

THE SPECTRUM OF LIGHTNING.—It is not very often that a very successful photograph of the spectrum of lightning is obtained, but that secured by Mr. A. Steadworthy, and reproduced in the Journal of the Royal Astronomical Society of Canada (September–October, 1914) is of this nature. The easiest way to secure such photographs is by placing a prism or a transparent replica grating in front of the camera lens. In the case of the former the spectrum only is photographed, but in that of the latter images of both the flash and the spectrum are recorded side by side. Mr. Steadworthy employed the first method, using a 60° dense flint glass prism in front of a 2-in. lens of 16-in. focus. The account is accompanied by the measurements of the lines of the spectrum made by Mr. J. B. Cannon, of the Ottawa Dominion Observatory. The wave-lengths of fifty lines are given, and a comparison table is given containing the wave-lengths of the lines measured in the fine spectrum obtained and described by Mr. Fox in the *Astrophysical Journal* (vol. xviii., p. 295). Mr. Steadworthy also secured ten excellent stereoscopic photographs of lightning flashes, some of which are reproduced in his article.

REPORT OF THE SMITHSONIAN ASTROPHYSICAL OBSERVATORY.—The director of the Astrophysical Observatory of the Smithsonian Institution, Prof. C. G. Abbot, has issued his report for the year ending June, 1914. This report contains a brief statement of the equipment of the observatory, the work of the observatory at Washington, and at Mount Wilson. It is shown that progress has been made in the measurement of the effects produced by atmospheric water vapour on solar and terrestrial radiation. New apparatus for measuring sky radiation has been devised and perfected. A most interesting account is given, including an illustration, of special pyrhelimeters for recording solar radiation at great altitudes when attached to free balloons. The highest elevation at which a radiation record has been obtained was about 14,000 metres, or nearly 45,000 ft. The results obtained tend to confirm the adopted value of the solar constant of radiation. A Tower telescope has been erected and put into operation on Mount Wilson. The tower is 50 ft. high and equipped temporarily with a reflecting telescope of 12-in. aperture and 75 ft. focal length. By means of it the variability of the sun has been independently confirmed, and it is stated that changes of the distribution of radiation over the sun's disc occur in correlation with the changes of the sun's total radiation.

ORNITHOLOGICAL NOTES.

IN the report of the council of the Royal Society for the Protection of Birds, embodied in the winter number of *Bird Notes and News*, it is stated that four British lighthouses have now been fitted with bird-perches. The same issue also contains the results of the 1914 competitions for school challenge shields in connection with "bird-and-tree day." Despite a good series of essays from Woburn, the Bedfordshire shield has been withdrawn, on account of the lack of competitors; Lancashire, on the other hand, bids fair to receive the award of a shield during the current year.

In an article on the probable effect of the war in the western area on birds, in *La Nature* for January 16, Dr. E. L. Trouessart expresses the opinion that storks in Alsace and local ground-birds and partial migrants throughout the area of conflict will be the main sufferers. Night-flying migrants, on the other hand, will probably steer clear of the chief areas of conflict, which, looking at the subject in a wide sense, are relatively small. In the neighbourhood of Arras

the country was reported to be the resort of myriads of crows in December, attracted doubtless by the rich supply of food.

Among the more notable birds observed in Hertfordshire in 1913, Mr. W. Bickerton records, in the Transactions of the Hertfordshire Natural History Society for January, quail, snipe, and goldcrests as breeding in the county, together with casual visits of the oriole, hobby, and dotterel.

In anticipation of a fuller notice in a forthcoming issue of his *Birds of Australia*, Mr. G. M. Mathews revises the classification of the frigate-birds in vol. ii., No. 6, of the *Austral Avian Record*. Hitherto only two species of these birds have been recognised, *Fregata aquila* and *F. ariel*, the former a widely spread type, split up by some ornithologists into three or four local forms. Mr. Mathews, on the other hand, restricts *F. aquila* to the Ascension Island bird, both sexes of which are wholly black, with no rust-colour on the white heads of the young. The other frigate-birds hitherto classed with *F. aquila* are for the most part identified with *F. minor*, of Melin, the typical locality of which is taken to be Jamaica, several subspecies, from the Seychelles, Aldabra, Laysan, the Galapagos, etc., being recognised. The frigate-bird of Christmas Island, Indian Ocean, is described as a new species, with the name of *F. andrewsi*, and is characterised by the under-parts being wholly white in the female and partially so in the male. Lastly, we have *F. ariel*, typically from Torres Strait, characterised by the presence of a white patch on the flanks of the cock, and of which three local races are recognised.

Hybridism in cockatoos forms the subject of an article (illustrated by a coloured plate) by Dr. E. Warren in vol. iii., pt. 1, of the *Annals of the Natal Museum*, dated September, 1914. A male of the sulphur-crested *Cacatua galerita*, and a female of the slender-beaked *Licmetis nasica*, have been kept for the last eight years or so in a state of semi-confinement in the open air at Pietermaritzburg. During the latter portion of that period the female laid several eggs, two of which were duly hatched. The two hybrids, which are practically similar to one another, are to a great extent intermediate in coloration and plumage between their parents, although nearer to the sulphur-crest than to the slender-beaked species, the resemblance to the former being especially shown by the stoutness and blackness of the beak, as well as by the red loreal patch of the female parent being replaced by orange, and by the total disappearance of the red at the bases of the feathers behind the eyes, so characteristic of the latter. Whether this resemblance of the hybrids to their male parent is due to prepotency in the latter, and the bearing of the whole case on Mendelism, form the subject of a long discussion by the author.

In reference to a recent discussion with regard to birds travelling northwards in autumn on the British coasts, Mr. J. H. Gurney records in the *Zoologist* for December, 1914, that an immense series of flocks of various species were seen flying northwards on October 7 over Cromer, Northreps, and Overstrand, the wind at the time being north. Mr. Gurney is of opinion that such movements are annual, and that after a short interval the wanderers would return south.

During a trip to eastern Siberia in the summer of 1914 Miss Maud Haviland was fortunate enough to come across the curlew-sandpiper breeding at Golchica, at the mouth of the Yenisei. Eggs of this species, it may be recalled, were collected by Mr. H. L. Popham, in July, 1897, on the Kristovski Islands, which are a considerable distance further down the estuary.

According to a narrative published in the January number of *British Birds*, Miss Haviland found the species comparatively abundant in the Golchica district, and procured several skins, as well as a clutch of eggs and a couple of young birds. The last are very similar to young dunlin, but even when a few days old may be distinguished by the shape of the beak. As soon as hatched they leave the dry upland slopes for the sphagnum-bogs that occupy the hollows in the tundra.

R. L.

CLAY AND POTTERY INDUSTRIES.¹

IN an interesting and valuable introduction, Mr. Graham Balfour, who has been for so many years closely associated with educational work in North Staffordshire, says:—"This volume of collected papers is the first fruits of the Stoke-on-Trent Pottery School, and will in due course . . . be followed by many successors of equal size and value."

The publication of this record of work done by the students and members of the staff coincides with the opening of the New Central Schools of Science and Technology at Stoke-on-Trent, which contain finely equipped chemical, physical, and pottery laboratories and class rooms, and in which the old pottery school finds at last a suitable home.

The school has been conducted by Dr. Mellor for some ten years under conditions which would certainly have damped the ardour of any ordinary man, but this record of work accomplished during these years by Dr. Mellor and his students is a striking testimony to the enthusiasm and ability with which the work has been carried on. It is no longer necessary or desirable that an English pottery student should go to Charlottenburg for his training as a ceramic chemist, for here at hand he has a splendidly equipped school, which has already built up a tradition for research work of the highest importance. The subjects dealt with cover a very large field, but nearly all are of direct practical value to the potter.

Paper xxix. on studies on cylinder grinding is a most excellent contribution, and is a typical example of the thoroughness with which the subjects are treated in their theoretical and practical aspects.

Paper xxiv., on the absorption and dissolution of gases by silicates, by Mr. Bernard Moore and Dr. Mellor, is an extremely interesting and important paper of direct practical value, and the publication of this and other similar work has already beneficially affected pottery practice in this country.

The papers on the nomenclature of silicates and on the chemical constitution of the kaolinite molecule are in another category, but although they are not of direct practical application, they are of great interest to the ceramic chemist, and they show that the outlook of the school is comprehensive and that the work done has an importance beyond the confines of the pottery industry.

The illustrations and descriptions of apparatus—much of which is here described for the first time—are excellent, and it need scarcely be said that Dr. Mellor has used his mathematical ingenuity to advantage in working out and in explaining the problems dealt with. The references to original papers and other published work of German, French, American, and English chemists is a very useful feature of the book.

The papers are naturally of very different values, and their publication in one volume produces a rather

¹ "Clay and Pottery Industries." Being vol. i. of the Collected Papers from the County Pottery Laboratory, Staffordshire. By several Authors. Edited by Dr. J. W. Mellor. Pp. xvii+411. (London: C. Griffin and Co., Ltd., 1914.) Price 15s. net.

uneven "Mosaic" effect, but the impression one gathers from a perusal of the book is the wide scope and thoroughness of the work and its practical value. It is a unique publication in this country as a record of work done by so small a school and in so modest a way.

JOSEPH BURTON.

THE IRISH TECHNICAL INSTRUCTION ASSOCIATION.

THE proceedings of the Annual Congress of the above Association, held at Killarney in May last, are of more than usual interest. The operations of the association cover virtually the whole of Ireland, and the congress just held is the thirteenth since the Act of 1902. Without any question these congresses have contributed largely to the development of scientific and technical instruction in Ireland, and incidentally to a keener interest in a more efficient elementary and intermediate education.

The subjects dealt with have been concerned mainly with industrial progress and with the conditions and problems which await investigation and solution in order to ensure a stable advance in the agricultural, industrial, and commercial well-being of the nation.

In this endeavour there is the closest co-operation on the part of the Government and other official authorities with the education committees of the various areas, and four of the papers of high importance, dealing with the "Problem of Small Industries," "The Technical Training of Skilled and Unskilled Workers in France and Germany," "An Industrial Survey of Ireland," and "Technical Instruction for Small Holders," were read by officials of the Department of Agriculture and Technical Instruction, and Mr. T. P. Gill, the secretary of the Department, gave an inspiring review of the progress of technical instruction in Ireland since its initiation in 1902.

The position and future of the Irish woollen trade was the subject of a highly interesting paper by Mr. J. F. Crowley, of Siemens Bros., Ltd., with the object of showing that the industry, now somewhat languishing, is peculiarly suited to the genius, temperament, and circumstances of the Irish people, and that, given the organisation, both industrial and commercial, due technical training and capital, there is no reason why the industry should not take a high place amongst the productive enterprises of Ireland. It is essential to its success that there should be, amongst other measures, a central woollen textile school established in the south of Ireland for the efficient training of the various grades of persons engaged in the industry.

The paper by Mr. Macartney-Filgate, well illustrated by maps, diagrams, and lantern slides, setting forth the varied industries and natural resources of Ireland and suggesting lines and methods of scientific development, was of much interest. Whilst the available coal supply is limited, there is water power available, easy of transformation into electrical energy, to the extent of $1\frac{1}{2}$ million horse power, together with an almost unlimited supply of peat fuel, and examples were given showing how this and the former source of power had been successfully utilised on a large scale, and only needed capital and enterprise still further to develop it. The extraction of oil from shale on a considerable scale has also been successfully begun, rendering it possible to utilise the internal combustion engine for the service of the small manufacturer. Much valuable information was given by Mr. L. J. Humphreys on the efficiency of co-operative effort in his paper on "Technical Instruction for Small