It must be concluded that heating sodium citrate solutions does not increase their osmotic pressure, and that solutions containing 2.9 g per 100 ml—whether they have been heated or not—are not isotonic with bull's blood which, according to Salisbury *et al.* (1948), has a mean freezing point depression of 0.56° C.

Nevertheless, in making up egg yolk-citrate diluents for semen, the use of solutions containing 2.9 g of $Na_3C_6H_5O_7 \cdot 2H_2O$ per 100 ml appears *theoretically* sounder than that of solutions containing 3.6 g (as earlier recommended by C. B. Knodt and G. W. Salisbury [*J. Dairy Sci.*, 1946, **29**, 285]) for which a freezing point depression of 0.645° C was found by the Hortvet technique. Since egg yolk has an average freezing point depression of 0.60° C (Needham, J., and Smith, M. *J. exp. Biol.*, 1931, **8**, 286), mixtures of equal parts of yolk and 2.9% citrate solution with a freezing point depression of 0.526° C are likely to be nearly isotonic with fresh bull's semen which has an osmotic pressure equal to, or slightly higher than, bovine blood (Salisbury *et al.*, 1948). Mixtures of equal parts of yolk and 3.6% citrate solution, on the other hand, are clearly hypertonic to semen. Whether this point is of *practical* importance, however, remains to be seen. The good results of artificial insemination obtained in the past with 3.6% citrate solution suggest that, within limits, bull's semen is not very sensitive to variations in the tonicity of the diluent.

R. ASCHAFFENBURG
National Institute for Research in Dairying
University of Reading, England

A Simple Method for Opening Quartz Capsules Containing Radioactive Materials

The authors encountered considerable difficulty in opening capsules containing either irradiated red phosphorus or phosphorus pentasulfide obtained by service irradiation at Oak Ridge National Laboratories on authorization from the Atomic Energy Commission. These materials were submitted for service irradiation sealed in quartz capsules of less than 3 in. in length and ½ in. in diam, packed under nitrogen at less than atmospheric pressure. The phosphorus was obtained in 1-g lots with an activity of 50 mc, and the phosphorus pentasulfide was obtained in a 4-g sample with an activity of 150 mc.

The apparatus shown in the accompanying drawing was used to open the sample of P_2S_5 without any laboratory or personnel contamination and also served to minimize the exposure of the operator's hands. (The survey meter read less than 2 mr/hr outside the case.)

After unpacking, the quartz capsule (Fig. 1, *4*) was placed in a hole of the proper dimensions in a lucite rod (Fig. 1, *5*) 1½ in. × 2½ in. A cement of lucite dissolved in chloroform was used to secure the capsule in the lucite rod. This lucite rod was placed in a lucite box (Fig. 1, *7*) 4 in. × 4 in. × 4 in. with walls ½ in. thick. This box was equipped with a retaining screw for holding the lucite rod and with a filter packed with glass wool (Fig. 1, *8*) to remove any radioactive materials that might be dispersed when the capsule was opened. The filter was connected to a vacuum source to insure a flow of air into the box through the shaft opening and at the junction between the cover and the box. The sliding cover (Fig. 1, *2*) was of ½-in. lucite, 6 in. × 6 in. A Dremel Moto Tool, or equivalent, was mounted on the sliding cover with the shaft projecting into the box. A carborundum cutting disk (Fig. 1, *3*) was mounted on the shaft, which was positioned in the chuck so as to bring the cutting disk in proper alignment with the quartz capsule. The cover was then placed on the box slightly off center so as to bring the edge of the carborundum disk into contact with the side of the quartz capsule. The sliding cover was then moved slowly so that the carborundum disk cut a groove completely around the capsule.

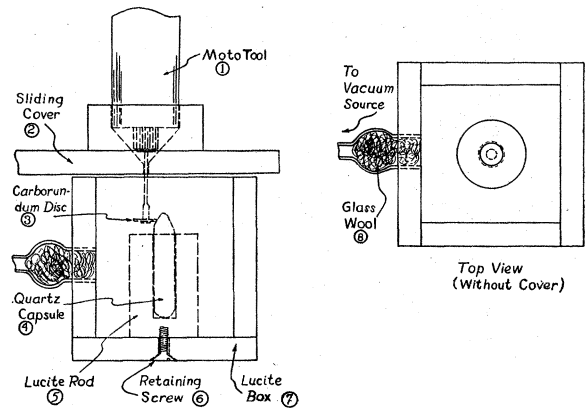

FIG. 1.

The authors have found it desirable to cut the top off completely with the cutting tool rather than break it at the groove by a sharp blow, since the sudden rush of air into the capsule tends to disperse the radioactive material. After the top is sawed off, the retaining screw is loosened and the lucite rod is removed with tongs to transfer the radioactive materials to the reaction flasks.

For gamma emitters the box and sliding lid can be constructed of lead, with lucite employed for the side of the box away from the operator in order to provide light. A lead-glass observation window in the front or a mirror placed behind the box would enable the operator to observe the position of the carborundum disk and the progress of the cutting operation.

H. H. COBURN and C. C. ROAN
University of Illinois
Urbana

Water-soluble Riboflavin Derivative

The recent paper "A Very Water-soluble Riboflavin Derivative" by George B. Stone (*Science*, 1950, **111**, 283) prompts us to report our own findings, which have a relation to his. During our search for water-soluble, biologically active riboflavin derivatives, which resulted in the preparation of methylol derivatives of riboflavin (Schoen, K., and Gordon, S. M. *Arch. Biochem.*, 1949, **22**, 149) we prepared in 1947 a riboflavin sulfate ester by essentially the same method as reported by Stone.