BOOKS

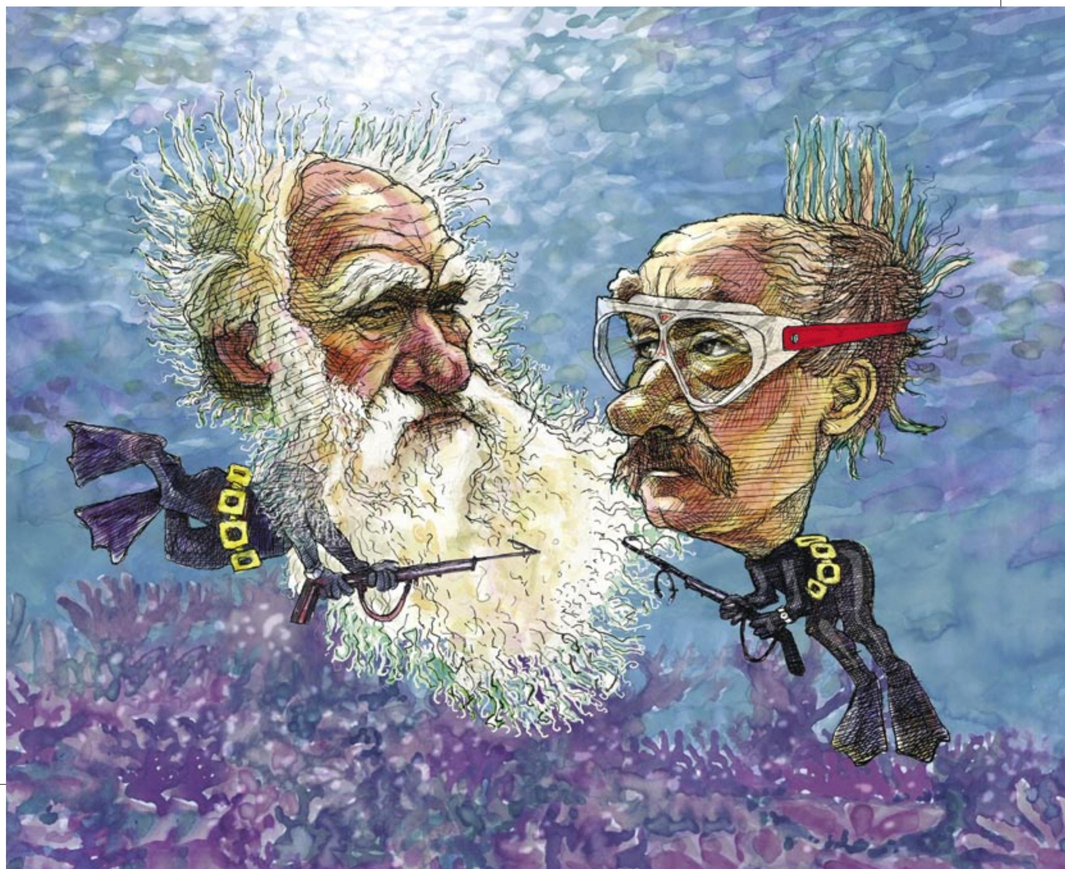
# Wrangling about Reefs

*In a nineteenth-century controversy about how coral reefs form, signs of the origin of "Big Science"*

by JAMES HANKEN

Tucked away at the periphery of the Harvard Museum of Natural History (HMNH) on Oxford Street in Cambridge, off to the side of the historic Hall of Mammals, lies a small room that is used mostly as a temporary classroom for the throngs of elementary-school students who invade the public galleries each weekday. On many weekends, the room doubles as a rental space that is used to accommodate children's birthday parties and other cacophonous events. For the occasional wedding or bar mitzvah, the room even serves as a dance hall. Few students, partygoers, or dancers notice the large and intricate three-dimensional model of Funafuti Atoll, a beautiful island chain in the west-central Pacific, which has been pushed off to the side to make room for tables and chairs, not to mention birthday cakes, balloons, wrapped water guns, CDs, and video games. And no one gets to see a second model, depicting the island of Bora-Bora in French Polynesia, which was cut into several large pieces many years ago to make additional room and is now stored on its side against one wall and hidden behind an imposing divider.

It wasn't always this way. The "coral reef room," as it is still known to many curators, staff members, and students, was once among the most important and prized exhibits of the Museum of Comparative Zoology (MCZ), the largest of HMNH's three parent museums. It depicted in graphic and exacting detail the objects of an intense intellectual debate that began in the mid 1800s and ultimately pitted many of the leading biologists and intellectuals of the late nineteenth and early twentieth centuries against one another: Charles Darwin, Ernst Haeckel, James Dwight Dana, Louis Agassiz (the founder of the MCZ in 1859), and his son, Alexander (who ultimately became the museum's second director after his father's death in 1873). And just as the museum's two coral reef exhibits have largely been set aside from public view, so, too, has the coral reef debate—or the coral reef "problem," as it was known in the nineteenth century—largely disappeared from contemporary understanding and appreciation of the history of evolutionary biology and geology. This is a shame, because the coral reef debate offers many valuable lessons regarding the nature of scientific inquiry and method, not to mention a series of colorful anecdotes and stories with a remarkable cast of characters that is hard to match. It is the history and significance of this debate that form the



David Dobbs, *Reef Madness: Charles Darwin, Alexander Agassiz, and the Meaning of Coral* (Pantheon, $25).

## OFF THE SHELF

*A sampling of current books received at this magazine*

**Saving Higher Education in the Age of Money,** by James Engell '73, Ph.D. '78, Gurney professor of English and professor of comparative literature, and Anthony Dangerfield (University of Virginia Press, $27.95). Increasingly, learning is no longer the reason to pursue or practice higher education, write the authors. Through analysis of admission practices, salaries, student attitudes, tuition costs, research programs, and so on, they detail how the pursuit of money has transformed the academy.

FROM THE BOOK

Sailors and señoritas on an American wallpaper

**Off the Wall: Wonderful Wall Coverings of the Twentieth Century,** by Lena Lenček, A.M. '72, G '83, and Gideon Bosker (Chronicle Books, $22.95, paper). A visual treat. The authors place each of the 150 designs, many from major museum collections, in cultural context. Wallpaper is an artistic medium to be reckoned with: as Oscar Wilde said on his deathbed, "Either that wallpaper goes or I do."

**Creative Healers: A Collection of Essays, Reviews, and Poems from *The Pharos,* 1938-1998,** edited by Edward Day Harris Jr., M.D. '62 (Alpha Omega Alpha Honor Medical Society, 525 Middlefield Road, Menlo Park, California 94025, $40). A rich anthology of pieces in the medical humanities, culled from 60 years of an honor-society journal, including works by Harvardians such as Lewis Thomas, Helen Taussig, and John Knowles.

**The Nature of Sacrifice: A Biography of Charles Russell Lowell, Jr., 1835-64,** by Carol Bundy (Farrar, Straus and Giroux, $35). Lowell, A.B. 1854, died in the war his family, full of Harvardians, helped fashion to be about slavery.

**The Competition Solution: The Bipartisan Secret behind American Prosperity,** by Paul A. London '58, M.P.A. '69, Ph.D. '74 (AEI Press, $25). For the past few decades, politicians have promoted competition in the American economy, and it is competition, London writes, more than monetary or tax policy, that has led to prosperity. More competition is wanted in healthcare and education.

**Against Depression,** by Peter D. Kramer '70, M.D. '76 (Viking, $25.95). Westerners traditionally have perceived depression as ennobling, and melancholy as romantic. Kramer, a clinical professor of psychiatry at Brown, finds nothing at all heroic about the pervasive disease.

**America's National Park Roads and Parkways: Drawings from the Historic American Engineering Record,** edited by Timothy Davis '80, Todd A. Croteau, and Christopher H. Marston (Johns Hopkins University Press, $55). This massive volume surprises and charms with old-fashioned drawings of bridges, tunnels, switchbacks, guard walls, and the like, many drawings with profuse incidental details such as cute little steamrollers, construction joinery, and the horse-drawn coach that once carried visitors to Yosemite.

FROM THE BOOK

Pathbreaking highway design for the Bronx River Parkway

**The Orientalist: Solving the Mystery of a Strange and Dangerous Life,** by Tom Reiss '86 (Random House, $25.95). An intriguing biography of Lev Nussimbaum, a Jew from exotic Baku who styled himself a Muslim prince and became a literary lion in Hitler's Germany—but the fascists caught onto him. Stranger than fiction.

**African Voices of the Atlantic Slave Trade: Beyond the Silence and the Shame,** by Anne C. Bailey '86 (Beacon Press, $26). The author is assistant professor of history at Spelman College. She uses oral narratives—40 interviews with chiefs and elders in Ghana—to examine the history of domestic slavery in Africa and to explore why Africans came to sell other Africans into transatlantic slavery.

**And Tango Makes Three,** by Justin Richardson '85, A.M.-M.D. '90, and Peter Parnell, illustrated by Henry Cole (Simon & Schuster, $14.95). Roy and Silo are two male penguins in New York's Central Park Zoo. Attracted to each other, they become a committed couple, build a nest, and attempt to hatch an egg-shaped stone. Finally, a zookeeper gives them a real, fertilized, but homeless egg to mind. The result is Tango, probably the first chinstrap penguin to be raised by two dads. For children four through eight, a tender tale, and guess what? It's true.

**Harvard Rules: The Struggle for the Soul of the World's Most Powerful University,** by Richard Bradley, A.M. '90, G '93 (HarperCollins, $25.95). An anecdotal and often negative assessment of Lawrence H. Summers and his Harvard presidency, as of Commencement 2004, by a former editor at *George* magazine.

*Illustration opposite by Tom Mosser*

OPEN BOOK

## *The Allure of the Bad Boy*

*The Peabody Sisters: Three Women Who Ignited American Romanticism,* by Megan Marshall '77 (Houghton Mifflin, $28), is a delightful group biography of Elizabeth, Mary, and Sophia Peabody, in many ways America's Brontë sisters. Elizabeth (1804-1894) was a key Transcendentalist, a writer, publisher, and translator, the founder of kindergartens in America, and the model for Miss Birdseye in Henry James's *The Bostonians.* By age 17 she was running a young ladies' boarding school in Lancaster, Massachusetts, a town full of rebel youths under the eye of Rev. Nathaniel Thayer, A.B. 1789, S.T.D. 1817, who was entrusted with renegade Harvard students during their rustications.

Aside from theology, another favorite subject of Elizabeth's morning discussions with Dr. Thayer was the company of Harvard students under his care. These young men, close in age to both Mary and Elizabeth, increasingly filled the sisters' after-school hours. There was Russell Sturgis of Harvard's notoriously rowdy class of 1823, the same one in which Mary's once beloved Charley Pickering had enrolled—and from which over half the students would be expelled before graduation. The 1820s were a time of recurrent strife between administration and students at Harvard, as its fourteenth president, John Kirkland, attempted to reform the college, then little better than a plush prep school for boys in their midteens, into a serious university. The class of 1823 was the first to encounter—and to resist—Kirkland's ban on the traditional dinners held the night before final examinations. The dinners took place in taverns at some distance from the college and included games of billiards, bowling, and countless rounds of toasts lasting far into the night. Not only had Russell Sturgis helped to organize one such dinner, but he also distributed the class drinking song, improvised on the occasion, to all his classmates the following morning as they gathered to take their exams.

Found guilty of entering into a "combination against the authority of the College," Sturgis was instantly suspended. Yet his actions were considered the height of class loyalty by his fellows and led to all manner of protests once he'd been disciplined: walkouts, bonfires, even one incident in which a student dropped a cannonball from his fourth-floor window "with an insulting note attached to the Proctor, breaking the stone steps and endangering the life of Professor Downing," according to the college's disciplinary records. The few students who had informed on Sturgis became part of a "black list" group that was heckled throughout their years on campus, although they became favorites with the faculty. Returning to college after his suspension, Sturgis disrupted an important lecture being delivered by the Reverend [William Ellery] Channing when he walked in late and his classmates rose to applaud him. This transgression brought him a full nine months' suspension, most of which he took in Lancaster. Yet Sturgis was one of the top scholars in his class. So self-assured that flouting the Harvard authorities meant little to him, Sturgis was instantly appealing to the Peabody sisters; Sturgis himself took a particular fancy to Mary.

subject of David Dobbs's splendid new book.

Dobbs, who is neither a practicing scientist nor a science historian, is instead a science writer who does a very effective and insightful job at conveying the spirit and subtleties of both disciplines. His two earlier books, *The Northern Forest*, which examines the political debate about harvesting and development of New England forests, and *The Great Gulf*, which chronicles the controversy over management and harvesting of New England marine fisheries, have received numerous awards for science journalism. Both books depict the pursuit of scientific objectives as deeply enmeshed in the overarching societal and political contexts of their time.

Similarly, Dobbs presents the coral reef debate—correctly—as deeply embedded in an intricate milieu that ranges from the transformation of nineteenth-century conceptions of the nature of empirical research and of scientific "proof" to the complex personalities and personal tragedies of the main partisans, as well as their interpersonal relationships and professional interactions. Indeed, the first half or more of the book deals principally with the early life experiences and intellectual maturation—including both heroic successes and dismal failures—of both Louis and Alexander Agassiz and Charles Darwin. This prolonged introduction very effectively sets the stage for the subsequent recounting of the coral reef debate.

Although there had been much discussion and theorizing on the coral reef problem earlier, the focused debate arguably began in earnest with Darwin's outline of his theory in the *Voyage of the "Beagle"* (1839), and subsequent fuller elaboration in his *Structure and Distribution of Coral Reefs* (1842). Darwin, arguing from what his opponents later regarded as both insufficient knowledge and inadequate observation of coral reefs, offered the dramatic suggestion that the geometry and other unique physical characteristics of most reef formations could be explained by coral growth following the progressive subsidence of oceanic islands. Numerous scientists subsequently disputed Darwin's theory, and for various reasons, but ultimately it was Alexander Agassiz, who by then was director of the MCZ, who reluctantly assumed the man-



Illustration by Mark Steele

tle as Darwin's chief opponent. (Alexander gradually developed his own theory, which attributed the formation of at least some reefs to elevation of marine substrates and their subsequent erosion.) Indeed, it is not too much of an exaggeration to regard the last 20 years of Alexander's professional life—beginning with his 1891 research cruise to the Galápagos Islands and ending in 1910 with his sudden and untimely death on board a passenger steamship bound for New York from England—as largely consumed with gathering data from coral reefs throughout the globe that would reveal the fatal flaws in Darwin's theory.

In retrospect, we now realize that attempts by Alexander Agassiz—or, indeed, any of his contemporaries—to adequately resolve the coral reef problem were hopeless. Extraction of deep underground rock samples, which would provide definitive evidence either in favor or against, needed the development of more robust drilling technology, decades after Alexander's death. Indeed, it was not until the 1950s that deep drilling by the U.S. Navy on Eniwetok Atoll, in advance of nuclear bomb tests in the Marshall Islands, yielded the hard, unequivocal evidence that (finally) proved Darwin correct.

Dobbs has written much more than a book about coral reefs and their formation. Among other things, his work gave me a much deeper understanding and appreciation of Alexander Agassiz, whose reluctance to take on Darwin is especially poignant. Compared to his extroverted father, Louis, whose dynamic and larger-than-life persona dominated intellectual life in the United States (and beyond) in the mid nineteenth century, Alexander appears unassuming, even dull. He was no publicity hound, ever seeking center stage. Yet it was Alexander, and not Louis, who while only in his thirties began to amass a vast personal fortune (by investing in and managing a tremendously productive copper mine in Michigan's Upper Peninsula) that would enable him to embark on the most comprehensive and far-reaching expeditions to investigate coral reefs that the world had ever seen. This was Big Science, nineteenth-century style.

More telling, perhaps, Alexander had as a young man witnessed the crushing intellectual defeat of his father, who had stubbornly refused to accept Darwin's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1859 theory of evolution by natural selection and instead had steadfastly championed his own brand of "special creation" until his death in 1873 [see "A Wrangle over Darwin," September-October 1998, page 47]. In many respects, the last thing that Alexander wanted to do was take on the man who was by then among the world's scientific elite and who had already notched one Agassiz on his belt. Yet the coral reef problem also was enticing. Should Alexander's hypothesis prove correct, it would, after all, offer a means of disproving Darwin and thus of extracting some modicum of revenge for his father's earlier defeat. Moreover, the opportunities and justification for virtually unlimited fieldwork in the far-flung corners of the globe would provide—even if only unconsciously—a means of coping with the deep psychological depression that Alexander suffered early in his career, following the nearly simultaneous death of both his wife and father in December 1873, among other personal losses.

The coral reef debate comprises a seemingly endless series of both marvelous coincidences and painful ironies. Thus, the Museum of Comparative Zoology was founded by the "creationist" Louis Agassiz in the same year as the initial publication of Darwin's *Origin of Species*. Consequently, even at the time of the museum's birth, Louis's scientific world was beginning to crumble. He would subsequently launch his own far-reaching expeditions, such as the famous Thayer expedition to the Brazilian Amazon (1865–66), and amass enormous collections in a futile attempt to refute Darwin's theory of evolution. Most of these collections still remain at 26 Oxford Street, and ultimately "The Agassiz Museum" would gain renown as a preeminent center for the study of Darwinian evolution. One final irony associated with Alexander Agassiz emerged after his death: his long-awaited synthesis of the data amassed during his extensive field investigations of coral reefs—data that he felt disproved Darwin's theory as a general model of coral reef formation—had not yet been published when he died. Moreover, despite Alexander's stated intention as early as 1902, eight years before his death, to prepare "a connected account of coral reefs based on what I have seen," no manuscript, no earlier drafts, not even organized notes were ever found. The work remains missing and unfinished to this day.

Dobbs has done an excellent job of weaving together these and other numerous threads into a fabric that is both informative and entertaining. *Reef Madness* treats a period when our contemporary way of doing science was beginning to emerge from the Victorian age; when "creationists" and "evolutionists" weren't as easy to pigeonhole as they are today; when a wealthy university museum director would hire a private railcar to convey him and his field party from Montreal to Vancouver at the beginning of a month-long journey from Boston to Fiji; and when one of Germany's leading scientists could describe one of Harvard's leading lights as "the most ingenious and energetic racketeer in the entire domain of natural history." This is fun science.

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## CHAPTER & VERSE

*A correspondence corner for not-so-famous lost words*

**Alon Ferency requests** the source of a quotation that runs, roughly, "Oh life! That we would die a little each day, rather than live all at once."

**Edward Lowry wonders** if someone can outperform Google by providing a precise source for "No man is safe in his life, liberty, and property while the Legislature is in session." He has seen the statement attributed to both Twain and Tocqueville, and notes that the remark was quoted with approval, but without attribution, by a New York State probate judge: *Estate of A.B.*, 1Tucker 249 (N.Y. Surrogate, 1866).

**Frank Slaninger hopes** to learn who first said, "Never attribute to mendacity what is sufficiently explained by stupidity," and if this version of the remark preceded or followed the variant that uses "malice" instead of "mendacity."

**William Bayliss would like** the title of a short poem, possibly by Goethe, about the heights of joy and depths of sorrow that uses the image of a swing to suggest that the higher one soars, the greater the depth one sinks to on return.

**Peter Pullman asks** if anyone can identify original sources—perhaps "from various bad poems that composer-pianist Earl 'Bud' Powell had to memorize in primary school"—for Powell's lyric "The Great Awakening." What may be its earliest version, found among the papers of fellow musician Mary Lou Williams, runs: "I was sitting in the Garden one late afternoon/And out of the sky a feather fell!/And not a moment to[sic] soon./I didn't stop to regard from what source it came/I only know it lifted me from out of the depths of shame./You see, I never really lived/All I've done was exist/For all the joy I've ever known, was from a knife, a gun, or fist./I came up the hard way, that is, the boys, a drink, and a broad/But from this moment hence,/I'm drawing my sword./And I'm going to cut the weed of temptation, before it entangles me./And live the way God intended/This short but sweet life to be./Oh, but there's one thing I've not cleared up, and that's the missing link/From whence the feather came has started me to think./And as I looked up at God's creation/A school of pigeons flew by./It was then I knew where it came from/God had used a spy."

**"Miss Diana Dingy"** (January-February). André Mayer notes that "dingy" or "dinge" was long a slang term for a person of color, and that "Diana" is "likely a classicized version of the biblical 'Dinah,' a stereotypical servant's name (as in 'Someone's in the kitchen with Dinah'). Thus the name identifies her as a woman of [Job Jerryson's] own race and station in life; the honorific 'Miss' and somewhat high-flown language of the rest of the quotation, together with Jerryson's claim to be the manager of a theatrical troupe, are all signs of social and cultural pretensions no doubt intended to amuse" an audience.

Send inquiries and answers to "Chapter and Verse," Harvard Magazine, 7 Ware Street, Cambridge 02138.