Letters to the Editor

On the Need for Social Engineering

The article, "Physical thinking and social problems" (*Science*, 1946, **103**, 717), like many other articles today that tender a solution to the threat of the atom bomb and war, is somewhat beside the point. While the rigorous and quantitative mind may be able to aid in developing social science, such development is superfluous so far as preventing war is concerned. The fundamental knowledge of social structure necessary to bring about peace is relatively simple and well known. What is needed is not so much new theory as social engineering.

Large areas on the face of the planet already enjoy peace because within them there is no point in fighting: each person within the area has more or less the same rights and privileges as the others and may obtain what he wants by his own peaceful efforts within the framework of law that guards the rights of all. Peace is thus shown to be an accomplished fact of social engineering. As soon as we extend this mutuality of opportunity to cover the whole world there will be no cause of war.

The call, therefore, should not be for physicists to help out with social theory, as useful as that may be for other purposes, but for all scientists to take a more active part in social and political engineering.

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Abbreviations of Generic Names

The practice of using abbreviations for generic names is admissible only in cases where it does not lead to confusion. In preparing a review of yeast-like fungi I had occasion to refer to a paper published in the *Journal of Dairy Science*, 1940, Vol. 23, in which the following organisms were discussed: "*O. lactis*," "*Myc. lipolytica*," "*Ach. lipolyticum*," "*Alc. lipolyticus*," and "*Ps. fluorescens*." Nowhere in the paper were the full generic names given. The author may have been certain of the identity of his organisms, but it is doubtful if many of his readers knew for certain what he had in mind. This paper is not by any means an isolated case, but it serves unusually well to illustrate my point.

"*O. lactis*" undoubtedly meant *Oidium lactis* or *Oospora lactis*, as anyone familiar with the field would deduce. "*Myc. lipolytica*" gave more difficulty. After some consideration it was decided that neither *Mycobacterium*, *Myceloblaston*, nor *Mycoderma* was meant, since *lipolytica* is feminine and each of these genera is neuter, although the last is often but improperly used as feminine. It probably was not *Mycoplana*, *Mycogone*, *Mycocandida*, or *Mycotoruloides*, but this could be ascertained only after a considerable search to find combinations of one of these generic names with *lipolytica* failed. There are many other generic names beginning with "Myc" but only those familiar to me were considered. Probably, but not certainly, the author meant *Mycotorula lipolytica* Harrison. Why did he not so state and why did the editor not insist on it?

"*Ach. lipolyticum*" gave almost as much trouble. Was *Achromatium* or *Achromobacter* among the bacteria or *Achorion* or *Achlea* among the molds meant? These were the only generic names beginning with "Ach," with which I was familiar. Unfortunately, three of them are neuter, as is the specific name. By means of elimination *Achromobacter* was tentatively decided upon.

In the same way it was decided that "*Alc.*" meant *Alcaligenes* and "*Ps.*" meant *Pseudomonas*. The fact that so many bacteriologists use "*Ps.*" to mean *Pseudomonas* and that the combination *fluorescens* is so familiar made this last deduction easy, although there are very many generic names in biology which commence with "Ps."

Either the author of this good paper or the editor of the journal in which it appeared should have seen to it that the full scientific names were spelled out once in the interests of scientific accuracy. Thereafter, abbreviations could well have been used, preferably single capital letters. Many bacteriologists seem to assume that we have official generic abbreviations. We have not.

This sort of thing has been discussed previously in the scientific press, but it can bear repetition. After all, many of us do read scientific papers, and we should like to know what organisms are being discussed. Finally, concerning a certain paper of my own, published about 20 years ago, the only thing that I can say in this regard is: "I acknowledge my transgression, etc."

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"The Little Researcher"

At last, and rightly so, the "Little Researcher" is being accorded some measure of credit and distinction. Carl G. Hartman (*Science*, 1946, **103**, 493–496) speaks strongly on behalf of the too frequently forgotten small-college teacher.

Briefly, Dr. Hartman suggests that one or two per cent of the $100,000,000 recommended for the annual budget of the National Science Foundation of the new Kilgore-Magnuson Bill be allocated to the "Little Researchers." He also calls attention to the fact that the universities and colleges are the training schools for research personnel. In his paper, as would be expected, the writer gives considerable space to the contributions made by the small colleges.

It is my firm belief that in the biological sciences, unless one carries on some scientific investigation especially, in a small college the setup becomes stagnant. The teacher who uses and holds his college lectures inviolate in teaching his own students leaves no outlet for the expression of individual differences. Prof. John Givler states (*Turtox News*, January 1944, Vol. 22) that "mere orthodoxy is sterile and particularly odious in the laboratory which has to its credit historical laudation for smashing religiosity devoid of spiritual value." This is the kind of thing which through long repetition becomes "dry rot." The indications are that the spirit of a small, thriving college must be intimately tied up with research. Then, too, a research teacher usually leaves a lasting impression upon his students. We may say that this is at least partly due to the personal contact between teacher and student.

Many small colleges with very limited resources carry on a small but very serious research program without neglecting the students. In the case of a heavy teaching load, careful organization of the courses is most important; often the teacher sacrifices his own time and finances. It is noteworthy that Harry W. Greene (*W. Va. St. Coll. Bull.*, February 1946, Ser. 33, No. 1) has compiled two decades of research and creative writings at the college. This type of program, I am sure, is duplicated by hundreds of small colleges.

The undersigned (*Turtox News*, October 1945, Vol. 23) attempted to point out a few of the advantages derived from using living specimens in studying vertebrate embryology. The use of living embryos lifts the course from mere pedantry to one of intense interest and active participation. I quote from the above paper: "Aside from interest it is perhaps the best way to develop a student for future service to humanity, especially should he wish to set up his own experiments or do some form of research."

Finally, it should be emphasized that the "Little Researchers" all over America have a common bond of interest, especially where there are little or no funds set up for research. The undersigned agrees that the small colleges as a whole must not overlook the new Kilgore-Magnuson Bill and must at the same time impress upon Congress that the "Little Researcher" is still an important factor in producing the "Big Researcher."

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Redwood Notes

Of the nearly 50 species of conifers in California the redwood, *Sequoia sempervirens* (Lindl.) Engl., is the most important. Unlike its relation, the giant Sequoia of the Sierra Nevada, which is restricted to about 30 isolated groves, mostly of small size and between 5,000 and 8,000 feet elevation, the redwood occurs, often in great numbers, from Monterey County to the Oregon border, a distance of 450 miles (W. L. Jepson. *Silva of California.* Berkeley: 1910).

As a rule, redwood grows only in areas which are invaded by the ocean fogs. These areas include the regions of heaviest rainfall in the state, the annual precipitation of some stations exceeding 100 inches.

The coastal climate is very uniform with relatively little temperature fluctuation. Thus, at San Francisco there is a difference of only 10° F. in the mean temperature of the warmest and coldest months (60°–50°). As a result of these favorable climatic conditions the growth is almost continuous and the forest is very luxuriant. The rapidity of growth in the young trees may be extraordinary. For example, a young redwood, perhaps 5 feet high, was planted near my house on the Stanford campus in the winter of 1913–14. When 30 years old it was 105 feet high, with a breast-high girth of 10 feet. There has been a very appreciable increase both in height and girth during the past year.

The redwood belt, with an average width of about 20 miles, begins in the Santa Lucia Mountains in Monterey County, where there are a few redwoods in some of the canyons opening to the sea. For the most part the area is too dry to support the redwoods. At the northern limit a few redwoods are found in Oregon above the California boundary. The forest reaches its maximum development in the northern counties, especially Humboldt and Del Norte. In this region, through which the Redwood Highway passes, the traveler can observe many trees more than 300 feet high—one recently measured was 364 feet, probably the tallest tree of any species of which there is an authentic record.

While the heaviest forests are in the northern counties, there are large areas in the mountains south of San Francisco and especially in the Santa Cruz range, site of a State Redwood Park and the "big trees" near Santa Cruz. Redwoods are also still growing within a few miles of San Francisco, the best known of these groves being Muir Woods on Mt. Tamalpais.

The Stanford estate of about 8,000 acres is 32 miles south of San Francisco and extends westward to the base of the Santa Cruz range, where redwoods are abundant. Some of these are included in the Stanford property, especially along the San Francisquito Creek, which forms the northern boundary of the Stanford estate. A solitary redwood, an ancient landmark still standing and known as "Palo Alto" (tall tree), gave name to the Stanford farm where the University is situated, and the name was borrowed for the town of Palo Alto, which adjoins the University property and which was founded soon after the University was opened.

In the heaviest forests of the northern counties the redwood is the only species and may occupy extensive areas as pure stands. It is claimed that the amount of timber yielded from these extensive areas of pure redwood is the greatest known. Jepson states that yields of 120,000 to 150,000 feet per acre are not uncommon, and 480,000 feet have been cut from a single tree.

In the southern forests, e.g. in the Santa Cruz Mountains, the redwood is associated with a number of other species—Douglas fir (*Pseudotsuga*), tanbark oak (*Lithocarpus*), madroño (*Arbutus*), and, outside the redwood belt, a variety of trees which are also associated with the vegetation of the open valley.

A notable feature of the redwood is its remarkable power of regeneration. Unlike most conifers, it develops many sprouts from the cut stump, and some of these shoots soon become trees that replace the parent and restore the forest. Sometimes similar shoots develop