of the new and stunning Sam Noble Oklahoma Museum of Natural History at the University of Oklahoma. Now here's a man who knows what's important in natural history!

Field narratives have certain conventions, and Mares follows them here, but with a verbal freshness (and a fine sense for a good yarn) that will delight even the most sophisticated urbanite who views Montauk Point as the ultimate wilderness. Of the two major desiderata of the genre, one must first tell terrific stories about animals—as Mares does again and again. Each reader will have a personal favorite. I was stunned by how the plains vizcacha rat of Argentina eats saltbush, when the salt crystals must first be scraped away to reach the edible leaf underneath. Two stiffened bundles of hair, shaped just like teeth, "articulate" with the lower incisors (true teeth) to chisel away the salt, which flies from the animal's mouth in all directions. Mares comments: "Few mammals use hair to assist in gathering food. The most ready examples are the baleen whales, those massive oceanic beasts that have developed filters of modified hair—the baleen—that strain microorganisms from the sea as the whale pumps ocean water through the mouth. In one respect, the little plains vizcacha rat is a whale of a rodent."

Second, one must relate the tales of danger, biting bugs, venomous snakes, near drowning, strandings in the desert, and meetings with weird and dangerous people—the occasional but inevitable incidents that no one really loves when they are happening, but that more than repay the debt in the pleasure of later telling. In this category, my personal favorite also leaves me duty bound to chastise my old buddy Mike Mares. He meets a grizzled cod-

ger in the most godforsaken and isolated spot of the Argentine desert. The guy claims he's from Detroit so Mares springs the trap and talks to him in English. But the guy comes up golden, speaking our native lingo perfectly. Then he tells Mares his story: He's been living in the desert some forty years and lost his passport about thirty years ago. His brother, he says, had been in Al Capone's gang, but left to set up a rival organization. Capone threatened to kill him, so the whole family had to run as far away as possible. And Mares swallows it.

Now c'mon Mike; I'll buy the Detroit thing, but my one will get you ten if anyone in his family ever spoke to Al Capone. People end up in the weirdest places for the oddest reasons (and the absolute best of fabricated stories). You always run into someone like Sam from Detroit, anywhere in the world. To tell my own politically incorrect tale, I was once working on an isolated island, population about a hundred native Bahamians, not a facility anywhere, and nary a visitor for months or years. So I'm collecting snails along the beach with my research assistant and I hear someone call out in an obvious American accent: "White people! What the hell are you doing here!" He had some story about his boat and his adventures all over the world, but if he could ever have reached the next island in that tub, I'd be surprised. Only white man there for years, he said. Maybe he first went there to escape Tony Soprano. Maybe he was the same guy that Mares met in Argentina.

Finally, because each stone does preach a sermon, books on natural history can only, as this book does so well, transcend the genre of a transient set of good yarns by tying these particulars to deep, important, and general problems of science that form the legitimate excuse for people putting themselves in danger, and spending so much time and money (though the latter sure seems scarcer than the former to field biologists), to pursue these private passions. In Mares's case, evolutionary theory sets this proper and general context, and Mike has masterfully woven his narrative of disparate stories around the central theoretical question that has motivated all his work—in one sense the best and deepest question of all the sciences of natural history: how much of life's diversity falls into predictable patterns regulated by scientific laws of evolution and biomechanics, and how much records the particular happenstances of singular places (in other words, the sensible, but unrepeatable, working out of unique historical sequences of events).

Evolutionists test this great question in the way that any experimental scientist would, although we must search for "experiments" performed for us by nature: by looking for independent replications under circumstances as identical as possible. In evolutionary terms, we ask: if faunas evolve independently in different parts of the world, but in climates and ecologies of maximal similarity, will we find the same adaptations, the same ecological strategies, repeated again and again by the historically different inhabitants of each region? If only a few ways of making a living can work in such a harsh place as a desert, will these modes be evolved again and again in different places—a phenomenon called "convergence," as illustrated, for example, in the separately evolved, but aerodynamically so similar, wings of bats, birds, and the extinct pterosaurs, or flying reptiles of dinosaur times. After all, flying isn't easy, and can only work in a few basic ways when you have to use bone and muscle, rather than oil and steel.

Now Mares and I have different suspicions about the relative weights of convergence versus unique historical oddity. I find the latter more fascinating and portentous; he thrills to the former. But we share the sense of all evolutionists that both modes make powerful contributions to the wondrously sensible diversity of life, and that no question could be more important to our field. Now Mike is hung up on one particular question amidst this generality—the best application to his field of desert rodents. I therefore end this foreword simply by honoring the importance of such private passions—and the beauty of genuine, factual, and fascinating resolutions sometimes provided by recalcitrant nature—in the best way I know: by retelling the lovely story of Mike's very best piece of detective work.

Michael Mares has put himself into great discomfort and occasional danger in nearly every great desert of the world, largely because he is consumed by a personal quest to understand and document one of the great convergences in biology: the propensity of some rodents (with the American kangaroo rat as the best-known local example) to become bipedal (two-legged) in deserts, where good biomechanical arguments identify hopping as an excellent mode of locomotion for many habitats in such places. Mike had to face a problem of great personal salience for a biologist of Hispanic background in the Americas: why, alone among the world's appropriate habitats, do the great South American deserts of Argentina and Chile lack any bipedal spe-

cies? At first, he doesn't believe that the claim can be true, for these deserts have been so underexplored for rodents. So he devotes years to the search for a bipedal species, and finds nothing.

Then he develops a perfectly good hypothesis, but based upon his unfavored alternative of real difference for unique historical reasons. The native rodents of South America all belong to an odd group, called the caviomorphs, and including the monsters of the rodent world, from the coypu to the pig-sized capybara. Perhaps, by some quirk of a particular evolutionary past, the caviomorphs simply lack the wherewithal to evolve a two-legged lifestyle, even though the adaptation would be advantageous for some desert forms. Moreover, the "ordinary" rodents—that is, the species belonging to the conventional group of mice, rats, squirrels, and their ilk on all other major continents—may not have evolved a bipedal form simply because they haven't been in the southern desert long enough. South America was an island continent until the Isthmus of Panama rose just two to three million years ago—and no "ordinary" rodent got to southern South America as a northern migrant before then.

But just as he is beginning to feel comfortable with this unloved hypothesis, Mares snatches victory from the jaws of defeat in the quirkily and utterly unexpected way of virtually all major discovery. (After all, one cannot go out to look actively for the unexpected). He is casually reading, one day in 1973, a paper on South American paleontology by the greatest professional in the field: George Gaylord Simpson. And he finds his bipedal forms—but with a wonderful twist that validates both the odd contingency of peculiar circumstances and the faith that convergence grants some predictability to evolution. First of all, these bipedal desert forms are extinct. Second, they weren't rodents at all, but a group of marsupials that lived in the habitat of rodents and served as their ecological "vicar" in isolated South America. (Just as on the island continent of Australia, several marsupial groups evolved and flourished in the separateness of South America. Some have survived, including the misnamed "Virginia" opossum—a South American migrant after the rise of the Isthmus. But many others died after the mixture of faunas that followed the joining of South America to the rest of the world. Most notably, the large native mammalian carnivores of South America were all marsupi-

als, and they are all gone. The jaguar evolved from another North American migrant.)

I thus end with Mike Mares's lovely resolution to the motivating scientific problem of his life as a field naturalist and student of living animals—solved by reading a paper about fossils: "The animals had disappeared in the Pleistocene, only about a million years ago, and had inhabited the Monte Desert near Andalgalá. Here was my bipedal desert specialist of the Monte Desert, only instead of being a rodent it was a marsupial . . . If I had arrived in Argentina a million years ago, instead of in 1970, I would have caught them in my traps and seen at once that they were strong ecological equivalents of the classical desert rodents of the world. I had simply gotten there too late."