Prof. Zenneck then describes the Pauling process. It is a well-known fact that vigorous blowing will put out the electric arc, consequently it is not an easy matter to blow air through an arc so that the nitrogen may become oxidised without blowing out the arc. In the process of Pauling, air is blown through an arc. The arc, however, is struck between horn-shaped conductors, such as are used as lightning arrestors. The two horns are closest together near the bottom, and it is here that the arc is struck. Owing to the ascending hot air, the arc rises upwards, and is broken once for each period of the alternating current. A new arc, however, is immediately produced again at the bottom, and this goes on continuously. An air current is also driven at high speed through the electrodes, and this further elongates the flames, so that an arc of very considerable length is produced. This process is now in successful operation in Switzerland and the south of France.

Special attention is given to the interesting process of the Badische Anilin- und Sodafabrik. This particular process was illustrated experimentally at the International Congress of Chemistry held in London in May, 1909. An arc is caused to form throughout a long tube, and the air is blown in tangentially. In practice, arcs of 8 metres long are employed.

Which of these three processes will best stand the test of time remains to be seen. The *sine qua non* in all cases is, however, cheap power. In structional details each plant is being continually improved, and at present each of these processes is being commercially worked. The Paulin process is, we believe, very well adapted for the manufacture of concentrated nitric acid, which is so important in the manufacture of explosives, and if sufficiently cheap may readily be converted into a fertiliser. The other two processes are certainly well adapted for the manufacture of fertilisers, and there is no inherent reason why nitric acid should not also be produced in all cases.

F. M. P.

BIRD NOTES.

IN a lecture on the birds of Victoria delivered to the local Field Naturalists' Club in September, 1910, and published in vol. xxvii., No. 8, of the *Victorian Naturalist*, Mr. J. A. Leach directed attention to the extraordinary, and apparently unique, richness of Australia in birds. Not only, he remarks, has the country its own peculiar types of interesting birds such as emeus, malleebirds, black swan, laughing jackass, cockatoos, many parrots, lyre-birds, bower-birds, &c. (some of these being common to New Guinea), but it likewise contains representatives of every widely spread family of birds with the exception of vultures and woodpeckers.

To vol. vi., No. 2, of the Journal of the South African Ornithologists' Union Messrs. Bucknill and Grönvold contribute a paper on the eggs of certain South African birds, which, for the most part, have not been previously described or figured, the paper being illustrated by an exquisite coloured plate. The largest egg figured is that of the African hawk-eagle (*Eutolmaëtus spilogaster*), one of a pair taken in Matabeleland in 1904, and now in the Transvaal Museum. Perhaps the most interesting of all is the egg of *Poliohierax semitorquatus*, which, in its uniform whiteness, corresponds with those of the nearly related Indo-Malay falconets (Microhierax). In 1902, when the second volume of the "Catalogue of Birds' Eggs" was published, the British Museum possessed one clutch of eggs of Microhierax, but none of the allied African genus.

The third part of vol. x. of the *Emu* (December, 1910) contains a report of the tenth annual session of the Royal Australian Ornithologists' Union, held at Brisbane in October. Special attention was directed to the need for protecting Australian birds, and it was decided to request the Government of Tasmania to take action for protecting the penguins on the Macquarie Islands. Mention was made of the founding of a Gould League for the purpose of encouraging a love of birds among the rising generation. At one of the meetings the State Governor, Sir William Macgregor, expressed himself in favour of bird-protection, but had doubts as to the feasibility of its enforcement. His Excellency stated as an example of this difficulty that when in British New Guinea he passed laws for the protection of birds-of-paradise, and that these were nearly fatal to the red species. For during his absence a visitor asked permission to obtain one or two specimens for scientific purposes, and, having obtained it, straightway proceeded to shoot all that were obtainable, so that when the Governor, on his return, visited Ferguson Island he found not a single full-plumaged bird of this species remaining.

Country Life of January 1 contains two life-size illustrations of the newly named Irish coaltit, placed alongside those of its British representative, with descriptive notes by Mr. W. R. Ogilvie-Grant. The Irish bird is characterised by the light patches on the sides of the head and neck, as well as the occipital spot, being pale mustard-yellow, instead of white; the back olive-grey washed with yellowish cinnamon, in place of olive-grey; the upper tail-coverts cinnamon, in marked contrast with the rest of the upper parts, instead of brownish-fawn, not decidedly different from the back; the breast and belly whitish, washed with mustard-yellow, in place of whitish or greyish-white; and the sides and flanks cinnamon, instead of fawn. In freshly killed examples the mustard-yellow is bright and conspicuous, but fades a few days after death. The British coaltit, which Mr. Grant regards as a subspecies (*Parus ater britannicus*), occurs in County Down, a fact, in his opinion, affording additional evidence in favour of regarding the Irish bird (*P. hibernicus*) as a separate species.

Considerable discussion, reported in various issues of the *Field*, has taken place at the British Ornithologists' Club with regard to white-breasted British cormorants. While some ornithologists regard all such birds as immature, others maintain that certain examples are much older, and consider that one particular skin belonged to a bird of from twelve to fifteen months old. It was also suggested that white-breasted birds appeared sporadically in certain colonies, where they might become the dominating type.

Notes on the peregrine falcon in the Midlands and on the habits of the crested grebe are contributed to the January number of the *Zoologist* by Mr. O. V. Aplin. The former species, it appears, is still a regular visitor to the southern Midland counties, but the birds seen there in autumn are, in most instances at any rate, immature.

Of a very different character from all the foregoing is a paper by Mr. H. C. Tracy, issued in the Zoological Publications of the University of California, on the significance of white markings in passerine birds. The object of the inquiry on this subject undertaken by the author was to endeavour to reconcile the old theory that white markings in birds are recognition-signs, with the newer, and apparently contradictory, hypothesis that they are for protective purposes. The result, in Mr. Tracy's opinion, is that both theories are perfectly true and mutually supplement one another. Markings which are displayed only or chiefly when the birds are in flight, such as the white area at the base of the tail-feathers common to many terrestrial birds—as in our own wheatear—are recognition-marks, and it is noticeable that these are specially developed in gregarious groups. On the other hand, in the case of arboreal species, white markings at the base of the flight feathers, which become specially conspicuous when their owners are in flight, appear to serve for protection and for recognition. The author took, for instance, specimens of the green-backed goldfinch (*Astragalinus psaltria*) and black-headed grosbeak (*Zamelodia melanocephala*), in which these particular markings are well developed, and, after spreading the wings, "photographed them against sunlit foliage and backgrounds of leaves with spaces of sky showing through. The birds were difficult to find in the resulting prints. Undoubtedly the photographs, by their lack of relief, exaggerated the concealing effect; yet that there is such an effect, in general, it is safe to admit." Later on, it is added that when the bird takes wing, a different principle comes into play, and, as there is no broken background, the markings stand out conspicuously. "When we consider," continues the author, "the value to all birds ranging in the open foliage of instant recognition at a distance and sight-clues for the purpose of keep-

ing together, we shall not easily believe that wing and tail white are solely features of concealing coloration. Their revealing function during flight is entirely in harmony with their concealing functions when at rest."

In conclusion, brief reference may be made to the paper by Mr. E. A. Wilson, field-observer to the Grouse-disease Inquiry Committee, in the Zoological Society's Proceedings for December, 1910, on the changes of the plumage in the grouse, a communication specially noteworthy on account of the excellence and beauty of the numerous coloured plates by which it is illustrated. R. L.

THE AUSTRALASIAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THIS year's meeting of the Australasian Association for the Advancement of Science was held at the University of Sydney on January 9–14, under the presidency of Prof. Orme Masson, F.R.S., professor of chemistry in the University of Melbourne.

The work of the meeting was divided among eleven main sections, each with its own president, vice-president, and secretary. The following is a list of sections with the name of the presidents and the subjects of their addresses, when these are stated in the official circulars which have been received.

Section A, Astronomy, Mathematics, and Physics: Prof. T. H. Laby, professor of physics in Victoria College, Wellington, N.Z. Section B, Chemistry, Metallurgy, and Mineralogy. Prof. B. D. Steele, professor of chemistry in the University of Queensland, Brisbane, who in his address dealt with inorganic solvents. Section C, Geology: Prof. P. Marshall, professor of geology in the University of Otago, Dunedin, N.Z., whose address was on the western margin of the Pacific basin. Section D, Biology: Mr. F. M. Bailey, Government botanist at Brisbane. Section E, Geography and History: Prof. G. C. Henderson, professor of history in the University of Adelaide, whose address discussed colonial historical research. Section F, Anthropology and Philology: Mr. Edward Tregear. Section G, (1) Social and Statistical Science: Mr. E. W. H. Fowles, the subject of whose address was unemployment. Section G, (2) Agriculture: Prof. W. Angus, late director of agriculture in Adelaide. Section H, Engineering and Architecture: Mr. Ellwood Mead, who was unable to attend the meeting, and instead of a presidential address, Prof. W. H. Warren, of the University of Sydney, delivered a lecture on irrigation in India. Section I, Sanitary Science and Hygiene: Dr. W. Perrin Norris, Commonwealth Director of Quarantine, Melbourne, who took for his subject public health ideals. Section J, Mental Science and Education: the Rev. E. H. Sugden, whose address dealt with the place of music in education

During the meeting Prof. P. Marshall delivered a popular lecture in the great hall of the University on glaciers of the southern Alps; Dr. Mawson, of Adelaide, lectured on "Antarctica," with special reference to his forthcoming expedition; and Prof. T. H. Laby exhibited a working model of Brennan's mono-rail. Numerous social functions were arranged, including a garden-party to members of the association, given by Lord Chelmsford.

There are several committees of the association which are to continue to exist during the present year. Among these may be mentioned the Solar Eclipse 1910 Committee, appointed at Brisbane in 1909. In connection with the work of this committee, the local Council of New South Wales passed the following resolution:—"That the committee appointed at the Brisbane meeting in 1909 in connection with the solar eclipse of 1910 be asked to make such arrangements as may be necessary before the meeting of the association in January for the observation of the total solar eclipse of 1911 by Australian and other astronomers, and report to the meeting." It was announced during the meeting that the Federal Government had granted 500*l.* in aid of the solar eclipse expedition of this year. Other existing committees are those on solar research, terrestrial magnetism in Australia, seismology, alkaline rocks of Australia, glacial phenomena, geological and geo-physical phenomena, deep-sea dredging off the east coast of Australia, New Zealand food-fishes, and the biological and hydrographical study of the New Zealand coast.

RECENT ADVANCES AND PROBLEMS IN CHEMISTRY.

THE subjoined lecture was delivered by Prof. Emil Fischer, of the University of Berlin, on the occasion of the inauguration of the Kaiser-Wilhelm-Gesellschaft zur Förderung der Wissenschaften, in the presence of the German Emperor, on January 11, in the Ministry of Education at Berlin.

Prof. Fischer traces the relations between science and scientific industries in Germany, pointing out that by affording facilities for the prosecution of pure scientific research, technical industry can only gain.

If only this fact were practically realised in this country as it is in Germany, we should be spared the humiliation of seeing important technical branches of commerce, such as chemical industry, transferred soon after their initiation from England to the Continent.

Prof. Fischer in his address deals fully with this subject from the German point of view, so that it is unnecessary to refer to it here in detail; the remedy, however, lies entirely with the powers that be.

Your Majesty; Gentlemen,

At the present time, more than at any other period, we are inclined critically to examine the fundamental principles of all branches of knowledge, and, when necessary, to introduce far-reaching alterations in our original conclusions. This state of mind applies also to the natural sciences. During the last decades our actual knowledge has been extended to an extraordinary degree owing to new methods of research, and in view of the more recent observations the older theories have proved in many cases to be far too narrow. Even the fundamental principles of our knowledge appear, to a certain extent, to demand revision.

Thus the progress in physical science forces us to adopt views which are incompatible with the older principles of mechanics, in spite of the fact that these were regarded as unassailable by thinkers such as Hermann von Helmholtz, Heinrich Hertz, and Lord Kelvin.

We stand in the same position with respect to the elements in chemistry. Owing to the discovery of radium and similar bodies, we have been forced to the conclusion that chemical elements are not unalterable, and hence that their atoms are not indivisible.

The same state of affairs obtains to even a greater degree in the biological sciences. In comparative anatomy, animal and vegetable physiology, theory of evolution, microbiology, and almost all branches of medical science, the rapid advance of experimental knowledge is accompanied by an equally rapid change in established theories. Even the semi-historical sciences, such as geology, palæontology, anthropology, and the venerable science of astronomy, are taking active part in the general progress.

Thus in these times of general scientific activity is founded the Kaiser-Wilhelm-Gesellschaft zur Förderung der Wissenschaften, the primary object of which is the erection and maintenance of institutions of research.

It need scarcely be said that we scientific investigators welcome this new and highly specialised creation with intense satisfaction, and I regard it as a particular honour to be permitted to be the first to give expression of our profound gratitude.

No one will be able to assert that experimental research in Germany has been neglected; exactly the opposite conclusions must be drawn on contemplating the history of science during the nineteenth century. This displays a long series of brilliant scientific discoveries made in this country. The industries closely connected with science, such as the chemical and electrotechnical industries, fine mechanical engineering, production of metals, industries connected with fermentation, and last, but not least, agriculture, have also undergone in our hands a development envied on almost all sides by other nations.

Should a criterion of the results of experimental research be desired, this may perhaps be found in the distribution of the Nobel prizes, which are awarded by absolutely independent corporations in Sweden.

Only a month ago the Nobel prize for chemistry came