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Count every living thing

Jon Carroll

Tuesday, October 2, 2001

THE CORRIDOR IS cool and the air is heavy. On either side are floor-to-ceiling metal racks holding jars of all sizes. Inside the jars, packed in formaldehyde, are fish curled into grotesque positions, their eyes bulging unnaturally against the thick glass.

John McCosker, lean and bright-eyed, picks one up. "This is a sweetlips. Cute little guy, huh?" He shakes it slightly; the pickled fish circles lazily in the thick fluid. "He's *Plectorhinchus chaetodonoides*, the harlequin sweetlips. Over here" -- he points to a shelf labeled "Group 181 Unidentified" -- "we have all the sweetlips we haven't identified yet. There's probably a new species. You could name it. *Plectorhinchus carrolli*."

We are in the basement of the California Academy of Sciences in Golden Gate Park. McCosker, an ichthyologist by training, and a media-friendly shark expert by accident, knows this room well -- some of the bottles contain fish he has collected and named.

He gestures down the row of jars. "This is one section of one museum containing one kind of vertebrate. All over the world, there are museums, and in every one there are thousands of unidentified species. And with the vertebrates, we're probably doing pretty well.

"No one knows the total number of species living on Earth, and no one can say how many are destroyed each day, no matter what numbers you hear. My guess is there might be 30 million species of living things, plants and animals, on Earth today -- or 100 million if you want to count the bacteria and the viruses. We know maybe 10 percent of them. The vast majority of critters that we share the planet with are unknown and unnamed. That should change."

Why is it important to name them all?

He taps his finger on the gray metal shelf. "As Aldo Leopold said, the first rule of intelligent tinkering is to save all the pieces."

THE IDEA FOR the All-Species Project started a year ago with Kevin Kelly, an editor with little formal training in biology. He had always believed in what he called "all" projects. The canonical "all" endeavor is the Human Genome Project, but there are others -- the proposed 3-D map of the

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universe, for instance. It could be argued that the periodic table of the elements was the first all project.

Kelly's idea was simple: Why not inventory all life on Earth? "This does several things," he said later. "It spreads the money all over the globe into corners where money rarely gets to, it spreads the good of discovery all over the globe, and it creates the beginnings of a new biology because for the first time we would know all the parts of the biosphere."

Then as now, Kelly was working with Stewart Brand and others in the Presidio offices of the Long Now Foundation, which is creating a 10,000-year clock in the desert of eastern Nevada. Might this be a project that Long Now would be interested in?

KELLY WENT TO work persuading others. A plan began to emerge. Brand and Kelly and Ryan Phelan, the Internet entrepreneur and medical database specialist who is married to Brand, came up with some numbers: a 25-year time line; a total endowment of \$1 billion.

There was nothing exactly like the All-Species Project, but there were many things sort of like it. The All-Species Project would offer support and coordination and, using the considerable engineering brainpower that floats in the Long Now orbit, new tools for the old task.

Said Kelly: "I emphasized why knowing 'all' is vastly different than just knowing 'most,' and I suggested how we could really do 'all' by inventing new tools." For his part, Brand realized that "all" was a useful funding device. "You can't sell 'most,' but you sure can sell 'all.' "

And so it was born, the soon-to-be-nonprofit All Species Inventory or, latterly, just ALL. Tomorrow: old ways, new tools.

Give me a billion dollars and 25 years, and I can find a lot of beetles.

The headbone's connected to the jcarroll@sfnchronicle.com.

<http://sfgate.com/cgi-bin/article.cgi?f=/c/a/2001/10/02/DD166108.DTL>

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Count every living thing, II

Jon Carroll

Wednesday, October 3, 2001

The story so far: Earlier this year, a small group in San Francisco, including author and futurist Stewart Brand and editor Kevin Kelly, conceived the idea of ALL, the All Species Foundation, a modest little plan to name and count every living species on Earth, a number that may approach 100 million, in a mere 25 years. The project would, they hoped, promote biodiversity while quantifying it. But they needed to find out whether their insanely ambitious dream would meet with any real-world support. .

THE NASCENT GROUP was headed by Ryan Phelan, whose expertise is medical databases and whose special skill is bottom-line entrepreneurial smarts -- always useful in a group of Big Dreamers. She took the idea to John McCosker, former director of the Steinhart Aquarium.

He was enthusiastic -- the first real scientist to express an interest -- and so they convened a meeting of many of the biggest guns in the worlds of biology and taxonomy. The list of attendees is available at www.all-species.org.

"The amazing thing to me," said Brand, "was that a lot of these guys hadn't met each other. Everybody was impressed to be in the same room with all the other somebodies in the room."

The 35 scientists thrashed out some of the problems that such an inventory might face. There were bottlenecks everywhere -- in the field, at the museums, in the publication process. The old bag it, tag it, ship it and forget it methodology was still the norm. Legend has it that at the British Museum, there are still unidentified species on the shelves that were collected by Charles Darwin. The pace of identification is glacial, much slower than the rate at which the most biodiverse habitats are being destroyed.

Plus, a controversy was raging in the hermetic world of taxonomists. The old Linnean system, the genus-and-species designation (*Homo sapiens*, *Felis catus*) that had been invented in the middle of the 18th century, was thought to be hopelessly outdated by advances in genetics. A new system, called PhyloCode, was being championed. How are you going to identify all the species on Earth if there's no general agreement about what to call them?

AND THERE WERE political problems. What is often called "bio-prospecting" --

searching for cancer cures or high-yield food in Third World countries -- had made some nations justly suspicious of pale taxonomists with unknown agendas. Plus, some of the richest places on Earth were also some of the most unstable - - Colombia, for instance, or Congo. Taxonomists have always been brave people, risking disease and maximal discomfort, but they are not foolish. No beetle is worth a life.

In the end, though, the verdict was unanimous: Go for it. One of the scientists there, Dr. Evert Schlinger, an entomologist attached to the California Academy of Sciences, put up \$1 million in seed money to get the project under way. "The enthusiasm was overwhelming," said Phelan, "but so was the job. We knew we were over our heads. Maybe we could raise a billion and maybe we couldn't, but we needed a CEO. So we wrote an ad."

BRIAN M. BOOM, the vice president for botanical science and Pfizer Curator of Botany at the New York Botanical Garden, was lying in bed one night reading a copy of the journal *Science*. His eye was caught by a small ad in the back of the magazine:

"All Species CEO Search. The Goal of the All-Species Inventory is to catalog every living species on earth within one generation (25 years). . . . Every once in a while there is a chance to do something grand and good -- send a human to the moon, or sequence a genome. For the right person, making the first inventory of all living species is that chance."

Boom put the magazine down. "That's my job," he said to his wife. "That's what we're doing next."

Tomorrow: Boom time.

The exciting slow-paced world of taxonomy, and how to have fun there.

My house is a very fine house, with two cats in jcarroll@sfgate.com.

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Count every living thing, III

Jon Carroll

Thursday, October 4, 2001

The story so far: Stewart Brand and his plucky band of adventurers at the Long Now Foundation have gotten seed money to start the All Species Foundation, or ALL, a mildly ambitious project to count and name every species on Earth within 25 years. Since no one at Long Now is a trained taxonomist, the group hired Brian M. Boom, former second in command at the New York Botanical Garden, to be the CEO of the new organization, headquartered at the Presidio. He started work last month.

IT IS POSSIBLE to see Brian Boom as hopelessly square. He looks like a stereotypical botany professor -- short, balding, neat -- but he talks with daunting intensity and disarming sincerity. He spent years doing field work under extremely harsh conditions in Ecuador, Bolivia and Venezuela.

Like Brand, Boom sees ALL as a catalyst, a small, swiftly moving organization putting people in touch with people, and putting people in touch with ideas. And like writer and editor Kevin Kelly, he believes that amateurs, what Kelly calls "barefoot taxonomists," have a substantial role to play in 21st century biology.

"You don't need people with Ph.D.s to collect specimens and tell you what they are," Boom said. "In every place I've worked, there have been indigenous people with a deep understanding of their own environment -- the names of the plants, where they grow, what they're used for. Our challenge is to do a country-by-country assessment and find those people."

KELLY, AND other people in the Long Now orbit, are committed to the notion that new tools will solve current bottlenecks. "Suppose," said Kelly, "that you could identify a species in the field. Suppose you had a small device that would process the animal or plant, inventory its characteristics, check the characteristics against its database and tell you whether you had a new thing or not."

John McCosker, the ichthyologist who's been involved with ALL almost from the beginning, called that idea "Kevin's Mr. Coffee: You put the bug in the top and, zip, instant taxonomy." But Boom was intrigued. "New tools can be incredibly important," said Boom. "Already a taxonomist in the field has a GPS box, and a laptop, maybe even an Internet connection if he can find a satellite through the rain forest canopy. I don't rule anything out. Clearly, at the pace we are talking about --

90 percent of the Earth's species in a generation -- we need to do things a different way."

This sense of urgency drives a lot of biologists. The rain forest is being destroyed; the coral reefs are dying from pollution and predators of opportunity; the northern forests are being logged. The events of Sept. 11 do not change this; the planet is under attack even as humans attack each other.

ONE OF THE most daunting challenges to ALL is based in human psychology: Most unidentified species are not big-eyed furry creatures or majestic birds; they are tiny brown beetles and fungi that look like ant vomit. And yet they are as important a part of the ecosystem as spotted owls or gray whales or pandas. As Richard Pyle, a member of the ALL advisory board and a deep-sea explorer and ichthyologist attached to the Bishop Museum in Hawaii, said:

"The life forms we hope to document are disappearing faster than we can document them. Unlike many other of humanity's great endeavors, the documentation of all species is a race against time. Human impacts to the environment are driving legions of species to extinction. We can't know that a species has gone extinct until we know it exists. How can we estimate the cost of this global extinction when we are only aware of a small fraction of what we've lost? We owe it to future generations to document these species before they are gone."

What we're talking about here is saving the planet. Let's keep it our secret.

And I think to myself, what a wonderful jcarroll@sfgate.com.

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