pound is useful in the treatment of the nausea and vomiting associated with cancer chemotherapy. It also has useful antiglaucoma and minor central nervous system tranquilizing properties (*3*).

The statement Duke cites referred to the *commercial* development of medicinals from higher plants, which results from a complex interaction between scientific and technical feasibility and economic factors such as long-term funding commitments for research (both for random biological screening and for literature searches of folklore reports), patentability of newly discovered natural plant products, development and marketing costs, market sizes to be addressed, and so forth. Plants such as the opium poppy, foxglove (*Digitalis* spp.), belladonna, marijuana, and even onions and garlic, were literally handed down to us by our ancestors. The biological activities of these plants had been known for centuries to peoples of many cultures, and there was never any question of their efficacy or their pharmacological effects. In a real sense, extensive empirical bioscreening and pharmacological research ("clinical trials") had already been done on these dramatically active plants by the time chemists arrived on the scene and set about the tasks of isolating and elucidating the chemical structures of their active principles. Alas, most of these ethnomedical "gifts" have been thoroughly investigated—early studies on these plants, in fact, were largely responsible for ushering in the era of modern organic medicinal chemistry. Today, although higher plant compounds with interesting and potentially useful biological properties are continually being discovered and developed from more obscure plants, this type of research can be more costly and time-consuming than in previous years. However, there is much evidence to show that natural product research is still potentially less expensive and more fruitful (in terms of new prototype compounds discovered) than are large chemical synthesis programs. Unfortunately, funding decisions are often made on the basis of perceptions rather than reality, and there are widely held misconceptions that higher plants are no longer viable as sources of useful new drugs. There can be no question that the jungles of Latin America (and elsewhere) *do* contain as yet undiscovered medicinals and other products. However, these jungles will not surrender their secrets readily. We are going to have to "fish a little harder" for such substances than we did in the past, which will require attitudinal changes on the part of institutions and long-term funding commitments for natural product research programs.

In contrast to the area of medicinal plant research, pesticide development from higher plants has traditionally received less attention. However, pesticide chemists have recently begun to reexamine the folklore histories of purportedly bioactive plants in search of new leads. In the case of insecticides, for example, compounds from the neem tree have been receiving a great deal of attention recently. Neem has a long and well-established folklore history of use in India as an insecticide, among other things. Extracts of this plant have now been approved by the Environmental Protection Agency for use as an insecticide on nonfood plants (for example, ornamental flowers). Thousands of other plant species also possess significant insecticidal activity. As in the case of medicinal plant research, however, the secrets of these less dramatically active plants may have to be extracted at a higher price.

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## U.S. Oil Consumption

Energy efficiency has played a much greater role, and nuclear power a lesser one, in reducing U.S. oil and energy consumption in recent years, than Mark P. Mills suggests (Letters, 12 July, p. 118).

Mills apportions the 4.4 quads per year increase in domestic energy production between 1978 and 1984 among the various fuel sources, headed by coal with 54 percent and nuclear at 20 percent. Yet coal's 1978 to 1984 increase was 3.0 quads (*1*) and nuclear's only 0.54 quads, giving them 69 and 12 percent, respectively, of the increase in production—far different shares than Mills asserts.

Nor does Mills quantify efficiency contributions. Using his own definition of efficiency gains—decline in total energy per real gross national product—efficiency measures added 12.9 quads per year between 1978 and 1984. This is almost triple the net gain from new supplies. If the above supply gains and demand savings are combined, the latter account for 74 percent of the total. Only 18 percent of the increase is from coal, and nuclear is almost unnoticeable at 3 percent.

Mills' statement that "utilities are directly responsible for reducing total U.S. oil consumption by one-third since 1978" also gives undue credit to the electricity sector. U.S. oil consumption fell from 38 quads in 1978 to 31 quads in 1984, a remarkable drop in so short a time, but still under 20 percent. Electric utilities did reduce their own oil-burning by an impressive two-thirds, from 4 quads to 1.3, but this reduction accounted for under 40 percent of total national oil savings.

Nor did nuclear power have a big hand in utility oil savings. From 1978 to 1984, electricity generation from oil fell by 245 billion kilowatt-hours (kWh), yet nuclear generation rose only 51 billion kWh. Rather, it was coal-fired electricity, up by 366 billion kWh, that displaced utility oil while also accommodating modest overall electricity growth.

Important lessons may be drawn from these data. First, most oil consumption occurs outside the electricity sector, in furnaces, vehicle engines, and feedstock uses; so most oil savings have and will come in these areas. Second, within the electricity sector, coal generation overshadows nuclear power by more than four to one; hence, keeping utilities from reviving oil use will depend more upon improving coal's economic and societal acceptability, for example, through acid rain mitigation, than upon efforts to resuscitate nuclear power. Third, efficiency measures remain America's biggest energy resource by far. Efforts to exploit our Saudi-size reserves of inefficient energy use will provide the greatest payoff among our energy options, as they have since the 1970's.

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**References and Notes**

1. Data herein are from U.S. Energy Information Administration's *Monthly Energy Review*, March 1985. Coal production data for 1978 are taken as the average of 1977 and 1979 to avoid overstating growth from artificially low 1978 output due to coal strike.

*Erratum*: In the article "Science and technology in India" by J. S. Rao (12 July, p. 130), it is incorrectly stated at the top of the first column on page 133 that C. V. Raman founded the Indian Institute of Science in Bangalore. The Indian Institute of Science was founded by Jamshed Tata.