

A Plea to Save the Voyager Mission

YOUR SPECIAL COVERAGE OF THE VOYAGER 1 spacecraft's journey out of the solar system was most welcome (Special Section: Voyager 1 crosses the termination shock, 23 Sept., pp. 2015–2029). The data now being received from the interstellar medium are, as the various articles show, valuable space science as well as testimony to a remarkable era of exploration.

How ironic and shortsighted it is that just as this happens, NASA has scheduled operation of the mission to cease. In order to save a couple of tenths of a percent of the cost, NASA would shut off the first interstellar spacecraft.

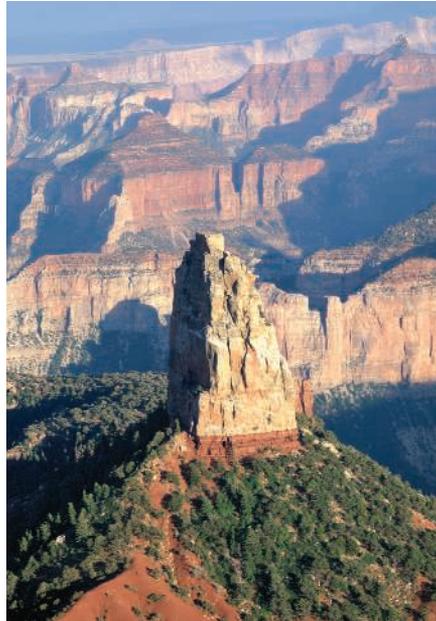
The Planetary Society just sent a petition signed by 10,000 people protesting this action to the Senate and House authorizing committees with jurisdiction over NASA, asking them to direct NASA to operate this mission. Those who read and enjoyed the special section on Voyager might want to add their names by writing to Senator Kay Bailey Hutchison and Representative Ken Calvert about Voyager.

LOUIS FRIEDMAN

Executive Director, The Planetary Society, Pasadena, CA 91106, USA.

Revisiting the Grand Canyon

IT WAS WITH WISTFULNESS THAT I READ JOHN Schmidt's review of James Powell's book *Grand Canyon* ("The grand question," 16 Sept., p. 1818). I was a teenager in the late 1960s when my family took an epic car trip around the United States, visiting the Grand Canyon and many other national parks. As a budding naturalist, I was eager to hear the words of park rangers and avidly read interpretive material. I made lists of plants and animals and soaked up information about habitats, succession, geological change, and evolution. In a fit of nostalgia, I recently repeated the epic with my wife and two children, driving from Washington State to Florida, hitting as many of the parks as we could. The only place I could find scientific content was in the less visited parks that had not been remodeled in a while. The Grand Canyon was the most chilling. The modern visitor center was architecturally magnificent but intellectually vacuous. With open spaces and giant images, it emphasized only



Point Imperial, North Rim, Grand Canyon.

the aesthetic experience. There was homage to John Wesley Powell, the man who carried out early explorations of the canyon and helped found the U.S. Geological Survey and the National Geographic Society. Yet the principles he so strongly promoted—rationalism and scientific curiosity as a means of appreciating the world and improving human welfare—were being relegated to obscurity. Schmidt notes that on viewing the canyon we ask, "How did this happen?" The current displays and signage at the Grand Canyon do their best to avoid any such question. As we left the park, we stopped to watch the sunrise at Desert View, a popular site. The most prominent sign at the overlook addressed only the visual beauty of the canyon and the religious significance of a distant mountain to Native Americans. One paragraph began, "The landscape seems consciously designed."

JOHN T. LONGINO

The Evergreen State College, Olympia, WA 98505, USA.

Déjà Vu All Over Again for Nuclear Power?

RECENT HEADLINES IN MANY NEWS SOURCES have proclaimed a revival for nuclear power. Eliot Marshall's article "Is the friendly atom poised for a comeback?" (News Focus, 19 Aug., p. 1168) poses the issue as a question rather than a conclusion, but nevertheless falls into step with the other sources by not mentioning the role of public acceptance in the fate of this tech-

nology. Three decades ago, Alvin Weinberg, then a leading spokesman for the technology, sagely observed: "The public perception and acceptance of nuclear power appears to be the question we missed rather badly in the very early days. This issue has emerged as the most critical question concerning the future of nuclear energy" [(1), p. 19].

A review of all available national surveys, not just general questions about the idea of nuclear electricity or about its future, indicates an American public who, although somewhat less opposed than in the past, is still not eager to build more nuclear power plants and is strongly opposed to having one sited in their community if they don't already have one. Even when asked whether they would favor nuclear power as a way of dealing with climate change, a majority remains opposed (2). Continued inattention to public acceptability has the very real potential of converting Weinberg's retrospection to a prescient forecast.

EUGENE A. ROSA

Department of Sociology and Thomas F. Foley Institute for Public Policy and Public Service, Washington State University, Pullman, WA 99164–4020, USA. E-mail: rosa@wsu.edu

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Issues Surrounding Nuclear Power

YOUR SERIES OF ARTICLES ON "RETHINKING nuclear power" (News Focus, 19 Aug., pp. 1168–1179) are a useful coverage of much of the reemerging nuclear debate, but they fall short with respect to two aspects.

Their emphasis, like the nuclear debate itself, is on a technical solution to greenhouse emissions. But climate change is only one symptom among many of excessive demands by humans on the natural environment. There are too many of us demanding too much from a finite planet. Emphasis on technical solutions to particular threats to the exclusion of an attack on the underlying causes ensures that these solutions are, at best, temporary, and, at worst, may lead to even more serious threats.

Although the misuse of nuclear knowledge and materials for war or terrorism is mentioned, the world context in which this might occur, and have to be countered, is envisaged as being much like today: reasonable economic buoyancy and inter-

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national relationships. The advent of the oil peak threatens to change this context dramatically. A progressive rise in oil prices will leave the poor within rich countries, and poor countries as a whole, behind. It is likely to increase tensions at all levels well within the time horizon in which the articles contemplate a possible large increase in the use of nuclear power. The increased risk of deliberate nuclear misuse when the oil starts to run out is the context in which any expanded use of nuclear energy needs to be considered.

JOHN R. COULTER

Adelaide, Australia. E-mail: jrpf@netspace.net.au

The Benefits of Solar Thermal Energy

THE ARTICLE "IS IT TIME TO SHOOT FOR THE sun?" (R. F. Service, *News Focus*, 22 July, p. 548) on solar energy overlooked a proven and affordable energy source that is already available, solar thermal energy with storage via heat transfer fluid. A recent National Research Council report (1) put the cost of a large plant at \$0.08/kWh, not competitive with conventional coal (\$0.04/kWh), but cheaper than electricity from clean coal power plants equipped for CO₂ sequestration [\$0.07/kWh plus the cost of CO₂ sequestration (2)].

Solar thermal energy has an unacknowledged, unique feature (3). A solar-concentrating collector and its associated heat storage can be regarded as a fuel plant, which feeds a conventional steam power plant. As the investment for the power plant is less than 14% of the total, it can be oversized by a factor of three. This gives the system control capabilities not affordable or available in any clean power plant technology. For intermediate loads (8:00 AM to 9:00 PM), 50% of our electricity requirements, the cost remains \$0.08/kWh, cheaper than nuclear energy or clean coal (\$0.11/kWh and \$0.10/kWh, respectively).

All solar thermal power plants need to be competitive is a government subsidy for a few large demonstration plants, as were available for the development of nuclear and clean coal plants. The cost of generating power with solar cells is now three to six times more expensive than with a solar thermal plant. Should solar cells ever become really cheap, instantaneously dispatchable solar thermal energy could compensate for their lack of storage capacity and they could become attractive for large-scale use and merit a large research effort.

REUEL SHINNAR

The Clean Fuels Institute, The City College of New York, 140th Street at Convent Avenue, New York, NY 10031, USA.

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A "Chick-a-dee" or a "Co-qui"?

I READ WITH GREAT INTEREST THE REPORT "Allometry of alarm calls: black-capped chickadees encode information about predator size" by C. N. Templeton *et al.* (24 June, p. 1934), who show that black-capped chickadees utilize a graded-response alarm call to warn against predators with differences in risk as measured by predator size. I was struck by the similarity between the findings of this work and the graded-response aggressive calls of *Eleutherodactylus* frogs. Similar to the chickadees' "chick-a-dee" calls, where increasing repetition of the "dee" note denotes increased threat, the two-note "co-qui" call of the Puerto Rican



An *Eleutherodactylus* frog and a black-capped chickadee.

coqui, *Eleutherodactylus coqui*, is used with increasing repetition of the second "qui" note during increasingly aggressive interactions with conspecific nest predators (1). Other *Eleutherodactylus* species also use a similar aggressive call system when confronted with conspecific or other predators (2, 3). A possible difference between these signaling systems may be in the interpretation of the calls by the receiver (in the case of the chickadees, this would include other birds at risk of predation, and in the case of the coquis, this would include the predator itself). In either case, this type of sophisticated, graded-response acoustic communication that implies knowledge of the level of threat posed by a predator and conveys this information to a receiver is not limited to birds and mammals, but is also used by lower vertebrates.

SCOTT F. MICHAEL

CREDITS: RAFAEL L. MARQUEZ/CAIPHOTOS; DONNA DE WHURST/USFWS

Department of Biotechnology, Florida Gulf Coast University, 260 Whittaker Hall, 10501 FGCU Boulevard, South, Fort Myers, FL 33965, USA.

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Response

WE THANK MICHAEL FOR POINTING OUT graded alarm signaling by some *Eleutherodactylus* frogs. We suspect that many other species, from a wide variety of taxonomic groups, may employ similar graded signaling systems. However, one exciting aspect of the chickadee alarm call communication system is that it incorporates not only a graded signaling system, where subtle variations in the “chick-a-dee” call reflect the degree of threat a perched predator represents, but also aspects of a functionally referential signaling system, where different types of vocalizations, “chick-a-dee” or “seet,” refer to the type of predator encounter. Careful examination of other species that are faced with challenging selection pressures from multiple predators may even reveal more complex communication systems.

CHRISTOPHER N. TEMPLETON¹ AND ERICK GREENE²

¹Department of Biology, University of Washington, Box 351800, Seattle, WA 98195, USA. ²Division of Biological Sciences, University of Montana, Missoula, MT 59812, USA.

Regulating Commercial Cloning of Animals

AS G. VOGEL REPORTED IN “THE PERFECT pedigree” (News of the Week, 5 Aug., p. 862), the South Korean lab that recently produced the world’s first cloned dog did so purely for the sake of biomedical research. Although the commercial pet-cloning industry may indirectly contribute to this laudable effort by honing techniques for cloning cats and dogs, we are concerned that these private companies lack effective oversight.

The U.S. Department of Agriculture (USDA) recently turned down a petition from the American Anti-Vivisection Society, which had urged the USDA to regulate pet-cloning companies like other animal research facilities under the Animal Welfare Act. The Agriculture Secretary has ruled that, because pet-cloning companies sell companion animals directly to consumers and not to wholesalers, they are simply retail pet breeders, which are exempt from federal regulation (1). We believe that this interpretation of the Animal Welfare Act is too narrow and ignores the spirit of the law. Pet cloning is clearly an experimental type of animal breeding that

was not envisioned when the law was written in 1985.

To fill this regulatory vacuum, we urge pet-cloning companies to register with the Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC). Esteemed by researchers worldwide, AAALAC is “a private, non-profit organization that promotes the humane treatment of animals in science” through a voluntary inspections program.

DUANE C. KRAEMER¹ AND DAVID LONGTIN²

¹Department of Veterinary Physiology and Pharmacology, College of Veterinary Medicine, Texas A&M University, College Station, TX 77840, USA. E-mail: Dkraemer@cvm.tamu.edu. ²Potomac, MD. E-mail: davelongtin@yahoo.com

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Density Is Only Relative

AS A LONG-TIME READER OF SCIENCE, I’M continually struck by the many parallels and cross-connects among articles from diverse disciplines. The 9 Sept. issue was no exception. A few News Focus articles (“Dissecting a hidden breast cancer risk,” J. Couzin, p. 1664; “Deep Impact finds a flying snowbank of a comet,” R. A. Kerr, p. 1667; “Coming into focus: a universe shaped by violent galaxies,” R. Irion, p. 1668) with illustrations read almost like a sequence of Rorschach ink blots with the interpretations left to your humble readers.

Amongst our *Science* authors, there’s propensity
To dissect hidden patterns of relative density
For many things. Some are small,
While others, large. They do enthrall,
And then are pursued with great intensity.

First, mammalian tissue is shown sequentially;
Next, comments on comets hit tangentially;
The impacts there upon a snowball,
As we view the cosmic fireball.
Our Rorschach universe is strange, immensely.

STACY DANIELS

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Letters to the Editor

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