

definition of an object, or between the definition of a concept and its applicability, makes it impossible to prove the objectivity of ordinary language as a whole. A kind of Gödel inconsistency appears that forces us to accept natural language immediately, at least in part, in order to make science "objective". All the same, complementarity does not limit natural science but, in fact, extends its scope through the movability of the boundaries of the dual concepts.

Much of what is said in this book follows Bohr's original arguments. I wonder whether it is not necessary, after almost fifty years of discussion of the quantum-mechanical principles, to start on a new approach, for example, by means of the concept of information. The very extensive, and often illuminating, literature on the subject is also not considered by the author. This makes the monograph rather less interesting than it might have been.

E. H. HUTTEN

## Basic Thermodynamics

*Classical Thermodynamics.* By D. Elwell and A. J. Pointon. Pp. 300. (Penguin: Harmondsworth, Middlesex, October 1972.) £4.

THIS is a good introduction to thermodynamics which deals with the three laws, basic kinetic theory (viscosity is not mentioned) and various applications to phase changes, magnetic and dielectric materials and thermoelectricity. The last part deals with thermal measurements. Students will obtain a good working knowledge of thermodynamics from this book.

There is little departure in the exposition from what may be called the usual treatments. Complications which arise in the proofs of the equivalence of various forms of the third law are not mentioned: in such arguments hypothetical materials should be considered for which the entropy-temperature curve approaches the  $T=0$  axis at two separated points, thus ensuring unattainability of the absolute zero without providing a unique entropy value at  $T=0$ . Also, the one-page exposition of Carathéodory's principle is somewhat confused, and ought to have been omitted. The statement here that states which are adiabatically accessible from a given state "are limited to a surface in  $(P,T,v)$ -space" is false, and encourages confusion (which I believe is still too widespread) between an adiabatic change and an isentropic or quasistatic adiabatic change. But these are marginal points of criticism of an otherwise useful exposition.

P. T. LANDSBERG

## Brain Nutrition

*Lipids, Malnutrition and the Developing Brain.* (A Ciba Foundation Symposium jointly with the Nestle Foundation in Memory of Sir Norman Wright.) Pp. viii+326. (Elsevier/Excerpta Medica/North Holland: Amsterdam, London and New York, 1972.) Dfl. 40; £4.80; \$12.50.

As a general rule the published versions of the symposia of the Ciba Foundation are valuable additions to most libraries and this volume is no exception. It is well produced, illustrated and indexed, and the editors have almost captured the atmosphere that these small and usually productive symposia generate.

The topic of the symposium is one of vital interest not only from the scientific point of view but also because of the far-reaching implications that the experimental work with animals and the observations on malnourished children have for mankind in general.

While it is true that some of the material in the volume can be gleaned from the literature its assembly in one volume is useful. The discussions following each paper which are also included, as is the custom, give the main participants the opportunity of expanding their ideas in a slightly less formal way than in their papers.

The symposium covered a wide field but one major theme and two related themes were dominant. The first concerned the implications of the timing of malnutrition in relation to the chronological development of the brain.

The two other themes were related to the first but deal in greater detail with the biochemical changes associated with dietary treatments on the processes of myelination, and more especially with the effects of essential fatty acid intake on the formation of brain lipids, including those involved in myelin formation. All the contributions in these areas show how the complex chemistry of the brain lipids is yielding a rich harvest for the biochemist and biophysicist.

The papers given at this symposium show that knowledge of the basic biochemistry of brain tissue is advancing rapidly, but that the changes produced by malnutrition cannot yet be related to the functional properties of the brain.

The two papers concentrating on behaviour emphasize the difficulties involved in relating the biochemical effects of malnutrition with behaviour both from the conceptual viewpoint and also when one attempts to apply them to man where cultural effects further confuse the issue.

This in no way implies that the tone of the symposium is negative; it is extremely provoking in pointing to the

difficult areas which remain to be explored.

One is left with the feeling that the "extra-curricular" discussions at this symposium must have been exciting and stimulating for researchers in this field, and that for the non-participant this volume represents the next best thing to having been there.

D. A. T. SOUTHGATE

## The Evolving Brain

*The Brain in Hominid Evolution.* By Phillip V. Tobias. Pp. xv+170. (Columbia University: New York and London, February 1972.) £4.75.

THIS book, based on the author's 1969 James Arthur Lecture on the evolution of the human brain, is surely the most complete and up-to-date compilation of the volumetric data of the brain casts of fossil man and the extant pongids. Tobias, perhaps wisely, has not ventured into the difficult, if not dubious, study of cerebral morphology guessed from plaster endocasts, nor has he pursued any substantive questions of comparative neuroanatomy, beyond the most cursory examination of variables such as neurone number, size, density, dendritic branching, and glial/neural ratios. The main parameter discussed is that of brain size, as reflected by the volumetric capacity of endocasts.

The first six chapters are a compilation of data existing for living primates and the fossil hominids. Some of the data, particularly of the East African hominids from Olduvai Gorge, are previously unpublished. The last five chapters deal with the problem of interpreting the 1,000 ml. growth in brain size during hominid evolution, particularly in terms of primate problem solving abilities, and the prehistoric artefacts associated with the hominids. Throughout, this book is written clearly, even delightfully, and the ample tables, illustrations, and photographs are certainly first-rate, a tribute to Tobias's colleagues, particularly Alun Hughes, who helped in the preparation of this book. The only outright error I could find in this book was a reference to one of my own publications (1969a, "the role of the brain in human mosaic evolution", which through some strange chain of events was never actually published in the *Eighth International Congress of Anthropological and Ethnological Sciences*, Tokyo, 1968). Thus the reference should read "unpublished manuscript", but that is not Tobias's fault.

The evolutionary picture that Tobias draws, on the basis of the few endocranial remains of the hominids thus