Comments and Communications

Editorial Policy

EDITORS of scientific journals have two reasonable ways of dealing with bad work. The best way is to reject it. The second way is to publish it and be ready also, to publish a reader's criticism of it. Too often, at present, neither policy is followed; instead, the bad work is published without criticism, because critical letters are against the policy of the journal.

Some scientists tolerate this situation for the sake of peace; they are not compelled, they say, to take notice of bad work. At the same time, their own work will be delayed in publication, and will lie in strange company in the journal's pages when it finally appears. I do not agree that we should let bad work go uncriticized; fear of criticism is a valuable check on bad work. But if an editor will not allow correspondence, it is all the more his duty to keep his standards high.

However, there are legends in our midst to the effect that some great man was neglected during his lifetime because his theories were so strange that the journals would not publish them. Perhaps a very small proportion of these legends may be true, at least in a modified form. But the belief in them is real, and that seems to be why some editors are too timid to reject bad work—they are afraid that thirty years later it may turn out to have been good after all. It is clear that if one abandons one's judgment to that extent there is nowhere to stop. In short, I can see no sensible alternative to the two policies which I first suggested.

I would like to illustrate my case with an example. No doubt many readers may be able to supply their own, but the following may also provide chemists and botanists with a chuckle.

The main theme of this article (Cooper, H. P., *Soil Science,* 69, 7 [1950]) could be expressed as follows: "The more difficult it is for the ion of a metal to be reduced to the metallic state, the more freely that ion will be absorbed by plants." (This rule actually holds for the sequence K, Ca, Mg, Fe, but breaks down, for example, with Na.) A second theme could be expressed, "A major action of light falling on a plant is to decompose molecules into their elements; for example, light of wavelength 4300–4400 angstroms has just the right amount of energy to decompose magnesium chloride into free magnesium and chlorine."

I have reworded both these themes to make them readable. The second theme appears thus in the article: "The radiant energy absorbed by chlorophyll is approximately the same as the decomposition voltage of certain nutrient salts [the accompanying table lists $FeCl_2$, $CrCl_2$, $ZnCl_2$, $MnCl_2$, $AlCl_3$, and $MgCl_2$]; therefore, it seems logical to assume that absorption of radiant energy by plants may result in reducing certain nutrient compounds to the elemental state."

Both theories imply that the elements exist as such—potassium, iron, magnesium, chlorine—inside the plant, at least temporarily. In reply to a statement that this precipitation of potassium is absurd, the author merely says (p. 29) that "many nutrients are solids in the elemental state and cannot be evolved like those that are gases" (referring here to oxygen in particular). This does not help us much; if the metallic potassium does not evolve like a gas, it ought to be demonstrated all the more easily as it lies glistening within the cell.

The paper includes a table (p. 10) showing that iodide and sulfide are equally strong reducing agents, and that acetate is a stronger oxidizing agent than chlorate.

The editor of the journal introduced this article with an explanatory note saying that, of many referees, all but two were against publication.

It seems only too clear that the reason for publishing this kind of article is the fear that later ages may consider it sensible. We come back then to the choice suggested at the start. Bad work should not be published, but if it is, then the same journal should open correspondence columns in which critics can give it the treatment it deserves.

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Agenda for S.U.N. Commission (I.U.P.A.P.), July 1951

AT THE next meeting (Copenhagen, July 1951) of the International Union of Pure and Applied Physics, the Commission on Symbols, Units and Nomenclature will discuss and may adopt resolutions recommending the universal use of certain units and symbols of interest to many American physicists, including certain symbols and nomenclature for nuclei, and units for electricity and magnetism. Universal agreement on units and symbols is certainly desirable although admittedly very difficult of attainment. It is a policy of the S.U.N. Commission to recommend a usage only when there is overwhelming support for it. The commission therefore invites discussion of questions on its agenda and in particular the questions presented here. Comments and discussion may be sent directly to Professor J. de Boer, Secretary of the S.U.N. Commission,[1] University of Amsterdam, Holland, or to the writer of this notice for transmittal to the commission.

NUCLEI

1. *Symbols for nuclei.* It has been proposed that the

[1] A. Perard, Director of the International Bureau of Weights and Measures. Sèvres, France, is president of the S.U.N. Commission. Other members are: J. de Boer (Amsterdam), E. Griffiths (Teddington), H. Konig (Berne), E. Perucca (Turin), and F. G. Brickwedde (Washington).

"diagonal" notation for nuclei be universally adopted. An example of this notation is:

$_{3}Li^{6}$ which is $_{(\text{atomic no.})}Li^{(\text{mass number})}$

This is already in general use by American physicists. It is objected to by French scientists, especially chemists, who indicate the atomic composition of molecules by upper right-hand indices (e.g., H^2O). This upper index notation for the composition of molecules, however, is in contradiction to a previously made recommendation of the S.U.N. Commission. Also, some American chemists prefer to reserve the upper right-hand index space for the sign (+ or −) of an ion.

The indication of the atomic composition of molecules by lower right-hand indices would be retained. Two suggestions for writing the atom numbers are illustrated by

(*a*) Li_2^6 and (*b*) $(Li^6)_2$.

The second form (*b*) has the advantages that it does not require the back-spacing necessary for the typing of parallel super- and subscripts, and it can be printed with regular superscript and subscript monotype. The parallel notation of form (*a*) calls for special type.

2. *Nomenclature for nuclei.* It is proposed that the word *monobar* be universally used to indicate a single atomic species having a definite atomic number and a definite mass number, as $_{1}H^{3}$ and $_{9}F^{19}$. It is proposed also that the word *isotopes* be used only to indicate monobars having the same atomic numbers but different mass numbers. *Isobars* would be recommended to indicate monobars having the same mass numbers but different atomic numbers.

Electrical Units

1. *The Giorgi–MKS system and the fourth* (*electrical*) *unit.* The general Assembly of the International Union of Pure and Applied Physics in Amsterdam, July 1948, approved the following resolution proposed by the S.U.N. Commission:

> The International Union of Pure and Applied Physics decides to ask the International Bureau of Weights and Measures to accept for international use, an *international practical system* of units. It is not proposed that the CGS-system should be abandoned by physicists.
>
> The International Union of Pure and Applied Physics recommends as an international practical system of units the system: *metre, kilogram* (*mass*), *second* and an electrical unit of the absolute practical system (to be chosen in near future).
>
> The unit of force in this system (i.e., the force, which acting on a mass of 1 kg produces an acceleration of 1 m/s²) should be called the *newton.*

The Union of Physics had two objectives in making this recommendation: (1) the elimination of other practical systems of units which use mass units as force units, and (2) to get a reaching of agreement on the fourth quantity of electrical or magnetic nature for a satisfactory description of electric and magnetic phenomena.

The above resolution of the union made no choice for the fourth unit. There is merit in the suggestion that electric charge or electric current be used as the basis of the fourth unit. Industrial physicists have advocated fixing the numerical value of the permeability of vacuum at 10^{-7}, making the practical MKS units decimal fractions or multiples of the electromagnetic CGS units.

2. *The rationalization of the electrical units.* A report of the S.U.N. Commission approved by the General Assembly of the Union of Physics, London, 1934, states that because "it appears improbable, that an overwhelming preponderance of opinion either favourable or unfavourable to rationalization [avoidance of the factor 4 π in Maxwell's equations] will be manifested in the near future," further action should be deferred until agreement on this matter has been reached. Although the situation has not changed much, it is probable that rationalization of the electrical units will again be discussed at the Copenhagen meeting.

It may be helpful to reach agreement first on a few general principles governing the choice. Two principles suggested are:

a) Physical equations in textbooks and scientific journals should be mathematical relations between physical quantities and hence be independent of the system of units used for the numerical evaluation of the quantities.

b) Unit-systems should always be coherent or germane, i.e., should not require the introduction of numerical conversion factors different from unity in the unit equations defining the derived units in terms of the fundamental units of its own system. The electrostatic and electromagnetic CGS units and the Giorgi-MKS units are each coherent unit systems. The volt as a unit of kinetic energy of an electron is an incoherent unit since the equation defining it in terms of the regular units of energy involves the charge of the electron as a numerical factor.

On the basis of these principles, rationalization should be considered as a change in the definition of some physical quantities, as:

$$D' = D/4\pi \qquad \varepsilon' = \varepsilon/4\pi \qquad \rho' = \rho/4\pi$$
$$H' = H/4\pi \qquad \mu' = 4\pi\mu \qquad M'(= B - \mu_0' H') = 4\pi M$$

This makes the factor 4 π disappear from Maxwell's equations and reappear in the force laws between electrical charges and currents and in problems involving spherical symmetry.

As it is to be expected that the quantities defined according to the rationalized equations will be used at the same time as the classical definitions, it is very important that the rationally defined quantities should be given a *new name* (an adjective of prefix to the classical name) and a *modified symbol* (suggestions: upper index *r*, prime as in the paragraph above, or another symbol, such as might be had by combining a solidus with *D, H,* ε, etc., in analogy to the Dirac ħ).

It is of interest to note that at the meeting of Technical Committee Number 24 (Electric and Magnetic Magnitudes and Units) of the International Electrotechnical Commission, held in Paris July 1950, the following conclusions were reached:

1. It was recorded that "newton" was finally adopted as the name for the unit of force in the Giorgi system.

2. The ampere was adopted as the fourth principal unit of the Giorgi system.

3. The so-called total rationalization of the Giorgi system was adopted.

4. An Experts Committee was set up to study the rationalization process and prepare questions to be considered at the next meeting.

Although such recommendations of the I.E.C. can have no legal force, they will doubtless be used by many engineers and writers of textbooks as a guide to preferred practice. It is very fortunate that Professor de Boer could participate in the meetings last July and is (as observer) a member of the Experts Committee.

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Cobalt 60 Labeled Vitamin B_{12} of High Specific Activity

A RECENT report (Chaiet, Rosenblum, and Woodbury, *Science,* **111,** 601 [1950]) described the microbial synthesis and isolation of crystalline vitamin B_{12} labeled with cobalt 60. The specific activity of this preparation was $\simeq 0.25$ μc/mg. The specific activity of the vitamin is determined by the specific activity of the cobalt added to the nutrient medium, by the extent of utilization of cobalt naturally present in the medium, and by the cobalt content of vitamin B_{12}. The highest specific activity cobalt 60 obtainable from the U. S. Atomic Energy Commission is an amount of 2,000 μc/mg ("Isotopes," *Catalog and Price List No. 3,* [July 1949]). The cobalt content of vitamin B_{12} has been reported variously as 4.5% (Brink, N. G., *et al., J. Amer. Chem. Soc.,* **71,** 1854 [1949]) and 4.0% (Fantes, K. H., *et al., Proc. Royal. Soc. London,* **136–B,** 592 [1949]). Assuming the 4.5% figure, and ignoring the possibility of an inactive cobalt (59) contribution from the broth, the maximum specific activity currently attainable is 90 μc/mg vitamin.

In more recent experiments we have been able to approach this maximum. Starting with cobalt 60 (purchased as the nitrate from Tracerlab, Inc., on allocation from the AEC) of specific activity 1.800 μc/mg added to the nutrient medium, we obtained a product with a specific activity of $\simeq 67$ μc/mg. The highest specific activity expected was 72–81 μc/mg, depending on the value (4% or 4.5%) taken for the cobalt content of vitamin B_{12}. Despite the uncertainty in the cobalt content of vitamin B_{12}, it thus appears that the added cobalt is utilized by the microorganism, and that only 7–17% of the cobalt that was incorporated in the radioactive vitamin originated in the raw broth. This finding that bivalent cobalt ions can be utilized by microorganism is in accord with the observation (Hendlin and Ruger, *Science,* **111,** 541 [1950]) that addition of cobalt salt to synthetic media increases the yields of B_{12}, and with the report (Abelson and Darby, *Science,* **110,** 566 [1949]) that a radioactive compound, presumably B_{12}, can be isolated from the feces of sheep fed inorganic cobalt 56.

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Operation Lamprey

THIS is to report an observation on lampreys that strikes me as being interesting rather than significant, but unparalleled in the field of general zoology. As is commonly known, the parasitic lampreys attack fish, rasp a hole in the flesh, and suck out the blood and tissue juices. If the lamprey attaches itself on the thick dorsal body wall the wound ordinarily heals after the lamprey releases its victim, and the fish usually survives. A distinctive sort of scar results. If, however, the attachment is made to the ventral body wall, the wound in most cases penetrates into the body cavity. This circumstance is almost always promptly fatal to the fish. In terms of surgery, the lamprey has performed a crude sort of laparotomy.

Clarence H. Kennedy, of the Department of Zoology and Entomology here, has told me of an observation he made several years ago on an 18-inch pike, *Esox reticulatus* Le Sueur or *E. lucius* L., which he had taken from Cayuga Lake, near Ithaca, New York. This pike had been attacked by a lamprey, presumably *Petromyzon marinus* (land-locked), about an inch directly craniad to the anus on the midventral line. The wound had been formed through the body wall, mesentery, and intestine and had then healed in such a manner as to form an opening into the gut without exposing the peritoneal cavity. The open character of the wound caused it to act as the outlet of the intestine and the original anus now appeared to be nonfunctional. Here, then is an example of a piece of difficult surgery being performed by a member of the most primitive class of vertebrates on an individual several "notches" advanced phylogenetically. Obviously, this was a case of accidental and unintentional colostomy that was startling to the pike if not to the lamprey.

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