Letters

Adoption of the Metric System

Pursuant to the resolution adopted unanimously at the business session of the American Geophysical Union on 7 May 1958 [*Trans. Am. Geophys. Union* **39**, 558 (1958)], Maurice Ewing, president, appointed a Committee on Adoption of the Metric System in the United States.

Bills for the compulsory adoption of the metric system in the United States have been more than once presented to Congress, but they have not been enacted into law, the principal reason being that in each case the effective date proposed followed too soon after passage of the bill. An early effective date would undoubtedly work a severe hardship on the adult population not familiar with the metric system, and it would make obsolete a prohibitive number of everyday items pertaining to weights and measures.

A solution would appear to be a bill to make the metric system the only official system of weights and measures in the United States, effective in not less than one generation (33 years) after passage of the bill. Following this action by Congress, the grade schools and high schools would begin immediately to teach children the metric along with the English system and, during the transition period, would place more and more emphasis on the metric system. At the end of the transition period the English system would still be taught, but the emphasis would be just the reverse of what it is today. A long transition period would result in a smooth change. In a generation most items of equipment involving weights and measures normally become obsolete or are worn out and replaced. Also, persons engaged in professions and trades now using the English system exclusively would normally retire during this period and would be replaced by a new generation thoroughly educated and trained in the metric system.

The questionnaire given below has been prepared for readers for the purpose of gathering statistical information to indicate the degree of interest in this matter. The metric committee of the American Geophysical Union will welcome any comments. Those submitting replies are urged to suggest solutions to difficulties which may be foreseen in the adoption of the metric system.

Additional copies of the questionnaire are available upon request. A small effort on the part of readers to complete and mail this questionnaire will be of invaluable help to the committee. The completed questionnnaire should be mailed to the Executive Secretary, American Geophysical Union, 1515 Massachusetts Ave., NW, Washington 5, D.C.

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Metric System Questionnaire.

1. Indicate professional field of interest in the AGU _____
2. What approximate percentages of units used in your work are:
   Metric ____ British ____ Other ____
3. Would it be to your advantage if a complete conversion to the metric system could eventually be made? Yes ____ No ____
4. How long a period of time (in years) should be allowed for the conversion?
   10 ____ 20 ____ 30 ____ 40 ____ 50 ____ Longer ____
5. Should the centigrade system of temperature measurement be adopted?
   Yes ____ No ____
6. Do you believe that United States export trade is suffering as a result of the use of British units? Yes ____ No ____ No opinion ____
7. Do you believe that the eventual adoption of the metric system is inevitable?
   Yes ____ No ____
8. Do you believe that the cost of a long-time conversion to the metric system would be prohibitive? Yes ____ No ____
9. In the event a joint committee were established to study the problem, circulate questionnaires, accumulate statistics, and report, it should be sponsored by (check one):
   Professional societies ____ Educational institutions ____ Industry ____
   Government ____
   How should the study be financed? _____
   Would you be willing to assist such a study group? Yes ____ No ____
   In what way? Financially ____ As an adviser ____
10. Additional remarks are welcome. _____

_____

Signature (optional)

Vertebrate Metamorphosis

As a conclusion to his most interesting article, "The significance of vertebrate metamorphosis" [*Science* **128**, 1481 (1958)], Wald states: "Metamorphosis is a basic and general phenomenon, common to the whole vertebrate stock. It includes anatomical, physiological, and—perhaps prior to these—biochemical components, all designed to prepare the animal to leave its natal environment. Necessarily, in order to reproduce, the animal must eventually return, so completing its life cycle. . . ."

As far as the lower vertebrates are concerned, the examples which are listed by the author (species such as the sea lamprey, fresh-water eel, salmon, and certain amphibians) support such a conclusion very well. However, these examples alone do not make it valid for the whole vertebrate stock, mainly because these are illustrations of the *exceptional* rather than the *usual* kind of behavior among the vertebrates.

In the largest group of vertebrates, the fishes, the anadromous or catadromous life cycle that Wald speaks of is very rare indeed, being found in probably less than 1 percent of the known species. The vast majority of fishes remain in essentially the same environment into which they are born, having no need for, and showing no evidence of, metamorphic change to prepare the adult for entry into a special natal environment. In fishes there is often a profound change from a larval to adult stage, but this also is not one that necessarily prepares the animal for entry into a new environment in the sense referred to by Wald.

In regard to the higher vertebrates (mammals, birds, and reptiles), no one will deny that there are vast changes during embryological development, some of which are recapitulatory in nature, but the idea that there are changes at maturity which facilitate a return to the natal environment is indeed far-fetched. This is no more true of a spermatozoan than it is of the entire individual.

When one speaks of the natal (or more properly the prenatal) environment of a higher vertebrate embryo, the reference is almost always to the amnion and its contained fluid. Obviously, even a spermatozoan could not "return" to such an environment, since, in a given individual, such structures could not appear until long after the advent of fertilization.

The most momentous event in the course of evolution of the higher vertebrates is often considered to be the appearance of the amniote egg, primarily because *the adult was then freed of the necessity for a return to the natal environment* in order to reproduce.

Instead of the sweeping statement quoted at the beginning of this letter, I would like to take the opportunity to