Letters

Purified Antigen Vaccines

I would like to expand and clarify one point in the report by Thomas H. Maugh II, "Influenza (II): A persistent disease may yield to new vaccines" (Research News, 15 June, p. 1159). Maugh states that "Work with influenza . . . has shown that the ability of purified antigens to stimulate the production of antibodies is significantly reduced when they are separated from the virion."

It is true that certain purified antigen (viral subunit) vaccines have proven serologically ineffective when tested in humans. However, serologic efficacy depends in part on the physical form of the immunizing antigen, which in turn derives from the method used for particle disruption and antigen extraction. At least three disruption procedures—utilizing ethyl ether (*1*), sodium deoxycholate (*2*), or tri-*n*-butyl phosphate (*3*)—are known to yield purified antigen preparations generally free of the bothersome side effects associated with whole-virus vaccines and with specific serologic potency at least equal to and probably greater (*4*) than that of the latter products. Antigen vaccines prepared by one or another of these procedures have been on the market in the United States and Australia for the past 5 years, and the many millions of doses used each year attest to their wide acceptance by the medical profession. Thus, it would be incorrect to leave the impression, as Maugh does, that all purified antigen vaccines are subpotent products awaiting new technological advances to bring them to practical use.

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The Frog Revisited

Papermaster and Gralla (Letters, 6 April, p. 10) and Emmons (Letters, 15 June, p. 1118) advocate the use of tetracycline as a stopgap solution to the problem of disease in the laboratory frog *Rana pipiens*. Data recently collected in our laboratory partially support their contention but also indicate potential problems in the use of this single therapeutic approach on the diseased bullfrog *Rana catesbeiana*. The application of tetracycline was based on the assumption that aeromonads were the major pathogens of frogs (*1*). The selection of this antibiotic was certainly a wise choice, as the majority of our isolated presumptive bacterial pathogens were shown to be sensitive to the tetracycline treatment. Thus 5 milligrams per 30 grams of body weight administered by stomach tube for 5 days (*2*) or 0.9 milligram per 30 grams of body weight injected into the dorsal lymph sac for up to 2 days after the disappearance of the clinical symptoms reversed the classical redleg syndrome, and mortalities were substantially reduced.

Within 1 week after the initiation of the antibiotic therapy, approximately 20 percent of our treated animals died. *Aeromonas* was not isolated from the dead animals. Death in these animals was not preceded by observable clinical symptoms, as in the case of redleg disease, and the bacteria isolated from these animals belonged to two genera—*Corynebacterium* and *Flavobacterium* (subsequently shown to be resistant to tetracycline)). The pathogenicity of these isolates was confirmed by reinoculation into an adult frog. The presence of these three organisms in diseased bullfrogs suggests a complex ecological interaction in amphibian disease processes.

These observations emphasize the need for determining both the identification and antibiotic sensitivities of presumptive pathogens within individual frog colonies. Without this information the initiation of successful antibiotic therapy is not only difficult but incomplete. Disease control in the Louisiana bullfrog population appeared to be achieved by expanding the tetracycline therapy to include 0.9 milligram per 30 grams of body weight each of sulfathiazole and erythromycin. Additional prophylaxis was achieved by immersion of tadpoles, but not the adult frog, in the same antibiotic solutions prepared in 3.0 percent dimethyl sulfoxide.

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Technology Assessment and the University

Michael S. Baram's conceptual framework for technology assessment and social control (4 May, p. 465) brings into perspective the need for a "flow of information . . . coherent and balanced . . . [which] must present alternatives with their uncertainties in comparable terms." Universities should take up this task. This job, if well done, would convince citizens and legislators that academia can make valuable contributions to the solution of urgent national and world problems. It would do much to counteract the antiacademic attitude which is growing in the land.

Rather than staging "teach-ins" which affect primarily the university community, and protests which usually leave a negative flavor, academia should stage "hear-outs" which would reach the citizens through well-planned mass media programs, including independent review of all alternatives and two-way discussions with citizens of how to assign values and weights to environmental and social amenities.

Universities are in part responsible for the growth of specialized knowledge which is threatening to outstrip our collective ability to control its effects on our lives. Shouldn't we therefore assign to universities the task of helping us keep technology under control? For example, when an issue has been raised by an advertisement of a commercial product on television or radio, the "Fairness Doctrine" discussed by Baram could be invoked, and a government-supported university could be charged

with the task of producing reasonable and fair presentations of the contrasting sides of the issue.

The academic environment, with its traditional dialogue and cooperative approach toward assessing the truth, should be a good setting for this task. It might help to transform the relationship between the public sector and corporate decision-makers from the present adversarial one "to one of joint decision-making and negotiation of differences in good faith," as Baram suggests. Our universities should make a joint effort to assess and plan the uses of technology.

The new citizen-feedback techniques mentioned by Baram could help to keep the universities in tune with the realities of the pervasive social impacts of technology, which are difficult to measure or quantify but are, as Baram states, "nevertheless real and should be as integral to decision-making as quantifiable technical and economic considerations."

Do we teach this in our university science and technology courses? We should.

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Women Job Applicants

The biochemistry and botany departments at the University of British Columbia have recently advertised vacancies for assistant or associate professors. Since 10 to 20 percent of the Ph.D.'s in these two fields are awarded to women, one would expect about the same proportion among the applicants. Not so. Only 7 out of 140 applicants for the biochemistry position (5 percent) and 3 out of 90 applicants for the botany position (3 percent) were women.

It's no wonder that women make up such a small proportion of faculty if they don't apply for the jobs. This is one factor we can't blame on the men. It's a rare department chairman these days who isn't sensitive to the possibility of being criticized for not having enough women on (his) staff. Figures like these give them an excuse.

Come on, girls, let's not give up without trying. This is one aspect of our problem we can solve, ourselves, right now.

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Survey of Academic Job Applicants

In *Science* of 4 February 1972, we advertised vacancies for qualified faculty in several areas of biology. We received 465 applications from qualified candidates, and at the end of April 1972, the 459 unsuccessful persons were invited to complete and return a prepaid postcard stating the number of applications they had submitted, the number of interviews to which they had been invited, and the number of positions they had been offered. By the end of July 1972, we had received 246 usable replies which represent 54 percent of the survey.

The data show that the 246 candidates submitted a total of 17,431 applications, an average of 70 per candidate; 34 percent submitted 20 or less, 28 percent submitted between 21 and 50, 15 percent submitted between 51 and 90, and 23 percent submitted over 91 (including 8 over 300). The 246 candidates had a total of 367 interviews distributed between 162 persons; 34 percent had no interview, 25 percent had one, 21 percent had two, 14 percent had three or four, and 6 percent had between five and eight interviews. The 246 applicants received a total of 161 job offers distributed between 99 applicants; 60 percent received no offer, 23 percent received one, 12 percent received two, and 5 percent received between three and five offers.

The individual experiences of the candidates must have affected the likelihood of their responding to the questionnaire, but I have no way of knowing in which direction the bias operated.

It is possible that the rejection of excess job offers by some candidates provided openings for a few of those who indicated no offer at the time of response, and the appearance of the situation would be improved a little by including in the survey the six successful candidates hired by George Mason University. The inclusion of these raises the number of successful candidates to 105, that is, 42 percent of the responders.

No further analysis of the data has been undertaken, but I would be pleased to make the data available. We expect to hire at least four more biology faculty this year so any suggestions for a better-planned survey would be welcome.

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