Genes or environment

Heredity, Environment, and Personality: A Study of 850 Sets of Twins. By John C. Loehlin and Robert C. Nichols. Pp. xii+202. (University of Texas: Austin, Texas and London, 1976.)

MODEST numbers of twins, carefully sampled and personally investigated in clinical detail, sometimes over a period of years, have an acknowledged place as a valuable if limited research method, particularly in the field of psychiatric abnormality. Attention has recently been drawn, however, to the need for large samples for the adequate study of genetic and environmental influences on ability, personality and interests in the normal population. The present study reports data on some 2,000 variables collected from 850 pairs of twins, not one of whom was personally seen by the authors. The information was obtained from examination results and from questionnaires sent by post to the twins and their parents.

The subjects were those twins who participated in the National Merit Scholarship Qualifying Test taken each year by about 600,000 American high school students at the age of 16 or 17 and who completed the postal questionnaires. The authors clearly discuss the effect of possible biases caused by diagnosis of zygosity by questionnaire, selection for academic ability and willingness to cooperate, and the usual excess of identicals and females found in such samples.

They present data and discuss differences between twins and non-twins, and examine in detail early environmental experiences such as dressing alike, parents treating the twins alike, and interpersonal relationships. None of these had much, if any, influence on the resemblance found. The authors conclude that the environment "operates in remarkably mysterious ways, given traditional views on personality and motivational development".

Not surprisingly, identical twins were no more alike than fraternals in matters such as race—or their opinions about racial integration. In most measures, however—whether single items, clusters, or the scales of a test such as the California Psychological Inventory—identicals were usually correlated about 0.20 higher than fraternals. On ability measures, intrapair correlations clustered around 0.75 and 0.55 in the two kinds of twins, personality measures, 0.50 and 0.30, and measures of self-concept and interests, 0.35 and 0.15.

The authors' main conclusion, that the almost ubiquitous genetic influence is roughly equal in degree for all traits, is admittedly controversial. Furthermore, some of the statistical analyses require critical interpretation, and little attention is given to which traits are influenced by the same genes. Useful appendices presenting the questionnaires and the intraclass correlations for the twins on each variable are fertile soil for the interested twin researcher. The book can be recommended for its lucid, readable presentation and discussion of the authors' own data and the relevant literature.

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Insect clocks

Insect Clocks. (International Series in Pure and Applied Biology. Division: Zoology, Vol. 54.) By D. S. Saunders. Pp. viii+279. (Pergamon: Oxford and New York, July 1976.) £9.25.

THE study of biological clocks is one of those areas of the biosciences that truly straddles the plant and animal kingdoms. The existence of clock-like processes is apparently universal in eukaryotic life, and the clocks of phylogenetically widely separated species exhibit remarkably similar characteristics. Whether this indicates evolutionary convergence or a common, primitive root is not clear, but what it does indicate is why the study of biological clocks has been, and must be multidisciplinary.

The need for a monograph on the clocks of insects may therefore not be immediately apparent. Its justification lies in the simple fact that in no other single order of organisms has so much research been done on so many different kinds of clock. Herein lies the strength of *Insect Clocks*: it provides a comprehensive cover of 'chronobiology' (the subject's American name) in a microcosm.

The book starts off on circadian (that is, 24-h) rhythms, in individuals (chapter 2), in populations (chapter 3), and in physiology (chapter 4). This separation is not entirely happy because rhythms exhibit the same characteristics at whatever level of organisation they occur, so phenomena such as temperature compensation, entrainment and phase-response curves have to be considered three times over, and the treatment, although thorough, is unnecessarily fragmented.

More than half the book, however, is devoted to insect photoperiodism—that is, the reactions of insects to seasonally changing daylength. Here, the author's touch is sure and his exposition and explanation first rate. Biologists of any specialisation wishing to understand the involutions of this tortuous subject could go a long way before finding a more comprehensive or better account. Whether this otherwise admirable explanation is aided by the chronobiologists' addiction to algebraic jargon is another matter. For example, it is simply irritating, rather than informative, to be told eight times in as many pages (8–16) that τ is the symbol for the free running period of rhythms; and does it help to be given the equation $\tau - T = \triangle\phi_{ss}$ by way of parenthetical expansion of the perfectly clear phrase ". . . entrainment is effected by discrete apparently instantaneous phase-shifts . . ." (p38)? There is a great deal of such symbolising, much of it seemingly unnecessary.

The author unashamedly sticks to insects, his self-confessed lifelong passion. Although this single-mindedness provides the book with its satisfying unitary structure, it does afflict it with an element of tunnel vision. This has prevented the author from considering any of the recent exciting work on the fundamental mechanisms of circadian oscillators, presumably because that work concerns plants, protista and molluscs. Very little is offered on the mechanisms of oscillators in general (the word 'membrane' does not appear anywhere in the otherwise full index, for example), and even on insect clock mechanisms the coverage is less thorough than in some recent reviews. The reader looking for guidance on the modern ideas about oscillator mechanisms, or for an account of the comparative physiology of clocks will therefore be disappointed.

This is the book's only serious weakness: the unifying thread woven through the fabric of the text is taxonomic rather than physiological. Nevertheless, it is an excellent source work, particularly on photoperiodism, and is to be welcomed for that reason alone. In addition, it provides a much more general textbook on chronobiology than its narrow title implies, a paradigm for the subject as a whole, and in that respect is a considerable advance on any of its rivals with more pretentious titles.

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