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LETTERS

Drugs from Third World Plants

I was dismayed to see Richard Stone's reference to the "windfall that Eli Lilly and Co. netted . . . from the rosy periwinkle of Madagascar" in his article about the Earth Summit (News & Comment, 19 June, p. 1624). As the leader of the group who detected the antitumor activity from the plant at Lilly, by using a system unique and different from conventional wisdom at the time, I can say that the reality was very different. First, two different groups were investigating the plant because of folklore suggesting the use of a tea of the leaves for diabetes. These reports were from the Philippine Islands and Jamaica. The plant, however, grows wild or is cultivated in most temperate and semitropical parts of the world. At the time it could be harvested because of its rampant growth in India and Madagascar, and it was grown commercially in Texas. It was *not* a rare and endangered plant investigated by an ethnobotanist. More than 60 complex indole and dihydroindole alkaloids were isolated, and eventually two were marketed for the treatment of cancer [Velban (vinblastine), Lilly and Oncovin (vincristine), Lilly]. The latter was originally isolated in a yield of 1 ounce per ton of dried leaves, and for some time was marketed for the cost of manufacture. In this case I do not believe there is a compelling reason to suggest that Madagascar's role in the discovery of the pharmacological action of a few of the alkaloids from this plant represents "easy picking" or any logical requirement for compensation. It was certainly *not* easy and required millions of dollars in investment. Should Jamaica, the Philippine Islands, Texas, Florida, and so forth also have shared? The share would have been infinitesimal and illogical. Should China continue to receive payments for digitalis and the United Kingdom for penicillin? A different case might be made in the case of an ethnobotanist working with a shaman in a rain forest where the plant is found only in a specific environmental niche. I fail to see why the vinca alkaloids are a reasonable example of the problem the biodiversity treaty was trying to address.

*Irving S. Johnson**
Indian Point Road, Stonington, ME 04681

*Former vice president of research, Eli Lilly and Co.

Computing in Science

In an introductory article to the topic "Computing in science," Robert Pool (3 Apr., p. 44) describes a scientist's work as that of

> simply one more researcher, who has discovered the power of what is being called the third branch of science: computer simulation of reality. With simulations so accurate that they can take their place alongside experimental data as an object of scientific study, this "computer experimentation" has given researchers a new eye on the world.

He also writes, "Computers keep getting faster and cheaper, so the experiments will only get better."

Computers do calculations. The equation solved may be that of a theory, such as Schrödinger's equation, or that of a model, such as a reaction-diffusion equation for a particular reaction mechanism. Solutions of such equations, whether obtained by analysis or numerical methods, are *predictions*, not results of experiments. The validation of a prediction is confirmation by experiment. No one doubts the ability of computers to solve the equations of models; it is the models that require validation by experiments.

Frequently, analytical solutions of an equation are achieved with given approximations and an exact numerical solution is used to check the validity of these approximations. This is a useful procedure, but again has nothing to do with physical reality.

Pool discusses calculation made by the integration of Schrödinger's equation for a block of 64 silicon atoms and a single oxygen atom moving in that block. He then states that as a result of that calculation, "Joannopoulos has discovered that oxidation does not start in the way that an early theory proposed—a finding that could lead to improve the processing of silicon." The result of that calculation is not a discovery, it is a prediction; experiments will establish the correctness of that prediction.

There are similar problems with the article by Ivan Amato (Research News, 17 Apr., p. 306), in which there are phrases such as, "computers do the chemistry" and "chemistry by computer is . . . taking the place of experiment."

All this may seem to be only a matter of proper usage of words; it is not. It is a matter of recognizing what science is about.

John Ross
Department of Chemistry, Stanford University, Stanford, CA 94305