Detroit Fluoride Conference

In his article, "Fluoridation: A meeting in Detroit raises some questions" (23 Sept., p. 1499), Greenberg focused attention on some important aspects of the continuing controversy over water fluoridation, not the least of which is the urgent need for top-level scientific symposia on the physiological properties of fluoride at which all sides are adequately and competently represented. He correctly pointed out that the newly formed American (name now changed to International) Society for Fluoride Research must still prove itself worthy of being considered a proper scientific organization for this or any other legitimate purpose.

With respect to the "curious" timing of the recent conference, it is pertinent to note that such a meeting was actually proposed over a year ago, long before there was even any intimation that there would be a referendum on fluoridation in Detroit this fall. However, owing to the problem of raising funds, final plans could not be made until late spring. My letters of invitation were composed and signed by me as a member of the program committee. At least a half dozen of those scientists who attended the conference were invited personally by Waldbott. Several others who came in response to his invitation would probably be considered "pro-fluoridationists."

The comments about Waldbott and his new book neglected to indicate that since 1955 he has published detailed clinical reports of reversible ill effects from fluoridated drinking water. These have appeared in such distinguished medical journals as *Acta Medica Scandinavica, International Archives of Allergy and Applied Immunology, Acta Allergologica, Confinia Neurologica, Deutsche Medizinische Wochenschrift, Hautarzt, Nordisk Medicin*, and others. Without this fact being stated, many readers might gain the impression that touring the country "proclaiming an association between fluorine and an immense catalog of misfortunes" is Dr. Waldbott's sole activity concerning the medical aspects of fluoride.

Actually, for anyone who is thoroughly familiar with Waldbott's clinical findings, it is clear that they present evidence for reproducible toxic effects from fluoride in drinking water, which has been disputed but not refuted. Those findings certainly appear to be as valid, say, as those of Ignaz Semmelweis who charged that unsanitary delivery room instruments and procedures were the primary cause of childbed fever. The weight of prevailing medical opinion was against Semmelweis, but that did not prove him wrong! After all, a physician does have a duty to his profession and to society to report any previously unnoticed side effects from an accepted medical practice. He is considered derelict if he does not do so, and justly so.

By the same token, was it not a little presumptuous to imply that the conference in Detroit would probably produce "little but scientific-sounding scare stories" without having knowledge of the actual content of the papers that were to be presented and discussed? Science cannot be expected to make advances if it can operate only in a climate of conformity to viewpoints that rest on older, rather than newer, data.

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Graduate Training in Astronomy

From 1930 to early 1957, I was active in training graduate students in astronomy at Harvard. From 1957 until last April, I was in Australia, establishing a graduate school of astronomy at the Australian National University, and I am now head of the department of astronomy at the University of Arizona. During my absence abroad, I visited the United States several times to attend meetings of the American Astronomical Society and kept closely in touch with graduate schools of astronomy at several universities. Last spring when I returned, I was impressed by the great increase in the number of graduate students. Further, it seemed to me that, while many new universities have entered the graduate training picture, the admission standards appear to have been lowered, and that there are, at the end of the first and second years, fewer dropouts now than there were 10 to 20 years ago. Moreover, the quality of the education does not seem as high as it was formerly. I have found also that many graduate students do not seem to be putting forth their maximum effort. The 1966 student is not so fully committed to his training for a future career as was the graduate student of the early and middle fifties.

The number of fellowships for gradu-

ate study has fortunately increased, especially through the programs of NSF, NASA, and NDEA. With this new affluence, stability, and opportunity, something seems to have been lost. The better graduate students of 10 to 20 years ago were young people in a hurry, whereas the 1966 model seems to take his time. In the past, most students who did graduate work in astronomy felt that it was a real privilege to be admitted to graduate school and be awarded a fellowship or assistantship. From the start, there was a sense of urgency. The few who did not try hard enough, or who lacked ability, were dropped after 1 year or, at most, 2 years in graduate school. The pressures on the student to work during the initial years should not be less than those on students in professional schools of medicine and law.

Predoctoral examinations in the field of astronomy seem to require more time for preparation than they did in the past and, as a result, the start of work on the doctoral thesis is delayed. Thesis work is often not really begun until 3 years after the student enters graduate school. It is not at all unusual now to see a student take 5 to 7 years to complete the work for the doctorate. The normal time, I believe, should be 4 years. If the student enters graduate school with an adequate preparation in physics and mathematics and with a fair knowledge of one or two foreign languages, the 2 years should suffice for his formal course work, which would leave 2 years for completing the doctoral thesis. The search for a thesis topic should start in earnest early in the second year.

Another example of the leisurely approach to the doctorate is the time consumed to fulfill the foreign language requirement. This has become such a major undertaking that students often spend most of a summer getting ready for the language examination, and, during that time, they suspend all their professional graduate study.

The generous fellowship support programs have had one further unfortunate side effect. In the past, a graduate student generally spent at least 1 year as an assistant teaching an elementary or intermediate course related to his field of study. It is now difficult to get promising students to do any teaching and this is leading to a generation of professional astronomers with practically no background in teaching. This is a pity, since I know of no better way for a graduate student to learn the general background for his professional work.

Under the present system a student is not thoroughly examined as to his capabilities for future professional work until 2 or 3 years after he has entered graduate school. We used to be able to eliminate our poor prospects generally at the end of the first year, and certainly at the end of the second year. But if a student remains in graduate school for as long as 3 years, he is generally firmly ensconced and it is difficult to get rid of him.

I wish to comment briefly on another discouraging development. Ten to twenty years ago, graduate students were active questioners and spoke up regularly in colloquia and at AAS meetings. Now, even though the student goes through the ordeal of presenting his own paper, first in the departmental colloquium, and then in a professional meeting, he is inclined to become less engaged in open question periods than he did formerly. Questioning is generally limited to the staff members in the first few rows at colloquia and to a few distinguished astronomers at professional meetings. This is too high a price to pay for bigness.

Since I have taken on the responsibility for a relatively young graduate school of astronomy, I have naturally given thought to improving these matters. In summary, it seems obvious that strict admission standards must be set, and that each student's case must be reviewed thoroughly and comprehensively at the end of the first and second year of graduate study. It should not be assumed as a matter of course that a student will spend 5 or more years in graduate school; 4 years on the average should suffice. Students should be urged increasingly to participate in scientific discussions and most would benefit from 1 year of teaching elementary or intermediate courses. Finally, the foreign language requirements should be fulfilled preferably during the undergraduate years.

Two concluding comments: it has been a source of regret to return to the United States after 10 years and find, first, that there are still very few graduate schools in which the study of optical and radio astronomy is naturally interwoven, and second, that women graduate students in astronomy are still so rare.

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