voted to decompression is normally a small fraction of the time invested in useful work, a desirable reversal of the usual experience in deep excursion diving. Many of the practical and biomedical problems encountered in saturation diving are described here. There is sufficient information available to indicate that the maximum depth of the continental shelf (approximately 360 meters) is within the physiologic capability of men provided with adequate life-support measures. While scientific curiosity and a need to develop an adequate rescue capability will undoubtedly provide a continued strong stimulus to further investigation of saturation diving, practical application of these concepts in commercial diving will await a clear demonstration that benefits derived exceed the considerable costs of these undertakings.

Another imaginative approach to minimizing or eliminating the problems associated with decompression is liquid breathing. No inert gas is absorbed or released by tissues, since the liquid vehicle is essentially incompressible. The current limitations of liquid breathing for man, such as inadequate ventilation, are described clearly, as are a variety of related approaches to respiration during immersion, including the use of artificial gills.

The chapters reviewing the biomedical effects of increased atmospheric pressures offer adequate presentations of current knowledge. The limitations of our understanding are evident as well. For example, the ingenious experimental studies of biologic responses to increased hydrostatic pressures in small animals do not adequately predict the effects upon man or reveal the significant mechanisms of hydrostatic intolerance. An excellent account is given of the respiratory changes associated with increased atmospheric pressures. Included are perceptive discussions of ventilatory adequacy during work and the effects of hyperbaric environments upon gas exchange. The review of oxygen toxicity is a reasonably comprehensive account of the known clinical and experimental manifestations. As is true for other subjects reviewed in this text, the basic intracellular mechanisms remain obscure. The book also contains two interesting chapters devoted to the narcotic effects of respirable gases.

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Biological Problems at the Clinical Level

Experience in Hepatic Transplantation. THOMAS E. STARZL. With the assistance of Charles W. Putnam. Saunders, Philadelphia, 1969. xxii + 554 pp., illus. $37.50.

This volume reports an experience of 29 liver transplants in human beings. Four of the transplanted livers were placed as accessory organs to the patients' own diseased livers. The longest survival at the time of publication of this report was 431 days after transplantation. Starzl, Putnam, and several other individuals who contribute chapters have given a full early account of their unique experience with this demanding exercise. Consummate skill is required at every stage from the selection of the patient through the major operative procedure to the morass of the postoperative period, where a maze of differential diagnostic possibilities exists. When a patient is surviving by virtue of a liver from a deceased donor, dysfunction of the transplanted organ may be from many causes. Infection, vascular insufficiency, sometimes due to a special situation involving kinking of the right hepatic artery, and poor function because of ischemic effects during the final hours of residence of the organ in its original donor or even because of toxic effects of the immunosuppressive drugs employed to protect it from rejection must be differentiated. Rejection, however, remains the principal danger.

These various problems are fully discussed in the light of evidence drawn both from animal experiments and from the wealth of observations made of the patients in this series. It is made very clear that the liver must be in optimum physiological condition to avoid catastrophic problems with blood coagulation deficits as well as other consequences of hepatic dysfunction. The sequence of pathological changes during the course of rejection in transplanted livers is generally quite similar to that seen in other organ transplants. The appearance of inspissated bile in the small canaliculi is described as a frequent occurrence. It has been stated that the liver may elicit rejection somewhat less than other organs; and this has been true in the case of some experimental transplants among certain pigs. Nevertheless, the clinical experience shows full well that rejection occurs only too readily in man, although it may be somewhat less virulent where the liver is concerned.

This volume is attractively produced, profusely illustrated with figures of high quality, and set out in a clear and well-organized fashion. The course of each patient is exhaustively described in somewhat anecdotal style. The fact that each patient is taken up again in succeeding chapters from the special points of view of the different authors is probably an unavoidable inconvenience. Although this work will obviously be indispensable reading for those concerned with clinical transplantation and certainly will stand as the definitive work on this subject for some time, it may not appear that it is for the general medical reader or for most biological scientists. Nevertheless, the fascination of the biological problems faced at a clinical level and the importance of the lessons it contains for management of the severely ill should earn it a wide readership.

This is an exploration in modern acute medicine at its extreme, drawing upon the new riches being produced by research in immunology and other fields. It is appropriate, as well as fashionable, these days to ask, Is it worth it? The answer is a resounding yes. Beneficial results have already been achieved for some patients, and there is promise of more to come for others. Perhaps more significant is the demonstration of the necessity for extensive interdisciplinary teamwork, which is a fairly new phenomenon in clinical investigation. Starzl and his colleagues deserve congratulations for their energy, persistence, thoroughness, and optimism.

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One-Dimensional Systems

Spectral Properties of Disordered Chains and Lattices. J. HORI. Pergamon, New York, 1968. xii + 232 pp., illus. $10. International Series of Monographs in Natural Philosophy, vol. 16.

Despite the unphysical nature of one-dimensional crystals, the study of the vibrational and electronic properties of disordered linear chains continues to attract the attention of solid state theorists. That this is so is due to the fact that the topological simplicity of one-dimensional systems, in comparison