OUR BOOK SHELF.

A Sequel to the First Six Books of the Elements of Euclid. Fifth Edition. By J. Casey, F.R.S. (Dublin: Hodges, 1888.)

THIS handy book has been a decided hit, and has supplied something that was really needed. The main body of the work is little altered in the present edition, but corrections have been made of slips which we had occasion to point out. The special part, *i.e.* the supplementary chapter on the recent elementary geometry, continues to grow. In the last edition, pp. 165-222 were devoted to it; in this, pp. 165-248. Additional articles are devoted to Taylor's circle (Mr. Taylor's paper in the *Messenger of Mathematics*, vol. xi., appeared before his article in the Mathematical Society's Proceedings, vol. xv., and some of the properties of it were given in a Trinity College, Cambridge, examination paper (*i.e.*); see, however, Simmons, "Recent Geometry," in "Milne's Companion," p. 181). Much of Section vi., on "The Theory of Harmonic Polygons," has been rewritten, and indebtedness to Messrs. Neuberg and Simmons is admitted. The impression conveyed to a reader is that the latter's important article, referred to above, has not been seen by Dr. Casey, for, if it had been seen by him, frequent reference must, we should suppose, have been made to it, whereas the only reference is to a note in the Mathematical Society's Proceedings, April 1887. We now commend the article in question to Dr. Casey's notice. Section vii., on the "General Theory of Associated Figures," is for the most part new to the volume,¹ and there are additional exercises. We would point out that Questions 76, 77 (p. 217, fourth edition, and p. 241, fifth edition) are not consistent. 76 is right; in 77 read, for "*orthocentre* of pedal triangle," "*symmedian point*," as in the author's "Conics," p. 325.

Elementary Theory of the Tides. By T. K. Abbot, B.D. (London: Longmans, Green, and Co., 1888.)

FULL discussions of tidal action and its effects have hitherto been confined to treatises which employ higher mathematics, and any successful attempt to simplify matters ought therefore to receive a hearty welcome. The book before us is an attempt at this, and although it only consists of some forty pages, it simplifies many points. The proofs of the various theorems require no special knowledge beyond that of the resolution of forces, but the quantitative determinations necessarily demand a little mathematical knowledge.

There is a common notion that without friction there would be high water under the moon, but Mr. Abbot easily demonstrates that it would occur at quadratures. A simple construction is given and proved for the determination of the amount of the disturbance at any point on the equator. The influence of tides upon the length of the day is also discussed. Airy's analytical method is given in an appendix.

The book is mainly a compilation of papers by the author which were published in 1871-82 in the *Philosophical Magazine* and other journals.

Pictures of Native Life in Distant Lands. Depicted by H. Leutemann. With Explanatory Text by Prof. A. Kirchoff; translated from the German by George Philip, Jun. (London: George Philip and Son, 1888.) TWELVE coloured plates, illustrating what are called the typical races of mankind, are brought together in this volume. The subjects have been well selected, and the workmanship of the pictures is sufficiently good for the artist's purpose. The letterpress, by Prof. Kirchoff, contains much valuable information, and it has been translated by Mr. Philip into clear and simple English. The work will both amuse and instruct any young readers who may be fortunate enough to obtain a copy.

¹ M. Torry's paper reached the author as his fourth edition was in the press; see pp. 221, 222 of that edition.

The Zoo. By the Rev. J. G. Wood. (London: Society for Promoting Christian Knowledge, 1888.)

MR. WOOD is so well known as an expounder of the facts of natural history that it is unnecessary to say much about the present volume. His object is to interest children in some of the animals which they may see in the course of a visit to the Zoological Gardens. He begins with an account of monkeys, and then goes on to talk about lions, tigers, leopards, the cheetah, the jaguar, the lynx, wolves, foxes, hyænas, the Aard wolf, bears, and the racoon. In each section he contrives to say something that is worth remembering, and perhaps a good many of his descriptions will be at least as interesting to older readers as to the young people for whom they are primarily intended. The book is prettily illustrated.

Alpine Winter in its Medical Aspects. By A. Tucker Wise. Fourth Edition. (London: J. and A. Churchill, 1888.)

THE present edition of this work contains all the subject-matter of previous publications of the Alpine climate series, with extracts from Dr. Wise's papers read at the Harveian Society of London, the Royal Meteorological Society, and the International Medical Congress held at Washington in September 1887. The writer knows his subject thoroughly, and he has too ardent a belief in the treatment of chest disease in the mountains to wish to make extravagant statements about it. In his representations of Alpine climate he has not forgotten to include those unpleasant details which are generally somewhat vaguely described as "drawbacks." The work contains a series of careful notes on Davos Platz, Wiesen, St. Moritz, and the Maloja.

Animal Physiology. By William S. Furneaux. (London: Longmans, Green, and Co., 1888.)

IF the necessity be granted that a separate text-book should be published to meet the requirements of every examination body in each department of learning, Mr. Furneaux may be said to have met his share of that necessity, and with more success than many of those who have recently set to themselves a similar task. The book covers a slightly wider field than that indicated by the "Elementary" Syllabus of the Science and Art Department for human anatomy and physiology; it is clear and well arranged, and the illustrations are good and carefully selected. Such loose statements as that "bone is produced by the gradual hardening of cartilage" (p. 34) appear to be almost a necessity in works of this stamp, but with Mr. Furneaux they are unusually rare. The volume forms one of Messrs. Longmans' series of "Elementary Science Manuals."

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

Hailstones.

A SEVERE hailstorm occurred here yesterday evening, between 6 and 7 o'clock, and lasted for about a quarter of an hour. The hailstones being fairly large, I was able, by the aid of a good lens, to examine them somewhat carefully. The result of this examination I give shortly in the following statement.

All the hailstones were pyramidal in form, and the pyramids were nearly all four-sided. Their bases were in almost every instance more or less rectangular in outline, the contours of a few only being triangular, and the surface of each base was convexly curved. The general length from the centre of the base to the apex was about a quarter of an inch; the longer diameter

of the base was nearly three-sixteenths of an inch, while the shorter basal diameter was about a sixteenth less. Of course, the above measurements are merely general, and were necessarily taken in a rather rough fashion.

The figures 1, 2, 3 below, although diagrammatic, will give a better idea of the usual shape of the hailstones than could be readily furnished by any further detailed description.

When sixteen hailstones, all of which were practically of the same size, were placed closely together side by side, so that all their apices terminated at the same point, a half spheroid was constructed, the curved basal surfaces of the pellets running neatly into one another to form the external globular surface. It

FIG. 1.—Magnified.

FIG. 2.—Magnified.

FIG. 3.—Basal view ; magnified.

is evident, therefore, that those particular hailstones, at least, were originally portions of spheroids, each hailstone being a segment (the $1/32$ nd in this case) of a globe. How the icy globes were formed, and what was the cause of their breaking up into segments, are problems, I believe, that yet await serious investigation.

When the substance of any of the hailstones was observed closely by means of a lens magnifying four times, it was seen to be a transparent mass of ice, and fairly homogeneous in texture, having apparently little or none of the fibrous structure which has been previously noticed in other cases, and recorded by myself and other observers (see NATURE, vol. xxxv. pp. 413, 438,

FIG. 4.—Showing numerous liquid cavities in a hailstone ; magnified six times.

536). Each icy mass, however, contained scattered about in its substance numerous small cavities, round, oval, or elliptical in form, which were filled wholly or partially with water (see Fig. 4).

In some cases these liquid cavities were so numerous and so crowded together as to interfere seriously with the diaphaneity of the hailstone and to give it quite a clouded or granulated appearance. I may add that the convex basal surfaces of the hailstones were not quite smooth and glassy, but exhibited a rather grainy appearance, and were slightly but distinctly rough to the feel.

ALEXANDER JOHNSTONE.

Edinburgh University, November 29.

The Renaissance of British Mineralogy.

THE following passage occurs on p. 116 of NATURE of November 29, in an article on the above subject :—

"Crystallography should be taught as a special subject ; and a knowledge of it should be required not only of the mineralogist but of the chemist, and even of the physicist. Hitherto, at least, the chemists of this country have been too content either to leave the crystalline forms of their artificial products undetermined, or to impose the task of their determination on the already sufficiently occupied mineralogist. It seems obvious, that in a satisfactory system of education every chemist should be taught how to measure and describe the crystalline characters of the products which it is his fate to call into existence. On various occasions expression has been given to this view, but the only chemist who has yet seen his way to act upon it is Prof. Henry Armstrong, who I am happy to say, has introduced the subject into the educational course of the City and Guilds Technical Institute. I trust that before another generation passes away his excellent example will be followed throughout the country. A knowledge of the elements of crystallography, including the mechanics of crystal measurement, ought to be made a *sine qua non* for a degree in chemistry at every University."

The views thus expressed are shared by many chemists, and are,

I believe, generally known. It is, however, not exactly correct that "the only chemist who has seen his way to act upon it is Prof. Henry Armstrong."

Long before the City and Guilds Institute was established or thought of, mineralogy, including crystallography, was a part of the curriculum in the Department of Engineering and Applied Science in King's College, London.

Until the year 1879, mineralogy and crystallography were studied in the Royal College of Science, Dublin, by students in the Faculty of Mining only, but at my suggestion these subjects were made compulsory on the students in all Faculties.

Furthermore, this subject was introduced into the course pursued in this College by the candidates for the Associateship of the Institute of Chemistry, the Council of the Institute accepting attendance at the course of mineralogy as equivalent to an equal number of hours in the chemical laboratory. This arrangement was carried out in 1881. It will be seen that mineralogy and crystallography are subjects which have by no means been neglected by chemists, though it is quite true that, like many other science subjects, they have not taken their proper places at the Universities. To chemists generally, there are without doubt more important subjects of study than crystallography which are not adequately taught ; I refer to the use of the microscope, polarimeter, and spectroscope. These instruments are employed, and are absolutely indispensable, in certain methods of chemical analysis and research.

In how few laboratories are any accurate measurements of spectra made, or is the spectroscope used for any other observations than for detecting the alkalies and alkaline earths !

We have as yet no Professor of Spectrum Analysis, though it is undoubtedly a fit subject for a distinct Professorship, and this fact has, I believe, been recognized in Germany. If the advances in chemistry made respectively by students of crystallography and of spectroscopy be compared, it will appear that we owe very much more to the latter than to the former.

W. N. HARTLEY.

Royal College of Science, Dublin, December 1.

"Weather Charts and Storm Warnings."

I HAVE just been reading Mr. Allan Broun's review of Mr. Robert H. Scott's "Weather Charts and Storm Warnings," in NATURE, vol. xiv. p. 566, and note that the reviewer says :—

"Why, in all the disquisitions on fluid equilibrium, are the constant low (barometric) pressures in the Antarctic regions south of 60° neglected? How shall we account for the permanent depression in the neighbourhood of Iceland referred to by the author (p. 64)? And, to come to our own country, how will cyclonic winds explain the fact that the pressure of the atmosphere diminishes, on the average of the whole year, at the rate of one-tenth of an inch of mercury for 4° of latitude as we proceed northwards?"

I have no suggestion to offer respecting the depression near Iceland, but the other two—the depression about the South Pole, and the diminution of pressure going northwards in Great Britain—are parts of one general fact—namely, the diminution of pressure in going from about lat. 30° to either Pole, which, however, is most marked in the southern hemisphere. This, I think, admits of a simple explanation. The zones on each side of the equator are occupied by the trade-winds, blowing from the east : their cause is too well known to need statement here. But, by the law of reaction, they necessitate the existence of winds of equal total force from the west, and those west winds are formed in the regions between the trade-winds and the Poles. Winds blowing continuously round the Poles, in the same direction as the earth's rotation, constitute vortices, and the pressure at the bottom of the vortex—that is to say, at the earth's surface—necessarily diminishes towards the centre—that is to say, towards each Pole. The diminution of pressure towards the Pole is much greater in the southern than in the northern hemisphere, because in the latter the unequal heating of continents and oceans produces currents of wind which, though on a large scale, are local currents in respect to the entire hemisphere, and tend to break up the vortex.

The cause I have assigned is a *vera causa*—that is to say, it is known to exist, and its effect must be of the nature of the effect actually found. Perhaps some of your mathematical correspondents will discuss the question whether it is of sufficient magnitude to account for the effect.

Belfast, December 2.

JOSEPH JOHN MURPHY.