

among the public at large in regard to matters of genetics and reproduction.

Here again the way out requires us frankly to admit and to face the problem, in the hope that the public will not wish indefinitely to continue favoring practices that lead to its genetic deterioration. Of course, this does not mean that we should abandon modern technology—far from it. It means that, in order to enable our descendants to retain the benefits of our technology, we must match it with a higher conception of our duties to subsequent generations. According to this more advanced morality, the saving of a life does not automatically justify its production of offspring, for the chief criterion on which to base decisions in the planning of parenthood would be the welfare of the descendants themselves.

Such a revision of outlook involves the development of a new and more intelligent type of idealism in regard to genetics: one that consciously strives to bequeath to each succeeding generation as good an outfit of genes as it can manage to. It is true that we might here dispute at length the meaning of the word *good*, as it is used in this connection. However, this question also is one that must be tackled eventually. There are indications that it will be found to be by no means a hopeless question, still less a meaningless one, as some critics contend, and that even genetics, through evolution science, will have some contribution

to make in regard to it. If all this comes to pass, then finally in the field of human genetics, even as in that of nuclear war, the old words of Edwin Markham may prove to have been prophetic:

The world is a vapor,
And only the vision is real;
Yea, nothing can hold against Hell
But the winged ideal!

References and Notes

1. This article is based on an address given before the National Academy of Sciences in Washington, D.C., 25 Apr. 1955, in acceptance of the Kimber Genetics award on the first occasion of its being granted. I wish to express again my deep appreciation to the sponsors of the Kimber Genetics award, for having provided this potent means of strengthening the morale of geneticists, and this opportunity for them publicly to air the problems and the prospects of their science. This article is contribution 590 from the Zoology Department of Indiana University. It is being published simultaneously in the *Bulletin of the Atomic Scientists*.
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3. H. J. Muller, *Science in Progress* (Yale Univ. Press, New Haven, Conn., 1951), vol. 7, p. 93; *Acta Radiol.* **41**, 5 (1954); *Am. J. Obstet. Gynecol.* **67**, 467 (1954); *Radiation Biology* (McGraw-Hill, New York, 1954), vol. 1, chaps. 7 and 8.
4. J. V. Neel *et al.*, *Science* **118**, 537 (1953).
5. W. L. Russell, *Cold Spring Harbor Symposia Quant. Biol.* **16**, 327 (1952).
6. Roentgen equivalents, physical.
7. D. W. Moeller *et al.*, *U.S. Public Health Repts.* **68**, 57 (1953).
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Role of the Sciences in Education

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THERE is no unanimity regarding the roles that the sciences should play upon the stage of education. The role must be a major one if a student is to acquire a grasp of the methods and concepts of a science sufficient to equip him to enlarge its horizon or to apply it to human welfare. Upon some of the stages, whose direction has been taken over by "general" educators, sciences are assigned only minor speaking parts. Upon others they are not allowed even to speak for themselves; their parts are taken by logicians and philosophers who claim to have psychoanalyzed them and to understand them better even than they understand themselves. Again, imposters may be thrust forward, dressed in the garb of science, by a nonscientist such as a certain professor of "science education" who advertises his actor in a veritable rhapsody, as follows (1).

Where democratic interplay is permitted and interchange of ideas and content information is fostered, our best people teach science in the midst of a glowing, vibrant, pulsing atmosphere of social awareness.

It is remarkable that a teacher should feel called upon to teach "social awareness" to his students, because that is a quality in many students to which one might justly apply the remark made by a southern lady who was asked whether she could supply a traveler with a little corn pone: "Bless your heart, honey, that is the only thing we ain't got a single thing in the house but."

An occasional director would keep the sciences entirely off the stage. One of them has lamented that "we" had not seen fit long ago to "starve out" science (2).

Many educational institutions provide two stages, one upon which the sciences act more or less alone, another for what are called on the bill "the humanities." My first purpose is to discuss the assumptions underlying the common practice of placing "science and the humanities" thus in juxtaposition.

The term *humanities* originally signified those studies having to do with the affairs of men, as distinguished from those concerned with deity, including theology. It has subsequently been given a variety of