Butler et al.: Model of Cabbage Looper Larva


BOOK REVIEW


The fourth edition of this well known and widely cited book is organized along the same 15 chapter titles that appeared in the first edition, 1964. A book treating technical and complex processes and addressed to an audience presumed to have a wide background in population genetics and evolution must, by any values, be judged successful when it has appeared in 4 editions, the first 3 with a number of printings, in a period of 11 years. The essence of this success appears to stem from the fact that Ford has largely by-passed theory and developed his case for evolutionary processes from studies conducted directly in the field, supported by laboratory breeding tests, etc. The methods clearly appeal to a wider range of biologists than the more esoteric treatment of mathematics that generally characterize population genetics. The first chapter attempts to define ecological genetics and distinguish it from related areas such as evolutionary genetics, population genetics, etc. Although Ford spends about 12 pages drawing this distinction, one can summarize by saying that it is an analysis of variation in natural populations seeking to explain its origin and maintenance. While Ford implies that concepts, generally recognized as those of theoretical population genetics are not the object of his discussion, it becomes clear that he assumes the reader to have some insight on that discipline. The second, third, and fourth chapters, are largely an expression of Ford's position on genetic drift versus selection in determining variation. Ford gives a rather simplified discussion of drift addressed to an individual encountering the concept for the first time. On this point, the book is inconsistent because he later discusses a number of equally or more complex processes with the assumption that the reader has an advanced understanding. Ford develops a strong case against drift which has apparently won over many colleagues to his views. While the examples he cites are convincing, he appears to extrapolate to evolution in general and on this point, many
students of evolution take exception. Chapter 5, Sympatric Evolution, summarizes some of the more interesting studies to emerge from the English School of Ecological Genetics. Ford carries the reader step-by-step through the investigations that suggest spot patterns evolved separate expressions in a butterfly population having an essentially sympatric range. Toward the end of the chapter, the reader is anxiously awaiting the explanation for the data only to find that Ford can offer no explanation, a situation most uncharacteristic for this talented author. Chapters 6 through 11 concern the theory of genetic polymorphism and chromosomal polymorphism. The principal interest here lies in his explanation for the evolution of heterozygous advantage along the same lines as the evolution of dominance, the latter which he assumes the student to understand. The development of a supergene, a number of linked loci controlling related traits, is also described in detail. Chapters 12 and 13 concern mimicry and its evolution. Ford gives a lengthy discussion of the basic theory of mimicry, the supporting evidence, and the data for the genetic basis of mimetic patterns. It may be of interest that Ford appears to feel kin selection is not necessary in explaining mimicry and that models suffer no significant loss of fitness by occasional mistakes of the predators. Chapter 14 concerns what Ford terms transient polymorphism, a process frequently identified as directional selection and his principal examples concern melanism. In Chapter 15, Ford touches on several topics such as mortality in small populations and speciation; the latter process is given much less space than typical of most books on evolution.

Ford's writing style often conveys the author's position as clearly as his written statements and increases the reading interest. Nonetheless a number of sentences are long and the meaning none too clear. Throughout Ford notes his reluctance to accept the prediction of mathematical models. However, he devotes several pages of Chapter 14 to reviewing studies involving an early model devised by J. B. S. Haldane. Then, he rejects the results because of an error in Haldane's basic equation. Unfortunately, the citation used to support the presence of an error is omitted from the References, though a footnote gives some direction.

The book assumes so much basic knowledge that it is unlikely to be used as a text and the price seems unduly high. Students of evolution, particularly at the genetic level will nonetheless profit by adding it to their working libraries. The photographic plates are placed together in the middle of the book while line-drawn figures appear with the related discussion; the references are largely expanded relative to earlier editions, and the index is sufficiently complete, allowing the reader to quickly locate topics of interest. Ford's own research has largely used lepidoptera and it is an asset to this edition that a wider range of organisms is represented in the examples. On this point, Ford stresses that he is treating principles and is not cataloging examples. In conclusion, this book provides an excellent up-to-date summary of evolutionary studies taking the premise that natural selection is sufficient for explaining variability. Printing errors in this book seem to be essentially absent.

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