of age structure in vaccination programs on age-structured disease (cf. the U.K. and U.S. vaccination strategies for Rubella), nor do we understand the interplay between individual immunities and herd immunities (P. E. M. Fine *et al.*).

While most of the discussion of control of the agents of infectious disease presupposes the goal of reducing the levels of infection and incidence, L. A. Falcon considers a different twist. Here the goal is control of insect pests via the control (mass culture and selective distribution) of appropriately chosen pathogenic viruses. Procedures, case studies, and current progress are reviewed.

Conventional wisdom holds that parasite–host combinations which survive long times tend to be those in which the parasite does little damage (A. C. Allison and J. C. Holmes). Indeed, the virulence of infection seems to be inversely proportional to the duration of the parasite–host relation. The advantage of short generation time for adaptation in simple organisms (parasite) is countered by the complexity of defensive possibilities in larger, slower breeding organisms (W. D. Hamilton). In this respect, the role of sex in temporal heterogeneity is a more important defense for complex organism than is the spatial heterogeneity which is achieved by independent locomotive abilities. Despite their simple appeal, these views are not yet satisfactorily supported by theoretical or empirical evidence, and further studies are suggested in the group report of B. R. Levin *et al.*

The reports and papers are well written, being readable and accessible to a widely diversified audience, yet leading directly to discussion of state of the art topics and literature. Ample bibliographies are supplied and referenced. The group reports are especially impressive in their synthesis of discussion and in the placing of discussion into the overall context of the workshop. Editors Anderson and May were exemplary in providing a thorough subject index, a glossary of technical terms (very handy for the nonspecialist) and a delightful as well as effective introduction.

One should not read this report expecting to find mathematical models and data waiting to be analyzed. Aside from a few discussions of coefficients and one model-oriented article, there are virtually none. One may consider it a strength of the discussion that it was appropriately confined to those aspects of the field which should be understood before mathematical modelling and analysis are undertaken. However, in all the discussion there is the clearly felt influence of mathematically inclined participants. This makes the book stimulating to the mathematically trained reader who is interested in applying quantitative methods of thought to the understanding of infectious disease. It is highly recommended to readers of this journal.

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Biology of Knowledge: The Evolutionary Basis of Reason. R. Riedl, Wiley, New York. 1981 (English edition 1984).

This book represents an attempt to synthesize ideas from biology and epistemology under the rubric of evolutionary epistemology in order to answer questions about the nature and adaptive functions of reason. This is an important goal, and one infrequently addressed.

Philosophers and scholars will be the readers most comfortable with Riedl's style. Mathematicians, computer experts, psychologists, and lay readers will find themselves stimulated by new ideas, but fighting the style and desiring other books and resources to clarify issues or references. Connections between this work and mathematics, psychology, and computer science are not spelled out by the author but must be created by the reader. Many readers unfortunately, will not have the time, energy, motivation, or background to do so. The chapter titles will not be a great help, since they reflect mainly philosophy, and what, to this reader, is the author's tendency to dance

around questions rather than addressing them (sample titles: "When unlike would be like", "The hypothesis of the comparable", "A stratification of hypothesis"). Yet those who are not put off by the pedantic style and the need for a broad and deep background in philosophy can gain the benefit of creative thought not readily available elsewhere. At least Riedl's graphics often convey ideas readily when his prose is obscure.

This book is one of the few that combines biological and psychological inquiries without reducing important questions to trivial or reductionistic shadows. Riedl mentions that his book is in the tradition of Freud, Jung, Piaget, Vollmer, Brunswick, Chomsky, Popper and Lorenz. Readers familiar with physics will see parallel inquiries in other authors, Prigogene, for example. Riedl is unique in beginning with the major philosophical and epistemological questions, where others begin with natural science and draw, secondarily, philosophical and epistemological implications.

Although this book is valuable and constitutes a step forward, I could not have found it so useful without having read several other authors. Primary among these are Lumsden and Wilson whose book *Genes, Mind, and Culture: A Coevolutionary Process* (1981) has a preliminary chapter that addresses epistemological questions similar to Riedl's in a more readable, more biological, more data-based, but less philosophical manner. Neither Lumsden and Wilson (in this book) nor Riedl offer offensively reductionistic sociobiology. Another book to read before Riedl, Hofstadter's *Gödel, Escher and Bach* (1980), examines how we know what *is* knowable and the criteria for truth from the perspectives of the computer scientist, biologist, chemist, mathematician, and artist. It is written so as to give experience (yes, really) with concepts discussed, if readers don't let themselves be put off by the discussion of well-formed strings or by the length of the book. A third book, Gregory Bateson's *Mind and Nature* (1979), addresses preliminary forms of Riedl's questions, while Mary Catherine Bateson's *Our Own Metaphor* (1972) continues that discussion at a sophisticated process-oriented level. James Miller's monumental *Living Systems* (1978) is a brilliant tour de force of functional adaptive analogical processes (one of Riedl's issues) in biological, psychological, and social systems. Other general systems theorists provide good background reading, too. With these as background, Riedl's ideas became far more interesting.

Some investigators working in cognitive psychology now are addressing mechanisms for humans knowing what Riedl knows about truth and adaptation. These include students of relativistic post-formal thought, e.g. Sinnott, in Commons *et al. Beyond Formal Operations* (1984). Add to this ideas like those in Churchman's *The Design of Inquiring Systems* (1971), Bastick's data-based synthetic theories [*Intuition: How We Think and Act* (1982)], and the newer work of Pribram, and a reader could have a solid grounding in the scholarship and science that makes Riedl's ideas come alive. So, Riedl's work could be either an interesting beginning or a synthesis endpoint in one's exploration of the evolutionary elements of reason.

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Statistics for Experimenters, An Introduction to Design, Data Analysis, and Model Building. G. E. P. Box, W. G. Hunter and J. S. Hunter, John Wiley and Sons, New York, NY. 1978.

Since it first made its appearance, this book has been popular among statisticians and widely used as a textbook for courses in analysis of variance, design of experiments, and regression. The topics covered in it might be described as "central" to the classical field of statistics and the application of statistics in scientific fields such as chemistry and biology. From the point of view of an ex-