

Chapter 12

It Should Have Been Called a Moustache

Harold F. Greeney

Stories you say? A significant moment from the field? Hmmm. Countless stories, numerous, humorous, tragic, magic, and fascinating, simultaneously clogged my creative ducts the moment I was invited to contribute to the present book. Sadly, some experiences, such as a particular incident involving a terrible night's sleep on the rocky soil of the Sonoran Desert, a gallon-sized can of ranch-style beans, and two dogs with incredibly vile dietary proclivities, must forever remain as orally transmitted traditions. (If you know the story, you are cracking up right now; if you do not, you will hear it eventually, and if you were there, you are fighting dry heaves). Of those stories suitable for general consumption, we will save the dramatic and the comedic for future campfires, lean-tos, base camps, black lights, and rainy days in the field. I have chosen, instead, a single monumental day, now more than two decades in the past. It is a day I will never forget, a story I have shared during many talks, and one from which I continue to draw inspiration, amusement, and even wisdom.

Before we begin, however, a bit of backstory may help readers interpret the importance (to me) of the story to follow. I have always loved nature, apparently even before I have memories, based on the number of half-eaten cockroaches my mother claims to have found in my diapers. The margins of my Peterson's Field Guides are filled with annotations in my father's handwriting where he entered my field notes before I was able to write them legibly myself. I was born a collector. If I could find more than two of anything, I started a collection and spent endless hours sorting, comparing, and organizing each of my collections into similarity-based groups: rocks, leaves, bottle caps, shells, skulls, coins, stamps, and (of course) insects. So, not surprisingly, I was thrilled when, in 1986, a Boy Scout service project helping the elderly move furniture led to the discovery of two enormous cabinets filled with butterfly specimens in the upstairs room of woman in need of our help. On that fateful day, I met the disgruntled mother of Phil DeVries who was ruining the day she agreed to store her son's butterfly collection while he explored Costa Rica. Upon

H. F. Greeney (✉)
Yanayacu Biological Station, Napo, Ecuador
e-mail: antpittanest@gmail.com

discovering what the ill-placed furniture contained, I abandoned my fellow scouts to their work and instead barraged this poor woman with an ecstatic stream of questions concerning, what I thought was, her butterfly collection. DeVries' mother explained the collection's origin and, much to my delight, invited me over to meet her son who, fortuitously, was scheduled to be home for Christmas that year. A few weeks later, I dined at the DeVries household with a field-worn Phil who had begrudgingly agreed to talk to "this nice young man who seems *really* interested in bugs." This was, at the age of 15, my first step towards a lifetime of tropical adventure. Another important, and as you will see topical, fascination of my youth concerned the creation of things out of folded paper: airplanes, origami, and (to my little sister's detriment) spit-wads. When I discovered that the caterpillars of skipper butterflies build leaf shelters out of their host plants, spit-wads and airplanes were forgotten. Living insects inside the house were frowned upon by my mother after the "accidental" escape of hundreds of fireflies in my room one night, so as a child I spent much more time finding caterpillars than actually rearing them through to adults. I reveled in the combination of detective work and outdoors skill that this required. Then came high school, college, and girls, the latter of which put a temporary damper on my propensity to talk about how much I loved bugs. It was not until around the time this narrative begins that I really began to bring caterpillars back from the field and rear them.

The day in question (October 12, 1993) began like any other at that time in my life. I woke up 2 hours earlier than the tourists whom I was going to guide that day, having Jedi mind-tricked them into believing that their enormously expensive trip to Amazonian Ecuador would be greatly enriched by sleeping in. This took little convincing after the previous day's "death march" of 8 h with a packed lunch through sweltering heat and boot-sucking mud, undertaken in order to show them what they paid for: tropical nature at its finest. I forget now the number I threw out when a mud-covered tourist asked how far we had traveled during those 8 h, but I know I tried to make it more impressive than the 4 km it was. In any case, as I fumbled around in the predawn for my boots, binoculars, butterfly net, and kill jars, I could hear my fellow Jedi doing the same through the thin bamboo-slat walls that separated our rooms in the guides' quarters of the tourist lodge for which we worked. On that morning we (myself, Tom Walla, and Mitch Lysinger) had yet to recognize that we had already been out-jedi'ed by Phil DeVries, who had unscrupulously Tom-Sawyer'ed us into running a canopy-understory butterfly study in our "spare time" while working full time as jungle guides. After a quick rendezvous at the kitchen for a cup of tepid instant coffee, we each dashed off in our assigned directions to check for butterflies captured during the past 24 hours and to "freshen" up the bait with rotten bananas (which still prevent me from enjoying anything remotely banana flavored). The fact that each of us would take an hour to travel the same paths which had previously disheartened our tourists, plus an additional kilometer or two, has remained our little secret (until now). We were fresh out of college, still eager to learn, and young enough to not notice the snow job DeVries had pulled. About the time we were half-way done, it began to pour, as only a tropical rainstorm can. Air became sheets of water; mud became quicksand; once-solid, exposed-root footholds became

our worst enemies (what Mitch referred to as “real ass-busters”). Somewhere, on another continent, DeVries was enjoying a Starbucks’ grande-double-caramel-something-or-other, his feet on the desk in his climate-controlled office, leisurely perusing the thousands of butterflies we had already shipped home from previous months. We did not care. This, this was tropical nature!

After trap-butterflies were sealed in glassine envelopes and put in a dry box, there was just time to rinse off in the water pouring off the roof of the guides’ cabin and put on dry(ish) clothes before sitting down to breakfast with our tourists. While none of us had been running wild in the jungle for more than a year at that point, somehow it was not hard to find an endless stream of entertaining stories to occupy our groups. After breakfast, another day of eager exploring and learning, while occasionally remembering to share a few easily digestible facts with the sweaty, repellent-soaked, tourists who trailed despondently along behind us. Enough preamble and scene setting, onto the real story.

So, as I mentioned, it is 1993 and I am living in a bamboo, thatched-roof hut in the Ecuadorian Amazon. I have fulfilled my promise of butterfly trapping to DeVries, and my tourists are either asleep or boozing it up in the bar. Mitch is listening to, and memorizing, bird songs on his walkman (told you it was a long time ago). Tom has wandered out into the jungle in search of a bushmaster rumored to be sleeping in a hole somewhere along one of the trails. I can finally sit down with my caterpillars, most of them skippers, which I am rearing in small plastic cups with snap lids that are stacked in neatly labeled rows on the shelves in the guides’ cabin. I have in front of me a fourth instar caterpillar of *Telemiades antiope* (Fig. 12.1). In my field book, I am carefully recording the shape, color, size, and behaviors of my subject. In particular, I spend an inordinate amount of time slowly opening and describing the architecture of its leaf shelter; a carefully excised portion of the leaf margin which the caterpillar then laboriously silks into the desired position to form a tent-like or pocket-like shelter. As if it were yesterday, I remember staring at the caterpillar’s rear trying to recall the technical jargon for the semi-hardened plate that covers the dorsum of the last abdominal segment (the aptly named anal plate). Unable to remember, I decided ass-shield was good enough for field notes. At that moment, however, as I watched in fascination, the caterpillar’s anus slowly unpuckered and a perfectly formed, grenade-shaped ball of frass (bug shit) appeared (Fig. 12.2). It paused there for a second, like a drop of dew at a leaf’s edge, apparently sticky enough to not fall off. Then, in an instant, it was gone. Please remember, I was young and, as DeVries would have said, working with a brain which was still blissfully uncluttered by knowledge. I saw no other explanation for the disappearance of the frass other than it had been sucked back into its owner’s rectum. Once again, nature left me in awe. Along with a plethora of jokes that I knew would greatly entertain my peers, this behavior I had discovered set off a tropical storm of questions in my head. Why would a caterpillar do such a thing? Perhaps the nutritional quality of its food plant leaves was so poor that it had evolved a poop-retention strategy, which allowed it to give it one last go for nutrients. Maybe it was water retention. Maybe the behavior depended on relative humidity. Maybe it was not, in fact, a frass ball that I had seen, but a frass-shaped organ of unknown utility which was yet to be described

in caterpillars. My pen could barely keep up with my mind as I poured out question after question and proposed answer after answer on the pages of my notebooks. In the middle of my thought, I noticed another frass pellet appear then ... gone!! I noted the time, backtracking to estimate the time of its first occurrence. I searched around the caterpillar (sitting on a white notebook) for the pellet. There wasn't one! Aha! They sometimes suck it back in twice! Feeling ecstatic and enormously wise in the ways of science, I spewed forth another series of hypotheses, digging deep into my scant knowledge of the scientific literature to find an explanation. This time, however, I turned the animal so as to have a straight-on view of the phenomenon. Guessing correctly, about 15 min later I was ready, inches from the aperture of interest, as I watched its recycled crap emerge. Again I watched as the puckering exoskeleton stretched and a green grenade slid out, perching delicately on the caterpillar's rear. In the split second that it remained there, I had just enough time to wonder what that curious little brown mustache was. The one which had appeared near the top of the anus just before the frass was produced. Were my eyes playing tricks, or had I just discovered *another* new caterpillar structure! Then, it hit me.

No, it actually hit me. The frass, that is. Now you see it, now you don't. In this case, the don't was punctuated by the tiny grenade bouncing from my furrowed brow and dropping back onto the table. Not for the first time, and certainly not for the last, nature had thrown me a curve ball. In this case, more of a fast-ball shot from the anus of a skipper larva. Although I was disappointed by the fact that my clever one-liners about anal recycling would no longer be of use, I was equally intrigued by this new observation. Pen flew over paper once again and outpoured another series of euphoric epiphanies. As I watched repeat performances late into the night, however, a vague memory began to surface. At that point in my career I had only briefly had a copy of Malcom Scoble's *The Lepidoptera* in my possession. But if memory served, I was, lamentably, not the first to discover that skipper caterpillars not only made origami but they also shot spit-wads. Indeed, skipper larvae, and a few other groups of lepidopterans, will forcibly eject frass from their anus, propelling it away from their location, presumably to reduce the possibility that their excrement can be used by natural enemies as a means of locating them. The anal moustache, sadly a term which has not come to popular use after I coined it that night was, in fact, the caterpillar's anal comb (hardly an improvement in terms). This structure is a spiny, comb- (or moustache) -shaped structure, which is sclerotized, located just inside the upper margin of the caterpillar's anus. In this position, it serves to hold the extruded frass in position while strong sphincter muscles clench and a small chamber of air is pressurized just inside the anus. A sudden relaxation of the sphincter expels the pressurized air, launching the fecal grenade through the air, often to distances equal to tens of times greater than the length of the caterpillar's body. Thank you Mother Nature for, yet again, providing fascinating (anal) cannon fodder to spice up my growing arsenal of stories to be delivered to bleary-eyed tourists across the breakfast table.

One of the few things that I regret in life is removing those fecal-crazed pages from my notebooks. At the time I feared the shame they would bring me should anyone find them and see how entirely wrong my observations, assumptions, and



Fig. 12.1 A progressive series of photographs showing the steps involved in shelter construction by a fifth instar larva of *Telemiades antiopa*, the hero of our story



Fig. 12.2 *Left panel:* A frass pellet poised for launch on the anus of a *Saliana* butterfly larva. *Right panel:* Terminal segments of the same individual, moments after frass-propulsion, showing the exposed anal comb (moustache)

ideas had been. Without a doubt, by simply transcribing those pages, I could have entertained you for hours (days) in place of this narrative. This terrible loss to ecology and comedic literature, however, is ameliorated by the fact that my memory of the moment is of such clarity that I can retell it ad nauseam. For me it will always epitomize what science, in particular natural history, is really about. It is discovery. It is wonder. It is passion. It is feeling like you have witnessed something that no one else has ever seen, and now have the power to describe it, understand it, and pass that knowledge on to others. To truly discover and chronicle a piece of the history of nature. And let us keep it honest. It also makes me giggle inside to give a lecture about little creatures with mustachioed anuses that can throw their own shit more than 30 times their own body length.

Harold F. Greeney is a broadly trained natural historian who has conducted much of his research (to date) in the New World tropics. He received a BSc from Wake Forest University where he paid for his education with an Army ROTC scholarship and cheered on the Demon Deacons as a Wake Forest Cheerleader. After several years guiding jungle tours in the Ecuadorian Amazon, he received an MSc in entomology from the University of Arizona while studying aquatic insects in Ecuador and subsequently earned a PhD in ornithology from the University of Wroclaw while

studying the breeding biology of tropical montane birds. Harold is, perhaps, best known as the creator of the Yanayacu Biological Station and Center for Creative Studies on the east slope of the Ecuadorian Andes, a place he called home for nearly 15 years. Harold was among the first recipients of the prestigious Alexander and Pamela Skutch Award honoring his dedication to publishing studies on the reproductive ecology of tropical birds and was recently awarded a Guggenheim Fellowship to help in the preparation of a field guide to the nest and eggs of Ecuadorian birds. Currently, Harold is studying the reproductive and migratory behavior of birds in southwestern USA and northern Mexico while finishing an authoritative book on the antpittas and gnateaters of the world. When not rearing caterpillars or filming bird nests, he dedicates his time to passing on a passionate love of the natural world to his children.