9. KENYON, J., and MUNRO, N. *J. Chem. Soc.*, 158 (1948).
10. MELNICK, D., HOCHBERG, M., and OSER, B. L. *J. Nutrition*, **30**, 67 (1945).
11. RUBIN, S. H., JAHNS, F. W., and BAUERNFEIND, J. C. *Fruit Products J.*, **24**, 327 (1945).
12. AMBROSE, A. M., and DE EDS, F. *Arch. Biochem.*, **12**, 375 (1947).
13. GOSWAMI, M., MUKERJI, S., and RAY, S. N. *Science and Culture*, **14**, 35 (1948).

A Satisfactory Apparatus for Study of Analgesia in Mice

James Y. P. Chen and Harry Beckman

Marquette University Medical School, Milwaukee, Wisconsin

The white mouse is a suitable animal for the study of the threshold to induced pain because if dropped upon a heated surface it will sharply withdraw its paws when the sensation of heat is succeeded by pain, the time lapse before this withdrawal being quite constant in individual animals. The only difficulty in our experience has been to obtain a constant and uniformly heated surface upon which to drop the mouse, a handicap now overcome through the development of the herein described apparatus, which is a modification of an arrangement discussed with one of us (H. B.) by N. B. Eddy, of the National Institutes of Health, who based his method upon that described by Woolfe and MacDonald (*1*).

The apparatus, shown in Fig. 1, consists of a copper teakettle, the large opening of which is sealed with a copper plate and the spout of which is connected with a long glass condenser through a tightly fitted cork and a copper cylinder soldered into the spout. The kettle is heated by a 600-w element operated through an adjustable bimetallic relay system and is about two thirds filled with a mixture of equal parts of ethyl formate and acetone. The mixed fumes from the ethyl formate (bp, 54°–55.5° C) and acetone (bp, 55.5°–55.8° C) are returned from the condenser to the kettle, and the temperature of the soldered-in copper plate in the top of the latter is maintained uniformly at 54°–55° C, which is just the pain temperature threshold of the mouse.

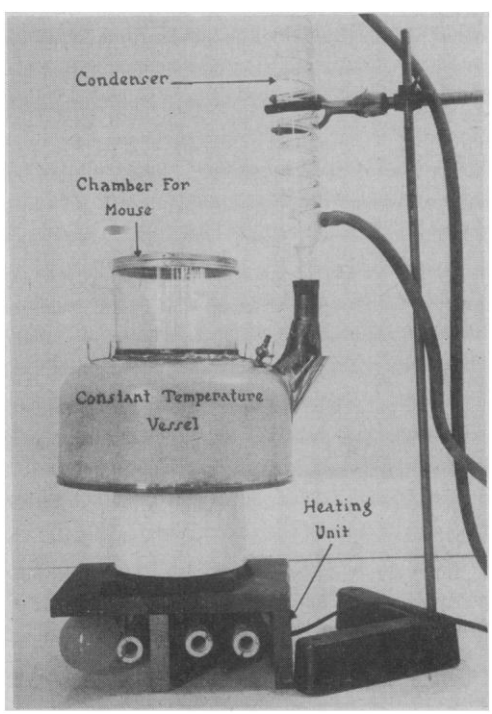

FIG. 1. Apparatus for study of analgesic threshold in mice.

To keep the mouse in contact with the hot plate during "pain-point" determination, a glass cylinder with a cover is fixed on top of the plate. The simultaneous lifting and licking of both forefeet have served us as the most reliable "pain-point," all mice invariably showing this sign within 15 sec after being put on the plate. In our experience any agent deferring the "pain-point" beyond 15 sec may be considered an analgesic.

Reference

1. WOOLFE, G., and MACDONALD, A. D. *J. Pharmacol. & Exptl. Therap.*, **80**, 300 (1944).

Stress and Ketone Body Metabolism[1]

Frederick Sargent II[2] and C. Frank Consolazio[3]

U. S. Army Medical Nutrition Laboratory, Chicago, Illinois

A clue to the role of fat in the metabolic adjustments of man to systemic stress has been provided by a review of data on ketonuria observed during Army ration trials and nutrition surveys. As a part of the nutritional and metabolic assessment of the troops taking part in the trials and surveys conducted in the period 1944–50, specimens of urine were collected for routine testing by one or another modification of Rothera's method (*1*) for detecting the presence of nitroprusside positive substances. The positive reactions, which were identical with those originally described by Rothera (*1*), were qualitatively graded: trace and 1 to 4+. In general the results have been reported as percentages of the tested samples that were positive at any given time (to be called here "per cent ketonuria").

The specimens of urine were collected under a variety of conditions. In the nutrition surveys, the specimens represented random samples. Occasionally similar samples were taken on ration trials. Usually,

[1] The opinions expressed in this paper are those of the authors and do not necessarily represent the official views of any governmental agency.

[2] Present address: Department of Physiology, University of Illinois, Urbana.

[3] To Jack Bollerud, who stimulated our interest in the ketonuria observed during cold weather ration trials, and Everett Bowden, of the Arctic Aeromedical Laboratory, we are indebted for supplying considerable unpublished data on ketonuria occurring during Alaskan ration trials. We wish to thank R. E. Johnson for his assistance in preparing this paper.