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