by 46 countries (Argentina and Chile not among them), including all of the major maritime nations. It imposes strict rules on tanker operators to prevent oil pollution. These rules not only prohibit the type of dumping that Boersma highlights but also incorporate vessel design and equipment requirements. These include segregated ballast tanks, crude oil washing, and other features that minimize the amount of oily waste that is generated aboard a tanker. The rules also require the installation of oil-in-water monitors that measure and record the oil content of ballast that is discharged by a tanker. In fact, these monitors are designed to stop the discharge of ballast automatically should oil concentration in the water exceed strict limits.

Thus, there are international regulations that prohibit tankers from "dumping" oil into the sea, and, contrary to Boersma's assertion, most tankers follow these rules.

In dealing with the "oily penguin problem," it appears first necessary to consider possible sources of contamination, for example, spills occurring during drilling and producing operations in the Tierra del Fuego area, indiscriminate discharges of oily engine room bilge wastes from any type of vessel operating in the area, and discharge of oily ballast water from tankers that may operate in the area and not conform to international operating standards.

Second, it will be necessary to heighten the level of awareness of government, industry, and the public with respect to the nature of the problem. Oil-producing and transportation operations are routinely conducted in other environmentally sensitive areas without adverse effects on those areas. Such environmentally acceptable operations should be sought and are achievable in Tierra del Fuego.

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Man's Role in Space

Peter M. Banks and David C. Black (Perspective, 17 Apr., p. 244) write optimistically and philosophically about what might be gained through manned research facilities in space. James A. Van Allen has already written factually (*1*) about what has been gained through unmanned spacecraft and what further surely could be gained. One might add that that work (in which I participated some three decades ago) (*2*) led to new and largely unforeseen technological applications of unmanned spacecraft as communication satellites. Since then earth observation satellites of various sorts and navigation satellites have assumed great importance.

Our present humiliating position is that exaggerated emphasis on man-in-space has left us, temporarily, we hope, without any domestic means for launching either scientific or technological spacecraft.

Man-in-space is an old dream which I exploited in science fiction (*3*) at a time when no one had thought of the new capabilities we have seen in unmanned spacecraft. The old dream of man-in-space, magnificently realized in Apollo, has been extended in the Shuttle, with an emphasis that has had disastrous consequences for our exploration and exploitation of space.

Surely, the exploration of man's role in space is worthy of continued and intense investigation. The survivability of man-in-space, to which Banks and Black give no emphasis, calls for continued and intense investigation, but not at the cost of scientific and technological benefits which we know we could attain through unmanned spacecraft—if we had the resources to construct and launch them.

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REFERENCES

1. J. A. Van Allen, *Science* **232**, 1075 (1986).
2. J. R. Pierce, *The Beginnings of Satellite Communications* (San Francisco Press, San Francisco, CA, 1968).
3. ——, "Relics of the earth," *Sci. Wonderstories*, March 1930, p. 894.

Neutrino Shield?

M. Mitchell Waldrop (Research News, 1 May, p. 523) quotes a theorist as saying that the neutrino flux alone from supernova 1987A would have killed an "unprotected human" out to nearly a billion kilometers. I am curious about what sort of protection the theorist had in mind. Is this one of the theorists behind the Strategic Defense Initiative?

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Erratum: In Constance Holden's article "Adjusting to an aging population" (News & Comment, 15 May, p. 772), Secretary of Labor William E. Brock III is incorrectly described as "Commerce Secretary."