

that the author recognises two species of okapi, as two of the plates are lettered *Okapia liebrechtsi*. This is due, however, to the fact that Prof. Fraipont had to use the plates prepared for Dr. Major, and from the descriptions of the plates we learn that the author recognises only a single species—the typical *O. johnstoni*. In this we think he is certainly right, and that some other factor than specific distinction will have to be sought to explain the differences between individual okapis in the matter both of colour-pattern and of skull-characters. If there be two kinds, the okapi certainly forms a strange exception to the law of “geminal species.”

Both the author and the administration of the Congo Free State are to be congratulated on this handsome and exhaustive monograph. R. L.

IRON AND STEEL INSTITUTE.

THE annual meeting of the Iron and Steel Institute was held in London at the Institution of Civil Engineers on May 14 and 15, and was largely attended by members from the various iron-producing districts of this country and abroad. Sir Hugh Bell presided.

The report of the council, read by Mr. Bennett H. Brough, the secretary, showed that the institute had made considerable progress during the year 1907. The membership amounted to 2100, and the financial prosperity was a matter for congratulation. In presenting the accounts, Mr. W. H. Bleckly, hon. treasurer, announced that Mr. Andrew Carnegie, past-president, had presented to the research fund the further sum of eleven thousand dollars, bringing his total benefaction to one hundred thousand dollars. In moving the adoption of these reports, the president announced that the institute had secured larger premises in the same building as those previously occupied, and that the reading-room accommodation had been much improved.

The president then handed the Bessemer gold medal to Mr. B. Talbot, inventor of the continuous open-hearth steel process, who expressed his acknowledgments.

The first paper read described improvements in plate-rolling mills. In it Mr. A. Lamberton described a new form of plate-mill now successfully at work at the Glasgow Iron and Steel Works for rolling light plates. The paper, on the physical qualities of steel in relation to its mechanical treatment, contributed by Mr. James E. York (New York) contained suggestions for changes that might result in the production of more trustworthy rails and other similar sections than those now produced by ordinary methods. The heating of the ingots is a matter of great importance, and it is recommended that the finishing temperature should be as low as possible to get the best results, and that the initial temperature should not exceed 950° C. For solidifying ingots the author's method of transverse rolling may be applied.

Dr. T. E. Stanton, of the National Physical Laboratory, described a new fatigue test for iron and steel, in which a combination of rolling abrasion and alternate bending is used. The machine designed for the purpose was exhibited and described.

Prof. B. Igewsky (Kieff) submitted a paper describing a small electric furnace of novel design erected for experimental purposes at the Kieff Polytechnic Institute. It is a rotating cylindrical furnace, with its axis horizontal, built up of fire-brick blocks with contact pieces rubbing against the outside surface. Most of the heating is done by the passage of the current through the inner surfaces of the refractory material, which, when red hot, becomes a conductor. A continuous current of 250 volts and 50 amperes is employed. Experiments for the production of steel from cast iron by the ore process were successful.

The meeting was then adjourned until May 15, when the first paper was read by Mr. F. J. R. Carulla (Derby), who directed attention to the difficulty in finding cast iron suitable for use in the construction of chemical plant. For some purposes, as, for example, ammonia stills, cast iron seems everlasting, and even acid chemicals have sometimes little action on cast iron. Yet when hydrochloric acid is in question, cast iron succumbs like any weaker vessel.

It was announced that the council had awarded Carnegie research scholarships, each of the value of 100l., to

T. Baker (South Wales), R. F. Böhler (New York), W. Giesen (Mexico), E. Preuss (Germany), and L. P. M. Révillon (France). The president then handed the Carnegie gold medal for research to Dr. Carl Benedicks, of Upsala University, and stated that the reports submitted by the eight holders of research scholarships were considered to be of sufficient merit to warrant their publication in the journal of the institute.

Mr. E. F. Law exhibited some striking lantern photographs illustrating the application of colour photography to metallography. With the aid of Lumière's autochrome plates it is possible to obtain a photograph in colour on a single plate and by a single exposure. In order to distinguish the constituents, the polished specimen of an alloy is heated until a film of oxide forms on the surface. Owing to the different rates at which the constituents oxidise, they assume different colours, and can be readily distinguished in the coloured photograph.

The utilisation of blast-furnace slag formed the subject of a paper read by Mr. C. de Schwarz (Liège), in which he reviewed recent processes for making slag bricks and cement. Blast-furnace works, especially those producing grey pig iron, have evidently still a large field for improvement by utilising their slag for such purposes.

Mr. Walter Rosenhain gave a detailed description of the metallurgical and chemical laboratories in the National Physical Laboratory, and Mr. Wesley Lambert gave an interesting account of the pyrometric installation in the gun section of the Royal Gun and Carriage Factories, Woolwich.

The eight reports on research work submitted by holders of Carnegie research scholarships showed that a large amount of very valuable work is resulting from the funds placed at the disposal of the institute by Mr. Carnegie. The investigation described by Mr. E. Hess (New York) was carried out at a plant at Monterrey, Mexico, its object being to ascertain the microscopical structures of steels the carbon content of which is above 0.9 per cent. at various temperatures above the critical point. The rusting of iron was dealt with by Mr. J. Newton Friend (Suffolk), whose results point to the fact that the rusting of iron is primarily the result of acid attack. The object of the research described by Mr. D. M. Levy (Birmingham) was to investigate the influence of sulphur, as it affected the relations of carbon and iron, and by a series of coordinated thermal, mechanical, chemical, and microscopic tests to determine how far this action could be traced to any combination or reaction between these three elements, or what explanation could be elicited for it.

No evidence was found to support the view that chemical union between iron, carbon, and sulphur is the cause of sulphur tending to retain carbon in the combined form in irons. The purely physical—or rather mechanical—effects of the sulphide observed in the research appear to offer a satisfactory explanation of its action, exercised even by very small proportions.

Mr. A. Hiorth (Christiania) gave the preliminary results of trials in refining iron and steel by means of vapours of metallic sodium. He finds that iron treated in this way is more fusible and will remain molten longer than other iron, and that such treatment will remove the oxygen. The research submitted by Mr. B. Saklatwalla (Charlottenburg) on the constitution of iron and phosphorus compounds was made with the view of supplementing Stead's chemical researches by a complete thermal and metallographic investigation of the subject. The function of chromium and tungsten in high-speed tool steel was investigated by Mr. C. A. Edwards (Manchester); and Mr. H. C. Boynton (New Jersey) submitted a continuation of his researches on the hardness of the constituents of iron and steel.

Lastly, Dr. Carl Benedicks (Upsala), in a memoir for which the Carnegie gold medal was awarded, gave the results of experimental researches on the cooling power of liquids, on quenching velocities, and on the constituents troostite and austenite. He finds that the essential condition for a quenching liquid to give effective cooling appears to be a high latent heat of vapour, and so low a temperature that the vapour bubbles formed at the surface of the metal may be easily condensed in the surrounding liquid. The rate of flow of the liquid has very little in-

fluence on the effectiveness of the cooling. The investigations of cooling velocities were made with an automatic quenching apparatus and temperature calibration device, with a string galvanometer, calibration of which instrument has been investigated. The cooling velocity is considerably lowered with increasing carbon content, and possibly silicon has a similar effect. Results are given confirming the theory that troostite is a solid colloid solution of cementite in iron, or, in other words, a pearlite having ultra-microscopic particles of cementite. The last section of the report is devoted to the study of austenite, for which a new etching medium, 5 per cent. alcoholic solution of metanitrobenzolsulphonic acid, was found to be of use. Austenite was observed to be more liable to rusting than martensite. The most important fact found concerning the preservation of austenite in carbon steel is that it requires a high mechanical pressure. Austenite never occurs in the outer layer of a hardened specimen, but it is entirely erroneous to ascribe this to oxidation; it has been shown to depend on the lack of the necessary pressure.

The annual dinner of the institute was held on May 14, with Sir Hugh Bell in the chair. Four hundred members and visitors were present, the principal speakers being Sir Edward Grey, Secretary of State for Foreign Affairs, Sir W. H. White, K.C.B., the Right Hon. J. L. Wharton, Sir Walter Runciman, Mr. R. A. Hadfield, Viscount Ridley, and General Baden-Powell.

SCIENTIFIC AID TO EGYPTIAN AGRICULTURE.¹

FEW of the changes effected during the past decade in our management of the Crown colonies, India, and Egypt will be of more lasting benefit than the establishment in them of scientific, as distinct from the ordinary administrative, departments of agriculture. Although they have only been working a short time, some of them have already rendered very useful service, and give promise of even better things in the future; indeed, in this respect these countries are usually better off than the self-governing colonies—one might almost add than ourselves; in proof it is only necessary to refer to the admirable work accomplished in Jamaica and in the Transvaal, where, on the advent of self-government, it was decided to maintain the scientific department.

The volume before us contains an account of the work done by the scientific staff of the Khedivial Agricultural Society. More than half of it is devoted to cotton, the staple Egyptian crop.

Mr. Willcocks gives some notes on the Egyptian cotton-bug or cotton-stainer (*Oxycaenus hyalinipennis*), an insect which receives its name from the fact that it stains the fibre either with its excrements or with the juices of its body, but which in addition inflicts other damage by sucking the juices from the bolls and the seeds. Once the pest has invaded a cotton field there appears to be no way of getting rid of it, but various suggestions are given for keeping it down. Mr. Willcocks has worked out the life-history, and the stages in its development are shown in a beautiful coloured plate by Miss Connie Beard.

This is followed by a long paper, or rather a collection of papers, by Mr. Lawrence Balls, dealing mainly with heredity in cotton. The cotton plant follows Mendel's laws of gametic segregation in certain of its characters, but the practical problems involved are likely to prove difficult of solution. The history of cotton in Egypt has not yet been worked out; the crop is undoubtedly of great antiquity, and some indigenous culture still exists in the Soudan. But the modern crop is not indigenous; it is closely related to Sea Island cotton, from which, indeed, it has probably sprung, since Sea Island cotton was certainly imported into Egypt in 1822. It is not, however, a pure type. Mr. Balls shows that cross-fertilisation takes place to a certain extent under field conditions, and the accumulated effect of this has been to convert the crop into a mass of hybrids. This is no doubt of prime importance in studying two of the most pressing practical

problems, the deterioration of the crop in yield and quality and the multiplication of a weed cotton in the fields. Much can be done by selection to get rid of the weed cotton, but selection alone cannot solve the problem, since there will always remain the splitting forms arising from natural crosses between the wild and cultivated varieties. The only permanent solution is to breed pure types, and though Mr. Balls is aware of the special difficulties involved (notably the fact that many of the characters of importance to the manufacturer and cultivator are dominant), he is quite hopeful of the result.

Cotton is not the only hope of the scientific staff. The Nile Valley is well adapted to wheat cultivation, and was in Roman times a great wheat-producing district. To-day wheat is actually imported, but it is pointed out that the crop might very well come into the rotation with cotton, so that Egypt could once again take a place among the wheat-producing countries of the world.

Mr. Hughes contributes some notes on Egyptian and Soudan soils. Generally speaking, the Nile soils do not contain much organic matter, and the "total" phosphoric acid is not high, but a large proportion is "available," so that Dyer's method may show 0.02 per cent. to 0.08 per cent. In spite of this, however, application of superphosphate has been found beneficial. We may expect some very interesting and important results when the manurial requirements of these soils, as ascertained by field trials, are compared with their chemical composition. It would also be desirable to get out the full mechanical composition of some of the typical soils of known history. Mr. Burns gives an interesting series of analyses of the solids dissolved in the Nile water, samples having been taken for this purpose every month during 1906. The results will be of great value to students of the Nile flood.

Altogether, the work is very satisfactory, and is full of promise for the welfare of Egypt. E. J. R.

THE PIGMENTATION SURVEY OF SCOTLAND.

THE last half-yearly number of the Journal of the Royal Anthropological Institute contains an important memoir, prepared by two enthusiastic Scotch anthropologists, Messrs. Gray and Tocher, on the pigmentation of hair and eyes among the school children of Scotland. In one respect the methods employed fail to secure that precision which is necessary to an investigation of this kind. Attempts were made to furnish the correspondents with standard colour cards produced by the three-colour lithographic process, but English manufacturers have up to the present been unable to provide them. There seems, however, to be a prospect of overcoming this difficulty by the adaptation of Lovibond's tintometer to anthropological work. The new instrument is described by Mr. Gray in the April number of *Man*.

Even with these imperfect methods the results are valuable. In the first place, the percentage (24.9) of Scotch boys with fair hair is unexpectedly low. The obvious inference is that the pure Norse or English element in the population is by no means predominant, and that there is a dark or brunette element at least equal, and probably greater. The highest density of fair hair is to be found in the great river valleys opening on the German Ocean and in the Western Isles. In the former case this probably points to invasions of a blonde race into those regions. Similarly, the higher percentage of fair hair in the Spey valley and in the Western Isles implies inroads of the Vikings or Norsemen. It is perhaps pushing the evidence too far when the writers suggest that the high percentage of fair-haired girls in the neighbourhood of Dunfermline is due to the train of blonde damsels who are supposed to have accompanied the Saxon princess Margaret, who about the time of the Norman Conquest became Queen of Malcolm Canmore.

The survey appears to corroborate the conclusions of Dr. Shruballs in regard to London slum districts, that the percentage of fair-haired people in industrial towns is very low. For some reason as yet obscure, whether from alien invasion or the influence of environment, in towns like Glasgow and Dundee the conditions are specially unfavourable to the survival of blonde men, while the reverse is

¹ "Year-book of the Khedivial Agricultural Society, Cairo, 1906." Pp. 219. (Cairo: National Printing Department, 1907.)