lated throughout into terms of consequent changes in genetic means and variances. In all of this the trait receiving prime attention is, appropriately, Darwinian fitness. Numerous special topics are covered; examples are the components of genetic variance, effective population number, correlations between relatives, the cost of natural selection, genetic loads, probability of fixation of mutant alleles, and the number of neutral alleles maintained in finite populations.

There are some important things that might have been, but are not, found in this book. Available theory is presented, but not much in the way of perspective concerning its adequacy is provided. In general the authors have not offered judgments concerning the sufficiency of present theory or the areas in which further theoretical developments are most needed. Similarly, there is little discussion of how theory presented can be employed for inference concerning the genetic state of real populations or the actual shape of the genetic details (such as dominance, epistasis, selective values) that modify theoretical expectations. In a slightly different vein, it is worth noting that this book concentrates on the problems of single populations as opposed to those that arise from the interplay between species. For example, the fact that, while Darwinian fitness can only be increased by natural selection (that is what Fisher's fundamental theorem is about), species may, and often have, become numerically smaller (or extinct) is recognized by the authors but is not examined with the same quantitative rigor that they bring to the subject of gene frequency changes.

Lucid presentation of mathematical deductive theory with emphasis on derivations and underlying assumptions was the obvious objective of the authors. They have given us an effectively organized and integrated presentation of a substantial portion of the significant, currently available theory concerning single populations (to which, incidentally, they have both made their own substantial contributions). The book is written for students and in a manner designed to facilitate their understanding of both the derivations presented and the procedures by which theory is developed. The bibliography is extensive and will certainly be appreciated by many readers. In my opinion this book will be very useful to many of us and should be kept within easy reach by all serious students of population genetics, population biology, and biomathematics.

R. E. COMSTOCK
Department of Genetics and Cell Biology, University of Minnesota, St. Paul

Neuroscience

Short-Term Changes in Neural Activity and Behaviour. A conference, Cambridge, England, July 1969. GABRIEL HORN and ROBERT A. HINDE, Eds. Cambridge University Press, New York, 1970. viii, 606 pp., illus. $28.50.

The major topic of the conference represented by this volume was the neural basis of habituation, the term "habituation" referring to behavioral response decrement occurring as a result of repeated or continuous stimulation. The selection of habituation as the focal point of the conference stemmed from the hope that it might be "a relatively simple type of behavioural change in which units are phenomenologically similar at lower levels of analysis." The papers on behavioral and physiological aspects of habituation effectively dispose of this hope. It seems likely that the processes underlying habituation are no more similar than are, for example, the processes underlying behavioral "inhibition" or "extinction of conditioned reflexes." The wide diversity of mechanisms mediating behavioral habituation does not lessen the value of this volume, however, for its papers are thorrough and scholarly and have the mark of being written expressly for this publication rather than pieced together from previous works. Indeed, the organizers of the conference have been extraordinarily successful in enlisting the cooperation of participants so as to achieve complete coverage of the general problem areas under consideration.

The volume is divided into three sections: Neural Basis of Habituation, Neural Basis of Plastic Changes Other than Habituation, and a section on Behavioural Considerations relevant to the first two topics. Given the 600 rather large pages of which this book consists, the 19 separate chapters, and the 27 eminent participants, it is obviously impossible to review the contents of the volume in detail. But there are a few generalities that emerge. First, the authors have written thorough and highly readable reviews, as well as covered their own research efforts. These papers extend well beyond the topic of habituation per se, covering subjects classified in the volume as "neural basis of plastic changes other than habituation." These reviews deal with a wide range of topics, from the insect central nervous system to neurochemical correlates of learning in the mammalian brain.

In essence, though the conference may have failed to come up with support for the hope that habituation might be a key to unlock the secret of a neural basis for behavioral plasticity, the individual contributors have prepared a series of papers of remarkably high quality.

EDWARD V. EVARTS
Laboratory of Neurophysiology, National Institute of Mental Health, Bethesda, Maryland

Predation

Searching Image in Carrion Crows. Hunting Strategy in a Predator and Some Anti-Predator Devices in Camouflaged Prey. HARVEY CROZE. Parey, Berlin, 1970. 88 pp., illus. $12.10.

We are accustomed to a high quality in the reports from N. Tinbergen's laboratory. The questions he asks are significant, and the answers reflect both a high degree of ingenuity and diligence. Whether studying "pecking responses" or "predation," Tinbergen and his group provide grist for the mills of both those who are interested in behavioral mechanisms and those who attend to the ecological and evolutionary aspects of behavior. Croze, in *Searching Image in Carrion Crows,* continues in this laudable tradition. His booklet is especially useful at this time because the concept of searching image has become overused (and abused) of late, this reflecting the embarrassing fact that it has rarely been the subject of careful study, despite its age. The concept of "searching image" was introduced by Lukas Tinbergen (brother of Niko) to explain certain discrepancies between the abundance of a prey organism and the numbers actually taken by its avian predators. At low densities, a new species of insect prey may be altogether overlooked at first, only to suddenly become especially esteemed. This was assumed to result from the fact that birds

seek specific characters in their search for prey, and that once a new constellation of characters is discovered to mean "food," it is selectively sought. This has been an attractive concept, although L. Tinbergen advanced it merely as a hypothesis to explain his data relating prey abundance to risk of predation. A test, even on a noninsectivorous species such as crows, is welcome. Croze provides reasonable support for the usefulness of the concept.

Regrettably, Croze's admirable contribution suffers much from a lack of skill in the use of the English language and the publisher's failure to provide better copy editors. In any event, Croze's empirical approach to searching images merits the attention of ethologist, psychologist, and ecologist alike.

PETER H. KLOPFER
Zoology Department, Duke University, Durham, North Carolina

Ethological Essays

Social Behaviour in Birds and Mammals. Essays on the Social Ethology of Animals and Man. JOHN HURRELL CROOK, Ed. Academic Press, New York, 1970. xlii, 492 pp., illus. $21.

One can feel sympathy with the editor of this book, which is dedicated to the memory of K. R. L. Hall, in his attempt to unite over a common denominator individual papers which one would expect to find in a behavioral journal or in a volume called University of Bristol's Miscellaneous Collection, Sec. Psychology. In this book, comprehensive and creative reviews (for example J. H. Crook's own chapter on the socioecology of primates) alternate with rather specialized accounts (for example J. D. Gross-Custard's chapter on feeding dispersion in some overwintering wading birds). In the introduction the hope is expressed "that these studies demonstrate the value of carrying out behavior research at several levels of analysis within the same institution and attempting purposefully to show how they may be synthetically related," but it remains unclear on what this hope is based.

Four of the 11 chapters seem to fulfill the expectations evoked by the title of the volume and therefore deserve mention. Crook reviews and discusses the sociology of primates, with emphasis on the contribution of environmental factors and of tradition, and gives special attention to the social mobility of the male in primate groups. A good example of his approach is his discussion of cercopithecoid social systems and their association with environmental variables: Assuming three major habitat types of increasing seasonal change (forest, savanna, arid open country), he proposes associations with predation, numerical density, size and composition of the reproductive groups, male motility, utilization of space (home range, territory), group coherence, communication types, and reproductive seasonality. J. E. Archer gives a comprehensive review of the effects of population density on the behavior of various species of rodents. His conceptual framework is as follows: High densities lead to emigration; if emigration is restricted, aggression increases as an effect of crowding, which in turn leads to physiological changes (such as adrenal hyperactivity) and behavioral changes (such as shortened or interrupted sequence of sexual or maternal behavior). I. Vine has compiled an extensive review of communication by facial-visual signals, devoting much space to observations and investigations on human subjects, especially to the role of gazing. Janet Kear's chapter on the adaptive radiation of parental care in waterfowl gives a detailed survey of pair-bond, nest construction, incubation, and family life in swans, geese, ducks, and related waterfowl including flamingos, screamers, and magpie geese, and sets new standards for comparative behavior studies.

This book apparently does not provide revolutionary changes in our concepts of social behavior, but has its merit as a guide to the widely scattered literature. The attitude of its editor and contributors follows the present trend in ethology: emphasis of ecological aspects, caution in the application of traditional concepts of drive and motivation, interest in the role of learning, and great hopes in systems theory and cybernetics (without much attempt to test their value).

WOLFGANG M. SCHLEIDT
Department of Zoology, University of Maryland, College Park

Books Received

The AAAS Science Book List. A Selected and Annotated List of Science and Mathematics Books for Secondary School Students, College Undergraduates and Nonspecialists. Compiled by Hilary J. Deason. American Association for the Advancement of Science, Washington, D.C., ed. 3, 1970. xiv, 440 pp. $10; cash orders, $9.

Adipose Tissue. Regulation and Metabolic Functions. Bernard Jeanrenaud and Dieter Hepp, Eds. Thieme, Stuttgart; Academic Press, New York, 1970 (U.S. distributor, Intercontinental Medical Book Corporation, New York). viii, 212 pp., illus. $11.50.

Advances in Astronomy and Astrophysics. Vol. 7. Zdeněk Kopal, Ed. Academic Press, New York, 1970. xiv, 294 pp., illus. $18.50.

Advances in Child Development and Behavior. Vol. 5. Hayne W. Reese and Lewis P. Lipsitt, Eds. Academic Press, New York, 1970. xiv, 266 pp., illus. $13.

Advances in Clinical Chemistry. Vol. 13. Oscar Bodansky and C. P. Stewart, Eds. Academic Press, New York, 1970. xiv, 536 pp., illus. $22.50.

Advances in Food Research. Vol. 18. C. O. Chichester, E. M. Mrak, and G. F. Stewart, Eds. Academic Press, New York, 1970. x, 322 pp., illus. $16.

Advances in Heterocyclic Chemistry. Vol. 12. A. R. Katritzky and A. J. Boulton, Eds. Academic Press, New York, 1970. x, 340 pp., illus. $18.

Advances in Veterinary Science and Comparative Medicine. Vol. 14. C. A. Brandly and Charles E. Cornelius, Eds. Academic Press, New York, 1970. xviii, 420 pp., illus. $22.

Adventures in Research. A History of Ames Research Center, 1940–1965. Edwin P. Hartman. Scientific and Technical Information Division, National Aeronautics and Space Administration, Washington, D.C., 1970 (available from the Superintendent of Documents, Washington, D.C.). xx, 556 pp., illus. $4.75.

Aide-mémoire de détermination bactérienne. R. G. Capet. Vigot, Paris, 1970. 136 pp. Paper, $7.

Alejandro de Humboldt. Modelo en la Lucha por el Progreso y la Liberación de la Humanidad. Memorial en Conmemoración del Bicentenario de su Nacimiento. Akademie-Verlag, Berlin, 1969. xviii, 186 pp. + plates.

Amine Oxidases and Methods for Their Study. R. Kapeller-Adler. Wiley-Interscience, New York, 1970. xiv, 320 pp. $19.50.

Analytical Methods Used in Sugar Refining. R. W. Plews, Ed. Elsevier, New York, 1970. viii, 234 pp., illus. $15.

Annual Review of Genetics. Vol. 4. Herschel L. Roman, Laurence M. Sandler, and Allan Campbell, Eds. Annual Reviews, Palo Alto, Calif., 1970. xiv, 524 pp., illus. $10.

Annual Survey of Photochemistry. Vol. 2, Survey of 1968 Literature. Wiley-Interscience, New York, 1970. xvi, 412 pp., illus. $19.95.

Approximation Theory. Proceedings of a symposium, Lancaster, England, July 1969. A. Talbot, Ed. Academic Press, New York, 1970. viii, 356 pp., illus. $11.

Aquatic Chemistry. An Introduction Emphasizing Chemical Equilibria in Natural Waters. Werner Stumm and James J. Morgan. Wiley-Interscience, New York, 1970. xvi, 584 pp., illus. $24.95.

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