signers to translate into ASL a story about an old fisherman "whose face became red in the wind." Most signers omitted the sign for "become" and signed something like "red, face" or "wind (against face) red." At first the investigators assumed that ASL simply dispensed with the finer distinctions. But analysis of videotapes ultimately revealed that many adjectival predicates can be rendered in a variety of ways that express what are typically called *aspects* in spoken language, that is, such things as the onset, duration, frequency, or permanence of events or states. Predicates containing words like "red" or "sick" or "angry" can be modulated by variations in the movement of the sign. The basic sign might be made with a circular reduplicated movement or with a single accelerating movement, for instance. In this way the signer can indicate the shades of meaning that differentiate "tended to get red" from "got red once," and so on. The circular motion conveys the meaning "tends to be." Deaf signers, by adding this motion to the basic sign, can say things like "My brother characteristically gets dirty," or "My sister was in a car accident, and as a result she tends to be sickly." Only careful observation has made it clear that ASL is capable of expressing such sophisticated meanings, and these findings directly contradict the claims of some other contemporary researchers who still believe that ASL greatly resembles the language of young children who have not yet learned adult grammar.

Other studies deal with such topics as the formal structure of the sign, wit, humor, poetry, and song in sign. The volume is a tribute to human creativity and a significant contribution to our knowledge about language, thanks to the careful work of Klima, Bellugi, and their fellow authors: Robin Battison, Penny Boyes-Braem, Susan Fischer, Nancy Frishberg, Harlan Lane, Ella Mae Lentz, Don Newkirk, Elissa Newport, Carlene Canady Pedersen, and Patricia Siple.

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Rapprochements in Population Biology

Ecological Genetics. The Interface. Papers from a symposium, Ithaca, N.Y., June 1977. PETER F. BRUSSARD, Ed. Springer-Verlag, New York, 1978. x, 248 pp., illus. $22.80. Proceedings in Life Sciences.

Although population biology has traditionally, if artificially, been divided into the subdisciplines of population genetics and population ecology, there has always been some integration of the two. Ecological concepts have always been part of population and evolutionary genetic theory, and in recent years the mathematical models upon which much of this theory is founded have become increasingly contaminated with the parameters and variables of ecology. Geneticists working with natural populations have generally considered at least some components of the ecology of their subjects. In fact, for more than 20 years outdoor population geneticists in Great Britain have used the phrase "ecological genetics" to describe their endeavors. Although many ecologists continue to work on problems or at levels that enable them to ignore the complication of genetic variability, this is not the case for the increasing number of people interested in the evolution of ecological systems or in the role of genetic polymorphisms in stabilizing ecological associations. Although I would not characterize the efforts directed at merging the ecological and genetic components of population biology as a unified movement, it is clear that the tradition of separate treatment is breaking down at an increasing rate. The symposium from which the present volume stems was intended to illustrate this more ecumenical approach to the biology of populations.

The 12 papers in the volume vary considerably in subject matter and in the manner and extent to which ecological and genetic components are integrated. There are a brief introduction by the editor and an index, but there is no commentary on the topics considered or on the individual papers. The discussion following the original talks has not been included.

The opening section, Theory, includes a broad, somewhat critical, and I believe valuable review by S. A. Levin of the various approaches that have been used to develop a mathematical theory that simultaneously considers the ecological and genetic components of population biology. In the other paper in this section, J. Roughgarden uses ecological genetic models to consider how pairs of populations in nonsynergistic associations might satisfy the goals, or perhaps values, imposed upon them by geneticists and ecologists, that is, the simultaneous maximization of their fitnesses and sizes.

The two papers in a section entitled Physiology, Biochemistry, and Adaptation consider the association between variation in enzymes and other proteins and the physical environment in which the populations reside. R. K. Koehn lucidly sets out the criteria that would have to be met if enzyme polymorphisms were adaptive and then summarizes the results of his intensive field and laboratory studies to ascertain whether these criteria are met for the leucine aminopeptidase system of the mussel *Mytilus edulis*. W. J. Schull, R. E. Ferrell, and F. Rothhammer present a progress report on their retrospective investigations to ascertain whether existence in high-altitude environments has led to adaptive changes in blood and serum enzymes and proteins for human populations in the Andes.

Three papers are grouped by the genus of the organisms under consideration, *Drosophila*. H. L. Carson reports the results of some of his ecological and genetic studies of the mechanisms leading to the extraordinary number of *Drosophila* on the Hawaiian Islands. W. B. Heed summarizes the results of his studies relating choice of food plants to differential selection at the alcohol dehydrogenase locus in *D. mojavensis*. Heed's study reinforces the point clearly made in Koehn's paper; the direct demonstration of selection at particular enzyme loci and the elucidation of the mechanisms of that selection are difficult tasks that will require an extensive effort and a relatively deep excursion into the biochemistry and physiology of the organisms in question. R. C. Richmond presents evidence that ecological patchiness is responsible for microgeographical variation in natural populations of *Drosophila*.

In a section containing two papers devoted to Other Animals, R. G. Harrison considers the role of various forms of temporal isolation in selection and speciation in field crickets. And, in a paper whimsically entitled "Some contributions of snails to the development of ecological genetics," B. Clarke reviews the evidence for the selective maintenance of polymorphisms and linkage disequilibria obtained from studies with land snails. Although his paper does little to refute the suggestion that snails were chosen as the objects of ecological genetic studies because of an upper-

middle-class fascination with them, a suggestion about which Clarke reveals some sensitivity, his review does demonstrate that investigations of these mollusks have made a significant contribution to the subject. His paper also confirms the point made less explicitly in many others in this collection; a reasonably deep understanding of the ecology of populations is necessary for a direct demonstration of the action of selection on them.

As a testimony to the ecumenical nature of contemporary population biology, two papers are devoted to plants. M. T. Clegg, A. L. Kahler, and R. W. Allard review some recent work on the genetic demography of plants and summarize some of the evidence for both fertility and viability components to fitness and for selection for different genotypes during different stages of the life cycle. D. A. Levin considers the effects of the diverse mechanisms of reproduction and spatially fixed modes of existence on the effective sizes and genetic structure of and the operation of selection in plant populations. These two papers clearly indicate that the models of freely recombining, single-aged populations existing in dimensionless habitats upon which much of the mathematical theory of ecological genetics is based are even less appropriate as analogs of plant populations than they are of animal populations.

The final section of this collection, the "coda," is a paper by R. R. Sokal examining some of the evidence in support of the fundamental hypothesis (sometimes mistakenly considered to be an axiom) that the processes of evolution as they are studied and understood at the population level, microevolution, are sufficient to account for evolution at higher systematic levels, macroevolution. Although the evidence presented on patterns of variation within populations and among geographically distinct populations is considered to be consistent with this hypothesis, Sokal expresses his conviction that other "genomic rearrangements" are necessary for the manifested diversity to be realized. This possibility that other mechanisms are involved in evolution at higher systematic levels was once the subject of considerable controversy, which has also recently reemerged from comparisons of data on morphological and molecular evolutionary rates. It seems clear that the elucidation of these possible other mechanisms will require an odyssey beyond the p's, q's, and N's of the integrated population biology and into as yet uncharted areas of molecular and developmental biology.

In summary, this is a good collection of papers in contemporary population biology. I see little utility for the volume as a textbook for any but the most advanced "topics" courses. However, people working in evolutionary and population biology should be aware of its existence and I expect may want to photocopy at least a few papers from it (for their own personal use, of course).

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Metal Chelate Compounds

Metal β-Diketonates and Allied Derivatives. R. C. MEHROTRA, R. BOHRA, and D. P. GAUR. Academic Press, New York, 1978. viii, 382 pp., illus. $42.40.

Probably no other class of metal complexes has been as extensively studied as the metal β-diketonates. This is not particularly surprising in the light of their interesting and useful properties. The work done before 1900 by Combes, Claisen, and Urbain paved the way for advances. Since the turn of the century and the pioneering work of Werner, and later of Morgan and others, β-diketonate complexes of nearly all of the elements have been synthesized and studied. Since 1960 novel volatile and soluble complexes have been synthesized and studied for their application in gas chromatographic trace analysis, in nuclear magnetic resonance (NMR) spectroscopy as shift reagents, in laser technology, in isotope separations, and as catalysts and fuel additives. Underlying all of the progress has been a continuing improvement in the understanding of the basic chemical principles that give rise to the interesting characteristics of these compounds. Mehrotra, Bohra, and Gaur have undertaken the monumental task of summarizing their chemical and physical properties as well as some of their uses. They have done a commendable job of assembling and summarizing nearly 2000 references, and the book will be valuable to coordination chemists as well as to researchers in analytical, organic, and physical chemistry and in allied sciences. Although there are occasional lapses, on balance the volume is a worthwhile guide to the original literature.

The book discusses many aspects of metal chelate compounds. After a brief introduction to metal-β-diketonate complexes, which covers their general chemistry and historical background and classifies the different types of complexes, there is a chapter on the oxygen-bonded β-diketone complexes. Carbon-bonded β-diketone complexes are discussed next; thio-β-diketones and their metal derivatives are discussed in two chapters. The book closes with a short chapter on applications of these compounds.

Chapter 2, on oxygen-bonded β-diketone complexes, is understandably the longest in the book. Brief sections on the synthesis and the chemical properties of these complexes are followed by a long section on their physical properties. The section on synthesis is concise and readable, giving a quick yet reasonably thorough overview of the various methods of synthesizing β-diketonate complexes. The section on chemical properties contains a discussion of electrophilic substitution reactions that take place at the carbon atom between the carbonyl groups. The brief coverage of the formation of adducts by expansion of the coordination number of the metal is basically a list of references to all the reported examples of the process. The section gives a good summary of ligand replacement and exchange reactions that result in a variety of mixed ligand metal complexes. One topic noticeably missing from the section is the Schiffs base condensation of primary amines with β-diketones to form β-ketoimines. The section on physical properties includes coverage of volatility, thermal stability, and vapor pressure, stability constants and polarographic studies, nuclear magnetic resonance studies, infrared spectra, electronic spectra, mass spectra, Mössbauer spectra, x-ray crystal and molecular structure, and magnetic properties. Conclusions about which factors cause increased volatility and thermal stability, and why they cause improvements, are presented clearly.

The chapters on carbon-bonded β-diketones and thio-β-diketones are well done. Synthesis procedures for preparing both classes of compounds are described in detail.

The chapter on applications considers the use of metal β-diketonates in NMR spectroscopy as shift reagents, as laser chelates in vapor-phase chromatography, and in solvent extraction techniques. Coverage of these applications is by no means complete, tending to just touch on major accomplishments, with most of the papers on the subject given in a large list of references.

There is some unevenness in the way