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Forgetting, an essay

by David Ehrenfeld
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The tragedy aboard the battleship Iowa is still in the newspaper as I start to write this letter, but it is probably the last day that it will be on the front page of the New York Times. This morning's article was about fixing the damaged gun turret--the commander of the ship says it will be difficult and might turn out to be impossible. The Iowa is of World War II vintage and the materials and technological know-how to repair its gigantic guns may not exist anymore.

There was a similar problem about ten years ago when church officials decided it was time to resume construction of New York's vast Cathedral of St. John the Divine, after a lapse of decades. It turned out that a few old men in England were the only stonemasons left in the world who knew how to work the giant blocks from which a cathedral is built. If they hadn't been able to train young apprentices, there would have been no choice but to abandon the project in a few years.

I think that our concept of progress prevents us from being aware that skills and knowledge can vanish from the world. Most of us probably imagine knowledge to be cumulative: each advance is built on prior discoveries, block piled upon block in an ever-growing edifice. We don't think of the blocks underneath as crumbling away or, worse yet, simply vanishing. Our world view doesn't prepare us for that.

Yet loss of knowledge and skills is now a big problem in our universities, and no subject is in greater danger of disappearing than our long-accumulated knowledge of the natural world. The problem is so serious that I don't hesitate to call it the next environmental crisis, although it will never rival the hole in the ozone layer or global warming for press coverage. We are on the verge of losing our ability to tell one plant or animal from another and of forgetting how the known species interact among themselves and with their environments.

The process is gradual, and it is affecting the more prestigious, research-oriented schools first. What is happening is that certain subjects no longer have anyone to teach them, or

are taught on a piecemeal basis by people from the periphery of the university or outside it altogether. “Classification of Higher Plants,” “Marine Invertebrates,” “Ornithology,” “Mammalogy,” “Cryptogams” (ferns and mosses), “Biogeography,” “Comparative Physiology,” “Entomology” — you may find them in the catalog, but too often with the notation alongside, “Not offered in 1989-90.”

The features that distinguish lizards from snakes from crocodilians from turtles from tuataras aren't any less accepted or valid than they were twenty-five years ago, nor are they easier than they used to be to learn on your own from books without hands-on laboratory instruction, but try getting someone to teach such a lab in most top-ranked biology departments. There is at least one Ivy League university that is even having trouble staffing a basic ecology course from the faculty of its biology department, and as I write this there is a large, land-grant university that has no limnologist (a person who studies the biology of lakes and rivers) and only one, retired plant taxonomist on its main science campus.

New students who are attracted to the study of whole plants and animals still exit, but they find themselves in a very hostile teaching environment for their kind of biology. Not surprisingly, their numbers are dwindling. It is these students who, after getting their masters and doctoral degrees, ought to be going out to teach their subjects in the nation's colleges and universities, to be taking over as older professors retire. There won't be enough new graduates to go around. Reservoirs that are not replenished soon run dry.

To prove that I am not crying wolf, I want to tell a true story. One morning last April, at eight o'clock, my phone rang. It was a former student of mine who is now a research endocrinologist at a major teaching hospital in Houston. She had an odd question: at what point in animal evolution was the hemoglobin molecule first adopted for use specifically as an oxygen carrier? it was an essential piece of information for medical research that she was planning. If I didn't know the answer (I didn't), who did?

I racked my brains to think of a contemporary biochemist or university department that could provide this answer. Nothing. All I could come up with was a book, I thought by somebody names F.A. Baldwin, that I had read when I was a student. She thanked me politely and said goodbye.

Later I went down to the basement and found the book in a box. It was An Introduction to Comparative Biochemistry, by Ernest (not F.A.) Baldwin, Cambridge University Press, 1964, fourth edition--I doubt there was a fifth. The flyleaf, I noted ruefully, indicated that this hardcover text had set me back $2.75. Much of the information my former student had wanted was in there, brilliantly written.

By coincidence, I was scheduled to lecture that afternoon to a group of biochemistry professors and graduate students. So I asked them the question I had been asked earlier. "I'm not a biochemist," I said after describing the phone call. "Tell me who is working on this sort of thing these days." They looked at one another and laughed. Nobody does comparative biochemistry anymore, they answered; at least they didn't know of anybody.

There probably was nothing much more recent than Baldwin. As for the graduate students, they had never even heard of comparative biochemistry.

Gone! Not outdated. Not superseded. Not scientifically or politically controversial. Not even merely frivolous. A whole continent of important human knowledge gone, like Atlantis beneath the waves. True, we still have Ernest Baldwin's book, but this kind of knowledge needs trained, experienced people to keep it alive and to hand it on to the next generation.

At nearly all of today's research colleges and universities the teaching is being done by three kinds of "temporaries": graduate students; non tenure track researchers and scholars--mostly women--who works full-time hours for part-time pay and reduced benefits; and an assortment of experts from outside the university who free-lance courses a semester at a time. What they have in common is that they are skilled workers working for substandard wages with no job security. They tend to feel exploited and are often angry, depressed, or a mixture of the two. Some of these teachers manage to be conscientious, inspiring, and creative, but few are around for very long. Teaching, more than other professions, needs continuity.

Despite the starvation of teaching, universities are receiving and spending money as never before. Where is it going? The answer varies from school to school--at one it will be computer science, at a second genetic engineering, at a third high-energy physics--but in all cases the money is going to hire "world class scholars" at world class salaries, and to set them up in business. At my university, world class scholars have become a kind of consumer item, like fancy computer systems, and are known, collectively, as WCSl's or wixels. They are purchased on the open market. One wixel can cost tens of millions of dollars by the time the university is finished providing the building, space-age equipment, and numerous support personnel that the wixel has been promised. Wixels don't have time to teach, not even graduate students.

Eventually, every asset that the administrators can lay hands on is hocked to pay for these wixels. Teaching budgets are slashed, teaching laboratories are converted into research space, and the salaries of professors who were foolish enough to teach or whose research is not in one of the glamorous areas are seized when these professors retire or, if untenured, inevitably fail to gain promotion. Soon, all the university can afford to help keep its teaching program afloat is a flock of temporaries. Not only are they cheap, but if they complain they can be fired.

Conventional logic would have it that killing the roots and trunk of the tree to support a few exotic flowers makes no sense. What has driven higher education into this unstable imbalance? The motive, as my readers have surely guessed, is money.

Before the Second World War, universities were run by a rather small cadre of scholars-turned-administrators, usually distinguished professors who had reached a point in their careers when pomp and affluence were more appealing than the library or laboratory. This was harmless--even useful. Every university needs a royal family to get money and

charm the public. But after the war, things began to change. The Managerial Revolution was upon us, university administration became a career in itself (especially for those whose academic work wasn't going anywhere), and administrators proliferated like weeds in a garden. By the seventies and eighties, control of most universities had shifted from faculty to administration, and the ranks of administrators had grown by five- or ten-fold or more. Where did the money for expansion come from?

The money came from the overhead on research grants--a postwar phenomenon--and from patents. Overhead, the amount charge by the university to administer grants, was like manna from heaven. Real administrative costs of grants are only a few percent of the total, but administrators soon discovered that they could bump the figure up 60, 70, or even more than 100 percent of the actual research request without protest from the federal granting agencies. Better yet, the money disappeared into an administrative black hole--even the researchers who obtained the grants couldn't find out what happened to the overhead. Patent income was much the same.

There was only one catch. Grants and patents are not fixed budget items. A bloated administration required more and more of these unregulated funds to support its growth, but grants and patents are undependable. Inevitably, universities began to bid against one another to attract those scientists (the wixels) who had the best records of getting large grants. Research priorities shifted to a few areas, such as genetic engineering, with the greatest cash flow from government and industry. Everything else, traditional research, innovative speculative research, and of course teaching, was sacrificed.

University administrators now find themselves on a treadmill that they can't get off. They must spend fortunes to gain fortunes, but they hardly ever gain as much as they spend. Student tuitions are raised and raised, "unproductive" departments are closed, budgets (except the wixels') are pared. Many universities, despite massive endowments and cash flows, are now little more than shells. The system is spiraling out of control.

Because similar processes are occurring throughout our society---from hospitals to secondary schools to the Department of Defense---and because we have squandered most of the natural resources that gave us our wealth, we will soon run out of money to support the Managerial University, and it will end. But abrupt, unplanned endings means chaos, which nobody wants.

How can we brake the administrative juggernaut before it crashes? This is one of the major unsolved problems confronting our precariously elaborate and interlinked society. The only solution that I can think of starts by drastically reducing the flow of money to administration---soon. There is no reason why unspecified grant overheads should exceed 8 or 10 percent. In the case of heavily endowed schools, there should also be an end to knee-jerk giving by wealthy alumni, especially contributions for new buildings. In the modern university, money is increasingly proving to be a corrosive substance.

Turning off the money tap is not enough, however. An informed public will have to demand cuts in administration, greater faculty and student influence, a tuition freeze, a

moratorium on construction of "high tech" facilities, a higher priority for teaching, and support for a diversity of low-cost research projects which can function without multimillion-dollar grants and which may not generate lucrative patents.

And if there is no effective change, what then? Then we can expect the managerial ethic to continue to prevail and teaching to become vestigial as the existing university structure falls further into disarray. True, a new kind of university may emerge, perhaps already is emerging. It will have some positive features. But whatever its virtues, it will not be capable of transmitting our assembled knowledge of the natural world to the next generation. I fear for conservation when there is no one left in our places of learning who can tell one moth from another, no one who knows the habits of hornbills, no one to puzzle over the diversity of hawthorns.

Botanical Activities at the Range Science Herbarium (NMCR)

by Kelly W. Allred
Department of Animal & Range Sciences, New Mexico State University, Las Cruces, NM 88003

[This is the first in a series of introductions to the state's botanical institutions and their activities.]

The Range Science Herbarium (acronym NMCR) is located at Rm. 340 Knox Hall on the campus of New Mexico State University. It is administered through the Department of Animal & Range Sciences, College of Agriculture and is completely separate from the larger Biology Herbarium (NMC) in the College of Arts & Sciences.

The herbarium houses about 18,000 specimens, about half of them grasses, emphasizing the flora of New Mexico. The collection is especially rich in Aristida and Bothriochloa from western United States and northern Mexico.

Staff at the herbarium is small: Kelly Allred (faculty, curator), one or two graduate students (currently one, Thomas Adams), and usually a student employee who helps with mounting and filing. Of course, the botanical activities of the herbarium center around the interests and capacity of the curator and graduate students.

Teaching-Related Activities: In addition to its courses in agriculture, the Department of Animal & Range Sciences offers some botanically-related courses, which are taught by Allred. Range Grasses and Range Plants emphasize recognition and identification of southwestern plants and are taught every semester. Other botanical courses are offered periodically: Botanical Latin & Nomenclature, Advanced Grass Systematics. The herbarium staff also trains the Range Plant Identification Team, which competes in an annual plant identification contest sponsored by the Society for Range Management at its annual meeting.

Research-Related Activities: A long-term project at the herbarium is maintaining the Working Index of New Mexico Vascular Plant Names. This is a computer text file of all the scientific names used for New Mexico plants. The names are arranged by family within the larger categories of Ferns and Fern Allies, Dicotyledonous Plants, and Monocotyledonous Plants. The listing is meant to be updated and corrected in order to provide to the state's botanists a current list of the plants of the state. As correct names and classifications change, pertinent synonyms are added to the Index, as well as literature references documenting the changes. The Working Index currently encompasses 254 printed pages and 38 pages of supplements.

Another long-term and on-going project is the study of the Grasses of New Mexico. The little booklet, A Field Guide to the Grasses of New Mexico, summarizes our findings thus far. We have tried to not only document which grasses actually occur in the state, but also to verify nomenclature, investigate taxonomic problems, provide means of identification, and authenticate distributions. The current listing reports about 470 kinds of grasses (all species, subspecies, varieties, etc.) in New Mexico.

Other floristic projects include collaborating with Richard Worthington (Univ. Texas El Paso) on a Flora of the Organ Mountains (Dona Ana County) and with several other New Mexico botanists on a Flora of the Manzano and Sandia Mountains.

Recent floristic projects that have been completed were a Floristic Inventory of the Diamond Creek Drainage in the Gila National Forest (by Eric Roalson) and a Flora of Cooke's Range in Luna County (by Travis Columbus).

A new project is the inventory of the Mosses of New Mexico. The herbarium has a beginning collection of about 170 mosses from the state, and an initial draft list documents 30 families, 92 genera, and 261 species in New Mexico.

Also in the inaugural stages is an inventory of the Aquatic Plants of New Mexico. This project begins with a master's thesis (by Thomas Adams) concentrating on the southwestern six counties and focusing on only the truly aquatic plants of perennial bodies of water.

Systematic or monographic research at the herbarium focuses on the grass genus Aristida. We have studied this interesting genus throughout the United States, but have concentrated on the species occurring in the Southwest and northern Mexico, in particular the Aristida purpurea, A. pansa, A. ternipes, and A. schiedeana complexes. Earlier systematic work involved grasses in the genus Bothriochloa.

Extension-Related Activities: Because the herbarium is affiliated with the New Mexico State Cooperative Extension Service, some of our activities involve county agents, Extension Specialists, and the general populace, such as providing routine plant identifications for the citizens of the state. Also, we are involved in plant identification training of county agents and ranchers. A collaborative project with the state weed specialist, Richard Lee, is the production of a Manual of the Knapweeds and Starthistles

of New Mexico. This project is nearing completion and will provide keys, descriptions, maps, and photographs of these often noxious weeds.

Words to Live By

"I would be converted to a religion of grass.
Sleep the winter away and rise headlong each spring.
Sink deep roots.
Conserve water.
Respect and nourish your neighbors and never let trees gain the upper hand.
Such are the tenets and dogmas.
As for the practice — Grow lush in order to be devoured or caressed, stiffen in sweet elegance, invent startling seeds — these also make sense.
Bow beneath the arm of fire.
Connect underground.
Provide.
Provide.
Be lovely and do no harm."
— Louise Erdrich
[courtesy of Roger Peterson]

New Plant Distribution Records

New records for New Mexico are documented by the county of occurrence and the disposition (herbarium) of a specimen.

— Joneen Cockman (P.O. Box 5002, University Station, Las Cruces, NM 88003)
Brickellia veronicaefolia (H.B.K.) Gray (Asteraceae): Otero County (NMCR).

— Charles Huff (1420 Corbin St., Silver City, NM 88061)
Brassica rapa L. (Brassicaceae): Catron County (SNM).
Fraxinus anomala Torr. ex S. Wats. var. lowellii (Sarg.) Little (Oleaceae): Catron County (SNM).
Phoradendron californicum Nutt. (Viscaceae): Hidalgo County (SNM). [This documents the disposition of two specimens of this rare mistletoe.]

— Mosyakin (1995; see literature reports)
Corispermum americanum (Nuttall) Nuttall var. rydbergii Mosyakin (Chenopodiaceae). ["... seems to occur in several localities in Arizona, Colorado, New Mexico, Texas, and Utah."]

— Bob Sivinski (P.O. Box 1948, Santa Fe, NM 87504-1948)
Chenopodium cycloides A. Nels. (Chenopodiaceae): DeBaca County (UNM). [Additional collections of this species.]

— Turner (1995; see literature reports)
Hedyotis nigricans (Lam.) Fosberg var. papillacea B.L. Turner (Rubiaceae): Otero County (LL).

— Endangered Plants Notes and News (1996; see literature reports)
Salix arizonica Dorn (Salicaceae): Rio Arriba County (Santa Fe Nat. For. Herbarium) [Previously reported only from Taos County.]

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