rest-energy m_0c^2 . The energy-defect (as it were) corresponds, in the author's opinion, to what in Newton's theory appeared as the negative potential energy of gravitating matter. Again, the entire lot of sub-threshold particles or levels supersede the cumbersome lot which in Dirac's famous 'hole'-theory of the positron appeared as an infinite continuous sequence of ordinarily occupied levels of negative energy; and there is the great advantage over the latter that (1) the sub-threshold levels form a discontinuous lot, as particles ought to, (2) they are numerous (of the order of 10⁷⁹) but not infinite in number, (3) they constitute the bulk of the material of the world, whereas Dirac's lot were mere dummies, place-keepers, doomed otherwise to inactivity.

I have to refrain from following up many other ideas, however interesting they may be. I should be astonished if they proved all tenable in the form given, and so would Sir Arthur be, I believe. We have here before us a sketch of unusual grandeur, of which not the details alone need further development and, maybe, much modification. I am convinced that, for a long time to come, the most important research in physical theory will follow closely the lines of thought inaugurated by Sir Arthur Eddington.

E. Schrödinger.

The European Snake Venoms

Die europäischen und mediterranen Ottern und ihre Gifte:

Grundlagen zur Darstellung eines wirksamen Schlangenserums. Von Prof. Dr. Richard Bieling, Dr. Albert Demnitz, Dr. Otto Schaumann, Prof. Dr. Hans Schlossberger, Dr. Waldemar v. Schuckmann, Dr. Ernst Schwarz. (Behringwerk-Mitteilungen, begründet von E. v. Behring, Heft 7.) Pp. x + 362 (35 plates.) (Marburg-Lahn: Selbstverlag der Behringwerke, 1936.) n.p.

THE idea for this work originated with Dr. Richard Bieling, head of the Serological Department of the German Dye Trust at the Behring Works, Marburg, and it is due to this organization and its financial assistance that it has been possible to carry it through. The work was commenced in 1931 in an endeavour to find a better and more reliable antivenine for the European vipers in general.

The volume is divided into five parts, and each one is provided with a complete bibliography of its own.

Part 1, by Dr. Schlossberger, is an excellent and careful review of the history of snake venoms in general, and of the methods adopted through the ages for combating it. Part 2 discusses the pharmacology and chemistry of snake venoms and snake sera, and reviews the different groups, hæmolytic, etc., neurotoxic, into which the snake venoms can be divided. Part 3, by Dr. von Schuckmann, deals with the ecology of the European vipers, the methods of keeping and transporting them, a brief account of the venom apparatus, the moulting processes, hibernation, the treatment of disease, and finally the technique of extracting and preparing the venom for use in the making of antivenine. Part 4, by Drs. Schlossberger, Bieling and Demnitz, discusses the

question of antivenine in general and the manufacture of an antivenine for the European vipers in particular. This is the most important part of the book, and it contains much information that is both new and interesting.

The venoms of all the common species of European vipers were examined and their actions observed by experiments on mice. It was found that, not only did the venom of each species and subspecies differ as regards its properties and action, but also that the venom of the same species might vary when taken from specimens obtained in different localities. As was to be expected, the venoms of the majority of the European vipers were hæmolytic and coagulent in their action, but V. berus bosniensis and, to a lesser extent, V. a. ammodytes and V. u. ursinii differed in having high neurotoxic properties.

In addition, the antivenines marketed by the different institutions throughout the world were obtained, and their efficacy tested against the venoms of the well-known poisonous snakes, both colubrine and viperine. The results obtained from all the experiments are graphically summed up in a series of charts.

Dr. Schwarz concludes the work with a review of the systematic position of the European members of the genus. Four species are recognized, each with their several subspecies. They fall naturally into two groups, V. berus, V. ammodytes, and V. ursini, the true European species, in one section, V. lebetina, an entrant into Europe from Asia, in the other. Their evolution is discussed, the distribution of each form is given and is shown on a large-scale map, and the means by which dispersal was effected is suggested. This part of the work is lavishly illustrated with plates. Each form is figured at least once, and the colour-plates are excellent. M. A. S.