

fact, in many respects the best of all those dealing with the subject. The first 124 pages deal with the analysis of pigments, white, red, blue, yellow and brown, green and black; then follow two chapters dealing respectively with the analysis of mixed paints and with the examination of varnishes. Three appendices dealing with (a) specimen analyses, (b) a method for the determination of tung oil in paints and varnishes, and (c) distempers, together with index of subjects and index of names, complete the work.

Each subject is treated in a comprehensive manner and the methods given or recommended are those which the authors, in the course of their large and varied experience, have found to be trustworthy. They are especially useful in the case of some of the rarer pigments, which are so frequently in analytical works either ignored or dismissed by a reference to "the usual methods of analysis" that, when applied, are so often found to fail. Full analytical details are always given, a course which should always be followed in analytical methods of this description. A large number of references appear at the end of each chapter, enabling any analyst who wishes to do so to consult the original papers. It is gratifying to note that the authors have made use of the specifications of the British Engineering Standards Association, to the committees of which they have given so much valuable advice. In view of the tendency to give viscosities in C.G.S. units, the authors have rightly included instructions as to how this can be done (pp. 144-150), and it is to be hoped that with this lucid description now available, those concerned with the examination of varnishes will record the viscosities of the varnishes in C.G.S. units and not, as has been so frequently the case in the past, in arbitrary units which mean little or nothing to any one other than the observer. The only small criticism we have to offer is that the symbol ρH might have been briefly explained (p. 163), as we know from experience that there are still a number of paint and varnish 'chemists' who are not conversant with its real meaning.

In conclusion, we have no hesitation in saying that this book should be in the possession of every pigment, paint, or varnish works' laboratory.

G. R.

Constitution et évolution de l'univers. Par A. Verronet. (Encyclopédie scientifique: Bibliothèque d'astronomie et de physique céleste.) Pp. 475. (Paris: Gaston Doim et Cie, 1927.) 28 francs.

In the larger problems of astronomy it is not to be expected, or indeed to be desired, that there should be universal agreement. The subject of this book, as indicated by the title, is the ultimate problem of all astronomical and physical research, and a final pronouncement at the present time is obviously out of the question. Cosmogony, in fact, has only just emerged from the field of unalloyed speculation, and the tentative hypotheses which can now be put forward are more of the nature of convenient summaries of known facts and indica-

tions of new directions of observation than aspirants to the dignity of absolute truth. In the volume before us, M. Verronet, following lines of thought previously laid out by Henri Poincaré, considers the problem of the past, present, and future constitution of the individual bodies in the universe and of the universe as a whole. He reaches some very definite conclusions, which differ considerably from the more familiar views which we associate chiefly with the names of Eddington, Jeans, and Russell. For example, he maintains that the interior of a star is homogeneous, and has a sensibly uniform temperature about double or triple the surface temperature. Needless to say, he rejects Eddington's theory of radiative equilibrium, which he regards as being mathematically impossible. The age of the sun is placed at a few million years, and the past history of the universe is held to be almost negligible in duration compared with the future. These views are sufficiently unfamiliar to attract attention, and since M. Verronet gives reasons for the conclusions at which he has arrived, his work demands respectful consideration. It will doubtless not meet with general acceptance, but may nevertheless have some part to play in the advancement of knowledge.

Cours de physique à l'usage des élèves de l'enseignement supérieur et des ingénieurs. Par Prof. Jean Becquerel. Tome 2: *Élasticité. Acoustique.* Pp. ii+427. (Paris: J. Hermann, 1926.) 6s.

THE second volume of Prof. Becquerel's treatise on physics contains sections on elasticity and sound, the former subject occupying about one-quarter of the available space. The first chapter deals with the physical study of elasticity and the determination of the elastic constants; the second treats of the mathematical theory of elasticity. On the experimental side particular attention is given to the researches of Wertheim and of Amagat; on the theoretical side the aim has been to emphasise only essential questions and to derive the formulæ necessary for the propagation of waves in a homogeneous, isotropic medium. This discussion paves the way for the treatment of wave propagation in the next chapter, which deserves special mention for lucidity of treatment. In fact, throughout the volume the author gives an exceptionally clear exposition of what may be termed the classical theory of acoustics. Stress is laid for the most part on the mathematical rather than on the experimental aspects of the subject, but there is a valuable chapter dealing with the applications of acoustics in music which is unusually complete for a book of this character.

On account of the greater novelty of the subject matter and of the methods employed, the last three chapters in the book are, perhaps, the most interesting. The first of these deals with noises heard in the air, underground, and under water; instruments are described, many of them devised for use by the French army during the War, for determining the direction of the source of sound, and the subject of range-finding is given a chapter