# Letters

## And Gladly Wolde He Lerne, and Gladly Teche

In the discussion of teaching versus research (Letters, 28 Feb.), it is a disservice to separate the two functions even further by erroneously regarding them as being mutually exclusive. To debate this in terms of "either-or" is, in a sense, a red herring. The fact is that being a good researcher does not necessarily *prevent* a scientist from being a good teacher just as it does not necessarily make him one. Some men are and some men aren't.

A research scientist may have a flair for teaching or he may not. If he does he will have the attributes of a good teacher in addition to those of a researcher, not in place of them. These will be (i) the ability to synthesize both conceptual and factual material (other than his own) objectively; (ii) the ability to relate to students and to feel their response; (iii) the ability to communicate, to articulate and project his ideas in a clear and colorful manner; and (iv) it would be helpful if he had a sense of the dramatic (or melodramatic). More than that, he has to like teaching.

It is true that there are several factors which may make it difficult for a research scientist to function equally efficiently as a teacher. These are: (i) he does not have as much time for preparation as one solely involved in teaching; (ii) his narrow focus on his own area of investigation and interest may make it difficult for him to become adequately knowledgeable of broader areas; (iii) he may resent the intrusion of a long-standing teaching commitment on a research experiment in which exciting developments suddenly appear. But if an individual can overcome these obstacles he may still be an outstanding teacher.

Just as one can point to eminent researchers who were not good teachers, either on an undergraduate or graduate level, and to others who were ineffective for undergraduates but inspiring for graduates, and just as one can name great teachers who were poor researchers and had no taste for it, so one can think of many scientists who were equally competent in both academic functions.

As a loose generalization it is probably true that a man's competence as a teacher can be measured by whether he likes to teach or not. Generally, what one likes to do, one does well, or learns to do well, and the converse is also true. Furthermore, there is a feedback mechanism which reinforces the good teacher's liking to teach in that the favorable responses he receives from his students furnish him with ego-gratification.

There are two further considerations. First, in the academic merit system, credit and prestige should be given equally for competent teaching and for competent research and number of papers published, so that a scientist will not be reluctant to take time from one to devote to the other. Second, only those individuals should be assigned to lecture and seminar teaching who enjoy it and are proficient. Preceptorships are completely different and do not require the same qualifications.

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## Lesser of Two Evils

The brief announcement (14 Feb., p. 656) that the Department of Defense has cancelled a contract for reactivation of a St. Louis herbicide manufacturing plant while it continues massive use of herbicides in Vietnam deserves comment in view of Tschirley's article ("Defoliation in Vietnam," 21 Feb., p. 779). At the recent AAAS meeting in Dallas, Tschirley stated that the extremely long-lived herbicide picloram was being used in Vietnam not, as I had supposed, to kill conifers which are resistant to 2,4-D and 2,4,5-T, but rather because there is simply not enough 2,4-D-type herbicide produced in the U.S. to satisfy our military requirements. While I continue to oppose most aspects of our chemical warfare operation in Vietnam, if it is to continue it would be far better to use the readily biodegradable 2,4-D than picloram, which is so resistant in some clay soils that under 5 percent disappears each year. Perhaps that old herbicide plant should be reactivated to make 2,4-D, since continued large-scale use of picloram could seriously diminish productivity of soils for years after the hostilities will have ceased.

It is worth emphasizing that even in a quickie trip, in the middle of the dry season, with limited opportunity for ground observation, a qualified observer like Tschirley was able to discern serious and long-term ecological damage, both to mangrove associations, which were killed by one spray application and will take at least 20 years to recover, and to deciduous forests, where bamboo quickly invades defoliated areas. He was unable to get hard data on such other possible deleterious processes as soil laterization and erosion. The situation calls for immediate restrictions on the herbicide spray program, as follows: (i) Use only readily biodegradable phenoxyacetic acids. (ii) Limit spray operations to areas along roads and trails and around military encampments. (iii) Avoid spraying large block areas of deciduous forest. (iv) Do not extend spray operations into any new areas.

In a letter to Don Price, then president of AAAS, John S. Foster, director of research and engineering for the DOD, stated, "We have considered the possibility that the use of herbicides and defoliants might cause short or long term ecological impacts in the areas concerned. . . . Qualified scientists, both inside and outside our government . . . have judged that seriously adverse consequences will not occur. Unless we had confidence in these judgments, we should not continue to employ these materials." I suggest that Tschirley's report should shake that confidence . . . the herbicide spray program should be rigorously limited or halted.

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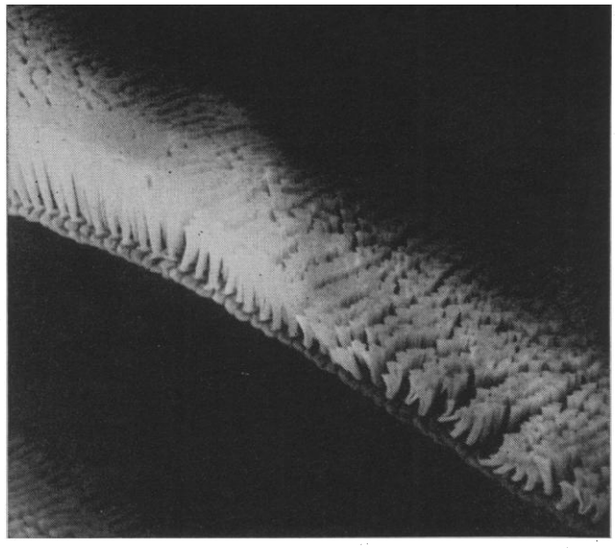
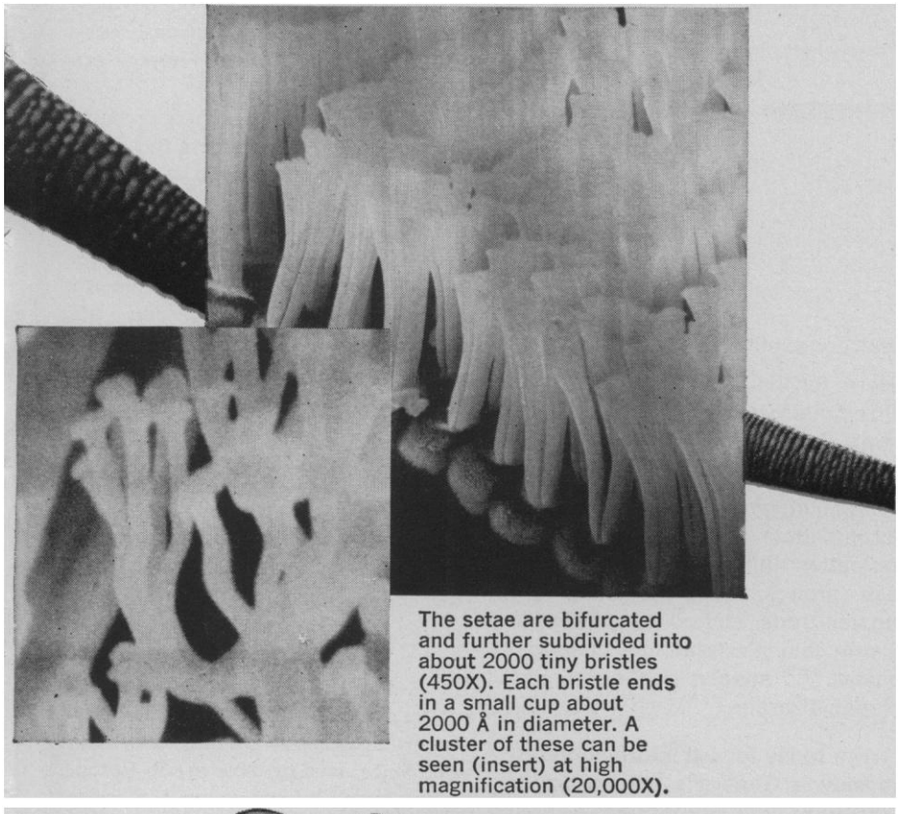
Tschirley suggests defoliation in Vietnam will not affect the water cycle, because he emphasizes the unimportance of transpiration as a contribution to rainfall input. Forest conservation studies often show that output is important, for replanting forests helps prevent floods, stream silting, and erosion, while cutting forests leads to



A detail of a single row of setae on one lamella showing their great number and regular arrangement (200X).



The setae are bifurcated and further subdivided into about 2000 tiny bristles (450X). Each bristle ends in a small cup about 2000 Å in diameter. A cluster of these can be seen (insert) at high magnification (20,000X).



high temperatures, wind and solar drying of soil, and low vegetation during dry seasons and to drying of springs (*1*). The adverse effects of deforestation and desiccation for humans and animals occur even where annual rainfall shows no change. The problem is that moisture supplies are lost or become irregular, not that total rainfall decreases. Defoliation, as a kind of deforestation, probably produces similar effects.

As for the effects of defoliation on animals, I have found, in working on neotropical birds, that many species of the forest interior die off and are replaced by species of more open areas if deforestation occurs. Presumably this happens in Vietnam. McClure noted many specialized species of the forest interior in nearby Malaya (*2*). I have repeatedly noted that birds of the forest interior disappear even if patches of undisturbed forest remain, because many such birds are at such low densities that they apparently must have large areas of forest for sufficient population sizes. Probably medium-to-large animals, with low densities, die off faster than insects and small animals, which can survive in tiny patches of forest; this is contrary to Tschirley's suggestion. The large animals he mentions as surviving in defoliated areas probably are not forest animals but those of low growth; such species may increase.

Population increases and nondefoliatory deforestation will eventually eliminate many of the forest-adapted species, presumably. But hastening extinctions by defoliation is not desirable. Even if species of open country increase in numbers, loss of the many more species adapted to forests would be unfortunate. Future studies should pay attention to the forest-adapted species, not to the open-country ones.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**References**


1. P. Sartorius and H. Henle, *Forestry and Economic Development* (Praeger, New York, 1968).
2. H. E. McClure, *Wilson Bull.* **79**, 131 (1967).


## NATO Science

Greenberg's informative article on NATO science (28 Feb., p. 915) is misleading in two respects. He identifies the NATO Science Committee as the