

such an idea. Mr. Wilson's results showed that ions may become the nuclei for condensation, but only when the air is both dust-free and supersaturated four-fold. An infinity of ions in dusty air, or in air supersaturated three-fold, would not cause clouds, and as neither dust-free nor supersaturated air have ever yet been met with in the atmosphere, it is difficult to see how electrons from the sun could produce cloudy weather.

(3) These considerations apply, but with still greater force, to Sir Oliver Lodge's next sentence:—"Local thunderstorms are also a not unlikely result." This is not the place to go into the controversy over the Wilson-Gerdien theory of thunderstorms, but it ought to be pointed out that very strong reasons have been put forward for doubting that the condensation of water on ions plays any part in thunderstorms.

GEORGE C. SIMPSON.

Meteorological Office, Simla, October 21.

The Identity of Certain Large Birds on Egyptian Vases.

In looking to-day for an archæological reference in my friend M. Jean Capart's valuable volume on "Primitive Art in Egypt" (English edition), I noted that he has determined certain birds, delineated on a series of decorated vases, as ostriches. The vases I refer to are to be found on p. 116, Fig. 88; p. 118, Fig. 91; p. 119, Fig. 92; p. 120, Fig. 93; p. 121, Fig. 94; and p. 123, Fig. 96. I venture to suggest that the birds intended to be represented are not ostriches, but flamingos. The inbent beak, the dorsal body-contour, the horizontal ventral region, and the long, lanky legs, uncovered by feathers in the tibial region as in ostriches, all so characteristic of the flamingo, are delineated with great truthfulness on a large scale on the vase illustrated on p. 123, Fig. 96. The crosier-staff-like head is common to all the drawings I have indicated. Although the representation of the bird on p. 120, Fig. 93, is rather too small and ill-defined to base much upon, the curvature of the neck is yet more that of a ciconiiform than of a struthious bird. Indeed, on p. 119, Fig. 92, the group of birds at the right-hand corner of the vase is actually in proximity to water, which would hardly be the case if the artist intended it for one of ostriches; while on the vase illustrated on p. 121, Fig. 94, the four birds delineated have very characteristic horizontal flamingo tails, especially the individual on the extreme left of the row, in which it is spread. These attitudes are in striking contrast with those of certain other large birds included in the zoological group on the rocks of Upper Egypt, reproduced on p. 204, which must be admitted to represent ostriches, at the first glance, from the attitude of their legs in walking, their plumage contour, and their straight beaks.

The above suggestion I have made during the past two or three years to several Egyptologists, who have recognised its valency; but as I have seen nowhere this emendation, which I believe it to be, recorded, I think it may be of interest to give it publicity, inasmuch as the ethnographical deductions to be drawn from these rude pictures can be correct only if the artist's intention has been accurately interpreted.

HENRY O. FORBES.

The Museums, Liverpool, October 31.

November Meteors.

THE absence of moonlight during the Leonid epoch of the present year will be favourable for observations of this historic shower. For determining on which of the three dates of November 14, 15, and 16 it may occur, calculations made by the writer point to the night of November 16 as that of the maximum, when, as was the case on the corresponding night of last year, the number of meteors radiating from the Sickle may be found by observers to be considerable. The following are details as to this and also other showers that become due during the remainder of the month of November:—

Leonid epoch, November 16, 8h. G.M.T. This shower is of the sixteenth order of magnitude, having its principal maximum on November 16, 15h.; other maxima take place on November 16, 10h. and 18h., and November 17, 21h.

Epoch November 21, 9h. 30m., shower of fourth order of magnitude. The principal maxima occur on November

19, 21h. 15m., and November 20, 18h. 30m. Two other maxima occur on November 20, 2h. 30m. and 5h. 30m.

Epoch November 21, 17h. This shower, which is of the fifteenth order of magnitude and immediately follows the former, has its maxima on November 21, 21h., and November 22, 11h. 30m.

Epoch November 26, 1h. 30m. This shower, of third order of magnitude, has two principal maxima, on November 26, 15h., and November 27, 2h. There is another maximum on November 27, 5h.

Epoch November 29, 20h. 30m., of third order of magnitude; has its principal maximum on November 29, 17h., with an earlier maximum on November 29, 3h. 30m.

Dublin, November 8.

JOHN R. HENRY.

The Absence of a Lunar Atmosphere.

WITH reference to Mr. Alexander Johnson's letter on this interesting subject, I should like to point out that the theory of radiation pressure is not applicable to gases. Beyond a certain range of minuteness, the effect of radiation pressure on particles diminishes, and the size of a particle on which the repulsive force of light is at a maximum is vastly greater than molecular magnitudes. As this is very important, I quote certain numerical determinations given by Prof. Arrhenius ("Worlds in the Making," pp. 97, 98):—

(1) Diameter of a totally reflecting sphere which would be in equilibrium near the sun under the opposing forces of gravitation and radiation pressure=0.0015 mm., the specific gravity of the sphere being the same as water.

(2) For radiation pressure to be effective, the diameter of the particle must exceed 0.3 of the wave-length of the incident radiation. If smaller than this, gravitation predominates.

(3) Radiation pressure is at a maximum when the diameter of the particle equals the wave-length of the incident light (e.g. 0.5 μ for the blue-green region about λ 5000 A.U.).

(4) In the case of sunlight, which is not homogeneous, Prof. Arrhenius gives 0.00016 mm. as the diameter of particles on which the effect is greatest.

As regards the absence of a lunar atmosphere, it seems that we must fall back on the kinetic theory of gases and attribute it to the gradual escape of the more swiftly moving molecules into the surrounding space.

CHARLES W. RAFFETY.

Wynnstay, Woodcote Valley Road, Purley, Surrey,
November 1.

Pitchblende as a Remedy.

As there is now no longer the least doubt as to important cures being effected by means of radium, the question arises whether crude pitchblende would not also have beneficial effect if applied in the case of minor chronic ailments. Perhaps one of the readers of NATURE will be able kindly to give some information on this subject. The very minute proportion of radium in pitchblende need be no real objection. If we substitute, in the case of pitchblende, grams for milligrams and days of application for so many minutes, a disparity of one million is soon made up, and there may be some action, although perhaps different from that of a pure radium salt. Moreover, we must expect a beneficial influence from minute quantities of radio-active substance if the assumption is to be finally proved that certain thermal waters owe much of their virtue to such traces. In addition to raw pitchblende, a possible utility of pure (yellow) uranium oxide might also be considered.

H. WARTH.

SOUTH AFRICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE seventh annual meeting of the South African Association for the Advancement of Science opened at Bloemfontein on Monday, September 27, under the presidency of the Governor, Sir Hamilton Goold-Adams. The advantage of Bloemfontein for such a conference, in that it is in the centre of South Africa, was observable in the number of busy men

who were able to run down from Johannesburg, Pretoria, and Kimberley for the occasion, to whom the usual two days and two nights' journey in the train necessary to travel from one centre to another would have been prohibitive. The meeting was the most successful so far held, from the fact that the Governor, the municipality, the Press, and the citizens generally, united in welcoming the delegates from the various centres, and in showing appreciation for the objects of the association.

In the opening address the president struck the dominant note of the meeting, namely, that science is not of purely academic interest, but that the results won by scientific men could be understood by the unlearned if they tried, and that the results could be applied to everyday life with material benefit. The text of the address was the "Application of Chemistry in Agriculture." The mining industry has a very important bearing on the prosperity of the country, "yet agriculture must be considered as the main and permanent foundation upon which the future progress of the nation must rest."

The acting mayor, Mr. A. E. Parfitt, in welcoming the delegates, said, "I daresay that from a sanitary point of view this town excels all others in South Africa," a wonderful statement in view of what the town was like only a few years ago. This fact was more fully brought out by Dr. Tomory, medical officer of health for the town, later on in his paper on "Recent Methods of Water Purification," in which he dealt with the merits of slow sand filtration and the American methods of rapid chemical treatment; the Bloemfontein system is a compromise between the two.

Prof. W. A. D. Rudge, of Grey College, Bloemfontein, president of the section of astronomy and mathematics, opened the sectional meetings at the Normal College buildings on September 28 with an address on the "Genesis of Matter." Mr. Hugh Gunn, Director of Education in the Orange Free State, president of the education section, took for the subject of his opening address "The Problem of Rural Education." He considered this to be the most exigent question of the moment. Farmers had done their best, but the badly provided farm schools, staffed with one teacher, whose emoluments were poor, and whose qualifications corresponded, were inadequate. Rural schools were regarded as being on the lowest rung of the educational ladder. He calculated that barely one-quarter of the area of South Africa was provided with school facilities, and that 80,000 children of school age were not attending school. Of this number he thought two-thirds lived in the rural districts. He wished to abolish single-teacher schools, and to replace them with three-teacher schools. This could be done by providing transport facilities. A beginning had been made in the Orange Free State with satisfactory results, and he hoped to see the system extended.

Dr. C. F. Juritz, of Cape Town, opened the section devoted to chemistry and geology with an address on "Agricultural Chemistry." The following are the more important papers read in the various sections. Unfortunately, the sections were reduced to three, and had subsequently to be divided to enable all the papers to be read, hence some confusion ensued in regard to placing the papers in their proper section.

Water vapour on Mars, J. de Fenton; notes on the geology of Natal, J. A. H. Armstrong; revised list of the mammals of South Africa, E. C. Chubb; puberty rites of the Basuto, and prehistoric African fauna and flora as evidenced by African philology, Rev. Father Norton; maize breeding, R. W. Thornton; cultivation of maize, J. Burt-Davy; solar radiation, H. E. Wood; the great snow-

storm of August, 1909, H. E. Wood; the Breede River irrigation works, T. E. Scaife; notes on the recent magnetic storm, G. W. Hopkinson; the flora of Portuguese East Africa, T. R. Sim; the vegetation of the southern Namib, Dr. R. Marloth; lime and milk, R. Pape; the composition of milk in Cape Colony, St. C. O. Sinclair; notes on the fauna and flora of Sarawak, J. Hewitt; mental healing, Right Rev. Bishop Chandler; the value of the practice and teaching of hygiene in schools, Dr. Targett-Adams; the salt pan of Haagenstad, G. W. Cook; the bearing of recent theories on the nature of the earth's interior on the question of deep mining, Prof. E. H. L. Schwarz; itacolumite from Swaziland, Prof. G. H. Stanley; observations on the vascular system of *Hemitelia Capensis*, H. G. Morris; notes on the anatomy of Widdringtonia and Callitris, W. T. Saxton; the principles of the naturalisation of forestry, C. Robertson; architecture, H. Baker; the relative growth of our white and black population, J. M. P. Muirhead; classics in our secondary schools, Dr. J. Brill; biography of Mohlomi, traveller, witch-doctor and chief, A. C. McGregor; the tercentenary of the telescope, H. B. Austin; the English language and literature in South Africa, Prof. Stanley Kidd; education in a Swiss canton, A. M. Robb; practical education, T. Lowden; agricultural training of natives, Hobart Houghton; weights and measures for South Africa, R. T. A. Innes.

Members of the association were taken round the new buildings of the Grey University College and the Grey School. The admirable building stone from the Bloemfontein commonage and the northern Free State allows the local architects to build elegant buildings; but this may become somewhat of a disadvantage, and leads often to cases where the effect of a window from the outside is considered more than its usefulness in the inside. A second excursion was to the military cantonments at Tempe, but the most instructive outing was to the dry farm at Groot Vlei, where lucerne, fescue, burnet, sainfoin, and other fodder plants, besides cereals, are grown without irrigation. A large area of the farm is planted with the Australian salt bush, which thrives admirably; the soil does not appear to be brak here, but, rather, is unproductive on account of its being clogged with fine silt.

Two popular lectures were given in the Town Hall, one on "Celestial Chemistry," by Dr. C. F. Juritz, and one on "Explosives," by Mr. W. Cullen, of the Modderfontein dynamite factory. At the close of the latter the British Association medal and cheque of 40*l.* were presented to Dr. Harry Bolus, the botanist.

At the annual general meeting the report of the council was presented, which showed a large decrease of membership owing to the prolonged depression in South Africa. To meet the decrease in income it was proposed to abolish one of the permanent offices, either the Johannesburg or the Cape Town one; it was also proposed to issue the Transactions in monthly parts. In view of the opening of the Union Parliament in Cape Town next year by His Royal Highness the Prince of Wales, it was proposed to hold the 1910 meeting in Cape Town at about the same date. His Excellency Sir Hamilton Goold-Adams was asked to offer the presidency of the association to His Royal Highness.

Mr. Lowden brought forward the subject of a prize scheme, which was discussed at some length both at Cape Town and at Johannesburg, and urged that something should be done to induce young students to take up science subjects. He suggested that if nothing else could be done, the association should offer at least a medal for the first two students matriculating in each science subject, and that if the funds of the association were not available, a subscription should be raised for the purpose. After some discussion the president stated that he would like to mark in some

way his appreciation of the work of the association and the honour done him in electing him the president for the year, and he thought he could do this by offering to defray the cost of the die of a suitable medal for the purpose suggested by Mr. Lowden. On the proposal of Mr. Innes, seconded by Dr. Juritz, it was resolved to accept this offer with many thanks, and to name the awards the "Goold-Adams" medals.

The Bloemfontein Museum deserves an article to itself; the members of the association were shown over the collections, and from cupboard and cranny objects of the utmost value were unearthed, including meteorites, stone and iron ones, Karroo fossils, early printed books, engravings, manuscripts, Bushmen implements, and a complete quagga skin. The collections urgently need proper accommodation, and it is hoped that the visit of the association brought home to the authorities some realisation of what a valuable asset for the town they had in their museum.

Dr. R. T. A. Innes was elected honorary secretary for the Transvaal and Free State, and Dr. C. F. Juritz for Cape Colony and Rhodesia, Dr. R. T. Lehfeldt honorary treasurer.

At the close of the meeting forty-five members left for a train and wagon trip to Basutoland, the railway authorities having placed a special train at the disposal of the association.

AMERICAN CAVE VERTEBRATES.¹

PROF. EIGENMANN has brought together in an attractive and copiously illustrated quarto volume the results of his investigations on the cave fauna of America, upon which he has been engaged for many years. He points out that each cave is a separate environmental unit requiring special consideration, but all share to a greater or less extent certain common features, viz. the reduction or total absence of light and the relative constancy of other physical conditions, such as temperature.

The blind cave vertebrates form a very mixed faunistic group, derived from a variety of epigeal ancestors. It appears, however, that "a certain predisposition in habit and structure must be present to enable a species to dispense with light and to live in caves." No mammals appear to have become especially adapted for permanent cave life, though, of course, many spend a large part of their lives in such situations. They may be "twilight animals," but they still have normal eyes. The same is the case with birds, and there are also no cave reptiles, which is remarkable when we consider that many snakes and lizards are blind, and burrow underground.

It is amongst the amphibia and fishes that true cave vertebrates are to be found. Two of the North American salamanders, of the genus *Spelerpes*, which habitually live in caves, still possess what appear to be normal eyes, while two others, of the genera *Typhlotriton* and *Typhlomolge*, have their eyes quite degenerate, resembling in this respect the European *Proteus*. The *Amblyopsidæ* are the typical North American cave fishes. "All the members of this family, eight in number, have degenerate eyes; five have mere vestiges; six permanently live in caves; one is known only from a spring, and another from open streams." More remarkable is the fact that in Cuba two sightless fishes, *Stygicola* and *Lucifuga*, belonging to a marine family many of which are blind, have become adapted to the fresh waters of caves.

¹ "Cave Vertebrates of America. A Study in Degenerative Evolution." By Prof. Carl H. Eigenmann. Pp. ix+241. (Washington: Carnegie Institution, 1909.)

Space forbids us to follow the author in his detailed and interesting discussion of the origin of the cave fauna. We may note, however, that he seems inclined to regard blindness as an antecedent rather than as a consequence of cave life, for it is only animals which are already accustomed to find their food by the sense of touch or smell which could ever establish themselves in complete darkness. In *Amblyopsis*, and other blind fishes, great numbers of special tactile organs are developed, especially about the head, and these serve for ascertaining, by disturbances in the water, the whereabouts of prey.

In the case of the loss of colour, however which is such a general character of animals living in perpetual darkness, it is different, and Prof. Eigenmann regards this character as due in the first place to the direct influence of the environment upon the individual. To quote his own words, "The bleached condition of animals living in the dark, an individual environmental adaptation, is transmissible, and finally becomes hereditarily fixed." This conclusion is based upon the fact that in *Amblyopsis* the bleaching takes place even when the young are reared in the light. "Natural selection cannot have affected the coloration of the cave forms, for it can be of no consequence whether a cave species is white or black. It could only affect the coloration indirectly in one of two ways: first, as a matter of economy, but since the *individual* is in part bleached by the direct effect of the darkness, there is no reason why natural selection should come into play at all in reducing the pigment as a matter of economy; second, Romanes has supposed that the colour disappeared through the selection of correlated structures, a supposition he found scarcely conceivable when the variety of animals showing the bleached condition was considered." It appears to us that these conclusions are of great interest and importance, and that Prof. Eigenmann has made out a strong case for the inheritance of acquired characters in this instance. In the case of *Proteus* it appears that the bleached condition has not yet become hereditarily established, for this animal becomes darker when exposed to the light. Possibly, after all, the inheritance or non-inheritance of acquired characters is largely a question of time, or, perhaps better, of the number of successive generations which have responded ontogenetically to the particular stimulus which evokes the character in question.

A great part of the volume is devoted to the consideration of the structural changes which accompany the degeneration of the eyes, and the author has given us a large amount of very valuable information on this difficult subject, including a detailed account of the development of the eye of *Amblyopsis*. From many points of view this interesting work will well repay a careful perusal.

ARTHUR DENDY.

THE PRESERVATION OF NATURAL MONUMENTS IN GERMANY.¹

THE German Government has been, for the last two years, organising a national system for the preservation of the natural monuments of the country. During the last year the scheme has developed in comprehensiveness, and has produced gratifying results. There are now forty local committees, and at the end of last year the first Congress for *Naturdenkmalpflege* in Prussia was held at Berlin. A considerable number of valuable reports has been issued; the present volume, edited by the energetic Government Commissioner for the Care of Natural Monuments, Prof. Conwentz, contains a report of the con-

¹ "Beiträge zur Naturdenkmalpflege." By Prof. H. Conwentz. Hef 3. Pp. 157-296. (Berlin: Gebrüder Borntraeger, 1909.) Price 2 marks.