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A Biologist Ruminates on Hiking, Science, and Nuclear Threats

By Richard Collins

I.

We had come during a green June, refugees from Arizona's scorching summer, seeking relief in Yellowstone's soaring mountains, deep forests, and bright, pounding streams, an annual pilgrimage we have made for the last twenty years. That morning I unfolded the tattered topographical map of the Mount Wallace quadrangle out on the bedroll, the fifteen-minute series where every distance was 62,500 times further on the ground than on the map and each brown, curving contour line was 50 feet higher or lower. A thin, blue line labeled Brundage Creek sliced up through the contours reaching almost to the top of Horse Mountain, elevation 9724 feet; our hike would be seven miles one way with an elevation gain of 1776 feet.

"Plans on a map are one thing, but the hike is another," Diane said, suspiciously. "Are you sure we can make it up and back in a day?"

"It's doable, if we stick to the routine," I replied. "We'll walk for thirty minutes and rest for five; that way we don't wear ourselves out."

II.

The routine was our trellis for time; the framework on which we would hang up the contour lines and go at them one-by-one, instead of worrying about how much further we had to go. Covered by ground fog of early morning, the first two miles of the trail went through a thick stand of Engelmann spruce shading a boggy forest floor, breeding grounds for the pesky mosquitoes swarming around our heads, ravenous for blood to renew their irritating tribe. Entomologists, scientists who study insects, call these "snow-pool" mosquitoes because of their peculiar reproductive routine. After feeding, the female mosquitoes deposit their eggs in pools of melted snow water and then die. The eggs remain dormant throughout the summer, waiting for next winter and the freezing temperatures required for priming their DNA to hatch the following spring. Firmly locked into this seasonal slot by the requirements for blood and chilling, this species produces just one generation per year. They had one chance to make good and this morning we were it; warm-blooded and now warmed by the climb, soft-skinned and hairless, we still waited the five minutes before hurrying on.

III.

Of all human endeavors, science most loves the litany of routine. Its practitioners like me are skeptical types, believing little at first blush. Precision is everything; a repeatable result even more. The scientific method is a reductive process that chews its way along, step-by-step, inquiring deeply of each least thing, searching for the tiniest kernel of truth that makes everything else tick.

"But a theory, if you hold it long enough and hard enough, becomes a creed," observed the poet Robert Frost.

Nowadays, science has become our new religion with the scientific method its Holy Scripture, a formulary of rigid organizing principles that concentrates human intelligence and energy with laser-like intensity on details and the immediate problem on hand.

Yet the methodology pays no heed to unintended consequences, gives little consideration to the larger

world, proceeding sometimes like an assembly-line robot programmed for self-destruction. Not so long ago, science uncovered the secrets of nuclear energy. The result was holocaust, and the accumulation of radioactive wastes that can remain deadly forever: Or perhaps for only ten thousand years, according to recent EPA standards.

IV.

Soon, we left the spruce forest and its mosquitoes behind and followed the faintly marked trail climbing a long, high ridge, its loose soil and talus anchored by young lodgepole pines, the gradient so steep we had to lean our shoulders into the hill and climb by sidestepping, one foot above the other, grabbing a tree limb, pulling the other foot up; like slow crabs scuttling over a coral reef sideways, or skiers ascending a deep, snow-packed mountain. The air was still and warmed by a bright, mid-morning sun and beads of sweat began trickling down our faces, our shirts wet beneath the daypacks. Desert dwellers, our bodies were adapted to one thousand feet elevation and our lungs heaved desperately at the thin, sub-alpine air. I wiped my sunglasses and stared at my watch, the minute hand creeping along, dawdling; seven more minutes to go before we can stop to rest; then six, then five, then four. Just like Pavlov's finely conditioned dogs, we think ahead no further than that.

V.


Sir Francis Bacon, physician and formulator of the scientific method, later in life grew to fear the unrestrained application of his instructive. In "Of Studies," an essay published in 1625, Bacon cautioned:

"Histories make men wise.... For expert men can execute, and perhaps judge of particulars, one by one; but the general councils, and the plots and marshalling of affairs, best come from those that are learned."

Bacon was saying with antique British circumlocution that the knowledge and opinions of experts are often limited in scope and usefulness. Sometimes, they can be mortally dangerous. Scientific facts and the wisdom of accumulated human experience can lead to vastly different conclusions. The former describes our world; the latter instructs on how we ought to live in it.

A crucial question we now face is whether to build more nuclear reactors for the generation of electricity. Past experience --- nuclear war and nuclear blackmail, accumulation of radioactive wastes, and accidents like Chernobyl --- argue against it. Dr. Steven Chu, our Secretary of Energy and Nobel Laureate in Physics, says we should, confidently claiming that nuclear power can be made safe and non-polluting. Perhaps Dr. Chu can prevent accidents, war, and blackmail, and design a nuclear dumpster lasting for more than ten thousand years; but more likely, he cannot. With nuclear proliferation, the possibilities for disaster are so widespread and extend so far into the future they exceed even the brilliant Dr. Chu's boundaries of comprehension.

VI.

Brundage Creek trilled alongside our path, making a happy song in the sunlight. Through a cleft in the highest rock outcropping, the creek fell in a long, shimmering arc, disappearing into a grove of white-barked pine. Fifteen minutes later, we topped out on an alpine meadow clotted with exquisite flowers --- blueleaf cinquefoil, white pussytoes, and purple alpine asters. The cerulean sky lifted our spirits and we strolled along, sniffing the pine-scented air, enchanted by the sweet, liquid song of mountain bluebirds. Miles away and 2500 feet lower on Yellowstone's road to Tower Junction, the windshield of a car winked back the midday sun. Soon, we reached the birthplace of Brundage Creek, a spring bursting from beneath a thicket of dwarf willows. Breaking the routine to drink from its pure water, we stopped before it was time. 

Richard Collins is a biologist (Ph.D., University of Arizona) who has worked on the epidemiology and control of insect-transmitted diseases for the Centers for Disease Control and authored dozens of scientific publications. His popular writings have appeared in *Science and Spirit Magazine*, *National Geography Traveler*, *Writers on the Range*, and his hometown newspaper, *The Sonoita (AZ) Bulletin*.

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