

along it. I found that that fog was fed by what I at once called fog-spouts. You know what water-spouts are, and you have all seen drawings of them, and the drawings of water-spouts that I have seen represent the reality very well. If you imagine a bank of fog about 50 or 60 feet high filled with little fog-spouts, you get exactly what I then saw, and you get exactly what one often sees in these quiet prominences on the sun, and I really believe that what I and others have likened to the trunks of trees may be really somewhat akin to these fog-spouts, with the enormous difference, however, that we are dealing with water and aqueous vapour in one case, and with the photosphere of the sun and incandescent hydrogen gas in the other.

These quiet prominences, when we come to examine them with the spectroscopic, seem to be built up entirely of hydrogen. When I say quiet you must understand that the word is a relative one. I have seen a quiet prominence as big as a dozen earths born and die in an hour. That is not at all an uncommon thing. And there are several facts which indicate that when such a prominence disappears, it does not mean that the stuff

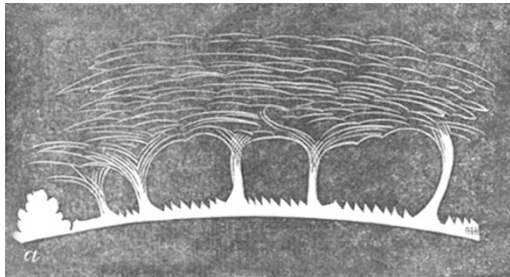


FIG. 14.—Tree-like prominences.

disappears; it means that it changes its state, that is to say, it chiefly changes its temperature. We can understand that these prominences, if they are excessively hot, will be very much more brilliant than if they are cool. If, therefore, they cool more or less suddenly, we may lose sight of them, but it may be that the hydrogen is there just the same, although it is no longer in a condition to radiate so much heat, and therefore light, to us. There is also evidence that these prominences are really, the quietest of them, due to up-rushes of gas from below.

When we watch the growth of a prominence it expands from below, close to the photosphere. First the prominence is of small height, then it gets higher and generally broader, and after a certain time we may see a kind of cloud formed at the top of it, but we never see the prominence coming down, as we have imagined the cooler materials of the sun must come down, to form a spot.

It happens very rarely indeed that any very large horizontal motion is indicated in such prominences as these. Drawings of prominences indicate very clearly the extraordinarily curious forms which these masses, which consist chiefly or entirely of hydrogen gas in the sun's atmosphere, put on.

J. NORMAN LOCKYER

(To be continued.)

SOCIETIES AND ACADEMIES

LONDON

Geological Society, February 19.—Annual General Meeting.—Prof. T. G. Bonney, F.R.S., President, in the chair.—The Secretary read the Reports of the Council and of the Library and Museum Committee for the year 1885. In the former the Council stated that they had the pleasure of congratulating the Society upon an improvement in the state of its affairs, both from a financial point of view and on account of an increase in the number of Fellows. The number of Fellows elected during the year was 54, and the total accession amounted to 51; while the losses by death, resignation, &c., amounted to 46, making an increase of 5 in the number of Fellows. The number of contributing Fellows was increased by 15. The balance-sheet showed an excess of income over expenditure during the year of 347*l.* 18*s.* 2*d.* The Council's Report further announced the awards of the various medals and of the proceeds of the donation funds in the gift of the Society. In handing the Wollaston Gold Medal to Mr. Warrington W. Smyth, F.R.S., for transmission to Prof. A. L. O. Des Cloizeaux, the President

addressed him as follows:—Mr. Warrington Smyth,—In the absence, which we much regret, of Prof. Des Cloizeaux, I must request you to transmit to him this medal. Geology is the child of two parents—mineralogy and biology. If we look to the latter to bid the dry bones and buried relics of organisms once more live, we appeal to the former to disclose the nature and constitution of the earth's framework whereon they flourished. It is therefore only just that our Society should seek opportunities of acknowledging the aid which we receive from mineralogists; and it would be difficult to find one on whom this Wollaston Medal could be more fitly conferred than on Prof. Des Cloizeaux. To enumerate the papers which he has written would be a formidable task; they numbered 141 so long as fourteen years ago; what, then, must be the present total? I may, however, point in passing to his admirable "Manuel de Minéralogie," and allude, as more directly bearing on the work of this Society, to his papers on the classification of hyperites and euphotides, on the geysers of Iceland, on the action of heat upon the position of the optic axes in a mineral, and the numerous memoirs on the distinction of minerals by their optical properties, especially those relating to microcline, and to other species of feldspar, of the importance of which students of microscopic petrology are daily more sensible. I esteem it a great honour to be the means of carrying into effect the award of the Council by placing in your hands, to be transmitted to Prof. Des Cloizeaux, the Wollaston Medal, founded "to promote researches concerning the mineral structure of the earth."—The President then presented the balance of the proceeds of the Wollaston Donation Fund to Mr. J. Starkie Gardner, F.G.S., and addressed him as follows:—Mr. Starkie Gardner,—The small number of students and the paucity of memoirs seems to indicate that fossil botany is one of those subjects of which the difficulties repel rather than fascinate the neophyte. If these are in some respects less formidable in the plant-remains of the earlier Tertiary period, if, in studying them, recent research throws some light on fossil botany, yet the practical difficulties of obtaining, developing, and preserving specimens are so great that no little ardour and patience are demanded from one who devotes himself to the subject. For years this has been your special work: after thoroughly exploring the flora of the Eocene Tertiaries on the coast of Hampshire and in the Isle of Wight, you are now, and have for some time been, engaged in communicating to us the fruits of your labours through the medium of the Palæontographical Society, thereby earning the thanks of students. Your researches also of late years have been extended to Antrim, Mull, and even Iceland, and their results cannot fail to be of the highest interest in regard to the age of these floras, and their relation to those which occur in the Hampshire district. In recognition of past, and in aid of future, work the Council has awarded to you the balance of the Wollaston Fund, which I have much pleasure in handing to you.—The President next presented the Murchison Medal to Mr. William Whitaker, B.A., F.G.S., and addressed him as follows:—Mr. William Whitaker,—To many members of the Geological Survey of Great Britain since the date of its constitution we are indebted for work freely done—beyond the sphere of their more strictly professional duties. Its chiefs, from the days of Sir H. de la Beche to the present distinguished Director-General, Dr. A. Geikie, have been among the most valued contributors to our *Journal*, and have enriched geological literature by their longer writings; while among its other members, few have done more than yourself in following the example of its leader. On the present occasion I will only allude to the various memoirs of the Geological Survey, especially that on the London Basin, in which you have taken so large and important a share, and will dwell rather on your contributions to our own *Journal* and to other publications. Your papers on the western end of the London Basin and on the Lower London Tertiaries of Kent deserve to be ranked with the classic memoirs of Prestwich as elucidating the geology of what I may call the Home District; and your last contribution to its deep-seated geology is still too fresh in our memories to need more than a mention. We do not forget your varied and valuable contributions to the *Geological Magazine*, especially those on the Red Chalk of Norfolk, on the water-supply from the Chalk, on the formation of the Chesil Bank (written jointly with Mr. Bristow), a paper, as it seems to me, of remarkable suggestiveness; and last, but by no means least, on sub-aerial denudation, in which, as remarked by the late Mr. C. Darwin, you had "the good fortune to bring conviction to the minds" of your fellow-workers by means of "a single memoir." We are also greatly indebted to you for your labours

in reference to the history of the literature of geology, a task involving not a little labour, which, though of the greatest value to students, is to all unremunerative, and would be, to many, exceptionally toilsome. Of this, your care for several years of the *Geological Record*, and the lists of books and memoirs relating to the geology of various counties in England, are conspicuous instances. There is a peculiar appropriateness in the award to you of this medal, founded by Sir Roderick Murchison, one of the illustrious chiefs of your Survey, and I have the greatest pleasure, on behalf of the Council of the Geological Society, in placing it in your hands, together with the customary grant from the Fund.—In presenting the balance of the proceeds of the Murchison Geological Fund to Mr. Clement Reid, F.G.S., the President said:—Mr. Clement Reid,—The later Pliocene and the Pleistocene deposits of East Anglia offer to geologists a series of problems as difficult as they are attractive. We are indebted to you for much valuable information on the exact distribution and the fossil contents of these varied deposits, which owing to peculiar local circumstances often present exceptional difficulties, and demand exceptionally patient study on the part of the investigators. Your memoir on the Forest Bed of Norfolk is a contribution of especial value to students as affording them fuller and more precise information than could previously be obtained, while the pages of our *Journal* and of the *Geological Magazine* testify to the zeal and thoroughness with which you have applied yourself to these and kindred questions. In conferring upon you this award from the Murchison Fund, which I have great pleasure in placing in your hands, the Council of the Geological Society hopes that it may aid you in prosecuting your studies in this department of geology and extending them to localities which could not be visited by you in the discharge of your professional duties as a Member of the Geological Survey of Great Britain.—The President next presented the Lyell Medal to Mr. William Pengelly, F.R.S., F.G.S., and addressed him as follows:—Mr. Pengelly,—The Council of the Geological Society has awarded you the Lyell Medal and a sum of twenty guineas from the Fund in recognition of your life-long labours in the cause of geology, and more especially, of your investigations in those caverns of the south-west of England by means of which our knowledge of the condition of Britain during the latest epoch of geological history has been so largely augmented. To exhume the contents of a cavern, not only the lair of wild beasts, but also an abode of men in those ages when, to quote the words of the old Greek tragedian,

“Like tiny ants they dwelt in sunless caves,”¹

requires the exercise of unwearied patience and, in addition, of extensive knowledge and critical acumen. By the labours of the Committee, of which you were the hands and the eyes, and at least a fair proportion of the compound brain, Mr. MacEnery's long-neglected discovery in Kent's Hole was placed beyond all dispute, and the contents of that cavern, its succession of deposits, its relics of extinct animals, and its tools of stone and bone, denoting more than one stage of civilisation, have been made known to the world. In like way the virgin ground of the Brixham cave was investigated, and its valuable contents have been rendered accessible to students. All this you have done, not as the fruit of secured leisure, but in the intervals of a busy life, of which, in the full sense of the words, time was money; and you began this work at a period when, owing to mistaken prejudices, you incurred no small risk of obloquy and personal loss. Your work at Bovey Tracey and your papers on the later geology of Devonshire and Cornwall are too well known to need more than a passing allusion; the Torquay Museum and the *Transactions* of the local societies will be a lasting monument of your zeal in stimulating scientific researches in the neighbourhood of your home. There is a peculiar fitness in the award to you of this Medal, a memorial of the fearless and illustrious author of the “Principles of Geology” and of the “Antiquity of Man.” I esteem myself exceptionally fortunate in being commissioned to place it in your hands, and being thus enabled to testify my regard for so valued and genial a friend.—In handing the balance of the proceeds of the Lyell Donation Fund to Dr. Henry Woodward, F.R.S., F.G.S., for transmission to Mr. D. Mackintosh, F.G.S., the President addressed him as follows:—Dr. Woodward,—I have much pleasure in placing in your hands, as representing Mr. Mackintosh, the balance of the Lyell Donation Fund awarded to him by the Council of the Geological Society. In him we have a second instance of the way in which, through an untiring zeal for

¹ Æschylus, *Prom. Vinc.*, 491.

science, the rare intervals of a hard-worked life may bear fruit so largely augmenting the common stock of geological knowledge. There are few problems more interesting than that of the physical condition of our native land during the period commonly designated the Glacial epoch; but for its solution an exact knowledge of the distribution of erratics and an identification of their points of departure is absolutely necessary. Those who, like myself, have attempted to adjust the rival claims of glacier and floe, of the ice-chariot *versus* the ice-ship, as vehicles of boulder-transport, can hardly speak too highly of the value of the papers on British erratics which he has contributed to our *Journal* and to other publications. I trust that this award may not only be gratifying to him as a mark of our appreciation, but also help him in continuing his labours in a field where, notwithstanding them, much still remains to be done.—The President then handed the award from the Barlow-Jameson Fund to Dr. W. T. Blanford, F.R.S., for transmission to Dr. H. J. Johnston-Lavis, F.G.S., and addressed him as follows:—Dr. Blanford,—I will ask you to transmit this award to Mr. Johnston-Lavis. In this country happily the volcanic fires have long ceased to glow, and the earthquake seldom causes more than a transient tremor. It is otherwise on the shores of the Bay of Naples, where again and again during the last eighteen centuries Vesuvius has rained down ruin; and of late years the earthquakes of Ischia have wrought destruction on the works, and desolation in the homes, of men. It is true that these phenomena of the darker side of nature have not been unobserved by the many illustrious men of science to whom Italy has given birth; but “the curse of Babel” has debarred some of us from access to their works. This alone gives an exceptional value to the elaborate studies which Mr. Johnston-Lavis has undertaken of the various eruptive products of Vesuvius and of the Ischian earthquakes. There is yet another advantage, that natural phenomena should be studied by men of different nations, diverse training, and varied habits of mind. In recognition of his past labours and in furtherance of future work in the vicinity of Naples, the Council has awarded to him a grant from the Barlow-Jameson Fund, which I have much pleasure in placing in your hands.—The President then read his Anniversary Address, in which, after giving obituary notices of some of the Members lost by the Society during the year 1885, he referred to the principal contributions to geological knowledge which have been made during the past year, both in the publications of the Society and elsewhere in Britain. The remainder of the address was devoted to a discussion of the principles of nomenclature which should be followed in regard to the metamorphic rocks. After describing the nature and relations of the various metamorphic rocks in certain parts of the Alps, Canada, Scotland, &c., the effects of the intrusion of igneous rocks, and the results of pressure in producing changes, both mechanical and chemical, upon rocks originally crystalline, he pointed out that these last could generally be distinguished from anterior foliation, otherwise produced; that many rocks in the metamorphic series appear to have originated in stratified deposits, but that the evidence at present in our possession pointed to the very great antiquity of all these, and to the probability of their having been produced under conditions which have not recurred since the beginning of the Palæozoic period.—The ballot for the Council and Officers was taken, and the following were duly elected for the ensuing year:—President: Prof. J. W. Judd, F.R.S.; Vice-Presidents: H. Bauerman, John Evans, F.R.S., A. Geikie, F.R.S., and J. A. Phillips, F.R.S.; Secretaries: W. T. Blanford, F.R.S., and W. H. Hudleston, F.R.S.; Foreign Secretary: Warington W. Smyth, F.R.S.; Treasurer: Prof. T. Wiltshire, F.L.S.; Council: H. Bauerman, W. T. Blanford, F.R.S., Prof. T. G. Bonney, F.R.S., Thomas Davies, Prof. P. Martin Duncan, F.R.S., John Evans, F.R.S., A. Geikie, F.R.S., Henry Hicks, F.R.S., G. J. Hinde, Ph.D., J. Hopkinson, W. H. Hudleston, F.R.S., Prof. T. M'Kenny Hughes, M.A., Prof. T. Rupert Jones, F.R.S., Prof. J. W. Judd, F.R.S., R. Lydekker, B.A., J. E. Marr, M.A., J. A. Phillips, F.R.S., Prof. H. G. Seeley, F.R.S., Warington W. Smyth, F.R.S., J. J. H. Teall, M.A., W. Topley, Prof. T. Wiltshire, F.L.S., Henry Woodward, F.R.S.

PARIS

Academy of Sciences, March 15.—M. Jurien de la Gravière, President, in the chair.—On the authenticity and exact value of the Peruvian unit of measure preserved in the Paris Observatory, by M. C. Wolf. The French legal metre being defined as a determined fraction of this standard taken at the temperature of 13° Réaumur, the importance of ascertaining

its exact value and state of preservation is obvious. As the same standard was used for the measurement of an arc of the meridian in Peru, it forms the connecting link between the older and more recent geodetic operations. It thus becomes an object of the highest interest, not only for France, but for the whole scientific world, and the author here replies in detail to the doubts and objections that have been raised by Peters and others in Germany against its authenticity and state of preservation. At his request the whole question will be submitted to a Commission appointed for the purpose by the Academy, consisting of MM. Faye, Mouchez, Janssen, F. Perrier, and Wolf.—Memoir on the order in which the first vessels in the leaves of the Cruciferae make their appearance: mixed formation, and morphogeny, by M. A. Trécul. The leaves of all the plants here treated belong to one of the two types of mixed formation described by the author in 1853, that in which the lobes or teeth of the lower part of the leaf are formed from above downwards, while those of the upper part are developed in the contrary direction from below upwards.—Theoretical considerations on the principles affecting the roll of vessels at sea, in connection with M. de Burry's recent communication (*Comptes rendus* of January 4, 1886), by M. A. Ledieu. It is shown that M. de Burry's conclusions cannot be accepted because based on de Benazé and Risbec's formulas, which are applicable only to ships in smooth water, account being taken of the resistance of the keel.—Remarks in connection with the *Bulletin* of the Society for the Encouragement of National Industry, presented to the Academy by M. Haton de la Goupillière.—Note on the hurricane that swept the Gulf of Aden in June 1885, by Vice-Admiral Cloué. The cyclone, in which five large vessels foundered, including the German corvette *Augusta*, and the French aviso *Le Renard*, both with all hands, and in which probably over 800 lives were lost, was especially remarkable for its sudden appearance. As it penetrated up the Gulf, it contracted from a diameter of 150 miles 250 miles east of Socotra to 50 miles at Obock, increasing in velocity from 8 to 15 miles an hour. The diameter appears to have continued to contract towards the interior of the continent, where it overtook a caravan proceeding from Sangallo in the direction of Shoa.—Remarks on the first botanical collections that have reached the Paris Natural History Museum from Tonquin (continued), by M. Ed. Bureau. Although collected exclusively in the delta of the Red River and surrounding hills, this flora includes no less than 407 species, distributed over 95 families. It comprises probably not a fourth of the whole flora of Tonquin, which thus appears to be one of the richest in the world.—Note on the ephemeris of Fabry's comet, by M. Lebeuf.—Complementary note on the barometric depressions observed by M. Perrin on board the *Galissonnière* in the Red Sea, by M. Mouchez.—Simplifications which may be effected in the numerical calculation of perturbations of planets, by M. O. Callandreaux.—On the latitudinal distribution of the solar phenomena observed during the year 1885, by M. P. Tacchini. The general conclusions arrived at are—(1) In 1885 the solar phenomena were more frequent in the southern hemisphere; (2) while the protuberances appear in each zone, the spots, faculae, and eruptions are confined almost entirely to the regions between the equator and $\pm 40^\circ$, one eruption and one facula alone being recorded in higher latitudes; (3) the maximum of eruptions, spots, and faculae occurs in the same zone of the southern hemisphere; (4) eruptions were less frequent in 1885 than in 1884, which was also true of the solar spots, showing the connection between these two phenomena; (5) the protuberances, on the contrary, were more frequent in the zones where no spots occurred.—On the theory of diversities in mathematical analysis, by M. Lipschitz.—Note on the construction of the tangents to plane curves, and determination of the point at which a movable straight line touches its envelope, by M. René Godefroy.—On the determination of the coefficient of self-induction; application of the Deprez d'Arsonval aperiodic galvanometer, by M. Ledebœr.—Application of the colour-diagram to experiments made on a colour-blind person, by M. Feret.—Description of a new apparatus for the quantitative analysis of oxygenated waters (one illustration), by M. Maurice de Thierry.—On selenides of sodium and of potassium, by M. Charles Fabre.—On the formation and dissociation of manganates of baryta and strontian, by M. G. Rousseau. The author had already shown that, under temperatures increasing from dark red upwards, the manganates of baryta and strontian become dissociated at a maximum of 1000° to 1100° , the limit being marked by the formation

of a diamanganate, which at a still higher temperature returns to the state of a monomanganite. He now finds that, by raising the temperature to a white heat, this manganite disappears in its turn, passing to a maximum of oxidation and becoming integrally transformed to manganate.—On the various degrees of solubility possessed by certain chlorides in the presence of hydrochloric acid, by M. R. Engel.—Description of various processes for the separation and quantitative analysis of copper, cadmium, zinc, nickel, &c., by M. Ad. Carnot.—On the existence of the elements of sugar of milk in plants, by M. A. Müntz. Although hitherto rarely detected, it is shown that these elements are found in great abundance in plants, and that the vegetable products yielding galactose are very numerous.—On the decomposition of the sodico-ammoniacal and sodico-potassic racemates, by M. G. Wyruboff.—On the seat of the organ of taste in the coleopterous insects, by M. J. Gazagnaire.—On the labrum of the Hymenoptera, by M. Joannes Chatin.—On the processes of fructification in the fossil calamodendrons, by M. B. Renault.—Complementary observations on the origin of the diamantiferous sands of South Africa, by M. Stanislas Meunier.—On the eruptive rocks and stratified formations of the Serrania de Ronda system, south of Spain, by MM. Michel Lévy and J. Bergeron.—On the optical properties of grünerite, withamite, and some other minerals destitute of determinable crystalline forms, by M. A. Lacroix.—On the spectrum of the *Ya* earth, by M. W. Crookes.—On the mosandrine earth of Lawrence Smith, by M. Lecoq de Boisbaudran.

BOOKS RECEIVED

"Turkestan," by J. Mochketon (St. Petersburg).—"The Statesman's Year-Book, 1886," edited by J. S. Keltie (Macmillan and Co.).—"Scientific Memoirs by Medical Officers of the Army of India," part I., 1884 (Calcutta).—"Minutes of the Sixth Annual Convention of the Provincial Educational Association of Nova Scotia, July 15 and 16, 1885" (Macnab, Halifax).—"Existing Glaciers in the United States," by J. C. Russell (Washington).—"L'Evolution et la Vie," by D. Cochin (G. Masson, Paris).—"Hourly Meteorological Readings, 1883," part iii., July to September).—"Christy's Guide to Poultry Rearing," new edition, by T. Christy.—"Annales del Museo Nacional de Buenos Aires, Entrega Décimacuarta," Segunda del toma iii., by German Burmeister (Buenos Aires).

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