Interleukin 2 After a Decade

Interleukin 2. KENDALL A. SMITH, Ed. Academic Press, San Diego, CA, 1988. xxii, 311 pp., illus. $69.

A short ten years or so after the discovery of interleukin 2 (IL-2), a 311-page book on this one protein is an eloquent testament to how much has been learned and how exciting the prospects are. Non-immunologists who are alternately bemused and annoyed by the interleukin explosion may not feel that any one lymphokine deserves a book. But for those of us who feel increasingly oppressed by information overload, such a compendium of information can be a valuable resource.

IL-2 can claim many "firsts" among cytokines. It was the first lymphocyte growth factor to be identified, one of the first two (with IL-1) whose protein and DNA sequences were defined, and the first whose cellular receptor was identified.

The importance of IL-2 is firmly established. As the major autocrine growth factor for T lymphocytes in all species, it plays a central role in all T cell–dependent immune responses. The use of IL-2 to grow cloned T cells indefinitely in culture has allowed remarkable progress in our understanding of the specificities, functions, and receptors of these lymphocytes. The biology of IL-2 serves as the paradigm for immunologically active cytokines, and studies of other interleukins have followed approaches first applied to IL-2. More recently, IL-2 has moved into clinical practice as the mainstay of attempts to treat advanced cancers with tumoricidal lymphocytes.

This book is an attempt to survey the most important facts about IL-2 and to highlight the questions that remain to be resolved. The editor, Kendall Smith, is a pioneer in IL-2 work whose laboratory has contributed much to the elucidation of the structure and function of IL-2. The 12 chapters vary greatly in style, often according to the theme being discussed. For instance, Smith's introductory section is very much a personal view of the advances in IL-2 research, with a justifiable emphasis on the part played by his own laboratory. In contrast, chapters by Kat and Ciardelli *et al.* on the biochemical characteristics and genes for IL-2 are compendia of structural information.

The major deficiencies of the book are predictably most apparent when authors delve into subjects that are incompletely understood and are being actively investigated at present. For instance, Imboden and Weiss discuss the mechanisms by which antigenic stimulation of T cells leads to IL-2 production, but the link between antigen receptor-mediated stimulation and lymphokine gene transcription is not entirely clear at present. Perhaps the most interesting recent advances in the identification of transcriptional regulatory elements in the IL-2 gene locus and the responses of these elements to T cell stimulation have been reported since this chapter was written (see G. R. Crabtree, *Science* **243**, 355–61 [1989]). Chapters on transmembrane signaling by IL-2 and IL-2–induced gene expression in T cells are unsatisfying, because not much is known about the mechanisms of action of IL-2 (or other cytokines). As a result, attempts to review these areas lead to restatements of obvious problems and little consensus on a central message.

The last four chapters deal with clinically relevant issues and illustrate why IL-2 is the example par excellence of the link between immunological research and clinical medicine. However, these chapters also lack thorough discussions of the most recent advances. For instance, hybrid IL-2–diphtheria toxin proteins are mentioned only briefly, and the current status of tumor immunotherapy is not critically reviewed.

In summary, some chapters provide a valuable perspective and others seem inadequate or outdated. Nevertheless, an attempt to collect in one volume the laboratory and clinical results, established facts, and future research directions concerning one immunologically active cytokine is of some benefit, especially for non-specialists who wish to survey an exciting topic with a modest investment of time and effort.

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Double Stars

Critical Observations versus Physical Models for Close Binary Systems. KAM-CHING LEUNG, Ed. Gordon and Breach, New York, 1988. xvi, 472 pp., illus. $95. From a colloquium, Beijing, China, Nov. 1985.

A binary star system can be thought of as "close" if the evolution of either member is altered by the proximity of the other. This interaction generally begins during a phase of a star's lifetime during which it expands drastically, for instance after it leaves the hydrogen-burning main sequence to become a red giant. For typical stars containing 1 to 10 solar masses of material, "close" roughly translates to orbital periods of less than a thousand days or separations of less than a few hundred solar radii between the two components. Since a large fraction of stars are in fact members of binary or higher-multiplicity systems, and since many binaries are close by the definition given above, we can expect that binary star interactions have affected many of the stars that we study.

At the same time as binary star interactions distort what we may think of as "normal" single-star evolution, they give us the opportunity to examine physical processes occurring inside stars that otherwise are unobservable. The synchronization of orbital and rotational periods through tidal dissipation, for example, obviously is not something that can be studied in isolated stars, yet empirical determination of the time scale for synchronization allows us to test our understanding of the structure of stellar envelopes and the efficiency of damping processes in them. The transfer of material from the surface of one star to its companion reveals successive layers of the star's interior, which in advanced stages of its life contain the products of nucleosynthetic reactions that occurred deep inside it.

This book on close binary systems is the result of the first in a series of joint meetings intended to establish closer ties between the Chinese astronomical community and the West. Eleven invited talks constitute slightly more than half its length. The remainder is shared among 30 contributed papers. There is a brief, incomplete index of topics and object names; there is no record of discussion after the talks. With respect to content the papers fall into three main categories. The largest set is concerned with the correct interpretation of observations, for example how well the models we fit to photometric time series conform to reality. The second set deals with our understanding of how membership in a binary system alters the evolution of a star, and the third and smallest set illustrates how studies of binary stars enhance our understanding of processes in all stars. Many of the shorter contributed papers report results of observations or modeling of specific binary systems, many of which have appeared in print elsewhere since the conference was held. The nonspecialist will gain most from the invited papers, many of which are in the nature of reviews.

I found two papers especially interesting. In his discussion of an observational approach to close binary evolution, Leung emphasizes that we have not yet identified all the phases in the mass-transfer history of a close binary star but that new types of systems continue to be found that may be the "missing links." For example, a class of stars called "reverse Algols" may represent the phase of evolution just prior to the rapid