Letters

ERS: Can the Cost Be Measured?

Carter summarized very well Representative Karth's report to the House Committee on Science and Astronautics on the earth resources satellite (ERS), but he omitted comment on the discussion of cost effectiveness (21 Feb., p. 796). Although I agree with Karth that unmanned satellites in polar orbit are preferable to manned satellites, I disagree strongly with his conclusion that cost effectiveness evaluations are not possible. He contends that a cost-benefit analysis is not crucial because NASA has not applied it to past programs. These past programs were designed to provide benefits which are largely intangible. Conversely, the ERS program, as stated by Karth, is "to achieve tangible economic returns from the substantial investment already made by the American taxpayer."

It is asserted that these economic benefits cannot be calculated without data actually collected from spacecraft. If this were true, we would have no right to launch a satellite until we knew what results we could reasonably expect. This attitude may be attributable to wishful thinking on the near-future potential ascribed to the ERS. For example, there is a consensus among my co-workers in remote sensing that the multi-spectral approach to analyzing terrestrial resources (where much data of limited application and value have been cited from a variety of studies) has been greatly oversold to the ERS planners. Eventually we will have automated techniques sophisticated and fast enough to utilize this data, but at present the multi-spectral approach is becoming a fad.

Two fields—cartography and oceanography—immediately lend themselves to cost-benefit analysis of data collected from a satellite. Of course, much of the data collected over land areas from a combination cartographic-oceanographic satellite will provide a basis for employing advanced techniques and equipment for the extremely complex analysis of terrestrial resources. NASA's aircraft program is also necessary, but it appears that this program could be administered more efficiently, judging by the annual increase in costs per missions flown which may be calculated from the table in Karth's report (*1*).

Karth's rather offhand dismissal of cost effectiveness is one result, I fear, of the ballyhoo about the potential of a remote sensing satellite which may eventually discredit our more reasonable expectations of the program.

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Reference

1. *Earth Resources Satellite System*, House Committee on Science and Astronautics (Government Printing Office, Washington, D.C., 1968), p. 12.

Economics of Reprints

Van Potter (Letters, 7 Mar.) deplores the fact that many people are requesting his reprints without having read his article, having seen the citation in *Current Contents*. Not all scientists are blessed with the marvelous library facilities which Potter has available to him at Madison, Wisconsin. At an isolated station or college, *Current Contents* is a great help and makes it possible for one to keep up at least to some extent on the literature through reprints. I have just returned from a number of months of field research. Without *Current Contents* and the reprints I received as a result of it, I would be woefully behind in the current literature. I hope Potter's attitude does not spread.

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Reprints are invaluable in research, in preparing manuscripts, and in writing monographs. For nearly 50 years, I have exchanged reprints with colleagues and have accumulated boxfuls of reprints, many of which are still in active use. It is a pity that the privilege of obtaining reprints is misused. . . . However, a small charge would discourage indiscriminate requests.

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The continuing static on reprints is fascinating, and the problem is not all that difficult to solve. Reprints cost money; reprints have value. Make a charge, gentlemen, and the dilemma will dissipate. Reprint requests are flattering, but now that our egos are all nicely boosted, a little salvation for our flattened exchequers would seem to be in order.

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. . . In a recent paper of mine in *Nature,* the title as printed in the table of contents was worded quite differently from that on the article itself. The score on requests for reprints to date: from the table of contents, 181; from the article itself, 86; requests accompanied by no title, 67. . . . The major effort and expense in sending reprints is generally not the actual cost of the document itself, but the envelopes, postage, secretarial time, and so forth. Why couldn't we copy the compromise adopted by many drug companies in which the request must be accompanied by a self-addressed stamped envelope? This involves a commitment by the requester, and a minimal effort for the sender. Charging for reprints or eliminating them entirely, as suggested by some, seem to be retrogressive steps, and ones which would hurt the junior investigator.

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Chicago: R.I.P.

Edsall's letter (7 Mar.) "Chicago boycott defended" clearly overstates the case. Of course, scientific societies cannot avoid politics in all circumstances, but they should not go out and deliber-

ately seek causes. If the meeting place of a society becomes determined by political considerations there will be no end of trouble. Don't meet in San Francisco—they are unsympathetic on campus to minority groups. Don't meet in Youngstown—they are unsympathetic toward paying taxes for public education. Don't meet in Boston—they are unsympathetic toward distributing information on contraceptives. Nuts!

For several years I have been working closely with a group of Chicago scientists planning a small meeting of paleontologists for 5–7 September 1969. We have never discussed the politics of the city. However, a number of the Chicago scientists are annoyed at the boycott of their city. Certainly their civil rights should be protected. Not only are local scientists in any city which is boycotted punished for the sins of others, but the boycott does little except insure economic difficulties for lower socioeconomic groups. Moral principles and practical results need not go hand in hand, but before we scientists start throwing our economic muscle around, we should make sure we have some.

Finally, I am annoyed with the liberals who view the Chicago disorders as the worst thing that ever happened. I was in Prague watching a first step toward democracy go down the drain, so I cannot judge how serious an event it really was. Although it was a stain on our country, at least the Chicago trouble could be seen live on television and was freely reported without anyone being shot with a 50-caliber tank-mounted machine gun.

I think it is time to drop all talk of a Chicago boycott. As scientists we should strive to understand what happened in the hope that it may be avoided in the future. However, nowhere in the scientific ethic do I see any rationale for vindictiveness.

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Fewer Pesticides—More Control

Carter's excellent article on the Madison DDT hearings (7 Feb., p. 548) was especially interesting to me, since I was the entomologist who testified in behalf of the Environmental Defense Fund. Recently, as a member of a research team concerned with cotton pest control, I strongly advocated the use of DDT over alternative materials, because of its less severe impact on the agroecosystem. The advocacy of DDT earned me a somewhat heretical reputation among my colleagues, in the light of my long experience as a specialist in biological control!

Actually, I realize that nature's way does not always work, and that chemical pest control is frequently necessary for economical crop production. I believed that DDT was the ecologically safer chemical choice in cotton. But what I learned at the Rochester conference (*1*) came as a shock and convinced me that the use of DDT and certain other organochlorines should be curtailed and eventually stopped. This change of opinion was an important facet of my testimony at Madison.

The chemical alternatives to DDT are disturbing, but until better things come along, these appear to be the safer materials. As for a moratorium on the use of DDT, it will be interesting to see how the agricultural economy of Arizona and the health and welfare of its citizenry hold up under the recently invoked year-long ban on DDT there. The ban is no assurance that all is well with chemical pest control in Arizona. Indeed, if the situation is at all comparable to that in California, it probably borders on the chaotic. But at least Arizona has stopped pouring DDT into the biosphere and is merely tearing up its own environment with alternative materials.

In general, the synthetic organic insecticides are ecologically crude and engender serious problems: resurgence of target pests, outbreaks of nontarget species, and pest resistance to pesticides. These have contributed to a steady increase in the use of insecticides in recent years. For example, in California pest control costs for two of its major crops, citrus and cotton, have risen sharply over the past decade. A critical analysis nationwide would reveal a similar pattern: bollworms in Texas cotton, spider mites in deciduous fruit orchards, cabbage loopers in vegetable crops, and so forth.

For the past two decades, the pest control field has been dominated by toxicologists and chemical company sales personnel—persons often either ignorant of or indifferent to ecological principles. Fortunately, entomologists are beginning to appreciate the ecological pitfalls that attend the unilateral use of synthetic insecticides. The concept of integrated control is gaining acceptance (*2*). This concept recognizes the ecological nature of pest control and has as its objective pest population management rather than simple pest kill. Integrated control does not reject chemical insecticides but attempts, instead, to integrate them into pest management systems. Its advocates are not "anti-insecticide," but they do reject ecologically untenable materials and practices, and they plead for more sophisticated materials and a voice in their development. . . . Greater pesticide efficacy and reduced environmental pollution will result. . . .

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References

1. First Rochester Conference on Toxicity, University of Rochester, Rochester, New York, 4–6 June 1968.
2. R. F. Smith and H. T. Reynolds, *Proc. Food Agr. Organ. Symp. Integrated Control* **1**, 11 (1966).

Smithsonian's Albatross

No man can be so naive as to think that a classified project financed by the army and administered through Fort Detrick has been funded by its backers in the name of pure research ("Biological warfare: Is the Smithsonian really a 'cover'?" 21 Feb., p. 791). Granting this premise, the defense offered by supporters of the Smithsonian's Pacific Biological Survey—that the military did not inform participants of its ulterior motives—misses the point completely. Few of us, I think, would willingly work on secret CBW projects. What is most inimical to our integrity and disappointing to our students is not the overt work of this few but the priorities of a majority. Our professionalism has distorted the ranking of our values; we have so inflated the importance of our research that we silently accept heavy strings on doubtful money to pursue work that would otherwise not be funded. We commit, in other words, the classic sin of pride.

. . . I appreciate Ripley's assessment of the Pacific project as "wonderful . . . from the scientific point of view—the fulfillment of a dream," but ask only that we be willing to defer dreams to save not only our honor, but perhaps even our lives and fortunes as well.

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