have preferential early access to the entire assembly, and they should collaborate on a finished sequence publication.

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## Bowties and Brainiacs at the AAAS Meeting

WHEN I TOLD MY SISTER I'D BE COMING TO Boston for the annual American Association for the Advancement of Science (AAAS) meeting in February, her response was predictable. "These people have their convention on Valentine's Day? What, are they all single? Don't they have lives?"

My response: "I just told you they were scientists."

Billed as the scene "where all of science meets," it was held over 5 days at a sprawling convention center–hotel complex now filled with an avalanche of intellect (if by avalanche we mean predominantly white and gray). There were various lively symposiums such as "The new biology of rocks," "Mathematics and science of origami," and "Rethinking the role of affiliation and aggression in primate groups." "Humans may not be as aggressive and competitive as thought," the Washington University press release for this last session noted, which made me wonder if their researchers had observed and experienced the cunning attacks, jealous rages, and biting of backs commonly associated with top primates engaged in academic peer review.


I next checked out a well-attended seminar on nanotechnology but was disappointed that it didn't really involve any big ideas. I suppose I could have rushed through a lot more sessions like "Animal parts for humans? Xenotransplantation science, ethics, policy and publics," but I didn't want to make a pig of myself. I did make it to a session on Science in Cuba, which started half an hour late, or, as they'd say in Havana, two hours early, compañiero.

The first press briefing I attended was titled "Avian cognition: When being called 'bird brain' is a compliment." Alan Kamil of the University of Nebraska told us how the Clarke's nutcracker can store 25,000 pine seeds every fall and later use spatial memory and landmarks to recover them. He found that one of his graduate students could only recall multiple hiding places with 50% of the accuracy of a Clarke's nutcracker. Of course, the nutcrackers are more highly motivated than grad students, since they can actually live on birdseed.

On Friday morning the President's science adviser, John Marburger, gave a well-attended speech. During follow-up questioning, he agreed that the bulk of the scientific community has reached consensus on human-enhanced global warming. "Everyone understands we have to go to a zero world carbon economy," he explained. Expected White House response, "The President totally agrees with Dr. Marburger that in order to achieve energy independence we have to drill for oil in the Arctic National Wildlife Refuge."

Climate-related panels warned of increased droughts and floods, more rapid sea-level rise, faster glacial melting, and a boom in shark populations around Alaska (which could create competitive pressure on members of the State Bar). The good news? Urban smog and pollution may be slowing the rate of heating by contributing to reflective cloud formation. Between that and the bioterrorism ballroom event, I was glad to see NASA sponsoring an alternative panel, "Interstellar travel and multi-generation space ships."

Later I attended a session where French physicist Maria Spiropulu explained her theory of the fourth dimension and how one couldn't literally be sucked into a black hole, which still left the unanswered question, so where did all those Enron billions go?

Unfortunately, one great technological challenge continues to stymie America's top scientists. I was deeply moved by how many continue to struggle with overhead projectors that often delay, distort, or simply make a mockery of their carefully arranged transparencies. Although it's admittedly easy to ridicule science and its culture (and fun too), I still have to acknowledge a modest sense of awe as I learned about cutting-edge discoveries in human origins (monkeys you say?), astronomy, behavioral genetics, and brain structure (I think, therefore my prefrontal cortex neural mechanisms are functioning).

I certainly experienced a sense of wonder staring at a picture of a transistor the width of a single electron. I wondered what kind of batteries it came with.

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## Regulating Natural Health Products

IN HIS RECENT EDITORIAL "THE FUTURE OF medicine" (11 Jan., p. 233), C. Everett Koop calls attention to the growing use of alternative medicine and the need to prove the efficacy and safety of dietary supplements. He is correct when he compares the current situation to the snake oil days of a century ago that led to passage of the Pure Food and Drug Act of 1906. However, in 1994, Congress passed the Dietary Supplement Health and Education Act (DSHEA), in response to a massive lobbying effort by the natural products industry. This law exempts the manufacturers of dietary supplements from having to prove safety or efficacy before marketing. The burden of proof is thus on the Food and Drug Administration (FDA) to show that something is not safe, and to do this, the FDA must rely on an inefficient system of voluntary reporting of adverse events. The net result of this is a relatively unregulated industry that was estimated to have sales of $17.1 billion in 2000 (*1*).

Koop calls upon the "natural products industry to work with medical research, including the FDA" to assure safety and efficacy. While this is certainly something that should happen, it is naïve to think that it will occur in the absence of regulatory requirements. Although many in the industry support the FDA's proposed Good Manufacturing Practices (which address only issues of quality control), the industry has no incentive to voluntarily fund research that might reveal that some products are neither safe nor effective.

Congress must repeal or amend the DSHEA to give the FDA the power to regulate nutritional supplements by requiring scientific proof of efficacy and safety. Until that happens, it is essential that adequate resources be made available to the FDA and the Federal Trade Commission to enforce existing rules covering claims made on labels and in other advertising. Manufacturers should also be required to label all dietary supplements with a toll-free number and a Web URL for reporting adverse events directly to the FDA (*2*).

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1. U.S. dietary supplements market size expressed as dollar sales by top six product categories for 1994 to 1998 and forecast for 1999 and 2000, *National Business Journal* (Dialog file No. 93, Dialog Corporation, San Francisco, CA, 2000).
2. J. C. Lashof, Testimony before the Senate Select Committee on Aging, 10 September 2001.

CREDIT: TIM SMITH

IN HIS EDITORIAL, KOOP DISCUSSES THE importance of applying scientific and regulatory tests to the use of herbal and nutritional remedies. Recent findings about St. John's wort, an herbal product used to treat a variety of ailments, including depression, raise a related issue of concern. St. John's wort has been found to interfere with the effectiveness of a wide variety of commonly used drugs (*1*). For example, it causes a rapid reduction in the level of the immunosuppressant

St. John's wort

cyclosporine, with attendant danger of transplant rejection (*2*), and a reduction in the level of an anti-HIV protease inhibitor, indinavir (*3*). A major ingredient of St. John's wort, hyperforin, binds to a transcription factor (the PXR protein), activating synthesis of an enzyme (cytochrome P450 3A4), which then degrades a wide variety of drugs, including not only cyclosporine and indinavir, but also the active ingredient of birth control pills. The existence of this pathway, whose normal purpose is to protect the body from noxious chemicals, is well documented in recent molecular studies (*4*, *5*).

I agree with Koop that there may well be roles for alternative and complementary therapies in health care. It is crucial, however, that in the efforts to realize this potential, these remedies do not cause unintended damage to approved therapeutic agents.

All FDA-approved drugs are required to list precautions such as potential interactions with other drugs. It is disappointing that the bottle of St. John's wort that I recently purchased locally at a major nutritional products store contained only the most perfunctory of precautions on the label about possible interactions with drugs ("If you are taking medication, consult a healthcare professional before using this product."). Furthermore, this store was unable to provide any literature warning of possible interference with drugs.

It is noteworthy that the 2002 edition of the *Physicians' Desk Reference* (*6*) contains specific recommendations against coadministration of indinavir and St. John's wort and describes the interaction between cyclosporine and St. John's wort. Given the widespread use of St. John's wort, it might be advisable for the herbal remedy and nutrition industry to provide comparable explicit warnings and information.

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2. F. Ruschitzka, P. J. Meier, M. Turina, T. F. Luscher, G. Noll, *Lancet* **355**, 548 (2000).
3. S. C. Piscitelli, A. H. Burstein, D. Chaitt, R. M. Alfaro, J. Falloon, *Lancet* **355**, 547 (2000).
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5. T. W. Synold, I. Dussault, B. M. Forman, *Nature Med.* **7**, 584 (2001).
6. *Physicians' Desk Reference* (Medical Economics Company, Montvale, NJ, ed. 56, 2002).

## McClintock and Marriage

AFTER READING NATHANIEL C. COMFORT'S letter about Barbara McClintock (*Science*'s Compass, 18 Jan., p. 440), I feel duty bound to McClintock to relay a story that she told me in 1992 while I was researching her biography for my book *Nobel Prize Women in Science: Their Lives, Struggles and Momentous Discoveries*. In 1936, when McClintock was an assistant professor in the University of Missouri's botany department, a newspaper announced the engagement of another woman of the same name. Assuming that the engaged woman was McClintock, the department chair summoned McClintock to his office, where she was threatened with firing if she got married.

Barbara McClintock.

The University of Missouri was "awful, awful, awful," McClintock told me. "The situation for women was unbelievable, it was so bad." Eventually she was told by the dean that, if her mentor left, she would be fired. Enraged, McClintock took an immediate leave of absence without pay, with the intention of never returning. At that time, she said she never wanted another job again, and it was several years before she changed her mind.

At Cold Spring Harbor Laboratory, incidentally, McClintock could have married. Its director, Vannevar Bush, was extremely supportive of Evelyn Witkin, for example, when her children were young. McClintock never married, however, and she told me that it was because "marriage would have been a disaster. Men weren't strong enough... and I knew I was a dominant person... I knew that I'd become very intolerant, that I'd make their lives miserable."

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### CORRECTIONS AND CLARIFICATIONS

**RESEARCH ARTICLES:** "Delineation of mRNA export pathways by the use of cell-permeable peptides" by I.-E. Gallouzi and J. A. Steitz (30 Nov. 2001, p. 1895). The sequences of several of the peptides used were reported incorrectly in Fig. 1A. The actual amino acid sequences that were conjugated to AP are as follows, with substitutions indicated in bold, additions denoted by underlining, and positions of amino acids not present in the peptides used indicated by [-]: HNS: RRFGGPVHHQAQRFRFSPMGVDHMSG **L**SGVNVP**G**; NES: [-]QLPPLERLTLD; mNES: [-]QLPP**DL**R**L**TLD; and M9: **N**NQSSNFGPMKGGNFGGRSSG-PYGGGGQYFAKPRNQ[---]. It has been verified that the substitution of L for I [I is present in the HNS sequence of HuR; X. C. Fan, J. A. Steitz, *Proc. Natl. Acad. Sci. U.S.A.* **95**, 15293 (1998)] does not alter the activity of the AP-HNS in the heterokaryon shuttling assay. Similarly, the absence of $NH_2$-terminal N and presence of COOH-terminal GGY (as in hnRNP A1) does not alter the activity of AP-M9. The mNES sequence used and reported above is that of the well-characterized NES mutation called M10 [M. H. Malim, S. Bohnlein, J. Hauber, B. R. Cullen, *Cell* **58**, 205 (1989)]; like the misrecorded mNES sequence, it differs from NES in only two amino acids. The scHNS and scM9 sequences originally reported are scrambled versions of the correct HNS and M9 sequences. Nicholas K. Conrad and Angie S. Grech are acknowledged for their work in discovering the errors and repeating the experiments.