DISCUSSION

A FORGOTTEN CONTRIBUTION TO NUTRITION BY MAGENDIE

McCAY[1] has called attention to the hitherto little recognized feeding experiments of Magendie in 1816, in which that noted physiologist tried to demonstrate the importance of nitrogenous foods in the diet. The criticism applied to some of Magendie's work has been its lack of completeness. It is of interest, therefore, to note that the distinguished teacher of Claude Bernard performed further nutrition investigations that supplement and extend the knowledge derived from his early failures to maintain dogs on rations of isolated materials. These additional and practically forgotten experiments in some respects exceed in value the later and more celebrated contributions of the gelatine commission, of which Magendie was chairman. Although, strangely enough, this work is not quoted in the gelatine report it is described in all but the first editions of the "Précis Elémentaire de Physiologie." The experiments are also discussed by Londe[2] and Johannes Müller.[3] The story may be retold as it could have been read nearly a hundred years ago in the American edition of Magendie's text-book.[4]

Since the publication of these facts (the experiments of 1816), in the first edition of this work, I have observed others not less important, which show how limited our knowledge still is on the subject of nutrition.

A dog was allowed to eat pure wheaten bread and drink common water at will. He died within fifty days, with all the signs of marasmus in the highest degree.

Another dog ate exclusively *military* or *munition* bread; his health continued perfectly good.

Rabbits or Guinea-pigs fed with a single substance, as wheat, barley, oats, cabbage, carrots, etc., will die, apparently from inanition, within a fortnight, and sometimes much sooner. But if the same substances be given together, or after short intervals, the animals live, and do well.

I fed an ass on dry rice, and afterward boiled it in water, because he refused the first; the animal lived only fifteen days. The last days he constantly refused to eat the rice. A cock was fed on boiled rice for several months, and preserved its health.

Dogs fed exclusively with cheese, and others with hard eggs, lived for a long time, but became weak and emaciated; lost their hair, showing imperfect nutrition. . . . The most general and important consequence deducible from these facts, and which ought to be followed up and examined, is, that diversity and multiplicity of aliments is a very important hygienic rule. This is indicated by our instincts, and the variations that the seasons bring in the nature and kind of aliments.

While the precise duplication of Magendie's experiments might prove difficult and while failure to eat in some instances masked the effects produced by the diets, yet in general, the qualitative results are such as might be expected from the standpoint of our modern knowledge. Magendie's interpretations are particularly skilful. The author indicates a rational solution to the practical problems of nutrition and yet recognizes that the field is just being opened. From the historical aspect we may credit Magendie as being one of the first physiologists to use rodents for nutritional investigations. The plan of the experiments described shows that he must have realized that the nutritive requirements of different species may vary. Finally, in view of our present data on the phenomena of dietary deficiencies in animals, his observation, that prolonged consumption of poor diets might result in loss of fur and in general emaciation, is peculiarly significant. One is almost tempted to say that Magendie observed, thereby, some of the signs of vitamin G deficiency in his dogs fed on eggs or cheese alone.

FRANKLIN C. BING
DEPARTMENT OF BIOCHEMISTRY,
SCHOOL OF MEDICINE,
WESTERN RESERVE UNIVERSITY,

A PROPOSED CLASSIFICATION OF DISEASE TRANSMISSIONS BY ARTHROPODS

THE diseases which are transmitted by insects and other arthropods often are classified according to the causative organism, and sometimes according to the transmitting agent. Each classification serves definite purposes. I should like to propose a classification based upon the type of transmission which occurs, not with the idea of attempting to supplant either of the systems of classification already established, but rather with the hope that this one will supplement and probably clarify the others.

The nearest approach to such a classification is the well established use of the terms "biological" and "mechanical" in connection with transmission by arthropods. These words have served a purpose, but they are inadequate for clearness. It is also true that authors are not in agreement as to their exact meanings. The transmission of malarias by mosquitoes is certainly biological. The transmission of anthrax and surra in cattle by blood-sucking flies is mechanical. In many cases the classification of the transmission is not so easily made, and authors classify them in one group or another depending upon their conception mainly of what constitutes a

[1] C. M. McCay, "Was Magendie the First Student of Vitamins?" SCIENCE, 71: 315, 1930.

[2] C. Londe, "Note sur les Alimens," *Arch. gén. de Méd.*, 10: 51–66, 1826.

[3] J. Müller, "Elements of Physiology," transl. by W. Baly, American ed. by J. Bell, Philadelphia, p. 333, 1843.

[4] F. Magendie, "An Elementary Treatise on Human Physiology," transl. by J. Revere, New York, p. 485, 1845.