Fluorescence of Amino Acids

In the December 2, 1949, issue of *Science,* A. R. Patton, Elsie M. Foreman, and Patricia C. Wilson published observations which led them to the conclusion that fluorescence by dry amino acids is "an assumption which appears unwarranted."

While we are in agreement with their observations gained with glass plates and filter paper, we wish to point out some differences of interpretation of the results. Even if one is to disregard J. de Ment's report on fluorescence of amino acids in the solid state observed at wavelengths 3650 A–3600 A (de Ment, A. and Dake, *Ultraviolet light and its application.* New York: Chemical Publishing Co., 1942.) One has to contend that more than a simple browning reaction between the amino acids and the paper is involved. Many organic substances display similar browning after prolonged heating of the paper. Assuming that it is a Maillard (browning) reaction, it must be one between the amino group of the amino acid and the paper, which results in no critical change in the amino acid molecule, as the subsequent ninhydrin reaction is strongly positive. Moreover, it has been observed that N-substituted amino acids do not fluoresce (Platner and Nager. *Helv. Chim. Acta,* 1948, **31,** 2203; Gal and Greenberg. *Proc. Soc. exp. Biol. Med.,* 1949, **71,** 88). The reasoning that extraction of the amino acid does not affect the fluorescence of the spot can be countered by the fact that neither the amino acids nor the pyrimidines or purines are 100% extractable from the paper; the losses amount to 7%–9%. This can easily be checked by radioactively labeled material. The nonextractable material might possibly be amino acids that have undergone an advanced browning reaction to the point of cyclization. In any case, in our experience, some amino pterines, and even ammonium hydroxide (prepared from ammonia gas and distilled water) leave similar fluorescent spots behind on the paper. This relationship becomes more complicated if the effect of solvents is taken into consideration. Whether this effect can be so simply described as a *sine qua non* of the filter paper is still an open question.

Another possibility is the physical aspect. It is a well-known fact that many substances that show no fluorescence in the solid state or in solution produce emission when brought into contact with a finely porous insulator, such as cellulose, cotton, or fine aluminum oxide. The insulation assures adequate isolation of radiating molecules from their neighbors so that the excitational energy cannot be dissipated. This is interpreted to mean that the main part of the substance cannot absorb energy from the activated particles, whose concentration remains at an optimum, sufficient to fluoresce. However, this possibility remains to be tested in the case of amino acid adsorption.

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The Use of a Fathometer for Surveying Shellfish Areas[1]

Although echo or sonic sounding instruments were designed primarily for navigational purposes, some of them have proved useful for hydrographic surveys and to locate schools of fish (Adams, K. T. *Hydrographic Manual,* U. S. Coast and Geodetic Survey Spec. Pub. #143, 1942; and Tester, A. L. *Bull. Fish. Res. Bd.,* Can. LXIII, 1943).

A portable depth recording instrument, Model 808-J, manufactured by the Submarine Signal Company, was recently used to obtain profiles of Pamlico Sound, North Carolina, in a survey of the bottom for shellfish beds. Several transects were made between the major shoals of the sound in depths of water varying from 10 ft to 25 ft. The different intensities of the recordings, indicating hard or soft bottom, were checked with a leadline and material was dredged with a conventional oyster dredge. In general, when hard bottom rising a few feet above the surrounding mud was located, it was found to be an oyster bed. From some fathograms it was possible to distinguish shell bottom from hard sand, although scattered oysters lying on hard sand bottom were not readily distinguishable.

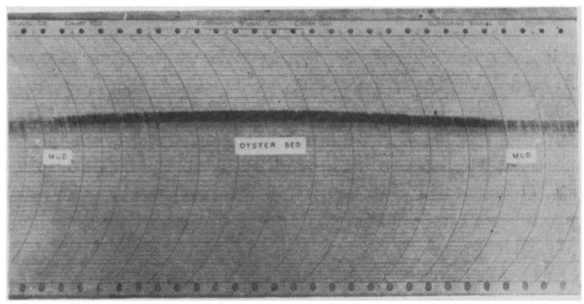

FIG. 1.

Fig. 1 is a photograph of a recording obtained while passing over an oyster bed. The depth of water overlying the bed is indicated in feet by the horizontal lines along the vertical scale A.

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[1] The Institute of Fisheries Research is indebted to the Submarine Signal Company of Boston, Massachusetts, for the loan of the fathometer.

The Chalkley Equation for Volume-Surface Ratios Applied to Open Figures

With reference to the excellent paper by Chalkley, Cornfield, and Park on the estimation of volume-surface ratios of closed three-dimensional figures (*Science,* 1949, **110,** 295), I should like to point out that the figures need not enclose finite volumes and that therefore the method has a somewhat broader field of application than the authors have indicated.