published elsewhere. Instead, they serve as introductions to the authors' work and as springboards for discussion.

The papers fall fairly clearly into two groups. Four deal with the elusive inferences possible from tropical field studies. P. Charles-Dominique records probable seasonal breeding in *Perodicticus potto* in Gabon; *Arctocebus* (the golden potto) in the same area may give birth at any time of year. Arlette Petter discusses Madagascar lemurs. She concludes that, although the months of mating and birth differ in each genus, nearly all the young are weaned during the wet season when there is abundant food. G. Dubost attempts to relate birth peaks in the chevrotain, *Hyemoschus aquaticus*, and Elizabeth Pagès the birth peaks of pangolins, to the complex twice-yearly rains and fruiting times of the Gabon jungle. All these papers have in common the difficulty of obtaining data on the animals themselves, either their birth seasons or their ecology.

The other groups of papers deal with reproductive physiology in European mammals. P. Delost speaks from a lifetime's work on rodent reproduction, particularly on the quiescent period when the reproductive tract may partially regress. The degree and time of regression differs between species, between populations in different regions of France, and even within a population from year to year, as does the length of gestation. Mme. L. Martinet discusses the growth rate and longevity of *Microtus arvalis*: voles born in the spring grow rapidly and reproduce and die in the same summer, whereas those born in the fall grow slowly and overwinter before reproducing. Canivenc *et al.* deal with delayed implantation in mustelids, particularly the European badger, which mates during a postpartum oestrus, then keeps the blastocyst free about 300 days before implantation—its total pregnancy therefore lasts very nearly one year! M. Herlant treats the role of the hypothalamus in delayed ovulation in *Myotis* bats, and A. Peyre the peculiar cysts which form in the ovotestis of the mole and the desman (*Galemys pyrenaicus*).

The discussions are fun—revealing, perhaps even dangerously revealing, of personal quirks. They are, at times, factually misleading, as when Canivenc remarks that lemurs in Madagascar (at 13 to 25 degrees below the equator!) are little exposed to changes in day length, or when Grassé says that female primates of low dominance status may be slow to be impregnated (a view not confirmed by any primate study). However, such discussions are not published to convey information, but to give the flavor and excitement of a meeting of specialists.

In summary, this book, like too many symposia, has some new and important information among much, particularly in discussions, that is thin or even professionally useless. As a book it is perhaps most interesting for enabling non-French readers, who may know few of the participants, so quickly to pick up the feel of research in France.

ALISON JOLLY
The Old Brewery House, Southover High Street, Lewes, Sussex, England

A Topic in Virology

Interferon. J. VILČEK. Springer-Verlag, New York, 1969. iv + 142 pp. $10.50. Virology Monographs, vol. 6.

This review of interferon is comprehensive, but not encyclopedic. If it attempted to be the latter, it would represent duplication of effort in a very popular area of literary endeavor.

What should one expect in a work of this type? To be useful, it must be timely; it must be fairly complete; and finally, from a work by a single author one expects readability and balance of judgment, qualities so rarely found in multiauthored compendia.

This book discusses literature published up to 1968. It is at most one year out of date, which is acceptable in a review of this size. It includes the important recent developments, such as the discovery of the double-stranded RNA inducers by the Merck group. It reflects the uncertainty of knowledge regarding the mechanism of action of interferon, about which we thought we knew more in 1966 than we do now. The author still diagrams the Marcus-Salb model in great detail, although there is scant positive evidence to support it. He does not mention the work by H. Levy and his co-workers at the National Institutes of Health showing that synthetic double-stranded RNA inhibits tumor growth in the animal. But this finding is so recent and unevaluated that perhaps it is just as well it has escaped review at this time. One actually does not know whether this effect has anything to do with interferon.

The coverage of the major subjects in the field of interferon is fairly complete. These include the assay, induction and synthesis, purification, and mechanism of action of interferon. There is relatively little on the effect of interferon in man or its prospects as an antiviral agent. These matters are so speculative, however, that the author may have been wise not to spend too much time on them.

On the whole, the mass of data is reviewed in a brief, precise, usually impartial, and yet interesting way. The language flows easily, and the book is at times even entertaining, which is remarkable for literature of this type. The bibliography is in alphabetic order by authors, and full references are given. This is useful for those who wish to have a handy compilation of the literature. There is no subject index, which may be construed as a deficiency. Nor is there an author index, so the innumerable experts in the field will not be able to look up the number of times they have been quoted.

I find this to be a useful book at this particular time for graduate students, teachers, and researchers in virology.

MONTO HO
Department of Epidemiology and Microbiology, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, Pennsylvania

Phylogeny of Some Insects

Evolutionary Trends in Heteroptera. Part 1, Eggs, Architecture of the Shell, Gross Embryology and Eclosion. R. H. COBBEN. Centre for Agricultural Publications and Documentation, Wageningen, The Netherlands, 1968. viii + 476 pp., illus. Dfl. 55. Laboratorium voor Entomologie, Wageningen, Mededeling No. 151. Also published as Agricultural Research Reports, No. 707.

Starting as an intensive investigation of eggs and their development and observations on the egg-laying habits of the shore bugs (Saldidae), the study on which this book is based expanded to include about 350 species "representing almost all families of Heteroptera." The results are presented in a 240-page, family-by-family description of details of the enclosing egg layers and some gross morphology of certain species in each family.

The effort to "trace separately the evolution of each egg-character" (pp. 250–349) of necessity continues the

descriptive approach, but emphasizes comparative description of single egg-characters from group to group. Conclusions are best presented in several phylogenetic trees; these trees in some ways appear too smooth for the data offered, but they do present a challenge against which subsequent findings may be tested.

"A preliminary discussion of the phylogeny of the suborder" (pp. 350–78) anticipating the next two volumes probably should have awaited them. Agreement with Cobben's statement that the student is faced with "a bewildering array of 'higher classification' " comes easy, but the bewilderment is not allayed by a partial review of the literature and comments on scattered structures culminating in a phylogenetic tree (fig. 360) with a series of purposely unnamed and undescribed derived branches presenting the author's "original" idea that "all Heteroptera descended from Amphibicorisae-like ancestors." Unnamed confusion is no less bewildering.

The list of 44 points of "Summary and conclusions" makes a useful guide to enable one to follow the generalizations while reading the wealth of description and examples. The 21 pages of references certainly should have started with the footnote from page 421 which informs the reader that "our list of references should be supplemented by the comprehensive bibliography of Southwood's publication." A brief (18 pp.) summary of the book in Dutch is included.

Some taxonomically significant changes are sandwiched in the discussions. The composition of several supercategories is changed ("Geocorisae" in a taxonomic sense is eliminated); and even a specific synonymy is made (p. 42): "Based on adult characters . . . [*Omania*] *samoensis* is conspecific with *marksae*. . . ." [These species were well separated by Herring and Chapman, *Proc. Ent. Soc. Washington* **69**, 354–59 (1967).]

New meanings for old words with long-established, simple definitions can be misleading in subsequent application. The word "aft" is adopted as an embryological term and defined as referring to the side of the egg "most closely associated with the substrate": this is surely quite unlike the usual English meaning of behind, posteriorly, or caudad, and quite likely will cause confusion.

Cobben says "it may be some time" before the remaining parts of the work are published. One hopes parts 2 and 3 continue to evidence the scholarly attention of the first part and take time to refute rather than ignore the reasoning on which other classifications have been based. There is still the potential trap of building a classification on one or two characters, searching out those facts that support it and simply dismissing those that do not.

RICHARD FROESCHNER
U.S. National Museum,
Washington, D.C.

Hormones: Control and Effects

Frontiers in Neuroendocrinology, 1969. WILLIAM F. GANONG and LUCIANO MARTINI, Eds. Oxford University Press, New York, 1969. xii + 444 pp., illus. $19.50.

Neuroendocrinology is a science which encompasses not only the neural control of endocrine secretion, but also the effects of hormones on behavior and virtually all of the complex interactions between the brain and the internal environment. *Frontiers in Neuroendocrinology, 1969* is one of the few successful attempts to review, summarize, and correlate the findings from all the diverse disciplines comprising the field. It is the first of a biennial series to be published to update a previous two-volume survey (*Neuroendocrinology*, edited by Martini and Ganong; Academic Press, 1966–67) by reviewing areas in which there have been recent advances, innovations, or controversies.

A detailed description of the fine structure of the median eminence, with attention to its phylogenetic organization and the development of function, constitutes an excellent first chapter. Other chapters devoted to the hypothalamus correlate changes in catecholamine concentrations or single and multiunit electrical responses of various regions with endocrine secretion and activity. The effects of isolation of the hypothalamus from the rest of the brain on endocrine function are also reviewed. Interspersed among these hypothalamus-oriented chapters are reviews on the regulation of growth hormone and gonadotropin secretion, fluid volume and vasopressin secretion, and the regulation of renal sodium excretion by the sympathetic nervous system. The apparently random order of these reviews and those on the effects of peptides on behavior, "short" feedback control mechanisms, and the mechanisms of action of releasing factors gives the impression that organization was on a first-received, first-printed basis. But there is clearly something for everyone interested in the field. In some areas the advances have not been recent or dramatic, and one might question their inclusion when such topics as that of the controversial pineal body are omitted.

In several of the reviews the controversial nature of the topic, of the experimentation or of the results or their interpretation, frequently disappears, and one might be led to believe that the issues are more settled than they actually are. Short descriptions of the experiments and results would have eliminated this problem in several instances and would have placed the reader in a better position to form his own conclusions without having to return to the original work. The addition of at least a brief summary on the "long," "classical" feedback mechanism or on control systems in general would have strengthened the description of the "short," "internal" feedback mechanism; in the experiments discussed there were obvious instances when "open-loop" conditions and the absence of adequate feedback existed. The importance of the "short" feedback system must be established in the presence of "long" feedback as well as in its absence.

The word "frontiers" used in the title, meaning unsettled, not fully explored regions, is an appropriate description of the field or territory neuroendocrinology. Some of its frontiers are older and more settled, more carefully mapped, than others. They are, however, still frontiers. If the book offers nothing else, it presents several good reviews of a number of important areas in neuroendocrinology as they exist, mapped but unsettled, at this moment.

JAMES A. MCCLINTOCK
Department of Anatomy,
Duke University,
Durham, North Carolina

Books Received

Abstract Methods in Partial Differential Equations. Robert W. Carroll. Harper and Row, New York, 1969. x + 374 pp. $14.95. Harper's Series in Modern Mathematics.

A.D. Twenty-One Hundred. A Narrative of Space. John Williams Andrews. Illustrated by Arthur Schaffert. Branden, Boston, 1969. 56 pp. $4.25.

(Continued on page 1074)