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 prevention 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. "Etiocholanolone 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