

contingent was predominant, including (titles omitted) H. Credner, G. Gürich, K. Keilhack, A. Penck, A. Rothpletz, W. Salomon, K. Sapper, F. Wahnschaffe, and other well-known names. Among those from France were L. Carez, L. de Lamothe, E. de Margerie, and A. Offret; from Italy, S. Cerulli-Irelli and E. Mattiolo; from Portugal, J. Mendez-Guerreiro; from Switzerland, M. Allorge, J. Brunhes, and P. Mercanton. From Denmark, among others, came V. E. Hintze, V. Madsen, and J. P. J. Ravn; from Holland, J. I. J. M. Schmutzer and Mlle. A. Grutterink; from Norway, H. Reusch; from Hungary, E. de Cholnoky and E. de Maros; and Japan was represented by K. Inouye and H. Yabe. Broadcast now is the gathering that went with the good ship *Aeolus* on this memorable voyage to Spitsbergen!

G. W. LAMPLUGH.

A FOURTH RECALESCENCE IN STEEL.

IN 1868 the late Dr. George Gore, F.R.S., discovered the recalescence points now known as Ar_3 and Ar_2 , and in 1872 Prof. W. F. Barrett, F.R.S., discovered the

made possible by a gift of chemically pure iron from Dr. Hicks and Prof. O'Shea, of Sheffield University. The recalescence data registered *in vacuo* on placing the thermocouple between two small plates of this iron show that the maximum of Ar_3 appears at 854° C., and the set-back between the two peaks of Ar_2 is registered at 750° C.

The Recalescence of Iron containing about 0.2 per cent. Carbon.

On cooling unsaturated steels containing about 0.2 per cent. carbon it was noticed that there was along the range of temperature between Ar_3 and Ar_1 some thermal evolution which prevented the curve crossing the radiation line after recalescence, and also kept it well to the right of that line. Careful investigation of this phenomena revealed the fact that whilst with iron containing 0.38 per cent. carbon this new and prolonged recalescence was very much augmented, as compared with a 0.2 per cent. carbon steel, that iron containing 0.63 per cent. carbon gives out during this fourth phase of recalescence much less heat than the 0.38 per cent. carbon steel. Therefore it would appear that the maximum of heat of the fourth phase of recalescence is evolved from a semi-saturated steel, namely, an iron containing 0.45 per cent. carbon, and having in the cold a micro-structure consisting of 50 per cent. ferrite and 50 per cent. pearlite. The recalescence data and curves of all these steels were shown on the screen and minutely described.

The Cause of the Fourth Phase of Recalescence.

By micro-thermal investigations Prof. Arnold has satisfied himself that the fourth phase of recalescence is due to constitutional segregation, namely, the falling out between Ar_3 and Ar_1 of the ferrite and hardenite from their state of mutual interpenetration or solid solution into microscopically invisible masses. A method was adopted for rapidly quenching from nitrogen in iced brine 0.2 per cent. carbon steel at various temperatures. The temperatures were:— (1) 995° C. (well above Ar_3); (2) just below Ar_3 ; (3) just after first peak of Ar_2 ; (4) just above Ar_1 ; (5) 15° (normalised or cooled in air).

The micrograph here reproduced is a section quenched between the two peaks of Ar_2 . The segregation is obviously proceeding very quickly, and the ferrite is strongly electro-negative to the dark etching areas of hardenite still containing in solution large quantities of iron. The micrographs indicate that the critical range Ar_2 has no influence on the segregation of hardenite and ferrite. In Prof. Arnold's view these five photomicrographs, when correlated with the recalescence curves of the steel experimented upon, prove that the fourth phase of recalescence is due to the heat evolved

during the segregation of the ultimate micrographic constituents of steel, which began at Ar_3 and incomplete at Ar_1 , during the cooling of unsaturated steels at a moderate rate, say 0.5° per second.

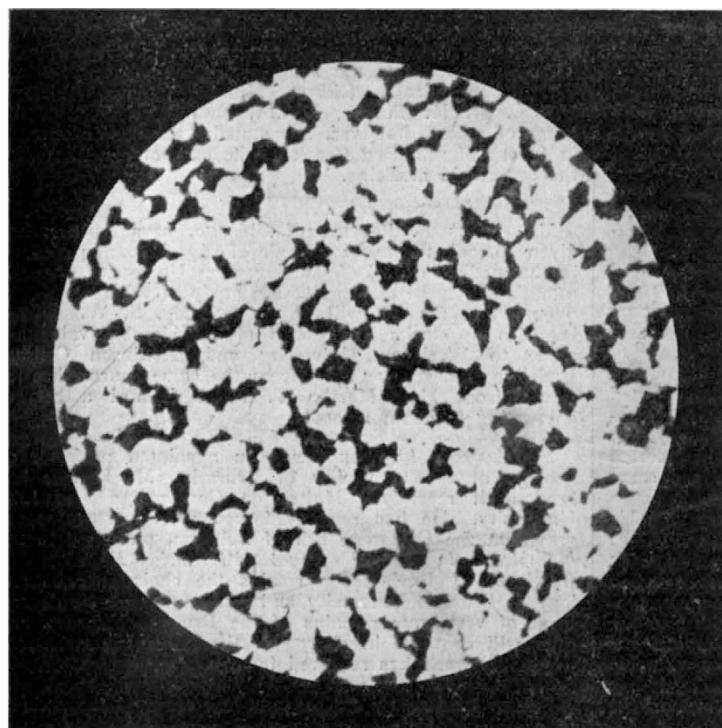


Photo-micrograph of nearly Pure Iron containing 0.21 per cent. Carbon. Rapidly quenched between the two peaks of Ar_2 . Magnified 450 diameters.

point Ar_1 , which is now known as the carbon change point. Prof. Barrett gave the phenomena the generic title of "recalescence," by which they have been known ever since.

At the recent meeting of the British Association, Prof. J. O. Arnold described to the section of chemistry the result of accumulated thermal and micrographic observations upon this subject extending over twenty years. He first described the recalescence apparatus used at Sheffield University, in which the tape results can be plotted either as a time-temperature or as an inverse-rate curve. The latter is more delicate, its coordinates being units of temperature and time in seconds, for units rise or fall in temperature.

The Recalescence of Chemically Pure Iron.

From many observations it appears that before even a rough quantitative measurement of recalescence in steel can be made it is very desirable to obtain a standard cooling curve of iron absolutely free from carbon; this was

REPORTS ON IMPERIAL FOODSTUFFS.

WE have received No. 63 ("Gums and Resins") and No. 71 ("Foodstuffs") of the "Colonial Reports: Miscellaneous," comprising selected reports from the Scientific and Technical Department of the Imperial Institute. They refer to products, from British possessions, examined at the institute with regard generally to the possibility of their profitable cultivation or preparation in the districts concerned. The first report is a useful little monograph on gums and resins from the commercial and analytical point of view, with particulars of the colonial specimens examined. The chief matter of scientific interest in the paper on foodstuffs, namely, a summary of the

facts relating to cyanogenesis in plants, has already been published elsewhere.

Among points of general interest we note that Yebb (or Yeheb) nuts from Somaliland, which grow in arid districts and have formed the principal food of many destitute refugees, were found to contain about 12 per cent. of albuminoids, 11 per cent. of oil, 24 per cent. of sugars, and 37 per cent. of other carbohydrates. They thus show high nutritive value as a foodstuff; and it is recommended that the cultivation of the plant (*Cordeauxia edulis*) producing the nuts should be tried in other countries, especially where a foodstuff is needed which can be grown in arid places. Tea from the Nyasaland Protectorate was found to be analytically of good quality, though on account of its having been packed with tobacco no opinion could be given on its flavour. Nevertheless, it is considered that the cultivation of tea in the Protectorate might well be extended. Some Natal tea, too, appears to be very satisfactory. Its proportion of caffeine is only slightly less than that of Indian tea examined, and as regards tannin it is intermediate between Indian and China teas. In the opinion of the department the cultivation and preparation of tea in Natal deserves very full study, with a view to the production of tea of characteristic quality.

Cocoa grown experimentally in Uganda gave very promising results. So also did some specimens cultivated by the Botanical Department of the Gold Coast Colony, though it was pointed out that more attention was required in the fermentation of the beans, since it is on this that the aroma and colour largely depend. Small consignments subsequently sent for actual sale realised fair prices, and from the knowledge gained it was possible to indicate the directions in which further improvement of the cocoa could be effected. Some useful memoranda on miscellaneous matters, such as the constituents of food and their functions, and the harvesting and shipment of maize, are also included in this report on foodstuffs.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The special board for medicine has elected Prof. Marsh, Master of Downing College, as its representative on the general board of studies for four years, and the special board for economics and politics has elected Mr. G. L. Dickinson as its representative on the same board for the same period.

Prof. Hughes states that he has received a very valuable gift of fossils, &c., from the widow of the Rev. G. F. Whidborne, who had previously presented to the Sedgwick Memorial Museum the collection of Devonian fossils which he had described in the Transactions of the Palæontographical Society. Mrs. Whidborne has now given to the museum the remainder of his collection, with all his scientific books and manuscripts, together with a valuable series of photographs and other illustrations, and has included in her gift the cabinets in which some of the specimens were kept and were being arranged.

The Vice-Chancellor publishes the following extract from the will of the late John Willis Clark, formerly Registrar of the University:—"I bequeath also to the Chancellor, Masters, and Scholars of the University of Cambridge my Collection of Voyages and Travels as recorded in a special catalogue, forming part of the collection, to be placed under the charge of the Museums and Lecture Rooms Syndicate. And I request the said Syndicate to deposit the same wherever in their judgment it is likely to be most useful."

The board of anthropological studies desires the establishment of a special examination in anthropology for the ordinary B.A. degree. The board reports as follows:—"As anthropology is a subject that is rapidly growing in importance, the board is of opinion that the time has arrived when it is desirable that a special examination in anthropology should be held. Anthropology is a science that demands extensive and precise study, and at the same time bears upon other branches of learning, for example, history, economics, psychology, biology, and geography. It may now be considered as a mental discipline not inferior to other subjects comprised in the various special examinations."

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OXFORD.—On November 29 Congregation took into consideration some of the amendments that had been proposed to the statute concerning the faculties and boards of faculties, of which the preamble was approved on November 8. Exception had been taken in some quarters to certain provisions of the statute which appeared to disqualify the college tutors as such for membership of the faculties. An amendment proposed by the Master of Balliol providing that the head of any college or similar society within the University might certify any member of Convocation authorised by his society as a member of the faculty in which his teaching is given was carried without a division. Another amendment, proposed by the Master of University College, to the effect that a number of the members of the general board of the faculties should be elected from and by the whole body of members instead of from and by each faculty acting separately, was opposed by the President of Magdalen, Prof. Gotch, F.R.S., and Prof. Oman, and rejected on a division.

As was generally anticipated, the question of compulsory Greek is not to be allowed to rest in the position to which it was relegated by the division on November 22. A petition to council is being prepared, asking that a short statute may be framed relieving honour students in the schools of natural science and mathematics "from the necessity of taking two ancient languages in Responsions." This movement has the support, amongst others, of Sir W. Anson, Profs. Gilbert Murray, Myres, Poulton, F.R.S., H. H. Turner, F.R.S., and Osler, F.R.S., the latter of whom, however, has stated "that he is strongly in favour of retaining Greek in the case of candidates for the degrees in medicine."

MR. JAMES A. PATTEN, of Chicago, says *Science*, has given 40,000*l.* to endow a chair of experimental pathology in the medical school of Northwestern University. Special attention is to be directed to the study of tuberculosis and pneumonia. By the will of the late Mr. S. W. Bowne, bequests in stocks and bonds of considerable value are made to Wesleyan University and Dickinson College. Radcliffe College, we learn from the same source, has received from Mrs. Martha T. Fiske Collard a bequest amounting to about 20,000*l.*

M. MAURICE LERICHE has been appointed professor of geology at the University of Brussels. M. Leriche has been until recently "Maître de Conférences" at Lille University. He has recently issued an important monograph on the Oligocene fish of Belgium, published in the *Mémoires du Musée Royal d'Historie Naturelle de Belgique*, v. Prof. Dollo retains the chair of palæontology at Brussels University and conservator of the department of vertebrate remains of the Brussels Museum, and thus will continue in charge of the important collections which his work has rendered famous.

PRINCE ARTHUR OF CONNAUGHT has accepted the position of president of the appeal committee appointed to secure the sum of 70,000*l.* for the purchase of the site in Gower Place and for the erection thereon of new chemical laboratories for University College, London. We are glad to notice that the new president in a further appeal through the Press emphasises the national aspect of the appeal committee's object, and asks for a national response. As we have pointed out already, 25,000*l.* must be raised before December 25 next if the new site is to be secured, and towards this amount upwards of 10,000*l.* has been raised. It should not be difficult to secure the remaining 15,000*l.* during the next few weeks.

THE German Emperor opened a new technical university at Breslau on Tuesday, November 29, and delivered an address, in which he referred to the great importance of such institutions for the industrial progress of the Empire. There are now eleven technical universities in Germany, five of which are in Prussia, namely, at Charlottenburg, Aachen, Hanover, Danzig, and Breslau. The Berlin correspondent of the *Morning Post* reports that in the course of his remarks at the dedication of this—the second technical university founded in his reign—the German Emperor said:—"The close connection between