

# Book Reviews

## Immunity and Survival

**Immunological Surveillance.** MACFARLANE BURNET. Pergamon, New York, 1970. viii, 280 pp., illus. \$7.75.

Conventional wisdom supports the notion that the chief function of the immune system is to combat infection by invading microorganisms. "Immunological surveillance" is a broad hypothesis which proclaims that another important, possibly the primary, function of immune mechanisms is to eliminate aberrant host cells, chiefly those of cancer. Although this hypothesis did not originate with him, Macfarlane Burnet has advanced the concept of immunological surveillance more vigorously than any other immunologist. This book is his most recent and most systematic review of the subject.

Burnet is a theoretical biologist who has a strong, stated dislike for the dominance of molecular biology. He believes that biological processes are so complex that information about them is difficult if not impossible to obtain from a study of molecular reactions. He prefers to deal with broad generalizations related to biological survival and evolution. In immunology, Burnet won wide acclaim with the concepts of clonal selection and tolerance in the face of considerable resistance from immunochemists. In *Immunological Surveillance* he discusses these topics as well as the evolution of the immune response, differentiation, the nature of malignancy, somatic mutation, autoimmune disease, and senescence. Burnet is an artist who paints with a broad stroke, and one can admire the result if one stands far enough away to be able to ignore the details.

Burnet suggests that the immune response evolved in primitive vertebrates as a means of combating parasitism by related species. A parasite that cannot be rejected is like a tumor. He suggests that diversification of histocompatibility antigens arose in order to prevent the rapid transmission of malignant cells.

I cannot see why the prevention of parasitism by related species is a more effective selective force than the pre-

vention of parasitism by microorganisms. A more puzzling question is what selective force led to the substitution of individual survival for a rapid reproductive rate as a means of survival of the species. The culmination of this biological and philosophical trend is the modern woman's demand that she have the right to determine the continuation or termination of her own pregnancy.

One may question whether the immune mechanism evolved to combat malignancy or whether it merely incidentally provided individuals with survival time which makes the development of malignancy possible. Despite all these questions and the lack of strong direct evidence, the concept of immunological surveillance is attractive. There is increasing evidence that most tumors contain unique antigens which make an immune attack by the host at least a theoretical possibility. Some of the tumor-specific antigens appear to be specific for a virus-inducing agent. Burnet provides an ingenious alternative for tumor-specific antigens in tumors not induced by a virus. He proposes that all somatic cells have a degree of diversification of their surface antigens similar to the diversification of antibody-forming potential by immunocytes. The clonal formation of a tumor concentrates minor antigens normally present on a minority of cells and raises their level above the threshold of immunologic detection. Thus tumor-specific antigens are like idiotypic determinants on myeloma proteins or highly homogeneous antibodies.

Whether or not immunological surveillance will be as successful a concept as clonal selection, Burnet has written an interesting, stimulating, and timely book. A detailed knowledge of immunology is not a prerequisite. At this time of concerted national attack on malignancy I cannot recommend any more appropriate introduction to the subject than Burnet's *Immunological Surveillance*.

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## Hormone Chemistry

**Chemical and Biological Aspects of Steroid Conjugation.** SEYMOUR BERNSTEIN and SAMUEL SOLOMON, Eds. Springer-Verlag, New York, 1970. xiv, 530 pp., illus. \$28.

The chemical portions of this book contain a wealth of information, useful and readily reproducible. The various techniques for the formation of glucosiduronide or sulfate conjugates of a steroid are discussed in detail. Techniques for the concentration, separation, and identification of various conjugated steroids are equally well described. There is a good discussion of the indirect methods (enzymic and solvolytic) of determining the nature of the conjugate and the various procedures for the differentiation and separation of the glucosiduronide and sulfate conjugates. Methods of assaying the total conjugated steroids are also discussed, together with their deficiencies.

Practically all the steroids of urine exist in the conjugated form, but some unconjugated steroids exist in other body fluids. A large part of the book consists of a listing of every conjugated steroid that has been demonstrated, indicated, or thought to be indicated from tissue or body fluids untreated or treated in a variety of ways. Little interpretation is given of the significance of the type of conjugate attached to a steroid or of the interconversion between types that occurs in the body. There are many demonstrations that sulfation of the steroid does not interfere with its further metabolism, but there is little evidence to indicate that previous sulfation is indispensable or even a desirable phenomenon, except possibly in pregnancy. Biologically, *in vitro* results frequently do not agree with *in vivo* results, but just as frequently they do not agree with the *in vitro* results obtained by other investigators. Clinical studies, reviewed in this book, have revealed little concerning the relation of conjugation to disease. In the Crigler-Najjar syndrome, a specific disorder associated with a defect of glucuronyl transferase, there is no agreement as to whether the glucosiduronide formulation of the steroid is interfered with. "Etiocolanolone fever" apparently disappears on conjugation of the steroid. The chapter "Biological properties of estrogen conjugates" (by a group from Ayerst, McKenna and Harrison), which might have been titled "Biological

properties of Premarin," is a review of much evidence that is old and some that is new.

As with many multiauthored texts there is little cohesion within the book. A short chapter recounting the historical development of knowledge concerning the facets of steroid conjugation covered in the text would have been helpful.

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## Organ of Speech

**On the Phylogeny and the Ontogeny of the Human Larynx.** A Morphological and Functional Study. J. WIND. Wolters-Noordhoff, Groningen, The Netherlands, 1970. xii, 158 pp., illus. \$15.60.

There is perhaps no better way to appreciate the paucity of detailed morphological and functional information available than to write a book on an individual organ such as the larynx. Fortunately the author of this book is aware of the limitations of both ontogenetic and phylogenetic knowledge. He understands that "many complicated and unsolved problems" remain and that to "suggest probabilities" is all that can be attempted.

The monograph was presented originally as a Ph.D. thesis by the author, who is a laryngological surgeon in the Netherlands. After a preliminary review of evolution and paleontology, he presents the comparative morphology of the larynx, partly on the basis of his own studies, and then proceeds to the phylogeny and ontogeny of the human larynx. The organ is considered concisely in its protective, respiratory, and valvular roles.

Because "[rational] language is the most diagnostic single trait of man," speech is discussed at some length, and the numerous factors that, in the author's opinion, may have contributed to its origin are included, although the author readily admits that "no satisfactory explanation of speech emergence has yet been given."

Ontogeny occupies a relatively small portion of the book. This is due partly to the author's predilection for phylogenetic speculation but also to the neglect of the human larynx in developmental studies (the latest important investigation is half a century old). Observations based on a closely graded

series of embryos are not available in the human or, a fortiori, in most other species. The author's personal contribution here is based largely on reconstructions of one fetal and two embryonic larynges in the human. Long overdue emphasis on the patent weaknesses of "Haeckelian recapitulation" occurs throughout the work.

It would not be unreasonable to maintain that it is premature to write a book on the ontogeny and even more so on the phylogeny of the larynx. However, if a brief statement of present-day viewpoints, in many instances quite speculative in character, is desired, then the volume under discussion provides an attractive introduction to the subject.

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## Genomes and Cells

**Control Mechanisms in the Expression of Cellular Phenotypes.** Proceedings of a symposium, Buffalo, N.Y. HELEN A. PADYKULA, Ed. Academic Press, New York, 1971. x, 286 pp., illus. \$16. Symposia of the International Society for Cell Biology, vol. 9.

As Morgan Harris states in the foreword, this symposium was designed to bring together investigators from a variety of disciplines each of whom is approaching from his own special direction the common problem of phenotypic expression at the cellular level. The manner in which the genome is expressed in a cell and how that expression is influenced by the preexisting organization of the cell and by alterations in its environment are broad problems of fundamental concern to the cell biologist. The 13 articles in this volume are restricted to eukaryotic cells and, with one or two exceptions, to cells in culture. The symposium includes articles on the inheritance of cortical organization in ciliates (Sonneborn), gene expression in allophenic mice (Mintz), phenotypic expression and its loss in cells from the chicken embryo (Holtzer; Whittaker), the phenotypic capabilities of plant cells and tissues in culture (Hildebrandt; Halperin; Braun and Meins), the stability of cell function in mammalian cell lines (Augusti-Tocco, Sato, Claude, and Potter; Yagi), and biochemical genetics and the regulation of enzyme

levels in mammalian cells in culture (Krooth; Puck; Siniscalco; Ruddle). Conceptually similar approaches in a number of organisms are conspicuous by their absence; work on the algae, the slime molds, and the developmental genetics of insects, particularly *Drosophila*, is not represented.

There is no obvious organizational theme running through the volume. Papers are clustered to some extent—for example, the plant cell papers are grouped together, as are those on cell fusion and on chicken embryo cells—but few of the authors make any serious attempt at unification. Halperin deserves special note in this regard since, in his paper on embryos from somatic plant cells, he very successfully draws on a number of concepts from embryology and suggests relevant correlations with some observations from the ciliated protozoa. It is unfortunate that open discussions that followed the presentations are not included in the volume, for the reader is left unable to judge whether the symposium was successful in promoting an exchange of ideas among investigators of diverse interests.

Most of the articles are substantial contributions in their own right, however, and those by Halperin, Siniscalco, and Ruddle are outstanding. Halperin describes his studies on the developmental potentials of somatic plant cells in the broad framework of developmental biology and considers very systematically the conditions under which such potentials can be expressed. The article by Siniscalco on hybridization of diploid human cell lines is superb not only in its lucid description of results to date, but also in its careful delineation of promising future approaches to the study of human biochemical genetics. Ruddle's paper on mouse-human hybrid lines is an excellent description of an approach likely to be of enormous significance to gene linkage studies in man. Both of these articles on cell fusion, and Puck's article as well, are focused on genetic studies, not on the control of phenotypic expression. Nonetheless, it is clear that the general approach is as adaptable to studies of phenotypic expression as it is to genetics.

On the whole, this book is a collection of stimulating, timely, and well-written articles.

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