

large circle of readers—kindly sent me an account of her experience of the offensive use of the Cuvierian organs. She tells me that in the Bay of Rapallo at Santa Margherita, near Porto Fino, she dredged a large black Holothurian, and that “the tangled mass of white threads you mention is so sticky and in such quantity that, after having taken one of these animals out with my hand, I had considerable difficulty in freeing my fingers from the threads; indeed, my hand was not comfortable till I had washed it in hot water.” On the other hand, an inquiry made of a gentleman living at Penzance, and interested in Echinoderms, resulted in the answer that he had never heard of the “Cotton-Spinner.”

F. JEFFREY BELL.

### The Red Glow

In your issue of April 10 (p. 549) is the statement by an observer in Australia that the “red glow” was margined by an immense black bow stretching across from north-west to south-east.”

I wish to say that the above language almost exactly describes the appearance to which I alluded on the same page as “the earth shadow cutting off the upper rim of the first glow.” The “black bow” of the Australian was evidently the shadow of the horizon projected on the haze stratum. In both the above cases the lower surface of the haze was evidently well defined, so that as the horizon intercepted the direct rays of the sun, a well-marked shadow moved westward and downward. Above this black rim or bow appeared the secondary glow, produced by the reflection of the sun’s rays from that portion of the haze surface which was directly illuminated. Very often the second glow was more conspicuous and impressive than the first, because it shone against the dark sky of night.

In the *Proceedings* of some association I have just read an astonishing estimate of the height of the haze as 141 miles, based on the fact that it received the sun’s rays one hour after sunset, the fact being strangely overlooked that the late reflection was a secondary one.

One evening the shadow or “black bow” was beautifully indented or serrated, doubtless by the shadows of remote cumuli such as are commonly seen in platoons on our evening horizons. The “black bow” was seen only during the first few days of the glows in September.

S. E. BISHOP

Hawaiian Government Survey, Honolulu, May 20

P.S.—I hoped long ere this to have sent you data from the Caroline Islands received per *Morning Star*, now much overdue. We fear she has suffered disaster.

### Light Phenomenon

THIS evening towards sunset, at 7.55 p.m., there was a column of light extending from the upper part of the setting sun to about 20°, the column being truncated and perpendicular to the horizon. After remaining thus for about two minutes, the sides of the pillar lost somewhat of their perpendicularity, and, with the whole volume of the sun, put on prismatic colouring, the ray (a single one, and still truncated) at times appearing to be a wave of flame. I observed this, with four or five other persons, from the cliffs, and should like to know if the peculiarity of this sunset was observed by others. It continued until 8.20 p.m., when the sun was below the horizon, and the wave of flame ceased. I can hardly better describe this ray than as being very like a northern light, only extremely circumscribed in size, and intensely brilliant.

R. D. GIBNEY

Falmouth, June 21

### Atmospheric Dust

IN connection with the recent experiments of Dr. Lodge and Mr. John Aitken (described in late numbers of *NATURE*) on the filtration of dusty atmospheres, I have ventured to call your attention to the following, as of possible interest. I have had frequent occasion to note the intensity of the so-called “rain-band,” an absorption-band of terrestrial origin, due probably to the dust and water-vapour present in the atmosphere, and of just less refrangibility than the less refrangible of the D lines, and have at present two continuous records of observations taken, in the main, five times a day, running back a year and a half or so. I have also a very thorough list of the auroral displays which have occurred for the same period in this vicinity. Granting that the aurora is an electric discharge in high regions of the

atmosphere, or, more accurately, where its density is inappreciable compared with that at the earth’s surface, and knowing that according to these recent experiments an electric discharge is capable of precipitating the dust-particles in the atmosphere, it should follow that at times of auroral display, or immediately following, the intensity of this rain-band should be at a minimum. Searching the records to ascertain if any such correspondence could be noticed, it is quite astonishing to find how distinct and well marked this variation in the intensity of the rain-band at times of auroral occurrence is. The atmosphere is full of fine dust-particles, and our very general, though not yet decisively proven, belief is that the aurora is somewhat of a glow-like discharge from electrified air strata, in whose vicinity the density of the dielectric is inconsiderable. The direct inference is that at such times the fine dust and vapour particles are deposited, made to settle, or, uniting together, form an agglomeration, and become perhaps cloud-nuclei. Perhaps other evidence on this matter can be elicited. The records at hand show very plainly just such an agreement as was anticipated.

ALEXANDER MCADIE

26, Garden Street, Cambridge, Mass., U.S.A.,

June 5

### Some Botanical Queries

THERE is a plant here with a very large bulb, *Scilla maritima* (?), whose flower I have not seen. I grew two of them in pots last year, but they failed. This plant is set by the peasants near the fig-trees with the idea that these latter will produce better fruit. Is this a mere superstition? or can the *Scilla* be connected in any way with capricification?

Is *Lilium bulbiferum* known to be polygamous? The greater part of the specimens I have found in the mountains near here are staminate, but in some there is a very minute though perfectly formed pistil. Müller, my only book of reference, says nothing on this point.

Is *Trifolium repens* among the list of cleistogamous plants? I am watching a specimen which seems to produce abundant fruit, but no ordinary flowers.

LIGUS

Nice, France, June 20

### Primæval Man and Working-Men Students

UNDER the above heading you published a letter from me in *NATURE*, August 2, 1883, p. 320, giving the names of four thoughtful artisans, who, after studying the Pitt-Rivers collection of antiquities, and reading my notes in *NATURE*, had made finds of Palæolithic implements in Essex. Ten months have passed since that letter was published, and a fifth student, Mr. W. Swain, has now joined the original party of four. On Sunday, June 15, these admirable workers called upon me with their recent discoveries. They consisted of fifteen Palæolithic implements found in the drift gravels of Leyton, Wanstead, and Plaistow, with the usual complement of flakes. Some of the implements were of the older abraded class, others were as keen as knives, and from my “Palæolithic Floor,” traces of which, as I have pointed out, may be seen in Essex. Three nondescript tools were also lighted on, and four hammer-stones of quartzite with abraded ends, one from Nazing; five Neolithic instruments from Jordan’s Wood, and a large collection of flakes.

The excursions for these tools and flakes have necessarily all been made on Sundays. The finders of the stones are not mere collectors, but men who have mastered the meaning of their subject.

W. G. S.

### FORESTRY

THE approaching International Forestry Exhibition at Edinburgh, which is to open on July 1 next, and which promises to be a very successful affair so far as the variety of the exhibits and the general arrangements of the Exhibition are concerned, will, it is hoped, prove something more than a mere show during the months it is open to the public. Though the objects exhibited will, in all probability, be a source of considerable attraction and instruction, inasmuch as the arrangement and scope of the several classes seem to have been carefully considered, it is much to be hoped that the Exhibition will be

the means of leaving a lasting improvement on the condition of forestry in this country. One thing it certainly must do, and that is it will draw attention to the great importance of practical forestry in utilising and developing the resources of forest produce, and in directing attention to these products the eyes of many will be opened as to their value, whether to the consumer or to the producer. There is, however, a higher aim in the prosecution of scientific forestry than even these points just referred to, namely, the preservation of indigenous arboreal vegetation and the securing of a sufficient rainfall.

The superiority of our Indian Empire and many of the British colonies, as well as France and other countries of continental Europe, over Great Britain itself must, from the nature of things, be prominently seen in the forthcoming Exhibition, whether in the character of the exhibits themselves, or in the exemplification of forest workings. This, then, should bring some good results towards putting our own country on a more satisfactory footing regarding the teaching of the principles of forestry, so that we may not in the future stand in the unenviable position of being about the only country of any importance which has not its School of Forestry or some institution or college where the Government recognises the importance of the subject by a grant from the Imperial Exchequer. The position of England in this respect as compared with other countries was admirably shown by Col. Pearson in his paper on "The Teaching of Forestry," read before the Society of Arts on March 1, 1882. He then pointed out that, "besides the establishments for teaching forest management in Germany and France, schools of silviculture now exist in all the principal countries of Europe except in Great Britain. Austria, Italy, Russia, Switzerland, and even Roumania, most of them, after sending pupils for a few years to the French and German schools, have set up schools of their own, and thus rendered themselves independent of foreign educational aid." After referring to the fact that America was at that time about founding a similar school, Col. Pearson says:—

"It is to be regretted that as yet no steps have been taken to do the same in Great Britain, for with us, as elsewhere, a forest school would become not only an establishment for teaching silviculture, but also a centre of study and practical observation from whence a knowledge of silviculture as a science would be spread abroad for the benefit of society in general.

"It is certain that, unless the forests of a country are properly and economically managed, the time may come when, as was the case in India, it will find itself without the means of procuring the needful supply of timber, except at an extravagant price; while at the same time the general interests of the community require that a fairly abundant and cheap supply should be constantly available. This is especially the case where, as in the great continental areas, deficiency in the means of transport, or the distance from the timber-producing tracts, adds materially to its cost. In such cases experience has shown that the only practicable way out of the difficulty is for the State to intervene; and although in England we have special facilities for supplying our wants from abroad, owing to our extended commerce with all countries, the extreme limits of a reasonably cheap supply seem to have been reached; and at all events State action seems so far desirable as to help private proprietors to make the best use of their timber-producing lands."

Following on this, namely, in August last, Sir John Lubbock asked from his place in the House of Commons whether Her Majesty's Government, during the autumn then ensuing, would consider the question of forest education in this country, and whether the national forests might not be utilised for this purpose, taking occasion to point out that our woods and plantations amounted in

round numbers to 2,500,000 acres, and, moreover, that in Scotland and Wales it was calculated that there were 5,000,000 or 6,000,000 acres at present almost valueless, which, if judiciously planted, would give large results, thereby showing that the subject was one of vast importance. Sir John Lubbock further said:—"We were the only important nation in Europe without a forest school, and yet if we included our colonies, our forests were the largest and most valuable in the world. It appeared to be a very strong argument in favour of the establishment of a forest school in this country that at present the young men who were going out to manage our Indian forests had to be sent for instruction to the great French Forest School at Nancy. No doubt that this was a most excellent institution, and we were indebted to the French Government for the courtesy with which they had received our English students; but the system of education given there naturally contained some branches—as, for instance, the study of French law—that were not adapted to English students, while there were many other considerations, such as climate, which rendered a Continental school less suitable for English requirements. He might add that no young Englishman as a matter of fact, went there excepting those intended for the Indian service. For our colonies, again, the establishment of a good forest school here would be of very great importance. A judicious management of their woods would add considerably to their income." As an illustration of the need of some system of forest teaching in this country, Sir John Lubbock referred to the recent appointment of a Forest Commissioner by the Government of the Cape of Good Hope at a high salary, a French gentleman having been selected in consequence of the failure to find a properly qualified Englishman.

India was perhaps the first country belonging to the British Empire to organise a complete system of forest conservancy, and this was not effected before it was absolutely needed, for many of the valuable timber trees of India were threatened with annihilation in consequence of the reckless manner in which they were felled to supply the wants of the people. The appointment of Dr. Brandis as Inspector-General of Forests, in 1863, was the commencement of a better state of things, "and in 1867 his scheme for training foresters for India in the schools of France and Germany was, after much discussion, adopted finally by both the Home and Indian Governments." The outcome of this is well known, and India now has a large and well-trained staff of educated forest officers, who not only furnish valuable and interesting periodical reports on the forests of their respective districts, but standard works on the subject of India's arboreal vegetation are not amongst the least important result of their labours. As a proof of this we need only mention the titles of Beddome's "Flora Sylvatica of Madras," published in 1873; Brandis's "Forest Flora of North-West and Central India," published in 1874; Kurz's "Forest Flora of British Burma," published in 1877, and last, though not by any means least, Gamble's "Manual of Indian Timbers," published in 1881.

Trained as Indian forest officers now are before commencing their duties, and with the books we have mentioned as their guides, it is not difficult to understand that our Indian Empire possesses a well-organised Forest Department, and many of the colonies are following, if not on exactly similar lines, the example set for the preservation of their forests. With all these indications around us that foreign countries and our own dependencies are fully alive to the importance of a proper management of their forests, it is not a little remarkable that we in this country are no farther advanced in the matter of establishing forest teaching here than we were two years since, when the subject was so strongly represented by Col. Pearson, or when nearly a year since Sir John Lubbock revived it, and placed the matter prominently before the

present Government. It is therefore sincerely to be hoped that the forthcoming Exhibition at Edinburgh will be the means of putting a new spoke in the wheel, and that before the close of the Exhibition, or soon after, something tangible may have resulted in making forestry one of the branches of education either in distinctly constituted forest schools, or in our present agricultural colleges.

It is satisfactory to know that the arrangements of the Exhibition are in a forward state, and that, if the promises which have been received by the executive are fulfilled, the Exhibition will exceed the anticipations of the promoters.

JOHN R. JACKSON

#### RAINFALL OF NEW SOUTH WALES<sup>1</sup>

UNDER the energetic direction of Mr. Russell the investigation of the rainfall of New South Wales is being prosecuted with much success, and the interest of the colonists may now fairly be regarded as awakened to the importance of the inquiry. This is evidenced by the recent rapid increase of stations, the number of rain stations for the five years ending 1882 being 96, 153, 191, 256, and 308, having thus trebled during this brief interval. A comparison of the maps of stations for 1878 and 1882 shows that the increase has been pretty evenly distributed over the whole colony; and of particular importance is it to note the spread of the rain-gauge over the extensive regions which lie to the north and north-west of the Murray River.

Mr. Russell draws pointed attention, in the following extract, to the practical value to the colonists of well kept rain registers:—

“As a proof of the necessity for the use of the rain-gauge all over the colony, not only for purposes of science, but also as a necessary instrument on every run, I may mention that on Goolhi station six gauges are kept on various parts of the run, and the records range from 19·81 inches to 27·75 inches. It would obviously lead to a false estimate of the grass the run would produce if only one gauge had been used, and that one where only 19·81 inches were recorded. I hope that the facts which the yearly records bring to light will have the effect of awakening those interested to the immense importance of collecting these statistics carefully, and at once, so that every year will add to the knowledge which will be of such value in forming estimates of the seasons which are to come, and of the possibility of conserving water.”

Lately much speculation was indulged in, and various schemes were proposed of increasing by artificial means the rainfall of New South Wales, particularly in seasons of drought when day after day the sky becomes covered with dark, dense-looking clouds which regularly pass away without a drop of rain. In these cases, science can as yet hold out no hopes to the agriculturist. The successful instances of rain-production by artificial means have occurred when the atmosphere in the district where the experiment was made was at or near the point of saturation, a state of things which does not exist in the arid plains of the interior of Australia under the meteorological conditions when clouds daily darken the skies and as regularly mock the expectation of the farmer.

It must then be to a judicious and skilful cropping of the rainfall that the Australian farmer must look for the supply of his wants in the dry season and still more in seasons of exceptional drought. Now, as contributions towards the solution of this problem, the annual rainfall reports of Mr. Russell are simply invaluable. These reports give the rainfall and total days of rain for each month and for the year, to which is added the mean annual rainfall and rainy days calculated from previous years' observations at each place available for the purpose.

<sup>1</sup> “Results of Rain and River Observations made in New South Wales during 1873-82.” By H. C. Russell, B.A., Government Astronomer for New South Wales.

The annual rainfall for each year is represented on a large map of the colony, 22 by 26 inches, where the fall for each station is entered in its place as a black spot, the diameter of which is proportioned to the quantity of rain. By this device, the eye takes in readily and at a glance the distribution of the rainfall for the year. The comparative results of the five years for the different districts of the colony are most instructive.

Owing to its position on the globe and its physical configuration, New South Wales presents extremely different climates according to the varying amounts of the rainfall. Thus at Antony, on the coast near the borders of Queensland, the mean annual rainfall amounts to 65·15 inches; whereas at Mount Poole, in the extreme north-west, it is only 8·38 inches. For the nine years beginning with 1874, an approximation to the annual rainfall of the colony for each year has been calculated by Mr. Russell, the results for the separate years being 33·46, 29·38, 27·66, 20·48, 25·05, 30·75, 19·93, 20·73, and 20·11 inches, each of the last three years showing a marked deficiency. Now the interesting point is this, and it is a peculiarity which every other country possesses, but particularly those which exhibit climates so diversified as New South Wales, viz. that the rainfall of any month, or of any year, is very far from being equably distributed. The amounts of the excesses above, or the defects from, the average, tend really to partition the country into several well-defined rain districts for the time, these being determined apparently by river basins, watersheds, and other features of its physical configuration taken in connection with their relations to the thunderstorms and the rain-bringing winds. It is quite in the future, as an outcome of Mr. Russell's work, that the settlers in different parts of the colony will receive specific directions as to the cropping of their rainfall so as to provide even against the recurring calamitous droughts of the Australian climates.

An interesting feature of the reports are the diagrams, showing, by curves, the heights for each day of the Darling, Murrumbidgee, and Murray Rivers. A heavy flood occurred at Bourke, on the Darling River, on February 4, 1882, and reached its maximum, 26 feet 2 inches, by the end of the month, and the river did not fall to its summer level until April 5. This flood was occasioned by heavy tropical rains, from February 1 to 7, that fell over the northern part of the Darling watershed, which took two months to drain off, as is proved by the fact that little or no rain fell during the latter half of February and all March. In a few years these systematic observations of the heights of the principal rivers of Australia will furnish invaluable data for the determination of not a few important problems of meteorology and physical geography, which the marked insular character of this continent is so well suited to elucidate.

#### CALCUTTA BOTANIC GARDEN

SIR JOSEPH HOOKER has kindly placed at our disposal the following letter on the Calcutta Botanic Garden:—

“Our beautiful garden is now looking very nice. Let me tell you what I am looking out upon. On the right is a fine *Terminalia Catappa*, a mass of dark green foliage from base to summit, its branches with a quantity of *Soranthus longiflorus* on them. Further off, towering in the distance, is a clean-stemmed, stately-looking *Dipterocarpus alatus*, its branches the roost of vultures and *cheels*. Almost as tall, to one side of the *Dipterocarpus*, is a beautiful *Terminalia Arunja*, with mahoganies and the golden-flowered *Peltophorum* in front. *Dillenia pentagyna* in front, and *Morinda tinctoria* covered with masses of *Vanda Roxburghii*. There is a fine *Adina cordifolia*, one of the monarchs of the garden; its straight, strong stem, disdaining to bend in the sudden squalls and rain-storms, bears evidence of having been topped before,