Geology of Malaya

The Geology of Malaya. By J. B. Scrivenor. Published with the Authority of the Federated Malay States Government. Pp. xx + 217. (London: Macmillan and Co., Ltd., 1931.) 16*s.* net.

READERS of Mr. Scrivenor's book on "The Geology of Malayan Ore-Deposits" will welcome this companion volume on the geology of the fascinating and enigmatic land which has claimed the author's attention since 1903. In the introduction, an interesting and instructive account is given of the history of geological investigations in Malaya, including a brief account of the Kinta tin-field controversy. It is justly pointed out that the Kinta valley does not provide a key to the geology of the country, and that while debate has been focused on that small and intricate area, the Survey Department has been occupied with the whole of Malaya. Progress has now reached the stage where linking up with the Netherlands Indies, Indo-China, and Lower Burma has become practicable. In all these lands closely accordant results have been achieved.

After a general statement of the leading geological and geographical features of the Peninsula, there are chapters dealing with the late Palæozoic and Triassic sediments and the associated Pahang Volcanic Series. During this long period, the site of Malaya was a sea of moderate depth which was finally silted up by sediment from the east. Great crustal movements occurred later and led to great intrusions of granite, which are responsible for the valuable tin deposits of the country.

An important chapter is devoted to the granite and the associated igneous rocks. A post-Triassic age now appears to be well established, and although there are no Cretaceous sediments in Malaya, the evidence from adjoining countries suggests that the intrusions may be of late Cretaceous age. The post-granitic rocks include Tertiary coal measures; high-level alluvium which appears to be Pleistocene or older; and recent alluvium and pumiceous ash.

The remaining chapters deal successively with weathering and laterite; metamorphism, with special reference to a puzzling series of tourmaline-corundum rocks, thought provisionally to be altered bauxite; various minerals and tektites; and materials of economic interest other than ores. The book concludes with a bibliography complete to 1930 and a good index. A noteworthy feature is a colour-printed geological map of Malaya, on the scale of 12 miles to the inch, which is folded in a pocket at the end of the volume.

The book is written throughout in a clear and pleasant style, enlivened with flashes of humour and local colour. Mr. Scrivenor is to be warmly congratulated on having made available in so acceptable a form the conclusions he has reached after more than a quarter of a century's arduous work in a tantalising land that has become notorious for the difficulty of its geological problems.

Physics in the Making

Recent Advances in Physics (Non-Atomic). By Prof. F. H. Newman. Pp. ix + 378. (London: J. and A. Churchill, 1932.) 15*s.*

FRANKLY, we find the title of Prof. Newman's new book a little puzzling. He sets out to deal with recent advances in non-atomic physics, and, knowing his flair for exposition, we looked forward to a readable account, with due emphasis given to the experimental side, of recent developments in what we might call macroscopic or molar physics. His account is readable enough, and interesting experimental detail bulks largely therein, but the choice of topics bears singularly small relation to the title. Wave mechanics; statistical mechanics; electromagnetic radiation, including a discussion of infra-red spectra; γ-rays, cosmic rays, and the scattering and diffraction of X-rays; ninety pages on modern magnetics, and, under the heading electricity, a discussion, *inter alia*, of electrolytic conduction and of super-conductivity. These be strange themes to meet in a work where we had hoped a comfortable certainty would reign supreme and electron waves would cease to surge and roar.

The balance is to some extent redressed by a chapter on sound, which includes discussions on architectural acoustics, on sound-ranging, filters, and ultra-sonics, another chapter dealing with low temperatures and their measurement, and sections treating of high pressure researches and of atmospheric electricity. Nay, with a little twisting of the terms of reference, we may even include such topics as liquid viscosity and surface tensions, certain aspects of which Prof. Newman discusses in fairly full detail.

Truth to tell, it is impossible to make a division of topics which shall be strictly logical and shall avoid serious overlap. Prof. Newman points out, perhaps a trifle optimistically, that "the whole trend of modern science is, as it should be, towards correlation". Nevertheless, we may make a very convenient, if rough division, into molar physics, atomic physics—where the concept of the billiard-ball atom still subserves a useful purpose—and

sub-atomic physics. The difficulties and overlappings inherent in such a classification are obvious, but the section first-named will include topics which could very well replace some of the 'sub-atomic' sections of Prof. Newman's book. Photo-elasticity; recent developments in measurements of high precision; advances in applied physics, of which the Michell thrust block may be cited as an example; geophysical measurements; pyrometry—these are but a few of the topics which we should rejoice to see Prof. Newman handling and elucidating with his wonted skill.

We wish it to be clearly understood that we are suggesting substitution rather than addition. The subjects which Prof. Newman has discussed are so many and so diverse that some of them are necessarily treated in a cursory manner which, perhaps, makes the matter seem rather easier than it really is. But we do not desire to seem ungrateful. Prof. Newman has collected a vast mass of information in the three hundred and seventy pages of his text, and the book should prove very useful to a hard-pressed generation of students which has neither the leisure nor the will, among the multiplication of subjects which crowd our syllabuses, to scan critically and to abstract for itself original papers of importance. It should be added that for those who have time and inclination to refer to original sources, Prof. Newman provides carefully selected bibliographies of the various topics discussed.

ALLAN FERGUSON.

Biophysics in Muscular Action

Adventures in Biophysics. By Prof. A. V. Hill. Pp. ix + 162. (London: Oxford University Press, 1931.) 12*s.* 6*d.* net.

THE attractive title of this book is fully justified by its contents. Anyone who wished to sing with the Greek poet the praises of the inventive wit of man, σοφόν τι τὸ μηχανόεν τέχνας ὑπὲρ ἐλπίδ' ἔχων, could have no better example than some of the adventures in biophysics, of which Prof. Hill here gives an account. Technical skill and ingenuity in the use and construction of thermopiles made it possible to measure the rate at which a muscle liberates heat, when it is at complete rest, the basal metabolism of the living tissue. This basal rate was measured with the muscle in air or oxygen, and in nitrogen free from oxygen. It was about twice as great in oxygen as in nitrogen. The life of a tissue may be regarded as consisting in the balancing of destructive catabolic changes by reconstructive anabolic changes: heat may be supposed to be liberated by both kinds of change. In the absence of oxygen the anabolic changes would not appear.

When the muscle becomes active as a result of stimulation, additional heat is of course produced, whether oxygen is present or not. If oxygen is present, heat is produced for some time after the activity has ceased, and is a measure of the anabolic processes by which the muscle recovers from the changes attending activity, but finally the original basal rate is reached at the same level as before; the return is slow but complete. In nitrogen the return is rapid but incomplete. It is rapid because the slow anabolic processes involving oxidations are impossible without oxygen; the fact that it is incomplete seemed to mean that the effect of activity was to increase the instability of the living system and so lead to an increased rate of catabolic change. A very interesting observation and a very plausible interpretation; only it was surprising that the rate of catabolic change should increase directly in proportion to the amount of activity.

Among the tests to which the observation was put, was one in which hydrogen was used instead of nitrogen to displace the air surrounding the muscle. The result was that the basal metabolic rate after activity seemed to have been increased more than it would have been in nitrogen; and the plausible, interesting explanation became impossible. The phenomenon was then proved to be due to the lowering of the vapour pressure of the muscle by the activity. In activity, a few large molecules break down into a larger number of smaller ones, the osmotic pressure rises and the vapour pressure falls. Consequently, water from the solutions in the instrument, with which the vapour pressure of the muscle was previously in equilibrium, condenses on the muscle, and it is the heat released by this condensation that accounts for the apparent increase in metabolic rate of the resting muscle. In hydrogen the effect is greater because of the more rapid diffusion of water vapour in the less dense gas.

The thermopile has thus proved to be an incredibly sensitive means of recording minute differences of vapour pressure; 1 mm. on the galvanometer scale corresponding to a change of vapour pressure of the order of $0{\cdot}1\mu$ of mercury, or to an addition of less than 1 mgm. of lactic acid to 100 gm. of the solvent system of muscle. It is possible to calculate from the known chemical changes in an active muscle that these are capable of accounting for not more than four-fifths of the observed change in vapour pressure, and Prof. Hill argues from this as to the incompleteness of our knowledge of the