Those aspects of the chemistry and metallurgy of the early members of the series which are important to the technology of nuclear power are pointed out; the main purpose, however, is to give a scientific account rather than technical data. The position of these elements in the Periodic Table is discussed at length in the valuable summary chapter. The trivalent state is the characteristic valency of all elements beyond plutonium, and the relatively stable tetravalent state of berkelium is readily explained if the (5*f*) shell is half-filled at curium (No. 96), as is strongly supported by spectroscopic and magnetic evidence. It is only logical to group all the elements in a series starting with actinium, though thorium and protoactinium, the earliest two members, show few of the expected properties of a (5*f*) series. Similarities and differences between the lanthanide and actinide series are treated fully. The chief difference is the stability of the higher oxidation states of the earlier actinide elements, which leads to a far more complex chemistry, both in the solid state and in solution; a feature of the book is the detailed account of the solution chemistry of uranium and plutonium. The availability of the different isotopes and the difficulties caused by the intense α-activity of many of them are discussed.

This book will be primarily useful to research workers in this and allied fields of chemistry; it is good to know that the authors intend to keep the work up to date in later editions. It will come to be regarded as the standard text in this subject, and it can be recommended to all advanced students of inorganic chemistry. The printing is good and the price is not excessive. L. E. J. Roberts

MAMMALIAN DEVELOPMENT

Parthenogenesis and Polyploidy in Mammalian Development

By R. A. Beatty. (Cambridge Monographs in Experimental Biology, No. 7.) Pp. xii + 132 + 2 plates. (Cambridge: At the University Press, 1957.) 15*s*. net.

ON his own, and in collaboration with Dr. M. Fischberg, Dr. R. A. Beatty has published numerous papers relating chromosome number and developmental possibilities in the initial phases of embryogenesis. These researches have led him to examine the problem of parthenogenesis which, as we know, is closely linked to that of polyploidy.

Dr. Beatty reviews the present state of knowledge in a short monograph that aims at comprehensiveness, but the brevity of which is a tribute to the author's successful efforts in condensing a considerable body of knowledge into little more than 100 pages. He has worked principally on mammals; in his book, therefore, they take first place. But the author bases his exposition throughout on observations and experimental findings obtained in other zoological groups, particularly the Amphibia. This excellent method has the advantage of displaying the particular case of mammals with a more general context.

After an introductory chapter in which the various techniques in use are set out and discussed, the author examines sixteen possible 'routes' along which an oocyte or an egg can develop. Eight of them are apomictic, which means that they do not require the presence of a spermatozoon; we are concerned here with various types of parthenogenesis—haploid, diploid, tetraploid or octaploid. These four principal categories can be subdivided according to the cytological behaviour of the oocyte; for example, development would be diploid for a diploid oocyte that had emitted only a single polar body, and equally diploid for an originally tetraploid oocyte that had emitted two polar bodies, thus reducing it from the number $4n$ to the number $2n$. Having established this classification, the author goes through the various zoological groups in which one or other of the developmental types exists, and he examines the experimental production of each type. In mammals, it is thermal shock that has given the best results.

Next comes an analysis of eight amphimictic routes in which the initiation of development is associated with the presence of a spermatozoon. According to whether the oocyte is haploid (as in a normal fertilization) or not, the egg will be diploid, triploid, tetraploid, hexaploid or decaploid. It is interesting to note that embryogenesis can still occur in embryos the nucleoplasmic relationships of which have been profoundly modified.

Each of these combinations involves some general genetic consequences. Furthermore, sex, which can as we know depend on an equilibrium between the autosomes and the sex chromosomes, is a function of the chromosomal constitution of the embryo. Here again, Dr. Beatty presents a very clear and practical systematization of the various eventualities.

The problems relating to polyploidy in mammals are of great interest. In the mouse (Beatty and Fischberg) and in the rat (Austin and Braden), a thermal shock (45° C.) inhibits the emission of the second polar body and, when the egg has been fertilized, triploidy in the embryo is the result. Häggqvist and Bane, using colchicine, attempted to obtain adult triploid rabbits. But it must be admitted in this latter case that the cytological assessment carried out by Melander did not allow of any formal conclusions. With the pig, in which the Swedish authors claim the production of a triploid individual, the cytological analysis did not furnish a proof. While it is certain that triploid embryos of the mouse have been obtained in abundance by Beatty and others, it does not yet seem to be proved that the development of a triploid mammal can continue up to birth, let alone to adulthood.

Has polyploidy played a part in the chromosomal evolution of mammals? Several authors, particularly Darlington and Gates, answer this question in the affirmative. In the palæarctic Cricetinae, there exist species with 22 chromosomes and species with 44. Struck by this simple numerical relationship, Darlington has postulated that *Mesocricetus* ($2n = 44$) arose from an interspecific cross between *Cricetus* and *Cricetulus*, each with 22 chromosomes, with a polyploidization superimposed. Beatty, like White and Matthey, considers this hypothesis indefensible. I might add here, that to the numerous arguments which have been advanced against the hypothesis, I can now add another; there are Cricetinae with 20 chromosomes (*Cricetulus barabensis*), with 26 (*Allocricetulus*) and with 28 (*Phodopus*). This emphasizes that it is a simple coincidence that the two species which happened to have been studied first should have displayed a simple reciprocal relationship in their chromosome number.

The presentation and the choice of material in this monograph are excellent. The book is written in a style that is both direct and precise; it manifests the talent of its author who, from a critical and most searching analysis, has succeeded in creating a noteworthy synthesis. Robert Matthey