

occasions for self-aggrandizement. The temptation is, however, often strong and this reviewer, no St Anthony, is as frail as the next man; so with no further apologies he asks why palaeoprimatologists will insist on omitting a tail in reconstructions of *Proconsul africanus*. The short answer, of course, is that tail bones have never been discovered, but neither have the feet of Java Man and nobody doubts that he had them! The figure of the tailless *P. africanus* in a quadrupedal stance on page 16 looks as incomplete as Whistler's mother without her footstool.

The Evolution of Man is a worthwhile book. For a modest sum, the student, in or out of the field, can acquire an insight into this fascinating and compulsive discipline that many a larger and more expensive tome may fail to provide.

JOHN NAPIER

TWIN BIRTHS

The Biology of Twinning in Man

By M. G. Bulmer. Pp. ix+205. (Clarendon Press: Oxford; Oxford University Press: London, April 1970.) 40s.

TWINS have long fascinated mankind and in particular geneticists, embryologists and evolutionary biologists. Dr Bulmer's appraisal is that of a biomathematician, and his review covers the diagnosis of the type of twinning, the relative frequency of mono- and dizygotic twinning, the inheritance of twinning, and the information to be extracted from twin series about the heritability of continuous and quasi-continuous characters. His survey is well balanced. He concludes that the third type of twinning, uniovular and dispermatric, must be low. The frequency of monozygotic twinning is relatively constant at 3.5 to 4.0 per thousand total births in different races of man and shows only a small increase with advancing maternal age. Dizygotic twinning has a frequency varying from as low as 2 per thousand in Japanese and Chinese, through 6 to 9 per thousand in Indians and Europeans, to as high as 20 per thousand in Bantu and even 40 per thousand in the Yoruba of Nigeria. Dizygotic twinning also becomes more frequent with maternal age, probably as a result of increased excretion of gonadotrophin.

Monozygotic twinning does not seem to be inherited, but dizygotic twinning is inherited, and, expectedly, on the maternal side only. Bulmer suggests that claims of paternal inheritance of dizygotic twinning are inaccurate because of inadequate recall by the informant of the number of single births to his relatives. He suggests that the mechanism of inheritance of dizygotic twinning is essentially recessive; that "tt" women are about a quarter of all women and have a 3 per cent risk of having twin births. He notes, however, that the increased risk of DZ twinning after trizygotic triplets, perhaps 7 per cent, means that in some women the risk must be higher. It is perhaps more plausible to suppose that the inheritance is polygenic; though if the twinning rate is really higher in sisters than in daughters of mothers of DZ twins, there must be an element of dominance in the inheritance.

On the use of twins in the study of the genetics of human anomalies, the author correctly makes the point that it is the proportion of co-twins of index patients which are affected that is the useful statistic and not the proportion of concordant twin pairs. In general, he follows Falconer and others in his use of measurements of twins in partitioning the variance of continuous and quasi-continuous human variation into its genetic and environmental fractions. For quasi-continuous characters, however, in estimating the phenotypic correlation between twins from the proportion of co-twins affected, he prefers the method of tetrachoric correlation to Falconer's rather simpler but admittedly approximate method.

In a final interesting chapter, Bulmer discusses the

evolutionary significance of twinning. In general, primates which rear their young in nests give birth to two or more young which are born relatively immature. Primates which carry their young tend to have single births of relatively mature infants capable of clinging to their mothers. In man until recently, the higher neonatal and infant mortality of twins and the increased maternal mortality associated with twin birth were such that a series of twin births was likely to have left fewer survivors than a series of single births, and it is difficult to see why natural selection has not reduced the frequency of dizygotic twinning even lower than the present low rate. At present, twin births will certainly produce more adult survivors than a single birth, though with planned families this does not mean that mothers of twins will necessarily have a larger total family than mothers who do not experience a twin birth.

C. O. CARTER

MOTHER-CHILD INTERACTION

Stimulation in Early Infancy

Edited by Anthony Ambrose. (Proceedings of a CASDS Study Group on "The Functions of Stimulation in Early Postnatal Development" held jointly with the Ciba Foundation, November 1967.) Pp. xvi+289. (Academic Press: London and New York, April 1970.) 80s; \$12.

THIS volume consists of papers and discussions by a small group of experts in behaviour genetics, developmental neurology and psychology, psychiatry, ethology, neurophysiology and paediatrics, under the auspices of the Centre for Advanced Study in the Developmental Sciences, at a meeting held in 1967. Speakers included Seymour Levine of Stanford (on infantile stimulation and its endocrine effects), Victor Denenberg of Purdue University (on the effects of handling of the rat on the rat and the rat's offspring), Benson Ginsburg of Chicago (on genotype variables affecting responses to postnatal stimulation), P. P. G. Bateson of Cambridge (on imprinting), M. D. S. Ainsworth and S. M. Bell of Johns Hopkins (on patterns of mother-infant interaction during feeding), Myriam David and Geneviève Appell of Paris (on mother-child interaction), Jerome Bruner of Harvard (on the processes of growth in infancy), Papousek of Prague and Paula Bernstein of Denver (on conditioning stimulation), and Jerome Kagan (on the social class and cognitive development). Topics covered in discussion were the age at which infants should be taught, the effect of rooming-in on human babies, the causes of the infant's crying and smiling on the mother, the effect of the temperature of the baby animal on the mother's responses, the effect of rocking babies on their weight gain, and many other interesting topics.

This book, though expensive, is bound to find a place on the shelves of child psychologists, ethologists and many others interested in the scientific study of the development of the infant. Anthony Ambrose has achieved his object of making this a thoroughly readable book by skilful editing. The book is nicely printed on good paper.

R. S. ILLINGWORTH

LIVER TRANSPLANTS

Experience in Hepatic Transplantation

By Thomas E. Starzl, assisted by Charles W. Putnam. Pp. xxi+553. (W. B. Saunders: Philadelphia and London, 1969.) 319s.

DR STARZL has produced a book which is more than a manual for enterprising, fit and courageous surgeons. Like his earlier literary contributions to the field of renal transplantation, this volume describes the highly successful fusion of surgical and scientific resources at Denver,