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But with the change of the social structure of the dominant society and the advent of affirmative-action programs, demands for scientists of color have been created in the market place. Sixty percent of these scientists have had job offers from predominantly white institutions while only 12% have never received such offers. The 11% of scientists employed in the non-academic areas have all had multiple offers from government and industry. Of the 89% employed in academia, 97% have had offers from other black as well as white institutions.

The next major concern about the prospective black candidate is how well he gets along with non-blacks, or, what is his level of black awareness? Most of the scientists have great loyalty to their discipline. Thirty-six percent of the scientists felt that their personal contributions toward helping in the black struggle could best be done through increasing the general store of knowledge (helping to increase the bank of all knowledge through science). They should be good scientists who happen to be black. Thirty-four percent believed in being a good black scientist.

The first group preferred to be referred to simply as "scientists," while the second group prefer to be considered "Blacks who are scientists." Seventeen percent believe their contributions to Blacks would best be done through being role models for other Blacks. This was felt by almost all of those in industry.

The socio-political dogmas of the young were not significantly different from those of the old, nor did there appear to be any greater demand for younger scientists than older scientists. The greatest demand ages were between 32 and 56. Most had socio-political attachments to moderate organizations such as NAACP and the Urban League.

Salary? Although the law of supply and demand does have its effects, the salary scale for Blacks is not unreasonable; most salaries are negotiated from average salary levels at the institution plus a couple of thousand dollars extra to help in relocating a family of a wife and two children to a community amenable to middle-class Blacks.

And finally, what are the possibilities for getting them to change jobs today? Of those scientists employed in government and industry, 42% would prefer to both teach and do research (these could be attracted). Of those already teaching in universities both black and white, 78% are quite happy with their work. Nine percent of this group prefer industrial research, and 11% prefer university research without teaching.[5]

Now that you have the facts on the black doctorate, to get one in your institution you might do well to consider the following alternatives.

In light of the most recent figures of Educational Testing Service, which showed close to 2000 Blacks enrolled in graduate schools in the natural sciences, two approaches could be used to increase the supply of doctorates: (1) Encourage a graduate student to enroll in a doctoral program in your department (with an adequate stipend) with prospects of his staying on for a limited time after he has completed the terminal degree in order for him to attain top-caliber university experience. (2) Hire someone with a master's degree and subsidize him to go back to school to obtain his doctorate. It was by the latter method that most predominately black schools obtained their present supply of black doctorates. And in the process of encouraging a black to get a science doctorate, you can also chalk one up for altruism; you'd be adding to the pool of available black doctorates.

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Michelson clarifications

I read the article on Albert A. Michelson in the April issue (page 36) with great interest and pleasure. Physicists all over the world, at my own university in particular, should be grateful to Robert Shankland for the historical insights provided by his paper.

There is, however, one minor point in Shankland's excellent article that deserves clarification. This point concerns the Michelson–Gale–Pearson experiment—the "optical analog" of Foucault's pendulum. The key idea of detecting rotation through the interference between two coherent lightbeams traversing the same closed circuit in opposite directions is due to G. Sagnac, who mounted a ring interferometer on a rotating platform in 1913. (Arnold Sommerfeld, in his well-known textbook on optics, also refers to a similar experiment by Harress, but I could not locate the relevant publication.) In using Earth as the platform, Michelson and his co-workers faced of course the

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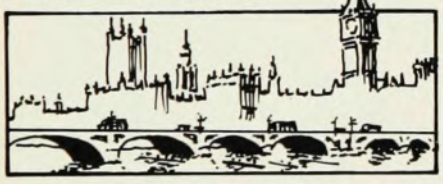

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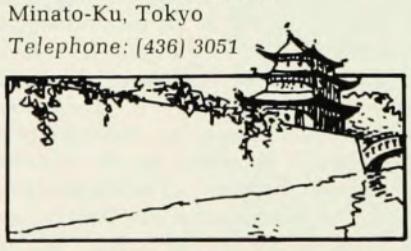

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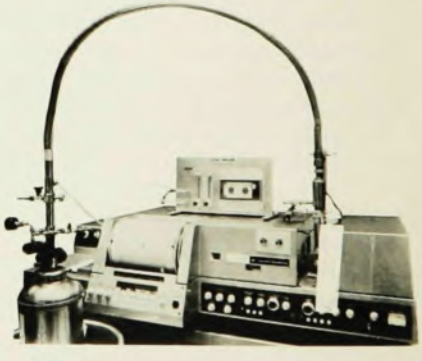

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problem that Earth's rotation cannot be stopped at pleasure. For the solution of this puzzle, the interested reader is referred to the original paper [*Astrophys. J.* **61,** 137 (1925)].

Two further facts may be of interest. Michelson neither gives a derivation of the theoretical formula that describes effect nor does he quote Sagnac [*Comptes Rendu* **157,** 708 (1913)]. Sagnac on the other hand considered his effect as a proof of the "ether wind," and died (1928) an ardent opponent of relativity. Since the observed effect is of order v/c, it has of course no direct bearing on relativity versus ether; on the other hand if a (relative) "ether wind" manifested itself in rotation it would have had to manifest itself in translation as well.

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Hurricane prevention

The article "Solar Sea Power," by Clarence Zener (January 1973, page 48) gave many good arguments for the feasibility and desirability of sea-power generators utilizing the large temperature gradient of tropical waters. These generators could produce a potentially beneficial side effect: the reduction of hurricane intensity. A modest reduction of the intensity of hurricanes that strike land would save many millions of dollars each year, as well as many lives.

The enormous energy of a hurricane is derived from the warm surface of tropical waters. It is for this reason that the hurricane season occurs when the water surface is warmest and also why most hurricanes dissipate quickly over land.[1,2] Furthermore, observations have shown[3,4] that the intensity of a hurricane can be directly correlated with the temperature of the water over which it passes. Recent analytical results by R. A. Anthes[5] indicate that only a 2 deg C decrease in sea-surface temperature would reduce the maximum wind speed of a hurricane by 26 meters per second. This brings about the possibility of artifically cooling the surface of the water in order to reduce the intensity of hurricanes before they reach selected land areas, producing "hurricane lines" analogous to the fire lines used to prevent the spreading of forest fires. The wide of these lines would be a hundred miles or so, and they would extend up to a thousand miles in length. We would hope that hurricanes encountering such a line would lose intensity before striking land instead of after striking land.

It appears that the solar sea-power generators described in Zener's article would be an ideal means of forming hurricane lines. Not only do these generators naturally cool the surface of the water, but the power derived could be used to cool the surface further by pumping and dispersing large amounts of cool, deep water onto the surface some distance from the warm water intake of the generator. To cool a large area, the generator could be pulled slowly through the water. The mechanical power developed by the generator could be used for propulsion.

A coordinated fleet of such generators would be required to form each hurricane line prior to and during the hurricane season. If each generator is capable of cooling a span five miles long and is moved along the water at two miles per hour, it would require only twenty generators to cover a hurricane line 100 miles wide and 1000 miles long twice in 50 days. The operating cost of the entire system would be negligible, requiring no external power and only a few personnel per unit for operation. Although the initial cost of the system would be large, it could be used for many seasons and if successful would save many times its cost by preventing hurricane destruction.

The feasibility of such a scheme could be determined in the near future from our present knowledge of the dynamics of hurricanes and their relationship to the thermal structure of tropical and subtropical waters. Although large solar sea-power generators have not yet been built, hurricane destruction prevention may prove to be a great incentive for their development in addition to providing cheap power.

The environmental consequences of such a plan would also need to be studied in detail. Such a study should note that the passage of a hurricane cools the water over which it passes[4,6] so that the use of solar sea-power generators might produce the same end effect, although much less destructively.

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THE AUTHOR RESPONDS: I am indebted to Fishman for pointing out the possibility of establishing "hurricane lines." Under normal conditions one wishes to minimize the disturbance to the surface temperature, and so the cold water coming out of the condensers of