

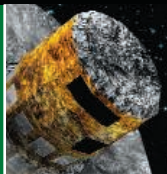
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LETTERS

edited by Jennifer Sills

Spore Show Not Gaming the Science System

I WAS SURPRISED TO SEE THE NEWS OF THE WEEK STORY BY J. BOHANNON (“‘SPORE’ DOCUMENTARY SPawns protest by scientists who starred in it,” 24 October, p. 517) about our television documentary *How to Build a Better Being*, in which we used the video game *Spore* as a way to explain the latest ideas in evolutionary biology.

Contrary to the implication in Bohannon’s story, any objective viewer will see a show replete with science and scientists, excitedly explaining their work and ideas. We used *Spore* as an entree into that scientific world as a means of informing a young audience that typically doesn’t watch science programming. It was an approach designed to educate a larger audience about this dynamic field of study, and we are proud of the result.



As we said to Bohannon, our producers were transparent with all of the scientists included in the film. In many cases *Spore* creator Will Wright visited their labs to conduct interviews, and in no case did we attempt to disguise the premise of the show once it was developed. The reaction we have received from those who participated in the documentary has been uniformly positive.

Making complex science understandable to a mass audience is a difficult challenge. In this production, we decided to take an unconventional approach by using a vernacular familiar to mil-

lions of videogame users as a tool for exploring evolutionary biology. I deeply regret that Bohannon chose to interpret this as crass commercialism, rather than what it really is—a genuine effort to reach viewers who don’t normally tune in to science.

MICHAEL ROSENFELD

President, National Geographic Television, 1145 17th Street, NW, Washington, DC 20036, USA. E-mail: mrosenfe@ngs.org

Limiting the Impact of the Impact Factor

K. SIMONS’S EDITORIAL “THE MISUSED IMPACT factor” (10 October, p. 165) reminded me of the Tolstoy story in which his brother tells him not to think about a white bear: When you say, “Don’t think about it,” it becomes hard to think of anything else. Instead, AAAS and *Science* should take the lead by defining some declarative “bibliometric postulates” that specify a code of conduct for the use of simplified indices. Postulates might include “numerical factors applied to journals should not be used to evaluate individuals” or “numerical journal factors should never be quoted without disclaimers explaining that they include falsified papers.” Only an organization like *Science* with the

backing of the non-commercially beholden AAAS has the profile to defend itself and scientists from enslavement to the impact factor’s absurdly one-dimensional parameterization of achievement.

JEREMY B. A. GREEN

Department of Developmental Cell Biology, King’s College, London, UK. E-mail: jeremy.green@kcl.ac.uk

Putting Materials and Methods in Their Place

IN HIS EDITORIAL “SCIENTIFIC PUBLISHING standards” (5 September, p. 1271), B. Alberts wrote that scientific journals “must insist on detailed descriptions of all of the methods used, so as to allow other scientists to repro-

duce the results in a straightforward manner.” Indeed, the principle of full disclosure is an essential element of the scientific method. Given the fundamental importance of procedural clarity, I strongly disagree that “[t]he appropriate place for most of this information is in the easily expandable Supplementary Materials that accompany each article.” This information must be in the main text, not in an online supplement.

There are traditionally four main sections of a scientific article: Introduction, Materials and Methods, Results, and Discussion. Of the 24 possible permutations of these sections, only the one listed yields a logically ordered presentation. Some journals have opted for placing the Materials and Methods section after the Results and the Discussion sections. Other journals have almost completely moved the Materials and Methods section from the main text to online supplements. These journals are conveying the message, however inadvertent, that the sine qua non of the scientific method, the Materials and Methods, is the least important part of a scientific publication.

DANIEL SHRINER

13533 Aston Manor Way, Apartment K, Silver Spring, MD 20904, USA. E-mail: dshrinerster@gmail.com

Artificial Intelligence Disappoints

IT IS VERY INFREQUENT THAT THE COVER OF *Science* evokes depressing thoughts. The 12 September issue’s cover is one of them. It was exactly 35 years ago when, as a graduate student, I took a one-semester course in Artificial Intelligence. I had an excellent textbook: *Problem-Solving Methods in Artificial Intelligence* by Nils Nilsson. It was a fascinating subject; at the time, researchers earnestly felt that wonderful capabilities were just around the corner, if only we had somewhat more powerful computers.

I did not pursue a career in Artificial Intelligence. I regretted that for a long time, but looking at this issue’s cover story, I wonder if my regrets were misplaced. After 35 years, is reCAPTCHA the state of the art in Artificial Intelligence? What happened? If I had a time machine that allowed me to go back

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in time to 1973 to show today's *Science* cover story to the people working in Artificial Intelligence at that time, I wouldn't do it. Nobody would ever believe me. I find it hard to believe it myself that, in the 21st century, transcription of printed text still requires human intervention.

GIOVANNI VANNUCCI

Milvius Research, LLC, Red Bank, NJ 07701, USA. E-mail: gv@milvius.com

ChemCam's Cost a Drop in the Mars Bucket

IN THE NEWS OF THE WEEK STORY ABOUT the ChemCam instrument on the Mars Science Laboratory (MSL) rover ("Rising costs could delay NASA's next mission to Mars and future launches," A. Lawler, 26 September, p. 1754), ChemCam, depicted in the image, contributed less than one two-hundredth of the overall overrun for the project. A collaboration between CNES and NASA, ChemCam is one of the least expensive MSL instruments from a NASA standpoint, although its role will be significant. The ChemCam mast unit, including the laser,

was provided by CNES at no charge to NASA. Contrary to your caption, the laser was not redesigned. The laser-based instrument will measure the composition of rocks some distance from the rover, even when the rocks are covered by Mars dust, a feat that could not previously be accomplished. We are proud of this innovative instrument and its future contributions to planetary science.

ROGER C. WIENS^{1*} AND SYLVESTRE MAURICE²

¹ChemCam Principal Investigator, Los Alamos, NM, USA.

²ChemCam Deputy Principal Investigator, Toulouse, France.

*To whom correspondence should be addressed. E-mail: rwiens@lanl.gov

An Order of Plumpy'nut, Hold the Aflatoxins

THE NEWS FOCUS STORY BY M. ENSERINK ("The peanut butter debate," 3 October, p. 36) discusses the value of Plumpy'nut, a peanut-containing ready-to-use food (RTUF), distributed to treat severe malnutrition. This is a complex area, particularly when extended to consider use in the prevention of malnutrition. However, we would like to sound a cau-

tionary note, a subject of much discussion that was absent from the article: the risk of contamination of the peanuts (groundnuts) with aflatoxins.

Aflatoxins are fungal metabolites ubiquitous in many staple foods, including peanuts, in sub-Saharan Africa, southeast Asia, and the southern United States (1). Regulation and testing limit human exposure in richer countries but are ineffective in many low-income countries where subsistence farming predominates. Aflatoxins are human liver carcinogens (2). More recent research also demonstrated an association between exposure and impairment of child growth (3–5). Evidence of acute toxicity and immunomodulation in people and animals has also been described (6). As a consequence, monitoring of products such as Plumpy'nut for aflatoxins is essential. It becomes particularly critical to maintain quality control as the production is franchised, as described in the article by Enserink, to numerous production sites in Africa or even adopted on a small scale at the local village [for one example, see (7)]. Representative sampling of peanuts for accurate assessment of aflatoxin is not a trivial exercise given the heterogeneity of

contamination and requires long-term commitment to training and resources.

There is a precedent for this concern. Schoolchildren in the Eastern Cape region of South Africa, through the Primary Schools Nutrition Programme, were provided with peanut butter as a nutritional supplement that allegedly contained high amounts of aflatoxin (8). Problems arose because of the lack of funding and expertise to permit adequate sampling and aflatoxin analysis. While the benefits of peanut-based RUTFs continue to be explored, this must be paralleled by emphasis on quality-control measures for possible contamination by aflatoxins.

**CHRISTOPHER PAUL WILD¹*
AND RUGGERO MONTESANO²**

¹Leeds Institute of Genetics, Health and Therapeutics, University of Leeds, Leeds LS2 9JT, UK. ²24 Via dei Giardini, 11013 Courmayeur, Aosta, Italy.

*To whom correspondence should be addressed. E-mail: c.p.wild@leeds.ac.uk

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In Defense of GM Crops

P. MITCHELL'S LETTER "DOUBTS ABOUT GM crops" (25 July, p. 489), referring to N. Fedoroff's Editorial (1), cannot go unanswered. Mitchell claimed that increasing yields with GM crops promoted by corporations hinders biodiversity management. Contrary to this old-fashioned framing of the issue, it is possible to combine efforts that benefit the poor as well as commercial ecological agriculture (2).

Mitchell referred to the IAASTD report (3) to degrade the importance of transgenic crops, but this report does not meet scientific review standards and comes to questionable negative conclusions about biotechnology in agriculture: "Information [about GM crops] can be anecdotal and contradictory, and uncertainty

on benefits and harms is unavoidable." Such biased judgment ignores thousands of high-quality science papers; it is not surprising that most renowned experts left the IAASTD panel before the final report was published.

Meta-analysis papers conclude that Bt crops are beneficial to nontarget insects (4). In addition, Mitchell cited Marnier's understandable call for more data (5) but ignores her previous statement that "[a] meta-analysis of 42 field experiments indicates that nontarget invertebrates are generally more abundant in Bt cotton and Bt maize fields than in non-transgenic fields managed with insecticides."

While sparing harmless (and often beneficial) insects, Bt effectively protects crops from harmful insects. Due to fewer infected insect bites and thus fewer fungal infections (6), Bt maize has been shown to contain fewer cancer-causing mycotoxins, an important benefit for human health (7). Particularly in developing countries, where storage can be problematic, regulatory offices should promote Bt maize as the healthier alternative to conventional maize.

Finally, apart from industrialized agriculture, there are positive trends associated with the adoption of GM crops by smallholders.

Public research is leading to local solutions (8) and to verifiable successes (9).

NIKLAUS H. AMMANN

Department of Biotechnology, Delft University of Technology, Delft NL-2628 BC, Netherlands. E-mail: klaus.ammann@ips.unibe.ch

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CORRECTIONS AND CLARIFICATIONS

ScienceScope: "This Jaguar's built for speed" by E. Kintisch (14 November, p. 1037). The Roadrunner super-computer is located at the Los Alamos National Laboratory in New Mexico, not the Lawrence Livermore National Laboratory in California.

News of the Week: "Rising costs could delay NASA's next mission to Mars and future launches," by A. Lawler (26 September, p. 1754). The laser instrument mentioned in the caption was not redesigned. NASA did halt funding for the instrument in September 2007 because of a \$1.5 mil-

lion cost overrun, but reinstated that funding in 2008 after an outcry from scientists. NASA is contributing approximately \$10 million for the effort, with France's CNES contributing a larger share of the cost.

Reports: "Manipulating the metazoan mitochondrial genome with targeted restriction enzymes" by H. Xu *et al.* (25 July, p. 575). The *caa* codon in the *mt:Col^{R301L}* mutant in Fig. 1E should encode a glutamine (Q) rather than the indicated leucine (L).

TECHNICAL COMMENT ABSTRACTS

COMMENT ON "Phytoplankton Calcification in a High-CO₂ World"

Ulf Riebesell, Richard G. J. Bellerby, Anja Engel, Victoria J. Fabry, David A. Hutchins, Thorsten B. H. Reusch, Kai G. Schulz, François M. M. Morel

Iglesias-Rodriguez *et al.* (Research Articles, 18 April 2008, p. 336) reported that the coccolithophore *Emiliana huxleyi* doubles its organic matter production and calcification in response to high carbon dioxide partial pressures, contrary to previous laboratory and field studies. We argue that shortcomings in their experimental protocol compromise the interpretation of their data and the resulting conclusions.

Full text at www.sciencemag.org/cgi/content/full/322/5907/1466b

Letters to the Editor

Letters (~300 words) discuss material published in *Science* in the previous 3 months or issues of general interest. They can be submitted through the Web (www.submit2science.org) or by regular mail (1200 New York Ave., NW, Washington, DC 20005, USA). Letters are not acknowledged upon receipt, nor are authors generally consulted before publication. Whether published in full or in part, letters are subject to editing for clarity and space.

RESPONSE TO COMMENT ON "Phytoplankton Calcification in a High-CO₂ World"

M. Debora Iglesias-Rodriguez, Erik T. Buitenhuis, John A. Raven, Oscar Schofield, Alex J. Poulton, Samantha Gibbs, Paul R. Halloran, Hein J. W. de Baar

Recently reported increasing calcification rates and primary productivity in the coccolithophore *Emiliana huxleyi* were obtained by equilibrating seawater with mixtures of carbon dioxide in air. The noted discrepancy with previously reported decreasing calcification is likely due to the previously less realistic simulation of bicarbonate due to addition of acid or base to obtain simulated future CO₂ partial pressure conditions.

Full text at www.sciencemag.org/cgi/content/full/322/5907/1466c

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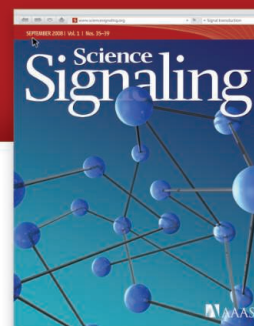
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