

BOOK REVIEWS

ANIMAL EVOLUTION IN CHANGING ENVIRONMENTS WITH SPECIAL REFERENCE TO ABNORMAL METAMORPHOSIS, by Ryuichi Matsuda. 1987. John Wiley & Sons, New York. 355 pp. \$44.95.

Truth *happens* to an idea. It *becomes* true, is *made* true by events. Its verity *is* in fact an event, a process: the process namely of its verifying itself, its verification. Its validity is the process of its validation.—William James, *The Varieties of Religious Experience* (1902)

What is truth? Specifically, what is truth in evolutionary biology? Neo-Darwinism remains constantly under attack; Fundamentalist Christians may be its most conspicuous antagonists, but neither Darwinism nor the neo-Darwinian synthesis has ever sat well among secular philosophers and humanists of various persuasions, and their objections to them surface and resurface periodically—the proverbial old wine in new bottles. The inheritance of acquired characteristics is an idea hallowed by time if not by recent consensus; it was a familiar theme in 19th- and early 20th-century lepidopterology, which in those days was at the frontier of evolutionary science. Its revival and embrace in Stalin's Soviet Union, with the concomitant suppression of Mendelian genetics for decades, added to its discredit elsewhere. But the idea of Lamarckian inheritance survives, and not only among nostalgic old Reds. It has a certain appeal to idealistic young radicals with no ties to Stalinism but with a faith in the perfectability of mankind through struggle, shared by old Lamarckists like Paul Kammerer. It also survives apart from politics among those who cannot accept an *undirected* ("random," but this word is always misused in such literature) process which leads to *adaptive* results. This position leads to some kind of vitalism. *Animal Evolution in Changing Environments* has links to the vitalist tradition. It is an exercise in wish-fulfillment: neo-Lamarckism *must* be true, therefore it *is*. Such declarations, alas, have no bearing on truth itself, only on our perception of what constitutes persuasive evidence pro or con. For lepidopterists this book is a window on an acrimonious argument which is an important part of our tradition, and is once again prominent in the broader sphere of evolutionary biology.

The book is in two parts. Part I is a polemic in favor of the notion that radical novelty in evolution is generated by genetic assimilation acting on components of the process of development, particularly on metamorphosis as expressed in stressful environments. Essentially the entire argument was advanced by Matsuda in an article in the *Canadian Journal of Zoology* in 1982, which can be seen as a précis of the book. It is summed up even more concisely by fig. 6 of the present volume (p. 244). Part I occupies the first 53 pages, concluding with a "proposal of pan-environmentalism": "Environment consists of both morphogenetic and selective factors . . . the former induces, by response of the genotype, variation upon which the selective factor(s) works . . ." and, graciously, "Neo-Darwinism may be retained as a method of analysis of the evolutionary process where the effect of environmental change or development is minor or negligible" (pp. 52-53). Part II occupies pages 57-355 and is a comprehensive and detailed bibliographic catalogue of cases of abnormal metamorphosis, neoteny, etc. judged by the author to be evolutionarily significant, arranged by taxa. (It also contains, in the aforementioned fig. 6 and accompanying text, the clearest statement of what the author's model *is*.) This is a remarkable achievement which would be of great value to theoreticians (who in these intellectually impoverished times in the English-speaking world know little comparative zoology as a rule)—if only they would read it. It does not read like a novel. It reads more like the telephone book. Matsuda is no Darwin or Gould or Dawkins, and the book suffers from disorganization and chopiness as well as a remarkably dull style for so fervent an advocate. And it must be read critically; like most compilers (the eccentric biogeographer Leon Croizat is a very good comparison), Matsuda himself accepts too much at face value and is prone to wish-fulfilling interpretation. As a student of genetic assimilation myself, however, I confess that about half of Matsuda's bibliography was new to me.

Because I have worked on phenotypic plasticity and genetic assimilation in butterflies

for some 20 years, Matsuda and I maintained a correspondence for some time which ultimately led to shared frustration. It was frustrating for Matsuda because he interpreted my results differently than I did, but was unable to convince me that he was right; it was frustrating for me because he seemed so plainly an enthusiast who was after verification of his ideas, which he equated with truth. (To be fair, clearly he saw me as unduly wedded to conventional neo-Darwinism.) More recently I had a somewhat similar interaction with Mae-Wan Ho, of Ho and Saunders, *Beyond Neo-Darwinism*; interestingly, Matsuda and Ho never did agree on the mechanism of genetic assimilation, although both professed a post-Darwinian, neo-Lamarckian viewpoint. A sociology-of-science approach to genetic assimilation as a problem has been undertaken by an American student, and his work should be forthcoming soon. It may clarify some of the issues, but its author has expressed the desire to avoid ideology as a factor. I think this is a mistake.

I am unhappy with Matsuda's handling of my own work and of butterfly polyphenism generally. This is no trivial matter. Historically, butterfly work informed and shaped the opinions not only of specialists like Standfuss and Fischer, but of generalizers and theoreticians who inspired much work and controversy—people like Kammerer, Weismann, Schmalhausen, and Goldschmidt, to name a very mixed bunch. I am especially unhappy because I think Matsuda was really on to something, and his premature declaration of victory will turn so many readers off that what is valid and important in this book will once again be relegated to oblivion. Matsuda, a morphologist by trade, had a fair grasp of both vertebrate and invertebrate endocrinology, but his model depends on his repeated invocation of “the mechanism of gene control,” and this does not ring true. It is akin to the promiscuous use of similar language by paleontologists—macroevolutionists. One such, a friend of mine in fact, invoked “reverse transcriptase” in a seminar and was asked in all innocence by a paleontology grad student if he could explain what that was and how it worked; of course he could not. Neither could Matsuda, and he stopped short even of citing relevant literature, including references I gave him. Literature searching ended in 1983, but a lot of highly relevant stuff was already available by then. One searches in vain for the *real* quasi-Lamarckian literature here—exciting stuff such as Gorczynski and Steele on the immune system, John Campbell on gene automodulation, Spergel and others on heritable drug-induced metabolic defects and hormone problems, Cullis on genotrophy in flax—none of which would prove Matsuda's case, but which might at least render it more plausible. As it is, Matsuda clearly did not grasp this literature, and his death shortly before the book went to the publisher denied him the opportunity to make a case to impress any but the already-convinced.

Studies of wing-pattern modification in butterflies may or may not ultimately help to unravel the Lamarckian problem, but we may continue working with the knowledge that this book does not close the matter. Perhaps someday someone will be able to make the assertions Matsuda made in this book, and back them up with a solid case rather than a lot of arm-waving. Then and only then will truth “happen to” the neo-Lamarckian idea.

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Journal of the Lepidopterists' Society
42(2), 1988, 147–149

THE BUTTERFLY GARDEN, by Mathew Tekulsky, introd. by Robert Michael Pyle, illus. by Susanah Brown. 1985. Harvard Common Press, Boston. x + 144 pp. \$8.95 (paper), \$16.95 (cloth).

THE BUTTERFLY GARDENER, by Miriam Rothschild and Clive Farrell, illus. by Elisabeth Luard. 1983. Michael Joseph Ltd. and Rainbird Publishing Group Ltd., London. 128 pp. UK £7.95 (hardbound).