arettes. Cigarettes with advertised value of 14 milligrams of tar are considered "low tar" cigarettes. These values are for the mainstream smoke, that is, the smoke actually inhaled by the smoker. Smoking one package of regular cigarettes per day produces 460 milligrams of tar particulates per day. For an average person to receive an equivalent dose, the 10 cubic meters of air per day he inhales would have to contain 46,000 micrograms of tar particulates per cubic meter, more than 50 times the air pollution emergency level of 875 micrograms per cubic meter, and more than 600 times the level considered safe according to the clean air standards (*4*).

A single cigarette when smoked produces approximately six times the mainstream smoke in the form of secondary smoke which goes into the local environment. In a room of 40 cubic meters in which the air is exchanged in 8 minutes (a typical office), a cigarette smoked in 4 minutes will raise the count of tar particulates to 2700 micrograms per cubic meter, 36 times the level considered safe according to the clean air standards.

It is clear that the enforcement of clean air standards is wasted on smokers; however, it also appears impossible to maintain clean air standards in the presence of smokers. If we are really serious about clean air, the use of tobacco must be controlled as well as pollution from automotive and industrial sources.

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References

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2. R. J. Phillippe and M. E. Hobbs, *Anal. Chem.* **28**, 2002 (1956).
3. *Fed. Reg.* **36**, 6679 (7 April 1971).
4. *Ibid.* **36**, 1502 (3 January 1971).

Resolution on the Panama Canal

The following resolution concerning the maintenance of the existing freshwater barrier in the Panama Canal was unanimously approved by the Council of the Biological Society of Washington on 22 May 1973 (*1*).

Whereas, Gatun Lake forms an effective freshwater barrier against the interoceanic migration of a vast majority of the stenohaline biotas at either end of the Panama Canal, and

Whereas, there is an ever-increasing number of ships passing through the Canal and a concomitant increase in the amount of water required for the lockages of these ships, and

Whereas, the Panama Canal Company is beginning a series of studies that would culminate in the pumping of sea water into Gatun Lake within the next thirty years, and

Whereas, such action would inevitably drastically modify the Gatun Lake environment by creating a brackish or marine lake, which would have effects similar to those of a sea-level canal in allowing the mixing of Atlantic and Pacific organisms with potentially dangerous results, and

Whereas, such a saline canal would constitute a more rigorous barrier to the net north-south movement of fresh water and terrestrial forms, as well as destroy the present populations in and immediately around Gatun Lake and the Canal,

Therefore, be it resolved that the Council of the Biological Society of Washington condemns this plan as being ecologically irresponsible, and strongly urges the adoption of other alternatives available to the Panama Canal Company.

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Notes

1. Similar resolutions have been passed by the American Malacological Union, the American Society of Ichthyologists and Herpetologists, the First International Congress of Systematic and Evolutionary Biology, the Western Society of Malacologists, and the Association of Island Marine Laboratories of the Caribbean.

Science and Society

Dorothy Zinberg (Editorial, 23 Mar., p. 1187) proposes that a major thrust of science education be to develop social awareness among scientists. While I agree that science has failed many of its responsibilities to society, the failure of science education, both for the scientist and the public, involves more than a failure to impart social awareness. The deficiencies in science education have roots which extend to the earliest years of each individual's development.

It is part of our culture to overreact to social movements; because of this overreaction to the demand for relevance, differences between science and technology, even for many scientists, are rapidly being blurred. One result is that the satisfaction and excitement involved in the search for knowledge has become irrelevant to many.

Education has played a major role in shaping society's present attitudes toward science. Science education, as Zinberg points out, is important for the public as well as the scientist. However, she suggests that one must educate the scientist first. This is the major fault of science education today—an artificial separation of scientist and public; in any mature society, science should be a completely integral part of the society.

Is there any reason why the excitement and fullfillment that the true scientist receives from his or her quest for knowledge cannot be shared by everyone? I don't think so. Many scientists avidly follow developments outside their areas of specialization in such exciting fields as cosmology and the origin of life, mind research, and geophysics and paleontology. Everyone, scientists and public, shares an interest in these questions.

I can see no reason why the general public, if science has been integrated into their education from childhood, shouldn't follow scientific developments as a leisure activity almost as avidly as they follow professional football, tennis, or chess tournaments. I have devoted a great deal of my time since childhood to athletics, as a participant and an observer, with great satisfaction; yet I find science equally as exciting. If Joe Namath and Billie Jean King, to say nothing of Bobby Fischer, can become popular heroes, why not some present-day Einstein or Watson and Crick?

A continuing quest for knowledge, even as an observer, adds immeasurably to the quality of life, so there is no reason why basic research need be justified. However, we seem to find ourselves in precisely this position today. It would be a tragic mistake, in the quest for social relevance, to put aside the one attribute which makes man unique from other species—his desire to understand (rather than control) the universe in which he lives. True, our survival depends upon continued progress, both social and environmental. However, loss of the instinct for knowing and understanding could be the first step toward a sterile society with frightening similarities to the stereotyped societies of the social insects.

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