PROCEEDINGS OF THE NUTRITION SOCIETY

ONE HUNDRED AND FIFTY-SIXTH SCIENTIFIC MEETING
THE HOSPITAL FOR SICK CHILDREN, GREAT ORMOND STREET, LONDON, W.C.1

16 MARCH 1963

NUTRITIONAL PROBLEMS IN INFANCY AND CHILDHOOD

Chairman : Dr D. P. CUTHBERTSON, C.B.E., D.Sc., M.D., *Rowett Research Institute, Bucksburn, Aberdeen*

Nutritional problems in infancy and childhood: Chairman's opening remarks

By D. P. CUTHBERTSON, *Rowett Research Institute, Bucksburn, Aberdeen*

In the Middle Ages there was almost no alternative to breast-feeding for infants, although efforts were made to give cow's or ass's milk. A cow's horn was sometimes used as a primitive feeding bottle—there is a 13th century miniature of this in the Wellcome Historical Medical Museum. Great care was taken with the choice of wet-nurse. After weaning, children were given bread crusts and milk. At 15 months poultry in small quantities was recommended and the child graduated naturally to the 'grosser meats' and so to the free choice of the adult.

Even in the middle of the 18th century there was a terrible mortality among infants and young children. A baby born in the big towns had about one chance in three of reaching the age of a year and the odds were that it would die before it was 5 (Drummond & Wilbraham, 1958). Wet-nurses were too often gin tipplers and gave spirits—sometimes opiates—to quieten the babies.

In a report to the General Committee of the Foundling Hospital in 1740 the question was asked 'Whether it will be prudent for the Governors to endeavour to provide wet-nurses for all the children they take in?' or 'Whether it will not be better to bring up by hand all such as will feed, and suckle only those that will not?'

The feeding of infants on cow's or ass's milk was not widely practised before the middle of the 18th century, though Hanway (1757) recommended it strongly. Frequently the milk was adulterated with water and the physician, not knowing, recommended further dilution. The teat was introduced about then and was of linen, leather or sponge. It must have been the breeding ground for bacteria before sterilization was practised.

Some were worried because fresh cow's milk tends to form a much denser clot in the stomach than does human milk. Humanizing by dilution with water and addition of lactose and cream fat was practised by many but some hold that a normal child should be able to utilize full-cream milk. Citrated milk was also used. Cadogan (1750) insisted that fruit and vegetables are not dangerous to children.

The 19th century saw a decline in breast-feeding. Increasing employment of women was a cause. Wet-nurses went out of fashion as bottle-feeding was developed. When the 19th century opened, however, many hospitals would still not admit a child under the age of 2 years. Until quite late in the century, when condensed milk became of importance in the feeding of infants, the substitutes were much as they had been in the latter part of the 18th century. The most popular food was cow's milk and water. Even half-diluted milk contains more protein and minerals than human milk. If this did not agree, skim milk with a little arrowroot, or diluted with barley water, was often tried. At that time absolutely nothing was known about sterilization.

A large number of proprietary preparations were used which were predominantly farinaceous and were not only deficient in protein and fat but in most of the vitamins. The children of the more prosperous classes were most affected by these badly compounded preparations, for they were too expensive for the working people. They put on weight in a deceptively encouraging way. At 2 or 3 years they were overweight for their age and almost invariably they developed mild rickets, some stunting of growth and bad teeth later. The existence of scurvy and prescorbutic disorders was not suspected until the last quarter of the century. The cheaper form of condensed milk was almost devoid of fat, being made by evaporating skim milk to which a considerable proportion of sugar was added. It was therefore low in fat and in the fat-soluble vitamins. Cow's milk is low in ascorbic acid and suffers a considerable loss on heat treatment. Cheadle (1889) was the first to advocate fruit juice.

Within this present century the death rate among infants in the County of London has dropped from over 200 per 1000 to less than a tenth of this figure.

This past of ours is in a measure, however, the present for so much of the world's population. The same killers and distortions of children that have so largely disappeared from the so-called developed countries are daily taking a frightful toll among children of the rest of the world, in particular in India, Africa, the Middle and Far East, Mexico, Central and much of Latin America.

Part of the distrust of cow's milk for infant and child feeding in some areas is explicable by the poor state of the cows and the adulteration of the milk, to which I have already referred. But there are also tribal prohibitions in some areas: restriction of availability to within a kinship can also be a factor.

Severe protein malnutrition or kwashiorkor is a major public-health problem among children in many underdeveloped countries today and usually appears after weaning when the diet consists of mainly starchy foods of low content of poor protein. Further, the tendency to give starch gruels and to withhold all protein-containing foods when diarrhoea develops has particularly unfortunate consequences. Only recently has the association between diarrhoeal disease and the subsequent development of kwashiorkor been fully realized (Scrimshaw, 1958). Scrimshaw reports that in rural Guatemala at least 5% of children under 5 years of age have clinical diarrhoea at any given time and that children of 1 year of age have an average of five episodes a year. Dr A. B. Sabin at the recent United Nations Conference

on Science and Technology as Applied to Less Developed Countries stated that in many of these cases there is no specific type of infection.

It is well known that children in the better developed countries are growing more rapidly and there is some evidence from Scandinavia that the final heights may be increasing (Cuthbertson, 1958). The adolescent spurt, as determined by the onset of the menarche in girls and the growth spurt in both sexes, is occurring earlier. Part of it is undoubtedly due to better nutrition—gone are bow and knock knees. Regardless of the doubtful desirability of greater height for all *per se*, it is a fact—speaking statistically of populations—that a suboptimal diet cannot be improved without a corresponding increase in the rate of growth and maturation. Conversely, poorer nutrition will be reflected in a slowing of these characteristics.

So long as the mothers' milk supply is adequate in these poorer communities the children grow as rapidly as those of well-nourished communities. It is after weaning that growth and maturation are markedly slowed down in the former.

In our discussions we should probably eliminate such ill-defined terms as 'optimal requirements' but describe those requirements which suffice to cover all the current needs of healthy children and enable them to meet both the common and the rare stresses of daily life and fulfil their genetic potential in these respects, as physiological requirements. The protein intake of a breast-fed infant is 2·0–2·5 g/kg daily, but mixtures based on cow's milk commonly provide 3–4 g/kg and there is much controversy as to which level is more satisfactory; and if we consider the mineral intake there is roughly the same degree of difference. This difference is bound up with the widely different growth rates of the calf and the human baby. Holt (1959) has suggested that the only way to find out the better system for the human infant would be to compare the different regimes with the ability to withstand the challenges to which the child is subject, both in infancy and later life, which has never been done.

REFERENCES

Cadogan, W. (1750). *Essay on Nursing and Management of Children*, 4th ed. London: Roberts.
Cheadle, W. B. (1889). *The Artificial Feeding and Food Disorders of Infants*. London: Smith, Elder & Co.
Cuthbertson, D. P. (1958). *Proc. Borden Centennial Symposium on Nutrition*. IV. *The Adolescent*, p. 38. New York: The Borden Company.
Drummond, J. C. & Wilbraham, A. (1958). *The Englishman's Food*, 2nd ed. London: Jonathan Cape.
Hanway, J. (1757). *A Journal of Eight Days Journey*. London: Ballard.
Holt, L. E. Jr. (1959). *J. Pediat.* **54**, 496.
Scrimshaw, N. S. (1958). *Proc. Borden Centennial Symposium on Nutrition*. III. *The Growing Child*, p. 27. New York: The Borden Company.

The experimental approach to some paediatric problems

By Elsie M. Widdowson, *Medical Research Council Department of Experimental Medicine, University of Cambridge*

Although brilliant contributions to the respiratory physiology of the foetus and newborn animal were made by Harvey and Mayow in the 17th century (Harvey,