postulate a growth curve for *Euphausia superba*. The population dynamics of this animal that may someday feed the world is so poorly understood that we do not know if it lives two years or maybe four. Obvious difficulties await those who would apply conventional fishery calculations to estimate maximum sustainable yield. Mauchline, employing regressions he developed earlier to express growth rates of other crustaceans, estimates that the life cycle may be two, three, or four years, depending on environmental temperatures and feeding conditions. It's a nice bit of speculation.

In general, this book, paired with its 1969 counterpart, will be indispensable to those newly interested in the biology of euphausiids, and the smaller group engrossed in the biology of mysids will be pleased that their animals have at last received the attention of a review.

CARL M. BOYD
Department of Oceanography
Dalhousie University, Halifax,
Nova Scotia B3H 4J1, Canada

The Solar-Stellar Connection

Solar Phenomena in Stars and Stellar Systems. Proceedings of an institute, Bonas, France, Aug. 1980. ROGER M. BONNET and ANDREA K. DUPREE, Eds. Reidel, Boston, 1981 (distributor, Kluwer Boston, Hingham, Mass.). x, 592 pp., illus. $69.50. NATO Advanced Study Institutes Series C, vol. 68.

Within the last decade solar physicists and stellar astronomers have rediscovered that the sun is a star. Early in this century, astronomers often used the sun as a benchmark against which to compare their crude stellar observations, but after they had reached the limits of their technology and exhausted the possibilities of comparison with the sun and its spectrum our star was relegated to an occasional appearance as a dot in a published color-magnitude diagram. Meanwhile, solar physicists busied themselves with studies of minute photospheric and chromospheric features and research into the appearance and nature of the solar cycle—matters that were clearly of no interest to those who did their observing after sunset.

All that has changed now. This thick volume is the proceedings of a meeting on the subject of the many connections that now exist between solar and stellar research. The papers are divided into three sections, on solar and stellar variability; chromospheres, coronas and convective phenomena; and solar and stellar interiors. It is clear that in all three of these areas the reason for the sudden burst of research activity is that there have been various improvements in the technological level of astronomical instrumentation in recent years.

The book begins with an overview by R. W. Noyes, which lays a solid foundation for all the contributions that follow. Solar and stellar interiors are treated in two review papers, one theoretical and the other observational. The observational paper, by E. Fossat, is a clear presentation of the fundamentals of solar and stellar oscillations and their detection. Already work on these oscillations is beginning to tell us something about the interior dynamics of the sun, and there is hope that before long, by means of seismic-type probing, we will be able to learn a great deal about the interior structure and dynamics of the sun and other stars. This is one of the most exciting developments in astronomy in many years.

The recent interest in stellar chromospheres and coronas has been generated by recent satellite observations of ultraviolet and x-ray radiation from stars. Solar observers have had such data for many years from satellites. The importance of the magnetic fields for the existence and the heating of these outer regions of the stars and the sun is now quite evident, although the exact mechanism for the heating of the corona still eludes us. In a comprehensive review, J. L. Linsky outlines the nature of stellar chromospheres and coronas and their distribution in the Hertzsprung-Russell diagram and lists the important stellar parameters that determine their properties.

The section on solar and stellar variability is highlighted by a thorough review of the topic by A. Skumanich and J. A. Eddy. It is now well established that many stars go through "activity cycles" that are apparently identical to that of the sun. The periods of these cycles are not far from the 11-year period of the solar cycle. This was first shown in the work of O. C. Wilson, which covered a period of many years. The activity level of stars is judged from the amount of emission in the cores of the H and K lines of ionized calcium, which are formed in the chromosphere.

The volume will make a good reference book for students and scientists. Of course in a rapidly advancing field a volume such as this becomes outdated quickly, and it is true that a greal deal has happened since the meeting (especially in solar and stellar activity). Nevertheless the papers are, to a large extent, solid reviews of the fundamental aspects of the field, so the book reads more like a textbook than a symposium proceedings.

In his concluding remarks, E. N. Parker, who always chooses his words carefully, states, "This has been about the most rewarding meeting I have ever had the pleasure of attending." The assiduous reader will share this enthusiasm.

ROBERT HOWARD
Mount Wilson and *Las Campanas Observatories, Carnegie Institution of Washington, Pasadena, California 91101*

Microbial Adhesion to Surfaces

Bacterial Adherence. E. H. BEACHEY, Ed. Chapman and Hall, London, 1980 (U.S. distributor, Methuen, New York). xii, 466 pp., illus. $69.95. Receptors and Recognition, Series B, vol. 6.

The number of recent books dealing with microbial adherence attests to the widespread interest in the subject. The present book concentrates on the adherence of bacteria to animal tissues, although there is a paper by Fletcher on adherence of marine microorganisms to smooth surfaces and one by Lippincott and Lippincott on microbial adherence in plants.

The idea that bacteria accumulate on solid surfaces because the highest concentrations of nutrients are found there is well accepted in marine microbiology and in oral microbiology, though it has received less attention in recent years. The use, initiated by marine microbiologists, of quantitative methods in the study of adherence has been exploited by oral microbiologists, as Gibbons and van Houte discuss. The application of quantitative methods has been instrumental in the development of the idea that adherence is often a specific process. This idea recurs in a number of guises throughout the book. The best-documented examples of specificity are those involving the nitrogen-fixing bacteria and plant pathogens, which are described by Lippincott and Lippincott. Extensive documentation of specificity in these organisms has been possible because the stability of the components involved allows the use of extraction techniques that would denature components involved in animal model systems. In addition, of course, plant cells can be grown and manipulated more easily than those of animals. The relationship between fimbriae (pili?) and epithelium in