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COMPARATIVE NUTRITION

Chairman: DR K. L. BLAXTER, PHD, DSC, NDA, FRSE, FRS,
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Chairman's opening remarks

By K. L. BLAXTER, *Rowett Research Institute, Bucksburn, Aberdeen*

Our Symposium today is concerned with comparative aspects of nutrition, that is with the variation between species in those physiological, biochemical and behavioural attributes or functions which are of nutritional concern.

I would like before we start to make some general remarks about comparative studies. The comparative approach is a very old one in biology, and one which reached a fruition in the evolutionary theory of the later 19th century. From what had hitherto been a mere collection of anecdotes and of scientific curiosity, there emerged a coherence of thought. Indeed, to many, comparative studies are often thought synonymous with phylogenetic studies. This is not so, as instanced by current interest in comparative physiology in which teleological reasoning has proved very useful.

I should emphasize that comparative studies are very difficult to make if only because they presuppose a considerable breadth of knowledge about a number of species. Few of us can pretend to such a prowess! Contributing to this difficulty is the fact that the reasoning in comparative studies is usually of a very different type from that employed in our current investigational work in which experiment follows hypothesis. In comparative study reasoning is *a posteriori* and is of the type described so well by Karl Pearson. Testing of hypothesis is reduced to an extension of species coverage. In this regard I should emphasize that many comparative studies from which broad generalizations about the mammalia as a class have been drawn are based on a meagre number of species. Many of these generalizations disappear when a wider coverage of species is included. Furthermore, the comparison of species with different evolutionary histories is complicated by the fact that these species differ in many attributes, including size. A comparison of a rat with a cow is not simply a comparison of a rodent with a herbivore or of a simple-stomached species with a complex-stomached one, or of a multitocous species with a predominantly monotocous species, or of a seasonally breeding animal with a non-seasonally breeding animal, or of a mammal producing helpless young at birth with one producing an active young. The comparison also involves two species differing in size by a factor of 2000 or so. No doubt participants in the Symposium

are already aware of all these many difficulties and are ready to accept the convenience of the concept of 'fitness' in evolutionary theory, when faced with the necessity to explain.

Finally, I think that it is only right to point out that man refuses to conform to many of the generalizations which have arisen in comparative study. All would agree that Adrian Spigelius of Padua in the 16th century did a great disservice to science when he insisted on the formal separation of study of the anatomy of man from comparative studies of anatomy as a whole. I do not wish to be accused of the same attitude of mind when I say that man is a very curious mammal! No doubt Dr Cuthbertson in the last paper this afternoon will put man in his correct perspective relative to other mammals.

Comparative nutrition, growth and longevity

By ELIZABETH EVANS and D. S. MILLER, *Queen Elizabeth College, London, W8*

Needham (1941) has said that there are two sorts of people—those that like generalizations and those that abhor them. In discussing species of living organisms we fall into the first category though we are aware of specific differences. Biochemically the cells of a whale are very similar to those of an amoeba, in as much as both have nuclei and cytoplasm, and comparable metabolisms of energy and nitrogen. Both contain simple sugars and complex proteins and would not function without these. All animals can utilize simple sugars, and some can utilize also more complex substances such as fats and cellulose as energy sources. Their requirement for nitrogen shows more variation: some can utilize simple sources of nitrogen while others require specific amino acids. The field of study of the nutritionist has been generally limited to birds and mammals. The distinctive feature of the two groups is that they have developed homoeothermic mechanisms, and as a result, are less dependent on the environment. The number of species whose nutritional requirements are known with any precision is relatively few. Of the mammals only about a dozen species have been studied out of a total of over 5000: the situation with birds is worse.

Food intake

Zoologists have described animals according to the diets they consume: carnivores, insectivores, omnivores and herbivores and this has much to commend it in studying the ways in which animals have adapted to their food. Unfortunately taxonomists have chosen to use *Carnivora* and *Insectivora* as the names of classes whose members are not entirely flesh-eating or insect-eating which is sometimes confusing.

Modifications associated with the diet are shown by differences in the dentition, digestive system and body conformation. Carnivorous mammals and birds typically have strong jaws and necks, sharp claws which help in the prehension of food and