The Search for Natural Groups

Starfish, Jellyfish, and the Order of Life. Issues in Nineteenth-Century Science. MARY P. WINSOR. Yale University Press, New Haven, Conn., 1976. x, 228 pp., illus. $17.50.

In the 19th century biologists came to believe that a hierarchical system of groupings existed in nature. As Mary Winsor pointed out in her doctoral thesis (Yale, 1971), upon which this book is based, 19th-century biologists put much of their time and energies into the discovery of these groupings, yet historians of biology, assuming classification to be dull, have virtually ignored this enterprise and as a result have constructed "a distorted picture of preDarwinian biology." Such historians reflect the views of an age that despises classical descriptive natural history. "Mere observation," it is argued, demands little intellectual ability.

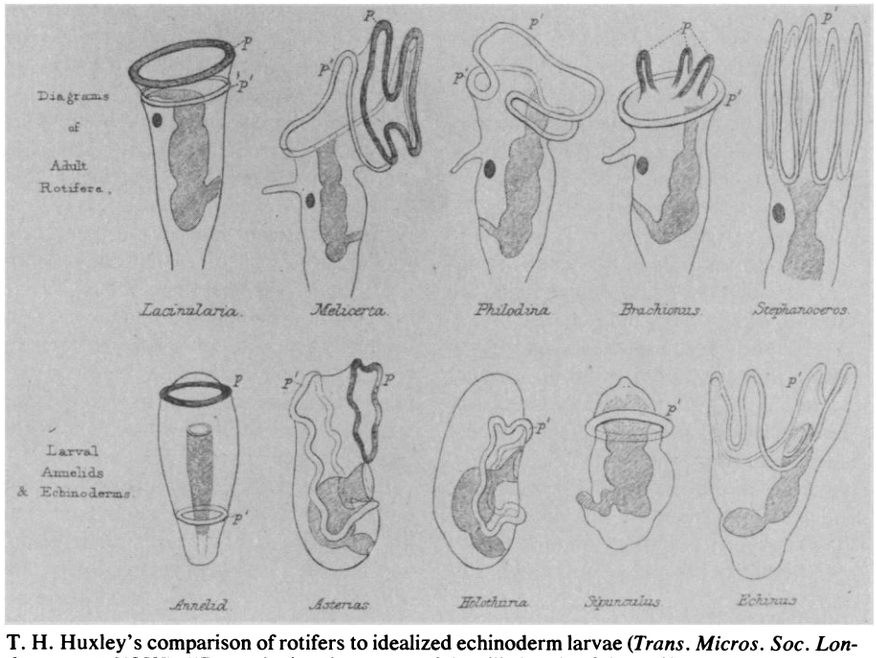
This book takes an important step in rectifying both of these misconceptions. As the author expresses it, on one side we have the observer and on the other "some silent creature, which is teasing, cajoling, and educating its examiner." Who of those lucky enough to be able to collect and observe marine invertebrates at first hand will not feel a strong kinship with our predecessors as they struggled to find meaningful relationships among these beautiful creatures?

The author deals with the mysterious Radiata, an *embranchement* erected by Cuvier in 1812 to include the infusorians, worms, polyps, acalephs (medusae), and echinoderms. Concentrating on the last three groups, she explores the impact of morphology, comparative anatomy, paleontology, and, above all, embryology on the attempts of numerous naturalists to come to terms with this "zoological lumber room."

The most interesting chapters in the book deal with the questions raised by the discovery of planktonic larval stages and the alternation of generations, which was seen to encompass not only the polyps and acalephs but also the echinoderms. How was it to be determined whether larval stages illustrated meaningful affinities with other groups or merely parallel adaptations to pelagic life? "On what grounds," the author asks, "may a zoologist decide that an animal merely resembles a medusa, and should be called 'medusa-like' or 'medusoid,' and at what point does he know that the animal really is what it resembles?" She also deals at length with the work of Louis Agassiz, who refused to abandon the radiate grouping despite the important work of Johannes Müller and Rudolf Leuckart.

The author reminds us, in a most interesting final chapter, that it was necessary for Darwin to explain how any mechanism of transformation leads to divergence before the existence of hierarchical natural groupings could be explained. She argues also that the importance attached to classification before Darwin cannot be explained either as reflecting the idea that classification revealed the Divine Plan or simply on the grounds that classification provided a helpful catalog. Rather, she claims, "the answer lies in [the biologists'] model of what good science is and how it develops."

In some ways the book is disappointing. A reader not conversant with the issues and personalities of 19th-century biology will find it difficult to read. This arises in part from the subject matter and in part from the author's economy with words. A succinct style is to be admired in scientific writing, but historical treatises demand a more discursive approach, even if it necessitates discussing matters already well known to the professional historians. As it stands the book seems to be addressed to too narrow an audience, namely those familiar both with the history of 19th-century science and with invertebrate zoology—a taxon of very restricted distribution. One would like to see, for example, far more attention given to the conceptual background of the German naturalists, particularly since in the period under examination there was a fundamental clash between the older generation of Idealists and the younger generation in opposition to them. This clash is certainly reflected in the debates over the significance of the alternation of generations, and thus one assumes that it also influenced the approaches taken to the radiates. Leuckart, for example, although trained under the influence of the morphological school, moved toward a more functional physiological and anatomical approach in the 1840's. This shift is implied in the author's presentation of Leuckart's work, but needs more emphasis. One wonders, too, why Thomas Huxley receives so much attention in the book, when the scene was dominated by the new breed of professional German biologists.



T. H. Huxley's comparison of rotifers to idealized echinoderm larvae (*Trans. Micros. Soc. London*, n.s., **1** [1853]). "By analyzing the course of the cilia bands of the rotifers' 'wheel-organ' in relation to the mouth-anus axis, Huxley concluded that the rotifer was of essentially the same type as the annelid larva, and furthermore that the variations on this theme to be found in different genera of rotifer resembled the various forms of echinoderm larva." From his studies Huxley concluded that rotifers were permanent forms of echinoderm larvae. Huxley's comparison was rejected by Johannes Müller on the basis of observations on holothurian development. In his criticism of Huxley, Müller "in effect [applied] the . . . criterion of homology which Huxley himself had discussed . . . : that it is not enough for two forms to be alike, they must also have come into existence through like courses of development. . . . Müller's own diagrams of the plan of echinoderm larvae do not involve the extreme simplification and straightening out of axes which Huxley employed. . . . His 'ideal basic form' for the planktonic larvae was found simply by averaging the younger forms of the various larvae." [From *Starfish, Jellyfish, and the Order of Life*]

This beautifully presented book clearly will find a place on the bookshelves of those seriously interested in the history of biology. It is a mine of information for those concerned with the issues of classification. One can hope that it will stimulate others to continue where the author leaves off, to follow the story through the years when the biogenic law came into full flower and when the compilation of phylogenetic trees played an important role.

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Bases of Personality Variance

Heredity, Environment, and Personality. A Study of 850 Sets of Twins. JOHN C. LOEHLIN and ROBERT C. NICHOLS. University of Texas Press, Austin, 1976. xii, 202 pp. $8.95.

In one of the earliest efforts to examine personality in a scientific manner, Gordon Allport (1937) pointed out that the term was one of the most abstract in our language, it suffered from excessive use, "its connotative significance is very broad, its denotative significance negligible." Many advances have been made since that time, some of which are exemplified by the research monograph under review. Little did the identical (monozygotic) and same-sex fraternal (dizygotic) twins among the 596,241 high school juniors taking the National Merit Scholarship Qualifying Test (NMSQT) in 1962 realize that they and their parents would soon have the opportunity to volunteer for a mailed-questionnaire study of personality. Of the 1507 self-identified pairs of same-sex twins in the NMSQT population, 79 percent cooperated by returning a questionnaire from which zygosity could be determined with defensible accuracy; in due course, 56 percent or 850 pairs in the starting sample of twins turned in complete data for the battery of personality and interest tests together with the data supplied by their parents. Very few studies of either physical or psychological characteristics have ever achieved such large samples. The final sample represents about 1 in every 18 same-sex twin pairs in the entire United States of that age group, admittedly selected for intellectual ability.

What is the relative contribution of genes and environment to the development of variation in personality, ability, and interests? The empirical findings of the Loehlin-Nichols study are brought to bear on this extraordinarily difficult question. Specialists will find much to challenge their complacency, and generalists should consult the monograph for the clear exposition it provides of the classical twin method and its defense in psychological research. Nichols, an educational psychologist, designed the study and supervised the collection of the data. Loehlin, a behavioral geneticist and computer science specialist, assumed primary responsibility for the reported data analyses and the writing of the monograph. More than half the pages of this book are given over to reproducing the questionnaires and the basic data (processed into intraclass correlations, means, or both) for some 1600 twin variables and 300 parent-derived variables, while the remaining text is heavily punctuated with 51 tables and figures. Kudos to the publisher, for such luxuriance is warranted; having the data bank made public will permit further analyses and hypothesis testing.

The low-keyed approach to potentially controversial topics and conclusions chosen by the authors is refreshing in today's emotionally charged atmosphere in respect of mankind's social biology. With an elegance of language (and even wit) and precision rare in this field, Loehlin is content to let the genes fall where they may. We would expect such concepts as heritability to be used circumspectly and we are not disappointed. Most analyses are in terms of correlations, difference scores, and variances. The orientation of the authors toward their masses of empirical findings is psychometric, as opposed to the view that would be taken by personality theorists; in this they can be faulted for keeping too close to their data or can be praised for staying close to them.

Despite genuine efforts to test the assumptions behind the classical comparison of identical and fraternal twin resemblances and the generalizability of twin results to singletons, the assumptions and the generalizability remain intact. Monozygotic and dizygotic twins, as individuals, do not differ from each other and do not differ from singletons in ways that would bias studies of personality.

Personality was assessed by means of H. Gough's California Psychological Inventory (CPI), consisting of 18 standard scales plus nine special ones, and an ad hoc clustering of questionnaire data that yielded 70 clusters containing three or more items. Even those steeped in the same empirical tradition may anticipate an overdose of empiricism. The atheoretical approach is both a virtue and a vice. The CPI was premeditatedly atheoretical; its scales sample "folk concepts" of personality with nary a thought for differences between traits and states or between measurements of temperament-related traits and so-called superficial or surface traits. The clustering strategies will be subject to criticism from numerical taxonomists as well as from those concerned with construct validity. These strictures anticipate the findings. No consistent tendency was found for certain personality variables to show larger differences in correlation between monozygotic and dizygotic twins than others, both within and across sexes. (Their sample was large enough to permit division into random half-samples by zygosity and by sex.) The authors' conclusion, after surveying their groups of measures, is indeed challenging: "Identical twins correlate about .20 higher than fraternal twins, give or take some sampling fluctuation, and it doesn't much matter what you measure—whether the difference is between .75 and .55 on an ability measure, between .50 and .30 on a personality scale, or between .35 and .15 on a self-concept composite."

The quotation must be seen in the context of the authors' own range of twin correlation differences (monozygotic minus dizygotic) for the CPI of .03 to .44 and the demonstration by others using the CPI with twin samples (smaller by far in size but possibly more representative) of probable differential heritability of traits reminiscent of "temperament vs. surface" distinctions. The differential heritability of abilities may not be testable with Loehlin and Nichols's own data if all five specific abilities (English, mathematics, social studies, natural science, and vocabulary) tested by the NMSQT are mainly measures of "g" or general intelligence; however, their review of the literature on special abilities supports their conclusions, and the burden is now shifted to those who believe in differential genetic loadings. To support the lack of differentiation Loehlin and Nichols make frequent use of a statistical test of agreement across ranks (Kendall's W) in different studies using the same or similar scales; lack of agreement *is* demonstrated, but agreement and disagreement are not symmetrical opposites (see M. G. Kendall, *Rank Correlation Methods*, ed. 4, 1970, p. 95).

The findings about the role of the environment in the development of the measured personality variables, insofar as it could be assessed from parent question-