

magnetic pole is declared to have moved about 800 miles in a north-westerly direction between 1600 and 1780, then about 400 miles in a south-easterly direction between 1780 and 1915.

The remarkable results thus given in these charts can hardly be accepted until observation has done its work and provided a better basis of calculation than that at the disposal of their author.

The Wonderful Works of God. Pages from the Book of Nature. By J. Polkinghorn. Pp. iv + 156; illustrated. (London: Society for Promoting Christian Knowledge, 1903.) Price 2s.

THE purport of the book, it is said, is to awaken an interest in the marvels of creation, and perhaps this might have been done without the introduction of quite so many "pious reflections." Be this as it may, the author might at least have taken care that all his statements were up to date, and at the same time have avoided the introduction of misleading illustrations. As an example of the former failing, we may refer to the statements (p. 29) that sponges are included in the Coelenterata, and (p. 94) that a few birds probably hibernate (*vide* A. Newton, "Dictionary of Birds," p. 928). As regards the second point, we may direct attention to the figure on p. 29, in which the shell borne by a soldier-crab presents no resemblance to that of any mollusc with which we are acquainted. Although exception may be taken to the mode of treatment, the purport of the book is deserving of all commendation.

Riviera Nature Notes. Second edition. Pp. xv + 402. (London: Bernard Quaritch, 1903.)

THIS volume will be a welcome addition to the library of everyone who is interested in the old-fashioned hobby of field natural history or its modern substitute of "nature-study." The first edition, which was published in 1898, was a delightful book, but it left much to be desired in the matter of paper, printing, illustrations, correction of misprints, and similar matters of general detail. In all these respects the present volume is quite a different book from its predecessor, and though a few misprints still survive, it is evident that no pains have been spared in producing a well printed book, the illustrations in which are quite works of art. The anonymous author states that he is a school-master by profession, and that the book was written as a recreation, and with no intent to produce a scientific treatise. But those who have visited the shores of the Mediterranean will know that the fauna, the flora, and the folklore of this region possess an individuality of which no adequate impression can be conveyed by exact scientific descriptions, but of which a much better idea can be obtained from the descriptions and illustrations given by one who is evidently familiar with every nook and corner of the district. We cordially agree with the last words of the preface:—"But I may, perhaps, venture to plead that there are many recreations even less profitable than writing notes upon the Natural History of the Riviera."

The Square Circled. By P. O. P. Pp. 44. (Edinburgh: E. and S. Livingstone, 1903.)

MANY writers have given approximate geometrical constructions for straight lines equal in length to arcs of circles, and some of these are so simple that it seems a pity they are so rarely seen in text-books. This remark in no way applies to the constructions given in the present book. Most of the figures are very involved and complicated, containing between thirty and forty lines. If the methods really did lead to an exact and not merely an approximate construction for

squaring the circle, the use of ruler and compasses would introduce errors far greater than those which would arise from taking even such a rough value for π as $3\frac{1}{2}$. It is a pity that the author before writing this book did not consult a mathematical friend. Had he done so he would have been told that his "V-shaped curve" is a portion of a cycloid, and he would not have issued the book in its present form.

The Garden Diary and Calendar of Nature. With Gardening Directions by Rose Kingsley and Preface by G. A. B. Dewar. Pp. x + Diary. (London: George Allen, 1904.)

A FEW nature and other notes, together with directions as to the month's work in the garden, precede the diary for each month. Every day throughout the year is provided with an appropriate poetical quotation and a space in which to record personal observations of nature in the garden and elsewhere. Altogether a pleasing compilation.

LETTERS TO THE EDITOR.

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Oxford Science.

TO the report of a lecture recently delivered in Oxford (NATURE, vol. lxix. p. 207) Prof. Perry appends a footnote in which he states that if he were to endow a professorship in some definite branch of science at Oxford, the authorities would appoint a man who never had done, and who never could be expected to do, any research work, and whose highest ambition would be to act zealously as the bursar of his college! As some of the readers of this report might regard this statement as being literally true, it is as well it should be contradicted. Of the fourteen full science professors at Oxford, only one is, or ever has been, a college bursar. In fact, nearly all the professors are eminent men, who by their research work have contributed in no small measure to the advancement of science. All are fellows of the Royal Society, and nearly all have served on its council.

Prof. Perry's statement that Oxford turns out very little research work of any kind is likewise unsupported by facts. As can be seen from the "Reports of University Institutions" (published by the Clarendon Press), the amount of research work done in Oxford is increasing every year. To take but a few instances, we find that, in 1902, workers in the department of physiology published eighteen original memoirs, those in the department of astronomy eleven, and those in the department of comparative anatomy ten memoirs, whilst from the Hope department of zoology two bulky volumes of collected researches have been published within the last few months. In fact, I challenge Prof. Perry to name a single professor, lecturer or demonstrator, in the departments of physiology, comparative anatomy, zoology, geology, botany, physics (electricity), astronomy or mineralogy, who is not engaged upon research at the present time, and who has not published original work during the last year or two. Again, many of the colleges are subsidising research by electing research fellows rather than fellows by examination. Of such fellows—all elected within the last few years—it will suffice to mention the names of Messrs. Arthur Evans and D. G. Hogarth, whose exploration work in Crete is known to all, and Messrs. Grenfell and Hunt, equally well known for their work in Egypt.

The statement that Oxford hates science does not seem to be borne out by the fact that, of the total yearly revenue of the university (as apart from the colleges), more than 10,000*l.*, or a seventh part of the whole, is devoted to the upkeep of the science departments and the payment of science readers and lecturers. Many of the colleges are no less liberal in their support of science and research. To

take a single instance, Magdalen College spends more than 5000*l.* a year upon science professorships, fellowships and scholarships, or a seventh part of its net revenue, and of the last twelve fellowships it has awarded, six have been for research. Also it keeps up a very efficient private laboratory, as, indeed, do five other colleges in the university.

Oxford, January 9.

H. M. VERNON.

I THINK that others may interpret the footnote as Mr. Vernon does, and it is therefore my intention to express myself more clearly when the address is republished. Surely all Oxford science men know what I meant to say, and if so, they must know how difficult it is to say it without making two or three particular references. It is evident from other parts of my address that I certainly did not mean that most of the Oxford science professors neglect research. On the contrary, I know that the majority of them perform their duties well, including duties as to research, and they do this in an antipathetic atmosphere such as science professors elsewhere know nothing of. If I had the inclination to punish a scientific man and the power, I would appoint him to an Oxford science professorship.

Some of the most distinguished workers were listening to my address, and I know that they were not much annoyed when I expressed my opinion that, relatively to the position and wealth of Oxford, there is very little being done. We know the names of the Oxford men who are doing good research work in Oxford and elsewhere, and surely Mr. Vernon will not say that they form one-tenth of one per cent. of the number of living men who have been educated at Oxford. But I am not concerned with the easy standard which he is satisfied to apply. I was expressing what is a very general opinion, and one that is certainly my own. Also in saying that Oxford fears and hates natural science I was expressing a very general opinion. It is ridiculed by Mr. Vernon, but he does not disprove it when he tells how Oxford trifles with science by the establishment of what are called science scholarships and fellowships and starved little laboratories.

Public opinion has been burked for many years by this grotesque fooling. Add to this that the majority of the dons throw ridicule upon natural science studies and create an atmosphere in which it is nearly as difficult for a man to do scientific work as it is for a mouse to live in an atmosphere of carbonic acid. An earnest student of natural science swims in a sea of troubles, and the university authorities in their love for him ornament him with a millstone of compulsory Greek as neck ornament. Surely this is something worse than trifling; it is torture. The torture is not so exquisite as what is applied to natural science in schools which are under Oxford influence, but it serves its purpose.

JOHN PERRY.

An Undescribed Rudimentary Gill-plume in the Cray-fish.

I SHOULD be glad if you would allow me to place on record the discovery, by Miss Margery Moseley (daughter of my old friend, the late Prof. H. N. Moseley, of Oxford), in specimens of the common cray-fish (*Astacus fluviatilis*), of a pair of minute gill-plumes (right and left), belonging apparently to the somite of the first pair of maxillipedes. Miss Moseley discovered these new minute gill-plumes, independently, in the course of dissection of a series of "types" in the department of comparative anatomy at Oxford. Finding no description of them in the text-books, and that they were not recognised or admitted by the authorities, she sent her notes and drawings on the subject to me. The discovery has been confirmed at my request by Dr. Calman, who is engaged in work on the Crustacea at the Natural History Museum, and he expresses his astonishment (in a letter to me) that so important and (when once noted) so obvious an organ can have been overlooked by the many students who have carefully examined the cray-fish since Huxley made it one of his "types," and published his researches on the gills of the astacoid Crustacea.

The discovery is interesting, not only as a fact in the morphology of Crustacea, but as being a novelty in a subject treated with special attention by so skilled an observer as Huxley, and minutely examined by thousands of students

and teachers during the last twenty years. Miss Moseley is preparing a description and drawings of the new gill-plumes for immediate publication.

January 15.

E. RAY LANKESTER.

A Theory of the Cause of Atmospheric Electricity.

THE idea that the sun sends out a large amount of Becquerel rays has found considerable support in the scientific world, and has been used to explain a number of difficulties connected with cosmical physics, for example, the source of the sun's energy and comets' tails. There is still another old standing difficulty which it appears to be able to solve, viz. the permanent maintenance of the electrical field in the lower regions of the earth's atmosphere. If we take for granted that the sun continually emits Becquerel rays consisting of positive and negative electrons, one would expect the following to be the consequence. Some of the electrons which reach the earth's atmosphere will be absorbed—probably mainly by the water vapour and dust in the lower atmosphere—but according to Rutherford's experiments more positive than negative; thus we may expect a greater number of negative electrons to reach the surface, a corresponding number of positive electrons being held back by the air. We at once see a cause for the positive charge of the air and the corresponding negative charge on the surface. If there were no "dissipation" the result would be a continual charging up of the atmosphere or an ever increasing potential gradient above the earth's surface; but there is dissipation, and it counterbalances the tendency of the electrical field to increase. If we had a constant dissipation the result would be a maximum potential gradient in the daytime and a minimum in the night, for we must assume that more electrons reach the atmosphere in the day than in the night. But we know from Elster and Geitel's measurements that the dissipation reaches a maximum at midday; this will tend to reduce the maximum of potential gradient which would otherwise be reached about that time. This consideration agrees entirely with the fact, for Exner has described the daily variation of the potential gradient as "a simple daily period, distorted by a midday depression." With the fairly constant daily period of the entrance of electrons into the atmosphere, the main determining factor of the potential gradient will be the dissipation; thus we find a maximum potential gradient in the winter with a corresponding minimum dissipation. The relation between potential gradient and dissipation has been thoroughly investigated by Elster and Geitel, and they have found experimentally that that which tends to reduce the dissipation tends to increase the potential gradient," which is just what one would expect from the theory. This theory appears to me to be able to account for a great many more of the problems of atmospheric electricity, but the above will show the general idea.

GEORGE SIMPSON.

Projection of Imitation Spinthariscopes Appearance.

WITH reference to Sir Oliver Lodge's letter in NATURE of last week (p. 247), might I venture to say that I exhibited to a large audience the nature of the effect seen in a spinthariscopes in a lecture which I gave on radio-activity at the Cavendish Laboratory last term? My plan is somewhat similar to that suggested by one of Sir Oliver Lodge's sons, and consists of two black discs rotating in opposite directions in a mechanical slide. The discs have a large number of transparent spots, so that whenever two of these coincide a flash is produced on the screen. The resultant effect is the same as that seen in the spinthariscopes. The coincidences can be arranged so as to be most numerous near the centre.

J. B. B.

The Diminishing Size of the New Bishop's Ring around the Sun.

IN addition to the notes recently given in NATURE by Prof. Forel, Mr. Rotch and Mr. Backhouse concerning the new Bishop's Ring, I should like to direct attention to the steadily diminishing size of this ring.

Mr. Backhouse says in vol. lxvii. (p. 174) that the middle of this reddish ring in the summer of 1902 was 70° from the sun, but on December 21 it was only 40° from the sun.