

an acaricide structurally related to the formamidines, was the most potent compound tested; its anti-MAO activity compared favourably with that of tranlylcypromine.

We have shown that chlordimeform and several related compounds are potent inhibitors of the deamination of kynuramine by rat liver MAO *in vitro*. Although it is possible that these compounds will also interfere with other enzyme systems, it seems plausible to suggest that a causal relationship exists between the toxic action of these formamidine compounds and interference with the MAO-biogenic amine system. This is the first observation of inhibition of MAO by insecticides and acaricides.

SHAWKY A. AZIZ  
CHARLES O. KNOWLES

Department of Entomology,  
University of Missouri,  
Columbia,  
Missouri 65201

Received December 21, 1972.

- <sup>1</sup> Knowles, C. O., and Roulston, W. J., *J. Austral. Entomol. Soc.*, **11**, 349 (1972).
- <sup>2</sup> Blaschko, H., and Duthie, R., *Biochem. J.*, **39**, 347 (1945).
- <sup>3</sup> Weissbach, H., Smith, T. E., Daly, J. W., Witkop, B., and Udenfriend, S., *J. Biol. Chem.*, **235**, 1160 (1960).
- <sup>4</sup> Knowles, C. O., Ahmad, S., and Shrivastava, S. P., in *Proc. Second IUPAC Intern. Cong. Pesticide Chem.*, **1**, Insecticides, 77 (Gordon and Breach, New York, 1971).

## How Much Food Does Man Require?

We believe that the energy requirements of man and his balance of intake and expenditure are not known. Paradoxically, we conclude this from results of the increasingly sophisticated studies of food intake and energy expenditure which show that in any group of twenty or more subjects, with similar attributes and activities, food intake can vary as much as two-fold<sup>1-5</sup>. In those surveys where both intake and expenditure are measured, there is often good agreement between the two estimates for the average of the group, but usually very large discrepancies between individual intake and individual expenditure. The results of careful studies in a number of countries suggest that some people, perhaps through some mechanism of adaptation, are able to be healthy and active on energy intakes which, by current standards, would be regarded as inadequate. On the other hand, there are also studies in which subjects have been given large quantities of additional food with little or no increase in body weight<sup>6,7</sup>. In contrast, there are the difficulties experienced by the obese in reducing body weight in spite of a drastic reduction of food intake, and the well recognized fact that many fat people eat no more, and sometimes less, than those who are not obese. These observations underline the extent of our ignorance about the mechanisms by which energy balance is maintained.

When the energy requirements of large populations are calculated, using the currently available international standards prepared by the Food and Agriculture Organisation and the World Health Organisation, then it may be, and often is, concluded that a large proportion of the world's population is undernourished; present standards put this proportion at about 70%. This estimate is based on a careful examination of all available information; such estimates are essential for governmental planning of, for example, food production. Some of us have assisted in this preparation and suggest these

estimates with all their faults are the best that can be achieved on present knowledge.

It is possible, however, that the 30% of the world's population who have an "adequate" intake are really eating too much and that an unknown proportion of the rest are not undernourished. Our present information does not provide a satisfactory basis for more accurate estimates, as the methods commonly used are not precise enough and cannot be validated. Furthermore, the measurement of normal daily food intake and energy expenditure poses many technical and logistic problems, requires large teams of skilled staff and is expensive; hence so far only small populations of individual men and women have been studied. It is difficult to finance such work, and there are relatively few surveys in which individual food intake has been measured with acceptable levels of accuracy.

These are some of the reasons that prompt us to assert that we do not know how much food man requires. If there is merit in this assertion, and no doubt many will question it, we would stress that to determine man's energy need with more precision should be regarded as a major and urgent task. We believe that appropriate methods can be developed; for example, if a calorimeter suitable for man was available it would be possible to calibrate the various ways by which food intake, energy expenditure and energy balance are assessed. Calorimeters for domestic animals have been constructed, but none suitable for man exists today. This work would not be easy or cheap, but we suggest the social and political advantages of obtaining accurate answers could be immense.

J. V. G. A. DURRIN

Institute of Physiology,  
Glasgow

O. G. EDHOLM

Division of Human Physiology,  
National Institute for Medical Research,  
London

D. S. MILLER

Department of Nutrition,  
Queen Elizabeth College,  
London

J. C. WATERLOW

Department of Human Nutrition,  
London School of Hygiene and Tropical Medicine,  
London

Received December 15, 1972.

- <sup>1</sup> Widdowson, E. M., *Spec. Rep. Ser. Med. Res. Coun. No. 257* (1947).
- <sup>2</sup> Widdowson, E. M., *Proc. Nutr. Soc.*, **21**, 121 (1962).
- <sup>3</sup> Rose, G. A., and Williams, R. T., *Brit. J. Nutr.*, **15**, 1 (1961).
- <sup>4</sup> Ashworth, A., *Brit. J. Nutr.*, **22**, 341 (1968).
- <sup>5</sup> Wynn-Jones, C., Atkinson, S. J., and Nicolas, P., *Proc. Nutr. Soc.*, **31**, 83A (1972).
- <sup>6</sup> Miller, D. S., and Mumford, P. M., *Amer. J. Clin. Nutr.*, **20**, 1212 (1967).
- <sup>7</sup> Miller, D. S., Mumford, P. M., and Stock, M. J., *Amer. J. Clin. Nutr.*, **20**, 1223 (1967).