

# **P. Aarne Vesilind's Commentary on "A pHish Tale"**

Commentary On  
A pHish Tale

The interesting character in this case study is Richard, identified as a "senior research scientist." In response to Tom's concerns, Richard describes what he sees as the role of scientists:

We have some responsibility as scientists to be objective and stay neutral in such a debate.

He speaks as if being objective and staying neutral are all the same. It is not good, according to Richard, for scientists to fail to be objective or to take sides in debates concerning the use of their scientific information.

I want to ask first if it is necessary for a scientist to be objective in order to be a good scientist. That is one issue. The second issue is whether it is necessary for a scientist to stay neutral.

At the risk of being called a positivist, I believe that scientists discover the truth by the use of their senses. Tom and Richard measured the pH in the lakes, counted the fish species and performed other tests in their aquatic biology and chemistry laboratory. They used their senses of sight, smell, touch and perhaps even hearing to draw conclusions about the health of the lakes. Most of these data would be considered "objective." If Tom uses a pH meter to measure the pH of the water a certain distance below the surface during a certain time of day and at a given temperature, the result is an indisputable number (provided there have been no interferences and the meter was properly calibrated). Given this information, all scientists would agree that the data are objective and valid.

Suppose Tom and Richard find that the lake directly downwind from the power plant has by far the lowest pH value, and the lakes that are not affected by the plume from the power plant have neutral values, normal for lakes in that region. Is it then

"objective" to jump to the conclusion that the power plant is responsible for causing the low pH in the lake?

Good scientists will not make that statement. Proving causality is notoriously difficult, and Tom should refrain from suggesting conclusions where causality is uncertain.

A similar problem with drawing causative conclusions based on environmental data exists in the global warming controversy. We know, for example, that the carbon dioxide concentration in our atmosphere is increasing, and we also know that the temperature of the earth is increasing. We understand how the increased CO<sub>2</sub> in the atmosphere could cause global warming, and indeed most mathematical models suggest that CO<sub>2</sub> and other greenhouse gases such as methane indeed are the culprits, but *there is no proof of that*. A good scientist would say that there is evidence that both curves are increasing, and that there are some very sophisticated mathematical models that suggest that there is a causal relationship, but there is no proof up to this point. The role of scientists is to provide the data and to make suggestions. It is *not* the role of scientists, as scientists, to jump to conclusions where there may be alternative explanations for a phenomenon. If that is what Richard means by "neutral" in the case study, then he is right. In the absence of proof, the scientist is morally committed to simply present the data and suggest possible alternative explanations.

But there are other ways to stay "neutral," and that is what Tom is coping with. He recognizes that time is running out for the various species in these lakes, and that their loss would not only be detrimental to the ecosystem, but would result in an economic catastrophe for many of the people who depend on the fish. He also knows, I am sure, that once the pH in a lake has dropped to levels that preclude the procreation of fish, the water will stay at this pH for a very long time. There are no known techniques for economically revitalizing a lake destroyed by acidity.

Tom is now weighing the question of neutrality the same way that atmospheric scientists weigh the problem of global warming. We do not know for sure what is causing warmer temperatures, but the results of global warming are so catastrophic that it makes a lot of sense to do all we can to prevent further temperature increases now instead of waiting until it is too late. Atmospheric chemists talk of a "forcing function," a notion that we can do something to the atmosphere at the present time and not find out for many years what effect it might have on the long-

term global temperature. Similarly, Tom recognizes that the "forcing function" on the lakes is most likely the power plant emissions, and that if these emissions continue, the lakes will die.

Second, as a *private citizen*, Tom can advise the group and even represent them in a public hearing. Tom cannot do that in his role as a university researcher or a participant in a government-sponsored study, but his knowledge can be put to good use in his role as citizen. If he strongly suspects that the power plant is causing the pH to be depressed, then he has a moral obligation to say so. In contrast to his role as citizen/adviser, in his published scientific papers he has an obligation to *refrain* from suggesting that the problem is caused by the power plant unless he lists this possibility as one of several.

This dual role as scientist and citizen is not hard to understand because all of us participate in such mental bifurcation. I spend time with my buddies at a ball game and we drink beer and tell risqué jokes. At the ballgame, I am in my role as fan and friend. But the next day, in my role as professor, I cannot drink beer or tell such jokes. I continue to be the same person, but my roles change, as does appropriate behavior for those roles. In Tom's case, the appropriate role of the scientist is to question everything and to publish irrefutable data. As a citizen, his role ought to be to advise the people who could make a difference and perhaps save the lakes.