

The book is confined almost entirely to radiations of medium wave-length, from ultra-violet to infra-red, and thus omits the important but very different effects of X-rays, and those of the relatively long-wave electromagnetic radiations of which the biological application has only begun in the last few years. However, the field covered is quite wide enough for one volume. A chapter on the physics and measurement of the radiation concerned is followed by chapters on the effects on the skin, on wounds, on the eye, and on the circulatory system. The effects of radiation on metabolism are given 224 pages of discussion, which include a detailed account of the work leading to the preparation and isolation of vitamin D. Later chapters include an account of the striking phenomena of photodynamic sensitisation, and of a study of the results of heliotherapy in tuberculosis. The book ends with a useful bibliography of about 900 references.

The reader is left with a feeling of disappointment that in spite of so much study, so few conclusions can be drawn with any certainty. As the author says in an admirable preface, "Many readers will be annoyed at the inconclusiveness of some of the statements". This is so true that one wishes that the author had added to each section a summary showing what conclusions could be drawn with safety from the rather confusing mass of data presented to the reader. Such summaries, if made with the sound judgment shown in the preface and introduction, would have added much to the value of the book.

Much of the uncertainty is due to the exceptional difficulties met by research workers in this subject. Physicists, who are accustomed to have some control of the major variables concerned in their experiments, might well be appalled at the difficulties met with in studying such a problem as 'the therapeutic effects of ultra-violet light'. In this work, almost the only major variables that can be controlled accurately are the time of exposure to radiation and the sex of the persons receiving it. A host of other variables escape control to a greater or less extent, such as the source of radiation, the degree of disease in different patients, the blood supply to the skin, the diet, and even the regularity of attendance at the clinic. All these may form serious sources of error, and it is because of such difficulties that the author can sadly remark, "The real mode of action of radiant energy and its component parts is still unknown".

### Modern Research in Astronomy

*The Universe Around Us.* By Sir James Jeans. Third edition, revised and enlarged. Pp. x+380+30 plates. (Cambridge: At the University Press, 1933.) 12s. 6d. net.

THE three years which have elapsed since the publication of the second edition of this book have been fruitful in discovery in both physics and astronomy. To the two fundamental units of which matter was believed to be composed, the proton and the electron, have been added the neutron and the positron. The exclusion principle has assumed great prominence and many investigations have been concerned with the properties and nature of the highly penetrating or cosmic radiation. Much attention has been given to the theory of the expansion of the universe and to the question whether the observed rate of expansion, indicating a relatively short time-scale for the age of the universe, can be reconciled with the much longer time-scale which many lines of evidence point to for the evolution of the stars; or whether, on the other hand, previous conceptions must be abandoned and the short time-scale adopted for the stars also.

These new problems are all dealt with in the third edition of Sir James Jeans's well-known book, which has been at the same time thoroughly revised. The arguments for and against both the short and long time-scales of stellar evolution are discussed in some detail. Sir James favours the long time-scale; this time-scale can be harmonised with the observed data as to the velocities of recession of the spiral nebulae if, as de Sitter has shown, the universe is supposed to be either in a state of pulsation or to have undergone in the past a single contraction from an expanded state, followed by the expansion which is now in progress.

The new material makes the present edition substantially longer than the previous editions. The book retains its place as the best account available, in simple language, of the results of modern astronomical research and of their interpretation. The book is so free from mis-statements that attention must be directed to the statement on p. 277, repeated again on p. 290, that Nova Aquilæ when at its brightest had an effective temperature of 65,000°. It was only in the later stages of its outburst, long after maximum brightness had passed, that Nova Aquilæ or any nova attained temperatures of this magnitude.