

furnace to the hammer, and for moving them when under the hammer. 3. Improved hammers, with a clear unfettered fall, and with such width of standards as to give the workmen all the comfort and convenience possible in executing the necessary operations of shaping, forging, and cutting the material to the required form.

On Hammering and Stone-Dressing Machinery.—Dr. J. H. Lloyd. The author claimed to have devised machinery which was particularly applicable for cutting, sawing, chiselling, drilling, and dressing stone and other substances, for forging and hammering metals, and for working the tools in general by motive power, so as to supersede hand-labour. The invention has not yet been applied; indeed, the improved machinery as yet only exists in the state of a model. The paper was illustrated by numerous drawings.

REPORTS OF COMMITTEES

REPORT OF THE RAINFALL COMMITTEE

This report was read by Mr. G. J. Symons, the secretary of the committee. It commenced by referring to the steps taken last year to secure uniformity in the registration of rain by the observers throughout the country, and to the acceptance by the General Committee of the recommendation of the Rainfall Committee that additional observers should be obtained in parts of the country where at present such observers are far from one another. Dartmoor was last year quoted as an illustration; thither after last meeting Mr. Symons proceeded, and the result is that the number of stations in that district has been doubled. There are, however, still two parts of the moor where no one lives, and no one has yet been found willing to superintend a gauge. Reference is next made to other steps taken by the committee to secure returns from various other districts, and to the success of these efforts. The committee close this portion of their report by pointing out that to keep up an amateur staff adequate to the requirements of the subject, say from 1,500 to 2,000 observers, it is indispensable that a number of new ones be enlisted each year to supply vacancies caused by deaths and removals, and they therefore intimate their desire to receive through their secretary (Mr. G. J. Symons, 62, Camden Square, London) offers of assistance from parties willing to provide themselves with the inexpensive and simple gauge now generally in use. The report then proceeded to mention that the secretary has during the past year visited and examined the gauges in use at upwards of one hundred stations. By this personal intercourse greatly improved accuracy and uniformity of procedure is secured. The committee regret that through want of funds they have been unable to make any progress with the collection of old returns during the past year. The report then proceeds to describe certain experiments carried out at Calne, in Wiltshire, by Colonel Ward, with a view to determining the difference in the amount of rain collected at various heights above the ground, not so much with a view to determining the cause of this variation as its amount, and therefrom the possibility or otherwise of reducing observations made with gauges at different heights above the ground to what they would have been at some uniform datum. This portion of the report commences by a brief notice of the experiments made by Prof. Phillips at York in the years 1832-35, then pass on to illustrate the necessity for the determination of these corrections; thence to a description of the instruments employed, and their position; and then follow a heavy batch of tables of the calculations and the results which it is impossible to abbreviate. Part of the conclusions were exhibited in the form of diagrams representing the total rainfall on the surface of the ground, and its decrease at various altitudes above it, one diagram giving the mean annual decrease, and a series of twelve others the monthly curves; from these it was perfectly obvious that the difference between a gauge on the ground and one 20ft. high is in winter nearly three times as great as in summer, and hence it becomes evident that the mean annual correction is applicable to the total fall in one or more years only, and not to individual months, for each of which separate corrections are given. The report then proceeds to consider the most suitable height for the orifice of gauges to be above ground, and gives various reasons *pro* and *con*, finally concluding that 1ft., as hitherto adopted, be still recommended. The report next refers to the tables in an appendix giving the monthly fall of rain at about 300 stations during the years 1868-69, and to various calculations in different states of progress. The report concludes by pointing out the great work being done by the voluntary and entirely gratuitous

services of nearly 2,000 observers, and suggests that it would be alike graceful and an economical act on the part of the Government were they to offer to relieve the observers from the cost of reducing and publishing the observations which are now by their accuracy and completeness accepted as a type by foreign countries and our own colonies, and which are found yearly more and more useful in relation to our manufacturing and commercial interests. The committee conclude with the following words:—"A few hundreds annually would probably suffice to hold together a body of practised observers which has no equal in the world, and which once broken up, could not be replaced, since, irrespective of the difficulty of training the new observers, the continuity of the observations would be destroyed."

SCIENTIFIC SERIALS

THE *Geological Magazine* for September (No. 75) opens with an important article by Mr. E. Ray Lankester, describing a new species of *Cephalaspis* (*C. dawsoni*) from the Devonian sandstones of Gaspé, in Canada. This fish is figured, as also a spm, *Machairacanthus sulcatus*, which was found associated with it. Mr. Lankester also describes the characters of *Scaphaspis kerrii*.—Mr. Davidson continues his descriptions of Italian tertiary Brachiopoda, which he illustrates with two fine plates containing a great number of figures.—Mr. Alfred Marston contributes a paper on the transition beds between the Silurian and Devonian rocks; and Mr. Lankester describes and figures a supposed new species of *Terebratula* (*T. rex*), obtained from East Anglian drifts, but probably derived from beds of Portlandian age. The remaining articles in the number are a catalogue of mammalian fossils which have been discovered in Ireland, by Mr. R. H. Scott, and a reply by Archdeacon Pratt to some remarks by M. Delaunay on Mr. Hopkins's method of determining the thickness of the earth's crust.

THE *Journal of Botany* for October commences with some Observations on Willows, by the Rev. J. E. Leefe. Dr. Hance contributes some carpological notes on Chinese plants; and Mr. A. W. Bennett his paper on the relative period of maturity of the male and female organs in hermaphrodite plants, read at the Liverpool meeting of the British Association, of which an abstract has already appeared in our columns. Dr. Ferdinand von Müller has a note on some interesting plants gathered near Lake Barlee during Mr. Forrest's recent expedition; and among the borrowed abstracts is one of Mr. Bailey's useful paper on the natural ropes used for packing cotton bales in the Brazils, read before the Literary and Philosophical Society of Manchester.

THE two longest articles in the *American Naturalist* for September are a reprint of Mr. Darwin's memoir on the movements and habits of Climbing Plants, and a highly favourable review of Wallace's "Contributions to the Theory of Natural Selection." Prof. Cope contributes an article on the Fauna of the Southern Alleghanies, and Dr. C. C. Abbott one on Mud-living Fishes. One of the most interesting papers in the number is a very short one by Dr. William Stimpson on the Deep-water Fauna of Lake Michigan, containing a short account of a series of dredging operations which has been undertaken in this lake during the present year by the Chicago Academy of Sciences. At a distance of eighteen miles from Chicago, where the depth was fourteen fathoms, the sandy or gravelly bottom was found to be nearly barren of life. Between the distances of twelve and twenty-two miles from off Racine, the average depth was forty-five fathoms, and the bottom generally a reddish or brownish sandy mud. This bottom was found to be rather densely inhabited; the captures including a *Mysis* allied to Arctic forms, which led the author to refer its original entry into the lake to the cold period of the quaternary epoch, two species of *Gammarus*, a small white *Planaria*, and a new species of *Pisidium*. The investigation of the materials obtained by the dredging parties of the Academy is now in progress, and the results will be published in full with illustrations at an early period.

SOCIETIES AND ACADEMIES

BRISTOL

The Observing Astronomical Society.—Report of Observations made during the period from Aug. 7 to Sept. 6, 1870, inclusive.—*Solar Phenomena*.—Mr. T. G. E. Elger, of Bed-

ford, writes: "Observers of solar phenomena have seldom an opportunity of witnessing such a fine outbreak of spots as that which took place during the last fortnight of August. After the disappearance of the large group observed in the S. hemisphere (about July 31), a comparative lull in solar activity ensued, lasting thirteen days; the spots which appeared during this interval presented no remarkable features, and were mostly confined to the S. hemisphere. On the 17th, in the N. hemisphere, a large scattered group was observed, which a few days before had consisted of a congeries of minute specks; on the 18th it was 2' 55" in diameter, and was followed by another group, 2' 26" in length; both these groups diminished very rapidly after the 19th. On the 20th the two largest groups on the disc were nearly central; one of them 36", the other 54", in diameter. Cloudy days intervened between the 21st and 24th. On the latter date the first indications of the approaching outburst were remarked. At 4^h 30^m there were three immense groups in the N. hemisphere, extending from the centre of the disc to the E. limb; the preceding group, which was made up of very light and ill-defined penumbrae, enclosing upwards of sixty separate black spots, measured 3' 10" x 1' 49". The second group was 1' 20" in length, the third was too near the line to be satisfactorily measured. From the 26th to the end of the month the north maculose zone was completely crowded with groups and isolated spots, while the corresponding S. zone contained only punctures and small clusters. The following are the lengths of the three largest groups observed on the 29th: 3' 6", 2' 26", and 1' 57". The spotted zone could be seen with the naked eye, protected by an ordinary dark glass at noon on the 28th; it had the appearance of a dusky belt parallel to the sun's equator. Fresh groups observed in the sun's N. hemisphere during August = 11; ditto observed in the sun's S. hemisphere = 15. Maximum number of groups on disc = 13 (Aug. 29, 21^h 18^m); minimum number = 4 (Aug. 20, 4^h 15^m).—Mr. William F. Denning, of Bristol, observed the sun with his 3in. refractor, on Aug. 28, and reports that on this date four large groups of spots were visible in the northern hemisphere. In the N.E. quadrant two large groups were perceptible lying just above the equator. In the N.W. quadrant an irregular scattered group was seen near the limb, and another group near the centre of the disc was very conspicuous. The S.E. quadrant contained three small groups, while the S.W. quadrant was entirely free from visible spots.

Aurora Borealis.—Mr. H. Michell Whitley writes that on August 20 he observed a brilliant aurora. From 11^h 30^m to 12^h it was very well defined. Straight beams of light shot up from the N. horizon to an altitude of about 35°. "These streamers faded and reappeared in other places." Mr. Henry Ormesher, of Manchester, also witnessed this phenomenon. He says, "I first observed it at 11^h 40^m, but from its appearance it must have been visible for some time previous. I determined the extent of its base to be as far as W. by N. to N.E. by N. From between these points streamers shot forth in rapid succession, to a very considerable altitude, a great many of them reaching to the zenith of my place of observation. Some of these streamers were very brilliant, particularly one which at 11^h 50^m shot forth from a point just beneath the Pointers in a direction towards the polar star, and onwards to the zenith. I should think this stream of light to have been of about five minutes' duration, during which time its colour changed from a dark straw to a yellowish tinge. At 12^h 10^m there was quite an auroral arch, whose centre was towards the magnetic pole, and extending from the before-mentioned points to an altitude of at least 40°. The brightness of this arch increased until about 12^h 14^m, when it was exceedingly brilliant. During the whole of the time the sky was very clear, with the exception of a reddish glow, of which the aurora was the cause.

Meteors.—Very few meteors appear to have been observed on about August 10. Mr. Edmund Heison saw nine on the 10th, three on the 11th, and two on the 12th. The Rev. S. J. Johnson watched the sky from 10^h 45^m to 11^h 46^m on the same date, and only detected one. Mr. H. Michell Whitley, of Penarth, witnessed the appearance of two meteors on the evening of August 29. The first was visible at 10^h 25^m, and was accompanied with a faint train. It passed downwards below Corona Borealis. The second was seen at 10^h 30^m to the W. of Aquarius. Both were equal to a first magnitude star. On the 30th the Rev. S. J. Johnson observed the train of a very brilliant meteor. From the appearance of this train it was evi-

dent that the meteor must have become visible a degree or so to the W. of δ Draconis and have ended a degree or two to the E. of α Draconis.

NEW ZEALAND

Wellington Philosophical Society, July 10.—The value of the New Zealand Flax was fully discussed, and Dr. Hector exhibited the operation of the machine he is employing in testing the strength of the various fibres for the Commissioners who have been appointed to investigate the subject. The result, as far as yet obtained, tends to prove, that while the flax of the *Phormium tenax* dressed in the native manner greatly exceeds in strength either Russian hemp or Manilla; yet, when dressed by the machines in ordinary use, it is much inferior. The few samples of the fibre prepared by retting or carefully applied chemical processes, however, gave much better results.

July 17.—Mr. T. H. Potts described an egg of the Great Auk which is in his possession.

New Zealand Institute, July 23.—Anniversary meeting, his Excellency Sir G. F. Bowen, G.C.M.G., in the chair. The president, in advertising to the transactions of the Institute and affiliated societies during the past year, drew attention to the number of contributors on a great variety of subjects to the last issued volume, as proving that a large amount of intellectual activity and practical zeal exist among the associates, although debarred by the geographical circumstances of the colony from achieving frequent meetings. The address was chiefly directed to the necessity for practical scientific instruction; and he stated that the Board of the Institute, having been applied to, the Government had recommended that a course of lectures shall be established in connection with the Museum and Laboratory, on natural history, geology, chemistry, and mineralogy. In proposing the thanks of the meeting to the president, the Hon. Mr. Fox, Premier, stated that the scheme which his Excellency had propounded would be favourably entertained by the Government, who were very desirous of assisting the diffusion of sound scientific instruction, as it was an essential step towards developing the resources of the Colony.

BOOKS RECEIVED

ENGLISH.—The National History of Commerce: J. hn Yeats (Cassells and Co).—The Triangle: a Method of Harmony and Modulation: G. Green (Novello).—The Forces of the Universe, part I.: G. Ferwick (Longmans).—The Adventures of a Young Naturalist: L. Biart (S. Low, Son, and Co.). FOREIGN.—(Through Williams and Norgate)—Abhandlungen der mathematisch-physikalischen Classe der k. bayerischen Akademie der Wissenschaften 10^{ter} Band.—Flora der preussischen Rheinlande: Dr. Wirtzen.—Lehrbuch der Ingenieur- und Maschinen-Mechanic: Dr. Weisbach.—Das Naphthalin und seine Derivate: M. Ballo.—Anleitung zur Ausmittelung der Gifte: Dr. R. Otto.—Leopold von Buch's gesammelte Schriften 2^{ter} Band.

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