The Earth-monitoring Triana satellite mission was recently endorsed by the National Research Council, but "by focusing exclusively on 'scientific merit,' the NRC report neglected two important aspects of program evaluation: the cost-effectiveness and opportunity costs associated with the mission...." The role in the evolution and success of vertebrates of the peripheral myelin sheath, which allows for rapid nerve conduction, is examined. A strategy for maintaining a dynamic, online resource while preserving the authenticity of citations to it is described. And the possible mechanism of action of a drug found to slow the onset of a disease in mice similar to "mad cow disease" is discussed.

Science Policy and the NASA Triana Mission

The recent events concerning the National Air and Space Administration's (NASA's) Triana mission discussed in the News of the Week article "Endorsement for controversial satellite" (Andrew Lawler, 17 Mar., p. 1905) raise some issues about the role of the National Research Council (NRC) in providing advice to Congress. Specifically, NRC program evaluations—like its review of the Triana mission—rarely provide a comprehensive perspective needed to effectively inform national science and space policies.

In the case of Triana, by focusing exclusively on "scientific merit," the NRC report neglected two important aspects of program evaluation: the cost-effectiveness and opportunity costs associated with the mission—which are particularly important given that no recently published NRC reports called for a mission such as Triana as part of the nation's remote sensing strategy (*1*). The opportunity costs of Triana go beyond those expressed in budgets to include research community time and focus, adherence to scientific goals, and ultimately scientific credibility. To provide two examples of questions that should have been addressed: Would national needs be better served if the resources devoted to Triana were instead focused on the widely supported goal of a synthetic aperture radar satellite mission? A series of successful Earth Science Enterprise satellite missions is providing a deluge of new data to the scientific community: Might national needs be better served by additional funds for analysis and applications of these data?

But the NRC panel did not address such broader issues, stating that it "lacked the proper expertise, resources, and time to conduct a credible cost or cost-benefit analysis...or an analysis of the mission goals and objectives within the context of a limited NASA budget or relative to other Earth Science Enterprise missions" (*1*). It is exactly these issues that matter most in science and space policy decision-making.

By focusing only on scientific merit, the NRC not only neglected the needs of decision-makers for a comprehensive perspective, but it provided an opportunity for the misuse of the report. Immediately after the NRC report was released, partisans were "spinning" it as an endorsement of the mission, misrepresenting the report's narrow focus on scientific merit under an assumption of successful implementation. Whether or not Triana makes sense as a component of the nation's remote sensing agenda would require consideration of the issues neglected by the NRC panel, including Triana's contributions to meeting its other rationales, such as education and space weather forecasting.

Congress, the Administration, and the NRC should heed the words of Vice President Albert Gore, who wrote in his 1993 report on reinventing government that "If agencies are to set measurable goals for their programs, Congress must demand less and clarify priorities more....In the private sector, leaders do not simply drop goals on their organizations from above. [They] involve their full workforces in identifying a few goals that have top priority....This process enables the people directly responsible for meeting the goals to help set them. It also ensures that every part of an organization aims at the same goals, and that everyone understands where they fit in" (*2*).

We have no reason to believe that Triana should not be a component of the nation's remote sensing infrastructure; however, the existing process has not shown why the mission should play such a role. The Triana experience provides a clear example of how the scientific community too often neglects asking and answering the difficult, but necessary, questions involved with effectively advising policy-makers on the nation's scientific priorities. Ultimately the soundness of the nation's scientific endeavors is at stake.

Roger Pielke Jr.
Robert Harriss
Environmental and Societal Impact Group, National Center for Atmospheric Research, Post Office Box 3000, Boulder, CO 80307–3000, USA. E-mail: rogerp@ucar.edu or harriss@ucar.edu

References

1. "Review of scientific aspects of NASA Triana Mission" (National Research Council, Washington, DC, 2000).
2. A. Gore, *Creating a Government That Works Better and Costs Less: The Gore Report on Reinventing Government* (Report of the National Performance Review, Times Books, New York, 1993), p. 74.

Origins of Vertebrate Success

The News Focus article "In search of vertebrate origins: Beyond brain and bone" by Carl Zimmer (3 Mar., p. 1576) highlights recent findings of the progressive acquisition of bone and brain structures. These findings support Gans and Northcutt's theory (*1*), which postulates that the emergence of vertebrates was made possible by the invention of neural crest cells (embryonic cells that give rise to many peripheral tissues including the eyes, nerves, and skull), and specifically, this then led to the development of evolutionarily advantageous complex head structures. We agree with the importance of the neural crest in this regard, but wish to point out the contribution of one important neural crest

In jawed vertebrates, myelin ensheathes nerve fibers and permits rapid conduction of nerve impulses.

derivative—the peripheral myelin sheath—to the success of the vertebrates. Without this structure, the vertebrates as we know them simply could not exist (*2*).

Invertebrate axons are ensheathed by supporting cells but do not have a compact myelin sheath. As a consequence, action potentials (electrical pulses) that propagate along invertebrate axons are generally conducted at a speed of about 1 meter per second or less, fast enough for animals of small size to survive. However, as body size increases, a proportionate in-