Retraction

IN OUR REPORT "CLAVATA3, A MULTIMERIC ligand for the CLAVATA1 receptor-kinase," an analysis of CLV3 function in Arabidopsis, we concluded that CLV3 acted as a ligand for the CLV1 receptor-kinase (1). The work was based on the use of polyclonal antibodies to CLV3, and the data presented indicated that the antibodies specifically detected CLV3 from Arabidopsis and cauliflower extracts and CLV3 fusion proteins expressed in Escherichia coli. All experiments involved in the production and use of these antibodies had been conducted by a single lead investigator.

Subsequent attempts by other laboratory members to use aliquots of these polyclonal antibodies to CLV3, and the data presented indicated that the antibodies specifically detected CLV3 from Arabidopsis and cauliflower extracts and CLV3 fusion proteins expressed in Escherichia coli. All experiments involved in the production and use of these antibodies had been conducted by a single lead investigator.

In an attempt to independently assess CLV3 protein interactions, we have generated additional polyclonal antibodies to CLV3. We are currently testing these antibodies to determine their specificity and attempting to retest our previous findings. One of the original coauthors, Amy E. Trotochaud, could not be located to sign this retraction.

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Incorporating Science into Decision-Making

ALAN LESHNER’S EDITORIAL "PUBLIC ENGAGEMENT with science" (14 Feb., p. 977) highlights a conundrum: Why is science often ignored in important societal decisions, even as the call for decisions based on sound science escalates? One reason is that decision-making is often driven by a variety of nonscientific, adversarial, and stakeholder dynamics (J). Thus, even though science helps inform choices, it is only one of many values and interests considered by each stakeholder. In response to this emerging challenge, scientists at the U.S. Geological Survey (USGS) are exploring the problems of incorporating science into value-laden societal decisions. This research includes designing experiments that will assess the appropriateness of using the new and emerging approach of Joint Fact Finding (2, 3). This approach is a multistep participatory process, managed by a neutral facilitator, that is designed to (i) enhance the capacity of the lay public to express concerns in terms that scientists can readily incorporate, (ii) ensure participants an opportunity to advise on all the value judgments involved in any effort to analyze or assess impacts of decisions on ecosystem and natural resource management and environmental quality, (iii) incorporate local knowledge of stakeholders while giving appropriate weight to the scientific knowledge of experts, and (iv) avoid the delays and unnecessary costs that occur when legal battles develop over science-intensive policy decisions. This approach is intended to preserve the independence of the scientists, as well as their commitment to the best practices of scientific inquiry, while engaging them with citizens, thereby helping to ensure that science informs decisions and builds trust. Scientists and institutions must expand their capacity to work in collaborative problem-solving environments to ensure that new partnerships with citizens and decision-makers are meaningful and successful. To this end, the USGS has offered an internal course on Joint Fact Finding (4), has experimented with interactive learning tools, such as role-playing simulation (5), and is developing guidelines for scientists and managers as they engage with the public.

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References
5. See www.crowdingtherim.org/docs/ctr/rimsim.html.

Evolution of Protein Amino Acids

IN HIS ARTICLE "RESEARCHERS CREATE FIRST autonomous synthetic life form" (31 Jan., p. 640), Robert F. Service reports that Peter Schultz and his team at Scripps Research Institute have metabolically engineered Escherichia coli bacteria to manufacture and incorporate into its growing proteins a 21st amino acid, ω-aminophenylalanine. They are now experimenting to see if the new bacterial variety will outcompete and fare better than the 20-amino acid variety. If so, Schultz says that “it would suggest that although biology has made do with 20 amino acids for billions of years, evolution could make use of plenty more.” These are important and exciting results, but it is worth noting that about a billion years ago, evolution had already performed similar experiments with breakthrough success. Two new protein amino acids
evolved: hydroxyproline and hydroxylysine. Probably originating from within fungal-like protists (1), this development permitted the subsequent evolution of the structural glycoproteins collagen and extensin. Functional “make-do” substitutes for these proteins using some combination of the 20 “standard” amino acids had not been achieved. Thus, the evolution of these two amino acids and their insertion into fibrous proteins was a major biochemical breakthrough for complex life. It opened the way for the origin, evolution, and diversification of the Metazoa and Metaphyta. These “rare” amino acids require molecular oxygen and oxygenase enzymes for their synthesis. The proteins also use oxygen and oxidases for the intermolecular cross-links that are important for fibril strengthening and chemical resistance. Because of this mandatory, energy-expensive, and metabolically competitive need for molecular oxygen, it is likely that the delayed appearance of complex multicellular life until the latter part of the Precambrian could be due, in part, to the lower amounts of atmospheric free oxygen available earlier on (1–3).

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References

Giving Credit to the First Linear Collider

The first of the three well-done articles on the high-energy physics community’s effort to realize a worldwide consortium to build the World Linear Collider accelerator project (“Collision course with reality,” News Focus, Adrian Cho, 21 Feb., p. 1168) makes one error of fact. It says, “The proposed electron-positron accelerator would be unlike any ever built.” This is not so. To start a $5-billion project without having fully tested out the fundamental accelerator physics issues would make us even crazier than the author implies that we are.

The first linear collider (SLC), built at the Stanford Linear Accelerator Center (SLAC), began operation at energies up to 95 GeV in 1987. The critical issue for this new kind of accelerator was the ability to make what were then regarded as impossibly small beams stably collide with each other. It took some time to understand new accelerator physics problems and learn how to operate this machine. Many of the physicists involved in the new design competition discussed in the article took part in that work. The world accelerator physics community accepted the possibility of a very-high-energy collider when the SLC bettered its original beam size design goals, routinely operating for experiments with beams at the collision point of 0.5 by 1.0 µm.

The article by Charles Seife (“Why physicists long for the straight and narrow,” News Focus, 21 Feb., p. 1171) asserts that the Large Electron-Positron Collider (LEP) at CERN and the Tevatron at the Fermi National Accelerator Laboratory (FNAL) “filled in the details of the Standard Model.” In fact, the SLC delivered beams for the Mark II and SLD detectors. The linear collider makes it relatively straightforward to deliver polarized electron beams, and SLD used polarization asymmetries to make the most precise determination of the weak interaction “Weinberg” angle. The unique operating environment of the SLC permitted micrometer level reconstruction of the tracks of short-lived particles. The polarization and precision vertex reconstruction led to measurements more precise in some cases than comparable results from the combined four LEP detectors with their 30-times-larger sample of Z decays. For example, the most stringent constraint on the Standard Model Higgs boson mass is due to the SLC/SLD program.

Today’s international competition between technologies and for a home site is the natural evolution of what has been an enormously productive international collaboration in the R&D phase of collider design. Since the late 1980s, SLAC, KEK, DESY, and FNAL have cooperated in building and operating facilities to test key concepts of an advanced linear collider. The collaborative R&D ensured that everyone was part of the determination of the feasibility and of setting the parameters of a future facility. It has worked beautifully and has sped up development. The present rivalry is a natural consequence of having to
choose a site, and it will turn again to collaboration when a site is chosen.

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**Response**

Certainly in size, complexity, and expense, the proposed linear collider would be unlike anything that has come (to completion) before. However, as Baltay, Breidenbach, and Richter rightly point out, the SLC deserves recognition both as the first linear collider and for its scientific achievements.

**Adrian Cho**

### Calculating the Benefits of Regulation

**Jocelyn Kaiser’s Article “How much are human lives and health worth?”** (News Focus, 21 Mar., p. 1836), on the public policy impact of cost-benefit calculations, focuses almost entirely on controversial changes to the way monetary benefits of regulation are calculated. But a critical eye should be turned to the costs of health and life-saving regulation as well. Estimates of such costs are usually provided by the regulated industry itself in the course of fending off further regulation and assume the benefits (including saving money) and few problems with their multiple innovations (2). Regulation is not only good for health—it can be good for the U.S. economy.

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References


### CORRECTIONS AND CLARIFICATIONS:

Random Samples: “FASEB head” (18 Apr., p. 423). FASEB has 22 members, not 91, and FASEB’s new executive director, Frederick Rickles, plans to continue research at George Washington University but will not retain his position as vice president for health research there.

**News Focus:** “Last of the big-time spenders?” by A. Lawler (17 Jan., p. 330). In the table on page 331, Emory University is not among the top 10 industry-funded universities according to National Science Foundation data analyzed by Sheldon Krimsky.

**Research Articles:** “The draft genome of *Ciona intestinalis*: insights into chordate and vertebrate origins” by P. Dehal et al. (13 Dec., p. 2157). The name of the 34th author was spelled incorrectly. It should be Rosaria De Santis.

### TECHNICAL COMMENT ABSTRACTS

**Comment on “A New Species of Yunnanozoan with Implications for Deuterostome Evolution”**

Jon Mallatt, Junyuan Chen, Nicholas D. Holland

Shu et al. (Reports, 28 February 2003, p. 1380) interpreted the Cambrian fossil animal *Haikouella* as a basal deuterostome with gills—not a chordate. Our extraordinarily preserved specimens, however, show eyes, muscle fibers in myomeres, and a tail. These structures, plus the gills, indicate that *Haikouella* is a chordate close to vertebrates.

Full text at www.sciencemag.org/cgi/content/full/300/5624/1372c

**Response to Comment on “A New Species of Yunnanozoan with Implications for Deuterostome Evolution”**

Degan Shu and Simon Conway Morris

Interpretation of yunnanozoans as proto-vertebrates depends crucially on identification of such features as eyes, a large brain, myomeres, and a notochord. We question the evidence presented by Mallatt et al. and reiterate our view that the peculiar bodyplan of yunnanozoans is consistent with both a relationship with vetulicolians and a position among the stem-group deuterostomes.

Full text at www.sciencemag.org/cgi/content/full/300/5624/1372d
Retraction

Ryuichi Nishihama, Sangho Jeong, Brody DeYoung and Steven E. Clark

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