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Of the Week

Research Notes

Semiannual Index

Articles

Departments

COVER: Radio waves, given off by ship communications antennas like this one, could be a danger to human health. So could radio waves, microwaves and electrical fields that are emitted by other kinds of widely used electronics equipment —radar systems, radio and television stations, power lines, home appliances. See p. 418 (Photo: U.S. Navy)

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To the Editor

Life and the spreading sea

That the turtles which swim between Brazil and Ascension Island, now a distance of 2,000 kilometers, may, before the spreading of the sea floor, have gone only a short distance (SN: 5/25/74, p. 334) was pointed out by Ronald Fraser in *The Habitable Earth,* published in 1964. That the spreading of the floor may have "shaped" phylogenic behavior through a program of gradually increasing distances was suggested in my *Contingencies of Reinforcement: A Theoretical Analysis,* published in 1969 in the following passage:

"Both European and American eels . . . when ready to breed, leave their freshwater environments and journey to overlapping deep-sea breeding grounds in the middle Atlantic. The adults die there, but the young return to the appropriate continents. It is difficult to imagine that this extremely complex pattern in the behavior of both parents and offspring could have arisen in its present form through random mutations, selected by the survival of individuals possessing appropriate behavior. If we assume, however, that Europe and North America were once contiguous and that they moved only very slowly apart, the first journeys of the eels, or of those earlier forms which evolved as eels, could have been quite short. The present extreme behavior would have been gradually "shaped" through survival as the phylogenic contingencies changed. Each year only a slight extension of behavior would be demanded—possibly only a matter of inches—and the new contingencies could be met by most members of the species. Just as an animal with little or no innate tendency to home can be trained by releasing it at slowly increasing distances, so early forms of eels were "trained" by phylogenic contingencies as the distances to be traversed were extended by the continental drift. This would help to explain the fact that the breeding grounds of European and American eels are close together or overlap.

The behavior of salmon in the North Atlantic may be the result of a similar program of phylogenic contingencies."

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Virtues of frictionless physics

The article by Dietrick Thomsen decrying the teaching of "frictionless physics" (SN: 5/11/74, p. 308) makes a valid and even obvious point, but I fear it may well serve to further obscure a little appreciated, but crucially necessary, ingredient of the method of analysis which has been largely responsible for the tremendous progress of physics since the time of Galileo: Physics (or any analytical science) never attempts to attack a real problem directly in its complete existential complexity; instead it *conceives* and considers a *model* of the real problem. This model must have two properties, 1) it must be solvable, and 2) it must approximate the real problem sufficiently enough to be useful, within the context of the question being asked. The art of scientific analysis consists precisely in defining those concepts in terms of which intelligent and fruitful questions may be asked about certain chosen aspects of the problem which may be isolated—if only in thought —from the unsolvable complexity of phenomena in the real situation. "Divide and conquer" is not only a useful pedagogical tool, it is a necessary part of fruitful intellectual analysis.

It makes very good sense to learn (or discover, as did Galileo) physics by considering a block sliding down a frictionless plane, insulated from Mars, etc. Not only is it a useful model of a real situation; it divides, for the conquering mind, the phenomenon of friction from the phenomena of weight and rigid support. Only after these divided phenomena are separately understood can they be brought together to create a more useful (although still greatly idealized) model of a wider range of real situations.

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(Modelmaking is great, but we should never follow its logic out the window. Good models do not neglect important factors in the dynamics under study.—Ed.)

Cowboys and playboys

With reference to your article on two types of unexpressive males, "The Cowboy and the playboy," (SN: 5/25/74, p. 339): While I agree to some extent with the article, the fact is that women themselves prefer men to avoid shows of emotion, especially when it comes to negative and unpleasant ones. The general trend at least here seems to be that women claim to have their own problems and are therefore not interested in their male counterpart and consider it also unmanly. These are observations I have made with couples, groups and individual women, etc. A lot of men act accordingly to that.

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