Journal of the Lepidopterists' Society
45(4), 1991, 377–379

DIE GEOGRAPHISCH-SUBSPEZIFISCHE GLIEDERUNG VON *COLIAS ALFACARIENSIS* RIBBE, 1905 UNTER BERÜCKSICHTIGUNG DER MIGRATIONSVERHÄLTNISSE (LEPIDOPTERA, PIERIDAE), by Eduard Reissinger. 1989. Neue Entomologische Nachrichten aus dem Entomologischen Museum "Dr. Ulf Eitschberger," #26. Distributed by Dr. Ulf Eitschberger, Humboldtstrasse 13a, D-8688, Marktleuthen, Germany. 351 pp., 82 pls. Soft cover, 17 × 24 cm, ISSN 0722-3773, DM 145 (about $81 US).

The title of this monograph translates as "The Geographic-Subspecific Arrangement of *Colias alfacariensis* Ribbe, 1905 in the Light of its Pattern of Migration." *Colias alfacariensis* is the correct name for the species listed in most older Palearctic literature as *C. australis* Verity 1911. It has always been confused with the partly sympatric *C. hyale* Linnaeus 1758; L. Higgins and N. D. Riley (1970, *A Field Guide to the Butterflies of Britain and Europe*, Houghton Mifflin, Boston, p. 63) say of this pair: "Both species are variable and there is no reliable single external character for identification. . . . females may be very difficult." The complex also includes *C. erate* Esper 1804, extending from eastern Europe to the Far East. It has been known for decades that *C. alfacariensis* is dispersive or perhaps migratory, and an occasional visitor (and breeder) in southern Britain, for example. In its taxonomic career it had accumulated a fairly typical (for Europe, whose fauna is chronically overworked, mostly by amateurs) backlog of subspecies, varietal, and form names. That was before Reissinger got ahold of it.

Reissinger has been working on this project since the mid-1950's. He examined some 17,000 specimens for this revision (and provides full data for all of them). There are so many plates (14 color, 68 black-and-white) that one gets the feeling he wanted to illustrate every one of the 17,000. Map 44 in Higgins and Riley's book suggests that *C. alfacariensis* is very nearly continuously distributed over southern Europe, but Reissinger's Fig. 1 (p. 17) says otherwise. He uses phenotypes and sex-ratio data to infer that there are about thirteen permanent populations, from which temporary expansions and colonizations take place (creating an illusion of continuous distribution). (Sex-ratio is important, according to Reissinger, because it is primarily the females that emigrate. His sex-ratio method was first published in 1962, and this hard-to-find paper is reproduced in part on pp. 180–183 of the present work.) Given the close proximity of some of these populations and the dispersiveness of the animals, it is difficult to imagine how the genetic distinctness of the permanent populations could be maintained against gene flow. ("Wenn zudem ♂♂ mitwandern, so ist das ein weiterer Faktor zur subspecifischen Stabilisierung," p. 16.) But of course, there is no documentation of their genetic distinctness anyway—only a claim of *phenotypic* distinctness. And all of Reissinger's claims are deeply suspect.

The sex-ratio data confound multiple sources of variation and are thus ambiguous and unreliable (despite Reissinger's attempt to define various kinds of sex ratios and thereby define away the problem). Sex ratios may indeed be indicative of dispersal phenomena (I have published on this myself: Shapiro, A. M. 1970, Amer. Nat. 104:367–372), but the determinants thereof are complex and subtle. And the phenotypic differentiation he claims is supported only by vague, qualitative statements. The "subspecies" are much less well-defined than the phenotypes of the species *alfacariensis* and *hyale*, which are, as noted before, extremely similar. That is only to be expected, but it translates into the generalization that the way to identify *alfacariensis* to subspecies is by its locality label, not its wing markings! (Mammalogists traditionally had a "75% rule" for subspecies—75% of the specimens had to be correctly assignable by eyeball, or the subspecies wasn't accepted. It was totally arbitrary, but one wishes Reissinger subscribed to it.) Reissinger seems to think he can convince readers of the validity of the subspecies by printing huge numbers of photographs of specimens. Not so! While this is a way of dealing with variation and is thus an improvement over primitive typology, it is no substitute for quantitation. In the age of multivariate morphometrics, it is astonishing to see a 17,000-specimen study with *no statistical analysis whatsoever*. Indeed, the only quantitative phenotypic data reported here are wing-lengths for the successive seasonal generations of three taxa. These are presented in tabular form with sample sizes, means, and ranges *only*. Reissinger was trained as a medical doctor, not a biometrician—but I know practicing physicians who have heard of standard deviations.

All of this might still be marginally palatable had Reissinger not succumbed to *Haarspalterseuche*—Splitter's Disease. Having decided there are discrete populations, he could not possibly let them go unnamed. Thus this paper erects 12 new "subspecies" of *alfacariensis*, plus one of *hyale* for good measure. (One of the *alfacariensis*, named *kantaraica*, is from Algeria, where it is not even certain that the species is a permanent resident. Its distinctness, to judge by the plates, is underwhelming.) This sort of work draws inspiration from Bryk and Eisner's infamous studies of *Parnassius*, advanced through a special series called *Parnassiana Nova*. (The naive American reader might look up a copy of Capdeville, P., 1978, *Les Races Géographiques de Parnassius apollo*, Editions Sciences Nat, Compiègne, France, 190 pp., to see where this lunacy leads.) Such work greatly amplifies the nomenclature but somehow fails to generate biological insight. (It may be compared with the rigorous population biology done on *Parnassius mnemosyne* L. by Descimon, H., and Napolitano, M., 1990, Alexanor 16:413–426, which makes serious conceptual and empirical scientific contributions.) Yet even the multiplication of names might be bearable were it not for the impetus they give to anal-retentive amateurs to persecute endangered local populations in the name of synoptic completeness. Such behavior in turn led to the enactment of very restrictive legislation in much of western Europe, where butterfly collecting is now on a legal par with dope trafficking. Reissinger did his collecting before all this happened. In an Afterword, he laments the restrictions—complaining that to restrict collecting while failing to protect habitats is "throwing the baby out with the bath-water." True enough. This Afterword has the air of an *Apologia pro vita sua*, and is rather sad reading.

Nor, alas, does the multiplication of names end with "subspecies." Bryk and Eisner and Roger Verity on the Continent developed complex systems of polynomials to characterize all kinds of variation (and Jeane Gunder did somewhat the same thing in the United States.) Reissinger preserves this tradition where seasonal "forms" are concerned. Thus the three annual generations of the new Bavarian subspecies *alfacariensis orthocalida* are to be called *anteorthocalida*, typical *orthocalida*, and *postorthocalida*. In warmer Hungary the new subspecies *alfacariensis magyarica* has four generations: *antemagyarica*, *magyarica*, *postmagyarica* and *ultimamagyrica*! One hesitates to think what he would do with *Colias eurytheme* Bdv. in the Imperial Valley of California, which may have ten generations a year. Reissinger knows these names have no standing under the Code, and tells the reader that no one is obligated to use them. Dare any collector *not* get the complete "set" if he possibly can? Would a philatelist settle in the long term for a "short set" of stamps?

The study of geographic variation is an important component of population and evolutionary biology. Historically, it contributed to an understanding of the role of geographic isolation in the speciation process. But historically, phenotype was all we had to go on. Today we have various techniques for getting into the genome and quantifying genetic differentiation—and we have learned that phenotypic differentiation is not an especially reliable indicator of genetic relationships. The phenetic subspecies of the taxonomist may or may not reflect important genomic differences; they certainly cannot be assumed to be incipient species. Reproductive barriers, on the other hand, can exist in the complete absence of phenotypic differentiation. The lack of a biological subspecies concept, already evident to the perceptive and the subject of intense polemics by the 1950's, has only become all the more apparent with the passage of time.

The study of migration and dispersal is important ecologically and evolutionarily. There have been major advances in technique for such studies, mainly in the United States. Recent years have, moreover, seen a veritable explosion of interest in and techniques for the study of gene flow among populations, and the concept of the "metapopulation" has begun to clarify a lot of fuzzy thinking about populations as discrete entities, although it itself is bogged down in definitional problems (Gilpin, M. & I. Hanski, 1991, *Metapopulation Dynamics: Empirical and Theoretical Investigations*, Academic Press, New York, 336 pp.). The conflict between phenotypic and genomic evidence has been explored creatively in butterflies (e.g., Porter, A. H. & H. J. Geiger, 1988, Can. J. Zool. 66:2751–2765), using a gene-flow approach. All of this is relevant to *Colias alfacariensis*, but not to a worker with Reissinger's mind-set.

What is the point of a study like Reissinger's today? To ask this question is to miss the point. Publication of this study in a sense marks the end of an era, the era when a dedicated amateur like Reissinger could expect to rival the "pros" in sophisticated studies of variation, evolution or systematics. Work like this was already largely out of date several decades ago; now it is virtually a curiosity—both theory and technique have long ago passed it by. This is sad. It does not mean the amateur can no longer make valuable contributions to science, but it does force a redefinition of what those might be. Superb morphological and life-history work is still being done by amateurs, for example. The early stages of much of the world's lepidopteran fauna remain undescribed at a technical level. This kind of work requires a degree of sophistication, but no expensive equipment or statistical arcana. Perhaps the future of amateur contributions lies in the collaboration of amateurs and "pros" in addressing questions of mutual interest.

Eduard Reissinger died on 16 July 1991 at the age of 71. His close collaborator Ulf Eitschberger has written a moving obituary (Atalanta 22:ii–ix, 1991) which is equally the obituary of an era. I wish that Reissinger had published his *magnum opus* much earlier, but it will stand as a monument to one man's dedication to one bug. *Ave atque vae.*

ARTHUR M. SHAPIRO, *Department of Zoology and Center for Population Biology, University of California, Davis, California 95616.*

Journal of the Lepidopterists' Society
45(4), 1991, 379–380

BUTTERFLIES OF SOUTHEASTERN ARIZONA, by Richard A. Bailowitz and James P. Brock; photographs by Charles A. Hedgcock (Foreword by Gale Monson). 1991. Sonoran Arthropod Studies, Inc., P.O. Box 5624, Tucson, Arizona 85703. ix + 342 pp., with 4 color plates, 3 figures (including two regional maps), and 624 black-and-white photographs covering all species. Soft cover, 15.2 × 22.9 cm, ISBN 0-9626629-0-9. $29.95 (+$3.00 shipping).

REVIEW BY CLIFFORD D. FERRIS

Arizona boasts a broad diversity of life zones and habitats spread over its 15 counties. Much of its area is relatively arid, but lush meadows occur in coniferous forest in the White Mountains and Mogollon Rim country of the central and northeastern portions of the state. The southeastern portion of the state, the region covered by this book, is generally Sonoran desert interspersed with a variety of mountain ranges generally aligned with north-south orientation. Coniferous forest is found at the higher elevations in many of these ranges, whereas riparian canyons with unique flora and fauna exist at their bases. In some localities, one may pass through five ecological life zones when climbing from the desert floor to a mountain summit. Consequently, more than 240 butterfly species have been recorded from the six counties represented in this book. Many of these species are endemic, while others are Mexican migrants that occur with some regularity, and some species are single-specimen records.

Sonoran Arthropod Studies, Inc. (SASI) was founded in 1986 as a non-profit organization devoted exclusively to educating the public about arthropods and their interrelations with other animals, plants, and humans. Located in Tucson, Arizona, SASI operates the Arthropod Discovery Center in Tucson Mountain Park. A newsletter and quarterly magazine are published for SASI members, but *Butterflies of Southeastern Arizona* is the organization's first publication for a wide audience.