Comments and Communications

Articulate Science

In recent issues of Science there has been considerable interest in a number of problem areas, overlapping specialized fields, which are of concern to all scientists. The areas include, among others, scientific publications, ethics, monetary compensation, cost of research, loyalty oaths, combating pseudo-science, communication of scientific method and ideals to the public, public relations, religious limitation on science teaching.

The integrating factor underlying these areas is that they deal with human relations among scientists and with the scientist's relation to the social environment he encounters in his daily work. As such the problems are part of the broader field of scientific communication, which deals with all the media employed to facilitate the transfer of ideas in scientific fields.

John Pfeiffer, in his letter "Illiteracy Triumphant," in the July 13 issue of Science, asks very pointedly why individual scientists or individual scientific societies do not combat pseudo-science, such as is represented by Velikovsky's *Worlds in Collision.* He also asks whether there is an organization that can represent American science in this and similar problems.

The questions he asks are important and demand answers. The individual scientist, fully occupied with immediate professional problems, cannot devote much time to these areas. Individual societies are in a similar position. There appears to be a need for a new organization that will be primarily concerned with problems of communication. How shall such an organization be conceived so that it will become an important factor in furthering the aims of science?

In a narrow segment of the communications field, literature chemists were placed on an equal level with other chemists when the Division of Chemical Literature of the American Chemical Society was established in 1949. However, the communications field today must be broadened to include media of communication other than verbal, such as graphic, photographic, three-dimensional, auditory, and tactile. Associated problems of financing, freedom of communication, and extension of the media of communication to the general public must be considered. Communication is thus becoming a highly specialized field in itself, requiring specialized personnel and techniques.

Is the communications problem to be solved by forming, *ad infinitum,* a series of organizations to cope with each individual problem as it arises? Or can we form, on a broader and more systematic basis, one organization that could represent American science in combating pseudo-science and also in considering the related problems of effective media and public relations necessary for such a task? Could such an organization deal with problems in publications, ethics, etc.? An attempt to develop such an approach will be made at the AAAS meeting on December 30 at the symposium "Operation Knowledge." The author of this note will present a paper on "A Proposed Organization of Communications Scientists."

An effective organization of communications scientists might be in a position to analyze systematically the following suggested areas: Aims and objectives of scientific communication; evaluation and improvement of existing media; accessibility of the products; development of new media; reducing the communications time lag; manpower, personnel standards, and professional training; ethical standards; financing; the role of government and of industry in science communication; international aspects; language; translation needs; abstracting needs; communication's role in the diffusion of scientific knowledge to the public; communication and the unification of the sciences; educational aspects; freedom of communication; advertising in scientific fields; public relations for scientists; the trade magazine's role in science communication; the development of centralized scientific information services; propaganda and scientific communication; and communication needs of the armed forces.

Interested scientists are requested to submit their views on the proposed organization.

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Enzyme-Substrate Complexes

The growing interest in the calculation of the dissociation constants for enzyme-substrate complexes makes it desirable to simplify the currently used methods. The original method introduced by Michaelis and Menton (1913) was greatly improved by Lineweaver and Burk (*J. Am. Chem. Soc.,* 56, 658 [1934]). Veibel (*Enzymologia,* 3, 147 [1937]) introduced an even simpler procedure, which seems to have been completely overlooked in current publications. The principal purpose of this communication is to point out that this improved method exists. Although Veibel apparently never published the derivations of the equations involved, an independent derivation has been published by the writer (W. Pigman and R. M. Goepp, Jr. *Chemistry of the Carbohydrates.* New York: Academic Press, 480 [1948]).

There is also considerable current interest in the nature of covalent, easily dissociable bonds, such as appear to be present in some types of protein-coenzyme and enzyme-substrate compounds. In this connection it may be noted that reactions between amino compounds and sugars provide at least an analogy. Glycosylamines are readily synthesized and dissociated under physiological conditions, and the position of the equilibrium is dependent on the nature of the amine and on the pH (Pigman, Cleveland, Couch, and Cleveland. *J. Am. Chem. Soc.,* 73, 1976 [1951]). Isomerization may result during the period of combination. Isbell and Frush (*Ibid.,* 72, 1043 [1950]) showed that the curve for hydrolysis rate *vs* pH of one of these compounds is similar in shape to typical pH-activity curves for enzyme-catalyzed reactions. This analogy is interesting, even if not more significant.

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Photoinactivation of Indoleacetic Acid

IN A recent issue (SCIENCE, 113, 300 [1951]), R. G. Ferri and R. Guidolin state that "... the photoinactivation of indoleacetic acid (phytohormone) by riboflavin discovered by Galston ... should be explained by a mechanism in which riboflavin did not act specifically, since the same inactivation could be brought about by many different substances. Although chemically unrelated, all these compounds had in common the property of fluorescence." This statement is based on an article by M. G. Ferri (*Arch. Biochem. Biophys.,* 31, 127 [1951]), in which it is shown that many fluorescent substances can in fact sensitize the photoinactivation of indoleacetic acid.

These authors fail to consider two points: (*a*) The fact that riboflavin is not specific, for the reaction is well known, and is alluded to in my paper (SCIENCE, 111, 619 [1950]): "... other fluorescent pigments, some of a non-biological nature, are also effective in such reactions. ..."

(*b*) The reason for considering riboflavin to be *the* effective pigment is that the action spectrum for the destruction of indoleacetic acid by a plant *brei* corresponds extremely well with the absorption spectrum of riboflavin (*Am. J. Botany,* 36, 773 [1949]). Although this is not absolute proof that riboflavin participates in the reaction, it is certainly very strong evidence. In any event, it rules out the other fluorescent pigments discussed by the above authors, on the grounds that their absorption spectra do not fit the photoinactivation data.

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IT SEEMS to us that Dr. Galston feels we did not fully recognize the great importance of his discovery. That is not so. As can be seen from the quotation Dr. Galston made from our paper, we have clearly given him full credit for the most important finding that riboflavin induces the photoinactivation of indoleacetic acid.

On the other hand, though it does not seem particularly important to us, we do not quite agree with his statement that "The fact that riboflavin is not specific for the reaction is well known and is alluded to in my paper" [his present letter].

It is true that such an allusion was made, but only in a very general way, when Dr. Galston states (SCIENCE, 111, 619 [1950]): "Thus it is clear that riboflavin may cause the photochemical alteration of many different kinds of molecules, both large and small. It should also be pointed out that other fluorescent pigments, some of a non-biological nature, are also effective in such reactions."

In M. G. Ferri's paper, on the other hand, a very particular statement is made (*Arch. Biochem. Biophys.,* 31, 127 [1951]): "These results indicate quite clearly that the induction of the photoinactivation of indoleacetic acid (IAA) is by no means a peculiarity of riboflavin but is a property common to many fluorescent substances."

Thus the situation, as we see it, is that, whereas Galston made a very general statement, M. G. Ferri made a specific one, based on many experimental data.

As for Galston's second comment, that only riboflavin can be concerned in the photoinactivation of indoleacetic acid by a plant *brei,* we do not wish to discuss it, since in our paper we were not concerned with this problem.

We agree with Dr. Galston that his is very good evidence that riboflavin participates in the reaction of the plant *brei* he studied—namely, the *brei* of etiolated pea epicotyls (*Am. J. Botany,* 36, 773 [1949]). However, we feel that plant *breis* of various other species should be studied before the participation of other fluorescent substances can be definitely ruled out.

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Polymerization by Means of High-Energy Electrons

THE report of J. V. Schmitz and E. J. Lawton (SCIENCE, 113, 718 [1951]) on initiation of vinyl polymerization by high-energy electron irradiation evoked long-submerged memories of this writer's and his associates' work of two decades ago. The work took its origin in 1931 from a discussion of the requirements of receptacle surface conditions for the delay in coagulation of blood extravasates, during which the young physicist associate of our Central Laboratory and Hormone Research Institute of the City of Mannheim recalled an earlier observation that vacuum-tube irradiation increases the water repellency of glass surfaces. Experiments in which glass slides were exposed in cathode-ray tubes confirmed the observation. Analysis of the experiments indicated that the stopcock grease evaporating from the connections of the tube to the evacuation pump was responsible for the phenomenon, and disclosed the repellency to be the property of a minute film formed on the exposed glass surfaces. The film was strongly adherent to the glass and highly resistant to various kinds of harsh chemical and mechanical treatment. Our observations held out not only the promise of a particularly costly method