the mean free path of an electron is about 7 × 10^{-5} mm. The maximum electric field without breakdown is on the order of 1 kV/mm. Thus any stray electrons would accelerate through less than 0.1 V before striking an air molecule. But air contains almost no free electrons, or it would not be the near-perfect dielectric that it is. So, go ahead, climb on that wooden stool, crank up the Van de Graaff, and watch your hair stand up as long as you like.

Jonathan Allen
(rfguy13@comcast.net)
Titusville, New Jersey

Mayer earned the lunar-table prize

Siegfried Bodenmann's article "The 18th-Century Battle over Lunar Motion" (PHYSICS TODAY, January 2010, page 27) leaves the reader with the erroneous impression that Tobias Mayer simply utilized Leonhard Euler's lunar theory to produce the lunar tables that earned the £3000 reward paid to his widow by the British Parliament. The article states, "A look at [Mayer's] correspondence and works reveals that his tables are based on the lunar theory of none other than Euler."

According to Eric Forbes and Curtis Wilson, the lunar tables that Mayer submitted to the Admiralty in 1754 were a revision of his 1753 tables, which in turn were based on his own theory, not Euler's.[1] From the Forbes and Curtis article it seems clear that Mayer benefitted from Euler's advice but pursued a somewhat different strategy. One important difference between the two is that Mayer allowed his theory to be guided by observations in evaluating the coefficients rather than trying to obtain precise values analytically through lengthy calculations. His theory was therefore semi-empirical, not purely analytic. Forbes and Wilson comment that Euler, the "*supposed* author of the theory on which Mayer's tables were based" [italics mine], was "surprised" by his own £300 award. They imply that Mayer's widow might have received as much as £5000 but for a letter of Alexis Clairaut's published in an English magazine. In the letter Clairaut claimed that his and Euler's theories were more rigorous than Mayer's and that Mayer's tables were accurate mainly because of his skillful discussion of observational data. Clairaut may well have been correct on both points. However, for reasons that should be obvious, one would expect the Admiralty to have been more concerned with accuracy than mathematical rigor.

Reference

1. E. G. Forbes, C. Wilson, in *The General History of Astronomy*, vol. 2, part B, R. Taton, C. Wilson, eds., Cambridge U. Press, New York (1995), p. 62.

Haywood Smith Jr
(hsmith@astro.ufl.edu)
University of Florida
Gainesville

Students need to see education's job relevance

I read with interest "What Determines How Well Kids Do in School?" by Toni Feder (PHYSICS TODAY, December 2009, page 28). Mike Marder and Dhruv Bansal, whose analysis was the subject of Feder's piece, identify a sharp downturn in school performance in grades 5–8, particularly among low-income students.

I have observed the educational system firsthand over a number of years. While performing research at Xerox research labs, I developed and implemented science programs for inner-city schools in Rochester, New York. Eventually, 50 to 100 scientists from Xerox and Kodak taught science part-time in public schools. Although those programs had limited success, they did not attack the real, practical problems of life—primarily jobs and money. So I implemented money-making work activities for inner-city students on my own, because I could not get support for those practical activities.

From my observations of students in various settings, I believe that the drop in performance in grades 5–8 is related to the onset of sexual maturation, in which the surge of hormones also induces a surge of independence. It is all natural biochemical behavior, but at that age students are not prepared to be rationally independent. The problem is compounded for low-income students who have insufficient resources and insufficient parental control and influence to guide them. The students are anxious to proceed independently and successfully but lack the necessary skills and maturity. That conflict between desire and maturity level causes extensive problems from which it seems most low-income students never fully recover.

In my experience, many low-income students do not see any correlation between success in school and success in life, a trait they may have inherited from their parents and families. Judging by the programs I have initiated and implemented, low-income students relate more enthusiastically to money-making concepts than to academic subjects like spelling, history, or languages. But they are very interested in arithmetic—if money is involved.

The biggest failure of US education is its lack of direct obvious connection to fundamental realities. Therefore, I have proposed for many years that the practical relevance of education be a focus of the curriculum and that it center around a few core concepts.

In my program, a personal job/career plan would be the backbone of education for all students, starting in grade 1 and escalating through grade 12. Students would determine their personal career goals and objectives and would develop timed plans to acquire the skills necessary to achieve them. They would set primary, secondary, and tertiary goals, and plans would change to fit students' maturity, needs, and reality.

Key elements of the course would be how to choose a profession and what skills are required; how to apply for, obtain, and advance in a job; how to make, invest, budget, and spend money; how to run a company; and how to start and operate a business. Conventional subjects of reading, writing, arithmetic, and science would be incorporated into the curriculum as they fit the overall structure. Students would be encouraged to get jobs as early as possible and integrate their practical experience into the course.

Chuck Gallo
(chuckgallo@comcast.net)
Superconix Inc
Lake Elmo, Minnesota

No simple cause and effect for glacial melt

The spectacular Back Scatter image "Black Soot and Tibetan Glaciers" (PHYSICS TODAY, February 2010, page 72) is accompanied by a commentary suggesting that black soot from industry on the surrounding subcontinent is warming the lower atmosphere, darkening the glaciers' surface, and dramatically increasing absorption of solar radiation and the rate of melting. The rate of accretion or ablation of mountain glaciers may be as much a result of precipitation as of surface temperature. Increasing the Himalayan massif's surface temperature would just as likely enhance the Southeast Asian monsoons and bring more snowfall to the glaciers, thus causing them to grow rather than decay. In considering the complex feedback processes linking the surface to the atmosphere, it is dangerous to speculate on the net result.

Michael Garstang
(mxg@swa.com)
University of Virginia
Charlottesville

Scientific declarations best left to scientists

Prestigious scientific societies, I have believed since my undergraduate days, exist to serve and promote science. But pronouncements concerning global warming issued by the Royal Society and the American Physical Society in 2007 indicate that some societies appear set on usurping science. To quote Thomas Huxley, "Belief, in the scientific sense of the word, is a serious matter, and needs strong foundation." That strong foundation can be provided only by the profound examination of nature by individual scientists and peer assessment of those examinations. For a committee, however distinguished its membership, to pontificate on scientific matters is not only hubris, it is dangerous. Let individual scientists speak and let committees be silent.

The Royal Society and the American Physical Society published endorsements in 2007 of the belief that there is global warming and that it is caused by human-generated carbon dioxide. Those pronouncements were made despite the scientific difficulties of obtaining a reliable quantitative measurement of global warming and of establishing a rigorous causal connection to man-made CO_2 in the atmosphere.

The media does not involve itself directly with scientific literature; it relies on the popular expositions of scientists and, mistakenly but understandably, on pronouncements of scientific societies. But those societies have no authority concerning scientific truth or falsehood. That is the business of individual scientists. It was not the Royal Society that gave the world its first account of gravity, it was Isaac Newton.

B. K. Ridley
(bkr@essex.ac.uk)
University of Essex
Essex, UK

Teaching amid the research obsession

In his review of Joseph Hermanowicz's book *Lives in Science: How Institutions Affect Academic Careers* (University of Chicago, 2009), Robert Hilborn remarks, "The most important lesson [of the book] is that the science community's obsession with research as the sole reason for recognition and reward leads to frustration and dissatisfaction when reality fails to match expectations. And that, as the sociologists would put it, 'leads to anomie'" (PHYSICS TODAY, January 2010, page 48). Although that statement essentially describes my career in physics, I still find it shocking. How can brilliant people be so stupid?

According to the *Random House Dictionary*, 2nd edition (1987), anomie—derived from the Greek word for lawlessness—is a sociological term meaning "a state or condition of individuals or a society characterized by a breakdown or absence of social norms and values, as in the case of uprooted people." Uprooted people have an understandable excuse. What excuse can the physics community offer?

The obsession with research as the sole measure of an educator's worth came close to ruining my career but for the intercession of a few farsighted colleagues in the University of Minnesota physics department who came to my aid and helped me get some recognition and at least some improvement in salary. Today, after decades of work and dedication on my part, and after 10 years of retirement, I am considered a master volunteer teacher in the Osher Lifelong Learning Institute, and I had a similar reputation throughout most of my tenure at the university.

The research obsession is both self-reinforcing and self-destructive. The eroding state of science and science education in the US today is at least partly due to that misguided and harmful attitude in our universities. It has disfigured the humanities into useless imitations of some kind of quantitative science and has made the exact sciences a shadow of what they ought to be as part of liberal education and knowledge. It's tragic that at a time when science should be setting the standard for truth and understanding, science academics and administrators are too preoccupied with their own self-advancement to play the valuable and important leadership role.

My case is a small example of the problem. My department didn't recognize the value of my talents and skills, which it could have used in "selling" physics to the lay community. I could have been a central player in efforts to popularize, explain, and spread understanding of physics.

Teaching physics has been so undervalued for so many years that its denigration has become a serious, even self-destructive problem for science and society. Now, when we need science and scientists most, the populace has little understanding of the value of either, and even ridicules science on a regular basis. What have we wrought?

Roger S. Jones
(jones001@umn.edu)
University of Minnesota
Minneapolis

Notes on *Strangest Man*

I had just finished reading Graham Farmelo's biography, *The Strangest Man: The Hidden Life of Paul Dirac, Mystic of the Atom* (Basic Books, 2009), when the December 2009 issue of PHYSICS TODAY arrived, with the interesting review by Babak Ashrafi on page 52. Although I