

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).

When L. Hugh Newman and Moira Savonius published their classic book *Create a Butterfly Garden* in 1967 (John Baker, London), they crystallized and explored for the first time the theory of gardening to encourage butterflies. Native butterflies must be tempted into gardens by their favorite nectar flowers, they asserted, and some may establish breeding populations in gardens if the proper larval foodplants are grown.

Occasional articles on the subject have since been published in horticultural, lepidopterological, and environmental journals, but Rothschild and Farrell's *The Butterfly Gardener* and Tekulsky's *The Butterfly Garden* are the first book-length treatments of this special type of horticulture to appear in almost 20 years. Both are welcome, helpful additions to the limited and scattered literature on butterfly gardening.

The Butterfly Gardener is a strange marriage of what might better have been two separate volumes. The first part, "The Outdoor Butterfly Gardener," is by Miriam Rothschild of the renowned family of British naturalists (daughter of Charles, niece of Walter), an eminent, even awesome entomologist, naturalist, and conservationist in her own right. The second part, "The Indoor Butterfly Gardener," is by Clive Farrell who designed and established the famous London Butterfly House at Syon Park. Rothschild further treats the theme begun by Newman and Savonius, while Farrell explores a very different subject—the butterfly zoo, wherein breeding populations of tropical butterflies are maintained inside a special greenhouse containing their caterpillar hostplants and nectar flowers.

"Flowers and insects have travelled down the ages together, bound up in a kaleidoscopic rainbow relationship of mutual benefit and mutual exploitation," writes Rothschild. Her large garden is divided into three sections, a stone-walled kitchen garden, the grounds surrounding the house and courtyard, and an acre of flowering hayfield in which she has established more than 100 species of wild plants. Her seasonal approach is practical, emphasizing cultivation, conservation, and management of grasses, shrubs, and wildflowers that serve as larval foodplants and adult nectar sources for butterflies. The book includes directions for gathering and sowing wildflower seeds, techniques for mowing fields to minimize disturbance to butterflies in all life stages, and a butterfly garden design. Likewise, much useful information on British butterflies is enmeshed in anecdotes and in historical, cultural, and literary allusions that are a pleasure to wander through, just like a butterfly-filled garden itself. Her chapter on "Grass" is one of the most original, inspired, and delightful short essays I have read. The book deals less with butterflies and gardening than with the author's unique appreciation of them. Her wit and erudition, child-like curiosity, sensitivity, and humility, as well as her love of gardens, plants, butterflies, and people and her understanding of how they interact, shine in every line. This is a piece of great literature. Like Carl Sagan, she is able to distill the spirit of her subject in popular prose.

Farrell's chapters detail the indoor culture of exotic butterflies and their foodplants as a display for public education and enjoyment. Warmth, light, humidity, and ventilation are important considerations in a greenhouse managed for insects as well as plants. Also, an enclosure of this type must be very tight to prevent escape of butterflies and entry of parasites and predators, and no pesticides can be used. In richly informative, straightforward prose, Farrell treats each aspect of indoor butterfly culture, concentrating on easily reared tropical species. His level of detail is thoughtful, helpful, and indicates vast experience and a real talent to communicate. His directions for breeding captive butterflies are among the best available. Farrell's contribution is unique in the literature.

Mathew Tekulsky's *The Butterfly Garden* is the first comprehensive textbook on the subject, and the first butterfly gardening book slanted to the United States and Canada. The author basically reviews existing butterfly gardening lore, giving detailed abstracts of longer original treatments. He includes three chapters on garden setup and plants, plus information on feeders for butterflies like those for hummingbirds, hibernation boxes for adult angling butterflies, bait traps, and educational activities for the butterfly garden. Although the author lives in California, he included examples of plants and butterflies from all parts of the continent north of Mexico. Tekulsky is an excellent writer (his chapter transitions are especially well done), but I have a vague sense of disappointment at the

lack of original material. Even so, I expect the book to become a classic because it is so thorough. It proved a useful text for a butterfly gardening class I taught in 1987.

Both books are well illustrated. Rothschild and Farrell's has eight exquisite color photographs by Kazuo Unno, Carl Wallace, and Tony Evans, a color dust jacket, and 21 pen-and-ink drawings and decorations by Elisabeth Luard. Tekulsky's has 43 lovely pencil drawings and a beautiful color cover by Susanah Brown. Luard's designs are often very fine (especially the frontispiece), and her drawings do successfully communicate concepts, but poor technique frequently shows in an irritating overuse of stipple-dots. Brown's pencil drawings are wonderful. Both artists have depicted plants and butterflies in lifelike poses.

Each book contains appendices on garden butterflies; wild and cultivated nectar flowers; commercial sources of seeds, plants, butterflies, and equipment; organizations and publications dealing with horticulture, Lepidoptera, wildflowers, and conservation; and references. Tekulsky's section on "Further Reading" is the most complete bibliography of the subject I have seen. The appendices are the most practical sections of the works.

For those who derive great pleasure from seeing the living, moving color of wild butterflies among their blooms, these books are a must!

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Journal of the Lepidopterists' Society
42(2), 1988, 149-151

SPHINGIDAE MUNDI. Hawk Moths of the World, by Bernard D'Abrera. E. W. Classey, Faringdon, England. 226 pp. 79 plates. 250 × 340 mm, hard cover. £97.50 (ca. \$145.00).

Somebody once remarked to Dr. O. Niemeyer, the architect who designed most of the government buildings in Brasilia, the modern capital of Brazil, "your architecture is beautiful, but not always functional". Niemeyer kindly replied: "beauty *is* a function". D'Abrera's book *is* a beautiful book, and, in Dr. Niemeyer's concept, this book fulfills that function perfectly. It is artistically designed, and the plates are magnificent. The colors of specimens, especially those of Neotropical species, are well-balanced. Except for species represented by old, faded, and descaled specimens, the creatures would not be ashamed of their portraits.

To help the reader understand viewpoints to follow, we provide some background information. The first author met D'Abrera in 1979 at the British Museum (Natural History). They frequently spent long hours discussing work, dreams, and difficulties. D'Abrera does not regard himself a professional entomologist. He is, above all, an artist whose main interest is to express his talents through butterflies and moths, and at the same time to produce something beautiful and useful to others. Also, he is not supported by taxpayers, so has to work under great pressures, especially economic pressures. It is difficult to write books on butterflies and moths for a livelihood and to finance publication. This includes the cost of travelling more than 12,000 miles (19,300 km) from his home to the British Museum (Natural History), where he has to do his work, and production financing which includes preparing plates, writing text, designing, type setting, color separation, printing and binding, and export!

We offer this background for several reasons. First, it is important to recognize the motivation and personal sacrifice behind D'Abrera's books. Second, previous reviews of D'Abrera's books may have been unfair. We do not deny there are mistakes, but are they solely the author's fault, or do they reflect the chaotic state of lepidopteran taxonomy? D'Abrera clearly says that the main objective of this book "... is to provide, in a synoptic form, a modern illustrated systematic list of the known species of the Hawk Moths