Letters

Bees Are Easily Distracted

Wenner and his colleagues (*1*) presume to challenge findings of a great biologist. There is of course nothing wrong with this as such, but reliance on an elementary logical fallacy in doing so should not be encouraged in your journal.

In a characteristic quotation they state: "Recruited bees arrived at sites in apparent disregard of any dance information that they could have acquired before leaving the hive. Such data are not only incompatible with a language hypothesis. . . ." This nonsequitur is akin to one which faced von Frisch (*2*) earlier in his career, when von Hess asserted that bees were color-blind because he had found an experimental situation in which they ignored color.

Suppose a man tells me there is a bar three blocks down the street on the right. I set off thirsty, but on the way a strong smell of beer distracts me to another bar hidden up a side alley. Does this prove that human language does not communicate information?

Von Frisch and Lindauer (*3*) did an experiment in which a terrestrial landmark, the edge of a forest, competed with the sun as an orientation cue for bees. They found circumstances in which such a terrestrial cue overruled the sun: the bees appeared to ignore the sun completely. To conclude from this that bees do not use a sun compass would have been wrong, even if there had been no other evidence for a sun compass. The fact is of course that bees have alternative methods of orientation.

Similarly, it is entirely reasonable to suppose that bees have alternative ways of finding food—among them, the dance, smell, and the presence of other bees—and that each of these cues may predominate under different circumstances. For example, the artificial use of strong scent might cause olfactory cues to prevail, while the artificially engineered presence of large crowds of bees at control feeding stations might well distract foragers from other cues.

In brief, bees are easily distracted. This modest and uncontroversial conclusion is all that can be drawn from the experiments purporting to disprove von Frisch's classic work.

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References

1. A. M. Wenner, P. H. Wells, D. L. Johnson, *Science* **164**, 84 (1969).
2. K. von Frisch, *Bees, Their Vision, Chemical Senses, and Language* (Cornell Univ. Press, Ithaca, N.Y. 1950), p. 4.
3. M. Lindauer, *Communication Among Social Bees* (Harvard Univ. Press, Cambridge, Mass., 1961), p. 126.

Oceanography: An International Laboratory

The Commission on Marine Science, Engineering, and Resources in its recent report "Our Nation and the Sea" recommended the creation of several national laboratories of oceanography within the United States. Such organizations would make their resources available to universities and individual scientists who otherwise would not have access to the facilities necessary to carry out work at sea. Our discussions with foreign oceanographers have convinced us that this concept should be extended to the establishment of one or more international oceanographic laboratories which could serve scientists and smaller laboratories throughout the world. The need for such facilities is clear when one considers the large scope of various plans projected by UNESCO and individual nations such as those outlined in the Global Ocean Research Report of the Scientific Committee on Oceanic Research, World Meteorological Organization, and Advisory Committee on Marine Resources Research and in the U.S. National Academy of Sciences' "An Oceanic Quest."

The scale of the projects and the resources proposed for ocean exploration would overtax the capabilities of the world's existing facilities, even if they were directed to these ends alone. For example, proposed international programs over the next 10 years would require for their implementation as many as twenty-five hydrographic survey ships, forty oceanographic and fishery research ships, ten fishing vessels for systematic resource surveys, eight weather ships, an aircraft carrier with two escort ships, three deep-sea drilling vessels and five drilling barges, as well as some submarines including one with nuclear power. Further, many shore facilities will be needed for satellite tracking stations, buoy deployment and development, computer centers, and research laboratories.

The marine pollution problem is clearly international. The urgent requirement for international pollution studies does not need further emphasis; a consideration of the mechanics of monitoring the earth for a variety of inputs, taking a variety of paths from the continents to the oceans, is the point of entry into a joint quest. Here, innovations in our present techniques to handle a whole new era of research are called for.

We feel that an international laboratory, equipped on a scale commensurate to global problems, is necessary. First, large-scale problems do demand a concentration of effort involving effective and economic fleet operations, data handling, and communications within the facilities and with other meteorological, satellite, and data centers. Where synoptic studies are being carried out or where single, unexpected events occur which need subsequent observation and follow-up, as in the case of an oil-spill, a command center is essential.

Second, the laboratory, perhaps the largest one in the world because of its unique facilities, will attract the best minds in oceanography. We have already seen such a situation occurring in high energy nuclear physics, where CERN (European Council for Nuclear Research) became a gathering place for some of the world's most distinguished scientists.

Third, an international laboratory will allow scientists of smaller and developing countries to be partners in first order research instead of having to forgo this kind of experience be-