Reviews

I

Principles of Meteoritics by E.L. Krinov. Translated from Russian by Irene Vidziunas, edited by Harrison Brown, California Institute of Technology. Published by Pergamon Press, London, 1960; pp. *xi*+535, figures 154, plates 7; price 70 sh. (whole work reproduced by photolitho).

This is a comprehensive and up-to-date work on the subject of meteorites or shooting stars which are of great interest to us as pieces of planetary matter which may give us an insight into the material with which the solar system and perhaps even the whole universe may have been built. It is a cover-to-cover translation of a Russian work, with some revision made by the author before it was published by the Pergamon Press.

The work is well-organised and well-illustrated, though some of the illustrations have not come out well in the reproduction. It is divided into 8 chapters which deal with the following topics: Meteoritics as a branch of science; Motion and fall of meteorites; morphology, chemistry, mineralogy and petrography, and physical properties of meteorites; tectites; and origin of meteorites.

Meteorites have been known to man for perhaps 3000 years, but until about 2 centuries ago most people looked on them with supernatural awe or did not believe them at all. Gradually came the realisation that these fire-balls were fragments of interplanetary matter and a few scientists began studying them. But even in the 18th century there were strong disbelievers like the Austrian mineralogist Stutz, and the French Chemists Lavoisier and Berthollet and the Swiss J.A. Deluc who would not believe even their own eyes when they saw meteorites falling. It is said that Lavoisier and a few of his fellow academicians of the Paris Academy of Sciences published a memorandum in 1782 stating that the fall of stones from the sky was simply impossible. Much worse was the attitude of the Austrian mineralogist Born who, as the Director of the Imperial Museum in Vienna, had the collection of meteorites which were stored there thrown out, with the result that a valuable collection was lost for ever, because of his "scientific" bigotry. One is reminded of a Sultan of Egypt who is said to have ordered all the books in the great library of Alexandria consigned to the flames because he was convinced that the books were the source of all the arguments and quarrels of the learned men of his court.

Many well-known Russian scientists have been engaged during the last 2 centuries in the study of meteorites. Amongst the earlier ones are E.F. Chladni, Academician P.S. Pallas (after whom the type called *Pallasite* is named), Lovits, Stoikovich, A.F. Gebel, N.I. Koksharov, Simashko, R.A. Prendl. More recently V.I. Vernadsky, F.N. Chernyshevensky, A.E. Fersman, O. Backlund, L.A. Kulik, P.N. Chirvinsky, A.N. Zavaritsky, V.V. Fedynsky, V.G. Fesenkov, L.G. Kvasha, P.K. Gerling, E. L. Krinov and others. The Academy of Sciences of the USSR has now a Committee for the study of meteorites and arranges regular annual conferences and expeditions to places where meteorites have fallen.

The treatment of the subject follows the usual lines. The motion of meteorites and the characteristics of the fall are fully dealt with. The recent development of the application of radioastronomy to meteorite studies is described. Full descriptions of several falls, including

those of the spectacular *Tunguska* and *Sikhote-Alin* showers are given. Meteorite craters and their occurrence and significance are dealt with. Some of the important meteorites of other countries are also described. The penultimate chapter deals with *tectites* which are still very controversial and are of current interest. The textual matter is followed by a catalogue of Russian meteorites, important meteorites in other countries (pp. 454—502), literature references (pp. 503—511) and an index (pp. 512—535).

The book is authoritative and on a par with the best works such as those of Wulfing, Prior, Farrington and Ninninger. The apologia of the publishers who justify the high price as due to the need for quick publication and to the voluntary payment of royalty to the Russian author in the pious hope that the State publishing organisations of Russia would at some future date follow a similar procedure in respect of the translations of the works of western authors' works, sounds rather naive. Though the work is undoubtedly good, one cannot get out of the feeling that the apologia is the outcome of the competition in the new 'fashion' of publishing many cover-to-cover translations of Russian books and periodicals. The result is that the consumer has to pay a high price for this 'fashion'.

M. S. KRISHNAN

II

Beyond the Planet Earth by Konstantin Tsiolkovsky (translated from the Russian by Kenneth Syers). Published by Pergamon Press, London, 1960; pp. vi + 190; price 15 sh.

This book published by the Pergamon Press is an English translation of a remarkable story from the original Russian. It is a story written by Tsiolkovsky, quite a remarkable character himself, in 1920 about space travellers. The story is set in the year 2017 A.D. Scientists from many nations living as anchorites in the remote regions of the Himalayas performed elaborate scientific experiments and finally succeed in sending a party of scientists and technicians into the space in a 800 cubic metre rocket propelled by liquid propellant. The story goes on to tell about their explorations in the interplanetry gravity-free spaces in the solar system, around and upon the moon. The party uses the rocket for transportation but subsists on the products of a conservatory which they had erected in the empty space and taken it on the tow. The solar radiation naturally is considered to be the only and the ultimate source of energy available to these space travellers for their subsistence. The large differences of temperatures that can arise on the opposite faces of an object in space is fully exploited. These successful experiments lead, in Tsiolkovsky's story, to mass migrations in rockets of colonies to interstellar spaces where they set up their abode in space dwellings. Technical details are not omitted in the story. Talking about the conservatory in which the new colonies thrive he writes "One further very important piece of equipment must be mentioned—the dampness and humidity regulator. Plants, subjected to the hot rays of the Sun, continuously give off a mass of water vapour, and the soil rapidly dries out. This process would have made the hot-house terribly damp of course but it was obviated; the degree of humidity could be regulated. Outside, in the shade, a black metal pipe ran along the side of the structure, and acted as a condenser. The air was continuously injected into this pipe, where the water vapours then condensed,

the extent of the condensation depending on the temperature of the pipe. As we have explained, this temperature could be varied, or at least lowered, to nearly 200° below zero. There was of course no advantage in having a temperature as low as that; a very few degrees below zero would do".

Two of the scientists from amongst the space travellers are sent to the moon in a specially designed rocket for two passengers. Here is a graphic description of the landing of the special rocket. "The landing was like this: scarcely moving, the rocket almost touched the ground, which was creeping at a fair speed beneath them; they set the ship horizontal; it swung round and stood, on its four wheels, on the lunar surface like a cat landing on its paws; went forward a few dozen metres along the valley, and at last came to a standstill".

However one is mildly surprised to notice the fact that the tremendous revolution brought about in the means of communications by the electronics after 1920 was not anticipated in the story. Tsiolkovsky's travellers set up a huge reflecting mirror to act as heliograph for communication with the earth. The means of communication between two persons swimming in the space-suits is also visualized to be by pneumatic means only.

The return of the space travellers to the earth has been feelingly described. "Now they had brought out the water tanks, and one after another installed themselves in the liquid, so as to avoid suffering the effects of intensified relative gravity. In short, they repeated the entire routine which they had had to adopt before, when they left Earth. The ship and all its parts functioned with the precision of a gramophone, which will play the particular record one puts on and no other. The controls, however, were still manually operated from inside the antigravity fluid.

The ship entered the atmosphere. The thin safety skin burnt up, but the rocket's speed was no longer so great, and was still dropping the nearer they came to the ocean surface".

At the beginning of the book a brief and sketchy biography of K. Tsiolkovsky has been given in which the very remarkable life, scientific work and publications of this great Russian pioneer in rocketry have been described. Many of his papers both published and unpublished presented ideas that are current today. Publication of this story in English language will make his name prominent amongst the English reading public and many will cherish his name along with such others as H.G. Wells, Jules Verne, etc. The Pergamon Press has produced this book at a very opportune moment.

Even though the book may somewhat lack in artistic quality from a purely literary angle there are enough thrills in it which will make the book to be eagerly read by scientists as well as laymen.

U. K. BOSE

III

Descriptive Meteorology. Second edition by Hurd C. Willett and Frederick Sanders, published by Academic Press, Inc., New York, 1959, pp. xix + 355, 72 figures. Price $ 7·50.

Some of the important additions and alterations that have been made to the first edition are: (1) presentation of charts showing the upper air conditions over both the hemispheres, thus making the description of the general circulation of the atmosphere more complete, (2) shift in emphasis from the airmass and frontal concepts to those based on analysis of upper air data and (3) a critical review of the existing methods of forecasting for different ranges (of time), their efficacy, limitations and the scope for improvement of these methods.

The basic problem in meteorology is the understanding of the general circulation of the atmosphere, describing it exactly by certain parameters and then trying to predict its future evolution during different periods of time (short, medium and long ranges). The large amount of upper air data that has become available since the last war has added much to our knowledge of the observed characteristics of the circulation, but the basic problem remains to be solved.

Meteorologists have a tendency to treat the smaller scale circulations like cyclones as independent entities and forget that they just form a cogwheel in the bigger mechanism of the general circulation. One commendable feature of this book is that the entire description is so evolved that the general circulation is highlighted and the smaller scale circulations have been described as parts thereof with special reference to the parts they play. This kind of presentation is not usually met with in many text books and hence is very welcome.

Another important feature of this book is that considerable space is devoted to explain the physical processes underlying weather. Explanations, some established and some of a conjectural nature, are presented for some of the observed features of the atmosphere, like the lapse rate in the troposphere, the variations in the height of the tropopause and the influence of the distribution of land and sea on some of the observed features of general circulation.

The authors intended this book as "a suitable text in a comprehensive introductory course in meteorology". The book would have served this purpose better if (*i*) the introductory chapter were expanded to include brief description of the methods of measurement and the instruments utilised along with suitable illustrations and (*ii*) if the chapter on "Weather forecasting and Weather modification" were to include description of a few typical synoptic situations along with the related charts.

On reading thorugh the book one gets the impression that the readers who will get the best out of it are not those "who are familiar with general physics and with mathematics as far as elementary Calculus", but it is those who are already initiated into the field of meteorology and are interested in understanding the physical processes that cause weather. The treatment of the subject in this book, especially in the later chapters, is such that even Professional Meteorologists and research workers will find it worthwhile to read it.

P. S. PANT