



Peter J. Heaney

THE EXTINCTION OF GEOLOGY

Have you ever wondered why we are called “mineralogists” and not something else—“mineralists,” for example? Apparently the convention cannot be ascribed to historical precedence. According to the *Oxford English*

Dictionary (OED), John Ford introduced the now-abandoned “mineralist” in 1628 in his tragicomical play *The Lover’s Melancholy*, 17 years before the first recorded occurrence of “mineralogist” in Thomas Browne’s *Pseudodoxia Epidemica*. It may be just as well that “mineralist” vanished from the lexicon, as Ford’s treatment of “Mountebancks, Empricks, Quacksalvers, and Mineralists” was strictly satirical. From the 14th century onward, “mineral” often conveyed a medical meaning as chemical treatments for disease increasingly challenged the role of herbal remedies. Indeed, Shakespeare’s usage of the word (only four times in all his works) reflects this sense: “Thou has practic’d on her with foul charms, Abus’d her delicate youth with drugs or minerals” (*Othello* I.ii.73). Because the minerals used for healing frequently were poisons (often by intent!), it was not long before the field of iatrochemistry—and the mineralists who practiced it—became objects of derision.

The survival of certain terms in the scientific vocabulary and the disappearance of others are the results of choices that are neither haphazard nor trivial. Stanford historian Robert Proctor addresses this theme in the latest issue of *Isis*, the journal of the History of Science Society.¹ Proctor focuses specifically on the suffixes that scientists have exploited to distinguish themselves from the hoi polloi. “The names given to particular science fields and subfields,” he asserts, “are shaped by ideological baggage picked up in the course of usage.” Armed with the searchable version of the OED, Proctor examines the “-ologies,” “-ometries,” “-ographies,” and “-ics” that have been affixed to unsuspecting roots in order to create new fields of expertise, and his discoveries are provocative.

Prior to the 19th century, “-ic” dominated as the appendage of choice for intellectual pursuits. Based on the Greek ending “-ikos,” meaning “of or pertaining to,” this suffix yields a number of words that date back more than 600 years, such as “rhetoric,” “logic,” “arithmetic,” and “music.” “Physic” in its singular form referred to the practice of medicine, but when pluralized as “physics,” it drew upon the Aristotelian meaning: “of nature.” “Optics,” “ethics,” and “mathematics” are ancient borrowers of the pluralized form, but Proctor notes that the rise of empirical science in the 17th century witnessed the installation of many new members of the brotherhood: “acoustics,” “mechanics,” “pneumatics,” and “hydrostatics” among them.

Beginning in the 1800s, however, “-logos” supplanted “-ikos” as the favored Greek terminus. Meaning “discourse about,” “-logos”-inspired endings were not a new invention. “Anthropologia,” “meteorologia,” and “physiologia” are of extremely old vintage and were drawn directly from the Greek. Proctor argues that the increase in specialization and professionalization of the sciences in the 19th century led to a profusion of “-ologies,” beyond the point of absurdity. No reader of *Elements* can object to “petrology” (1811), “ecology” (1873), or even “climatology” (1843), but “ambrology” (1879)—the study of amber—may strike some as a little superfluous. Many hundreds of “-ologies” were coined during this period and early into the 20th century. Interestingly, however, Proctor

¹ Proctor RN (2007) “-Logos,” “-ismos,” and “-ikos”: The political iconicity of denominative suffixes in science (or, phonesthemic tints and taints in the coining of science domain names). *Isis* 98: 290-309

observes a resurgence of “-ics” following the end of World War II: “electronics,” “genomics,” “robotics,” and of course “plate tectonics” are examples. What accounts for the orismological turnaround? [From “orismology,” invented in 1815 to describe the terminology (1801) of technical words.] Proctor points to a rise in the stature of physics following the successes of the Manhattan Project, radar, and jet propulsion.

We can apply Proctor’s thesis to our own branch of natural history, and it is a little disturbing to realize how susceptible our generation is to the vagaries of elocutionary fashion. For example, for the first three-quarters of the 20th century, virtually all groups of scientists in academia who devoted their labors to the study of our planet belonged to “Departments of Geology.” The end of the 1980s, however, marked a titular K-T

event, as the word “geology” suddenly disappeared from letterheads all over. Drawing on a study of introductory Earth science courses at American universities,² I analyzed the names of 270 college-level departments and came up with the following statistics: Only 45% now describe themselves as “Departments of Geology” (including such permutations as “Geography and Geology”). Surprisingly, no one alternative has emerged as the reigning substitute. “Department of Earth Sciences” or some variant thereof (“Earth and Planetary Sciences,” “Earth and Space Sciences”) accounts for 19%. “Department of Geosciences” is next at 14%; “Department of Geological Sciences” is virtually tied with “Other” (Department of Environmental Sciences or Physical Sciences or whatnot) at 12% and 11%, respectively.

How is it that the terms “physics,” “chemistry,” and “mathematics” are sufficiently elastic that they can accommodate the re-invention and expansion of their fields, but “geology” cannot?

Even more tellingly, of the 27 top-rated programs in the United States according to *US News and World Report*, exactly one university is hanging tough with a “Department of Geology”: UC Davis. Three others claim some allegiance to tradition with “Department of Geology and Geophysics”: Yale, U Wisconsin–Madison, and U Minnesota–Twin Cities. The statistics for the remaining 23 schools fall out as follows: “Earth Science” – 52%; “Geological Sciences” – 22%; “Geosciences” – 11%.

Most readers of this journal have lived through this terminological watershed, and many even participated in it. But do we really understand why it happened? Most of my colleagues will argue that “geology” is simply too narrow to encompass the incredible breadth of what modern Earth scientists do. For the past two decades, we have been as likely to find an atmospheric scientist or an oceanographer occupying the adjacent office as someone who hammers on rocks, and nobody who boasts the mathematical expertise required for tornado dynamics wants to be labeled a “geologist.”

The OED is marching in lockstep with the terminological tenor of the times. The first definition for “geology” is as follows: “The science which treats of the earth in general.” But here is the kicker. Following that definition are the following three letters: *Obs!* Now for the second and modern definition: “The science which has for its object the investigation of the earth’s crust, of the strata which enter into its composition, with their mutual relations, and of the successive changes to which their present condition and positions are due.” That is a verbatim quotation. You can look it up.

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² Martinez C, Baker MA (2006) Introductory geoscience enrollment in the United States: Academic year 2004-2005. American Geological Institute Report GW-06-001

DINGWELL ELECTED MEMBER OF THE ACADEMIA EUROPAEA

The Academia Europaea, Europe's academy of science and letters, has elected **Prof. Donald Bruce Dingwell**, one of five geoscientists elected in 2007, to membership in the academy. The academy elected 81 new members in 2007. Prof. Dingwell is the chair of mineralogy and petrology and director of the Department of Earth and Environmental Sciences of the LMU-University of Munich, Germany.



Prof. Dingwell is a specialist in the application of experiments to the Earth. His research is dedicated to deciphering the complex processes behind volcanism using physico-chemical principles. He has previously been the recipient of awards from international academic and research societies. With about 250 publications and 5000 citations (ISI), he is one of the world's most highly cited geoscientists. He has been a member of the Mineralogical Society of America for 25 years.

Professor Dingwell received his membership from the president of the academy in Toledo, Spain, in September, along with four other geoscientists, Irina M. Artemieva (Denmark), Philippe Gillet (France), Gilles Ramstein (France), and Yuliya I. Troitskaya (Russia).

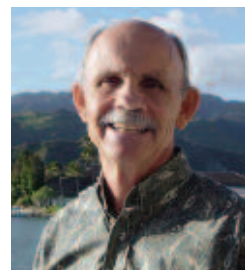


SCHIFFRIES TO HEAD GSA OFFICE IN WASHINGTON

Dr. Craig M. Schiffries recently joined the Geological Society of America (GSA) as its new Director for Geoscience Policy. He will staff an office focused on public policy and the geosciences in Washington, D.C. The overarching goal of this brand-new office is to provide GSA and its membership with leadership in public policy as well as active involvement in public policy decision-making and implementation processes. The office will also further the Society's core mission to advance the geosciences, enhance the professional growth of its members, and promote the geosciences in the service of society.

Dr. Schiffries joins GSA after five years as Director of Science Policy for the National Council for Science and Environment in Washington. Previously he held positions at the National Academy of Sciences and the American Geological Institute, and served as a GSA Congressional Science Fellow and professional staff member of the United States Senate. Schiffries holds an Honors BA in philosophy, politics, and economics from Oxford University, BS and MS degrees in geology and geophysics from Yale University, and a PhD in geology from Harvard University. He is a member of the Mineralogical Society of America.

VERNADSKY MEDAL TO MACKENZIE



Prof. Fred Mackenzie was awarded the inaugural Vernadsky Medal of the International Association of GeoChemistry (IAGC) during the recent Goldschmidt Conference. The

medal was awarded to Prof. Mackenzie for a distinguished record of scientific accomplishment in geochemistry over the course of his career.

Fred Mackenzie is currently Professor of Oceanography and Geology & Geophysics in the School of Ocean and Earth Science at the University of Hawai'i. He received his BS in geology and physics at Upsala College (New Jersey, USA) and his MS and PhD in geology and geochemistry from Lehigh University (USA). He is a distinguished researcher whose current research projects include modeling of the Earth's surface system through geologic time; the biogeochemical cycling of carbon, nitrogen, and phosphorus and CO₂ exchange in the coastal zone; the effects of rising CO₂ and temperature on coral/carbonate ecosystems; the kinetics and thermodynamics of mineral-solution reactions; and the implications of global warming for concepts of sustainability for Pacific island nations and Hawai'i.

His research has been recognized through awards such as the Francis J. Pettijohn Medal for excellence in sedimentology from the Society for Sedimentary Geology in 2005 and the Claire C. Patterson Medal in environmental geochemistry from the Geochemical Society in 2006. He is a fellow of the Mineralogical Society of America, the Geological Society of America, the Geochemical Society and the European Association for Geochemistry, and the American Association for the Advancement of Science, and is a life trustee of the Bermuda Biological Station for Research.

TRIPLE POINT (cont'd from page 301)

What is puzzling about this leap from "geology" to anything else is that "geology" is *not* a neologism (1799) of the 19th century. The medieval Latin term "geologia," meaning "the science of Earthly things," goes back at least to a 14th century manuscript by Richard de Bury, a bishop of Durham and tutor to Edward III. Transliterations of the word were used in Italian, French, and German texts through the intervening centuries. Therefore, "geology" does not belong to the hundreds of "-ologies" produced by the hyper-Baconian assembly line of the 1800s. While a part of the scientific enterprise at that time was characterized by tiresome data collection, geology ruled as the philosophical mindbender of its day.

Geology has since evolved, as have all other sciences. How is it that the terms "physics," "chemistry," and "mathematics" are sufficiently elastic that they can accommodate the reinvention and expansion of their

fields, but "geology" cannot? The top physics programs in the country still call themselves "Departments of Physics." A "Department of Physical Sciences" conjures up a group of physicists, chemists, geologists, and/or environmental scientists under one roof at a small liberal arts college. And nobody is coining "Department of Physiosciences" to emphasize a mathematical rigor that is not shared by mere physicists. As Proctor has argued, these transitions in nomenclature seem insignificant, and yet they are telling us something profound about ourselves. But are we sure that it is something good?

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