9-day embryo appeared to be perfectly formed. All except one of the advanced embryos were produced by daughters of a male with a history of retarded sexual maturity. Cytological studies indicate that the parthenogenetic embryos carried the diploid chromosome number (Yao, unpublished). In each of four instances where sex was determined, the embryo was found to be a male. These and other observations made during 1954 will be described in greater detail elsewhere.

References

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14 June 1954.

Communications

Education or Training?

The publication of William Seifriz's article on "A new university" [*Science* **120**, 87 (16 July 1954)] has impelled me to present this communication, the thesis of which is at least tangential to his. During the spring of 1954, I attempted in a very limited and informal manner to learn something of the cultural backgrounds of 15 candidates for the doctorate in botany, horticulture, agronomy, and zoology at the University of Illinois. My procedure was simple: at that point in the oral examination of each candidate at which the chairman of the examining committee places his palms on the table's edge, looks hopefully at the other members of the committee, and says, "Well, gentlemen, are there further questions?" I asked each candidate to identify as specifically as he could the following items; beneath each item are listed the numbers of satisfactory (S) and unsatisfactory (U) responses:

The Renaissance: S, 6; U, 9.
The Reformation: S, 5; U, 10.
The Monroe Doctrine: S, 2; U, 13.
Voltaire: S, 5; U, 10.
The Koran: S, 10; U, 5.
Plato: S, 7; U, 8.
The Medici Family: S, 1; U, 14.
Treaty of Versailles: S, 11; U, 4.
Bismarck: S, 4; U, 11.
Magna Carta: S, 2; U, 13.

I have made several interesting observations on these results: (i) Of the two students who gave an acceptably specific identification of the Monroe Doctrine, one was a Canadian. (ii) Only one student gave an acceptable identification of the Medici family; of the remaining 14 students, 10 had not even heard of the Medicis. (iii) Of the three students who turned in the best performances, one with 9 acceptable answers, two with 7 each, two were graduates of small liberal arts colleges. (iv) One student, a graduate of one of our largest state universities (*not* the University of Illinois!), failed to give a single acceptable answer. (v) The best score (9 acceptable answers) was that of a Canadian student (the other 14 were native-born citizens of the United States). (vi) Only two students were able to identify specifically Magna Carta, one of the great documents in the evolution of human political freedom; of the remaining 13, seven had not heard of Magna Carta. (vii) In a country in which the dominant religion is Christianity, twice as many students were able to identify the Koran as were able to give a satisfactory identification of the Reformation.

It is tempting to speculate upon the bases of these conclusions and upon their significance, but, since the sample was a small one (inevitably so, for the news of questions asked of doctoral candidates travels rapidly through the graduate student grapevine), one is justified in drawing but a single conclusion: perhaps we are overtraining both our graduate and undergraduate students to the detriment of their education.

One of my colleagues in history, interested in my little project, has, with my aid, drawn up a list of 10 notable theories, discoveries, and persons in the history of science and will try this list on doctoral candidates in the humanities to determine whether or not they are as poorly educated in science as my victims appear to have been in the humanities.

HARRY J. FULLER

Department of Botany,
University of Illinois, Urbana

5 August 1954.

Scarcity of Instrument Makers

During the past few years, much has been written about the scarcity of scientific personnel—a condition that may still exist but is becoming less acute.

Less attention, however, has been paid to another scarcity that is of longer duration and is, perhaps, more serious. I refer to the scarcity of instrument makers, the men who design and build the tools used by scientists, the "fine instruments" of long ago.

For years, we have been under the necessity of importing our scientific apparatus from Europe where the apprentice system has been—and still is—in general use. The apprentice served 4 years or more in the shop to learn the methods commonly used and then worked as journeyman or improver, learning more about his chosen profession in every shop.

In the United States the apprentice system is no more. Instrument manufacturers now employ toolmakers, lathe and milling machine hands, and so forth, who, while they may be excellent mechanics, know little about the simplest instrument, not even its use. The result is that no men are being trained in the

design, the skill to make, or the theory that is back of it all.

To become a competent instrument maker, a man must have a good education in mathematics, physics, chemistry, and mechanics, plus the ability to use this education, plus a high-grade manual skill. He should be able to use any instrument that comes to his attention for repair or rebuilding, or that he is called upon to manufacture. The instrument maker is a professional man in every sense of the word.

Since universities and colleges employ apparatus in vast numbers and the cost runs into large sums of money, it seems to me that these colleges ought to consider seriously the addition to their curriculums of a course in the theory and design of all kinds of apparatus, optical and otherwise. Included in this program should be a well-equipped instrument shop where theory would be translated into practice. By this means the college could supply its own requirements without purchasing outside. And the college should give thought to the additional prestige that would accrue, just as some colleges have a national reputation for their departments of law, medicine, engineering, chemistry, and the like.

Every college has among its students some who would like to take such a course if it were offered, Not every engineering graduate practices engineering, nor does every physicist follow physics as a means of earning a living.

During this time of economic unrest, and after world peace has been achieved, we shall want to do many things, accomplish many results more quickly and in a better manner than formerly. New and better methods of making high-precision measurements will be demanded, far beyond what we now have. Whereas physics and astronomy are now almost alone in making high-precision measurements, before long every branch of scientific endeavor will fall in line, and the demand for new instruments will be overwhelming. Our international relations and our involvement in global wars have made us acutely conscious of the need for better measuring instruments.

It is time that we Americans get busy and do some constructive thinking about this matter. And then, in the usual American fashion, do something about it.

FREDERICK A. BABCOCK

Precise Instrument Company,
Detroit 39, Michigan

10 September 1954.

"I Don't Want To Be Quoted"

The editorial "I don't want to be quoted by the press" [*Science,* 6 Aug.] is needed and should be helpful, especially to students and young scientists, whose habits are not yet fixed.

There are strong indications of a steadily lowering standard of ethics in the population of America, and world-history tells us what happens to nations when moral standards are persistently ignored. President Eisenhower once said: "America is great because she is good. When she ceases to be good she will cease to be great." Scientists, as teachers and in their messages to the public, can play a tremendous role here.

Statistics show that church membership is increasing in America much faster than population is increasing. Yet they also show that crime and wrongdoing of every kind are increasing faster than population is increasing. And, worst of all, the ages of delinquents and criminals are steadily lowering. Yet the teaching of every kind of crime and wrongdoing, in the most attractive forms, is steadily increasing. I refer especially to the so-called "comics" and "funnies" and to the flood of "murder mysteries" in Sunday supplements, magazines, and books. Sex crimes show an alarming increase, but some 100 pictures of nearly nude young women appear daily in newspapers, magazines, and books. America is ceasing to be good. History tells the results.

CARLETON R. BALL

Washington 15, D.C.

7 September 1954.

Role of the Salivary Glands in Extrathyroidal Iodine Metabolism

Recent evidence indicates that the parotid and submaxillary salivary glands function to control the level of thyroxin in the blood stream by deiodinating the hormone and recycling the iodide ion to the thyroid gland via the saliva and the gastrointestinal tract (*1–3*). This process of degradation appears to be essentially the reverse of the pathway of synthesis in the thyroid gland. The level of thyroxin in the blood is controlled by the rate of synthesis in the thyroid and the rate of degradation in the salivary glands.

If this concept is correct, it follows that the rate of degradation of thyroxin by the salivary glands will be under rigid control, since this is one of the methods for controlling the blood level of the hormone. However, if the process of degradation proceeds through the intermediates monoiodotyrosine and diiodotyrosine (DIT), then these substances must be very rapidly degraded to iodide, since they have not been shown to occur other than in thyroid tissue (*4*). This leads to the prediction that there should be a relatively slow, controlled deiodination of the thyroxin present in the blood stream and a very rapid deiodination of intravenously adminstered DIT.

Albert and his coworkers have studied the rate of deiodination of administered thyroxin and DIT in the human being and the rat (*5–7*). They found that thyroxin was deiodinated comparatively slowly in the body. DIT, on the other hand, was very rapidly degraded to the iodide ion. Tong, Taurog, and Chaikoff (*8*) studied the metabolism of labeled DIT in the rat and observed an extremely rapid deiodination of DIT, 90 percent being degraded to iodide in 20 min. The rate of deiodination was not influenced by previous thyroidectomy.