

rotating field method, the processes being apparently independent of one another.

Mr. Herbert adopts as a provisional theory that the rotating magnetic field gives rise to a fluctuation of a periodic character in the systems of electrons, which in turn causes periodic fluctuations in molecular cohesion. A very interesting possibility of a practical nature follows from these investigations, namely, the stabilisation of the metal at a selected phase in the fluctuations set up mechanically, magnetically, or otherwise. For example, the stabilisation of steel wire in a condition characterised by greatly increased ductility with undiminished tensile strength.

In *World Power* for October, Mr. Herbert describes some work in connexion with high-speed tools. At present the results obtained seem very anomalous; in some cases the magnetic field has a hardening effect on the metals experimented on, and in other cases it softens them. The results suggest that the magnetic effects have been merely superimposed on the normal age-hardening process. They may be quite different in character. A softening magnetic process added to age hardening might be expected to slow down the hardening process, while a hardening magnetic treatment added to the normal hardening might be expected to accelerate it. It was observed that an increase of hardness equivalent to an increase of 13 per cent on the Brinell scale was induced in high-speed steel by a single turn of the magnetic field, occupying about a minute and applied at a temperature of only 100° C. Such a treatment could easily be given to finished tools of the most complicated character as well as to drills, sawblades, and dies in which a high degree of hardness is desirable. It is probable that further experiments, especially as to what is the best temperature to employ, will give even better results. As no metal hitherto subjected to magnetic treatment has failed to react, it is possible that these effects are common to all metals. In the non-magnetic metals the hardness changes hitherto produced have been relatively slight, but research in this direction seems very promising. It has been suggested that these changes may not be confined to metallic or even to inorganic substances.

University and Educational Intelligence.

LONDON.—Dr. F. A. von Hayek has been appointed for the session 1931–32 to the Tooke chair of economic science and statistics tenable at the London School of Economics.

The following titles have been conferred in respect of posts held at the Colleges indicated: *Professor*:—Dr. Charles Singer (history of medicine, University College); Mr. E. F. D. Witchell (mechanical engineering, Imperial College—City and Guilds College). *Reader*:—Mr. R. J. Tabor (botany, Imperial College—Royal College of Science); Dr. W. G. Bickley (mathematics, Imperial College—City and Guilds College); Dr. G. F. J. Temple (mathematics, Imperial College—Royal College of Science); Mr. B. W. Holman (mining, Imperial College—Royal School of Mines); Dr. Herbert Dingle (physics, Imperial College—Royal College of Science); Dr. H. S. Gregory (physics, Imperial College—Royal College of Science); Dr. S. G. Paine (plant bacteriology, Imperial College—Royal College of Science); Mr. J. P. Ross (surgery, St. Bartholomew's Hospital Medical College); Dr. L. C. Martin (technical optics, Imperial College—Royal College of Science); Dr. Elizabeth A. Fraser (zoology, University College).

The title of emeritus professor in the University has been conferred on the following:—Prof. E. J. Garwood, on his retirement from the Yates-Goldsmid chair of

geology at University College; Prof. C. Spearman, on his retirement from the chair of psychology at University College; Prof. W. E. Dalby, on his retirement from the chair of civil and mechanical engineering at the Imperial College—City and Guilds College.

The degree of D.Sc. in biochemistry has been conferred on Bireschandra Guha for a thesis entitled "Investigations on the Factors of the Vitamin B Complex and on the Newer Factors necessary for the Normal Nutrition of the Rat" (*Brit. Med. Jour.*, 1931, and *Biochem. Jour.*, 1931).

FOR the session 1931–32, the Department of Coal Gas and Fuel Industries with Metallurgy of the University of Leeds has arranged a series of evening courses, with practical work. The courses comprise studies in the manufacture of coal gas, refractory materials, the coke fire, and metallurgy. Further information can be obtained from the Registrar, University, Leeds.

THE professional education of teachers in the United States of America during the past ten years is reviewed in *Bulletin*, No. 30, 1931, of the Office of Education, Washington. One of the most striking changes brought to notice is in the relationship between the demand for and supply of certificated teachers. The number of students in training for teaching increased from 135,435 in 1919–20 to 274,348 in 1927–28; the number of students completing one-, two-, and three-year curricula during the same time increased from 21,012 to 49,627, whilst those graduating after a four-year course increased from 1296 to 8179. The over-supply of teachers in many places and the overcrowding in a few teachers' training institutions have led to the raising of the standard of requirements for admission to teacher-training courses. There has been also rapid progress in raising standards of certification. The average number of students per training institution has grown from 439 to 877, necessitating better facilities for their social and physical welfare. Of the strictly professional courses, student teaching is coming to be recognised as one of the most important, and it is much more frequently provided than formerly, but probably fifty per cent of teachers enter upon their duties without having been through such a course. Training colleges are increasingly concerning themselves with the careers of their graduates, and recognising an obligation not only to see them placed but also to help them in overcoming their inevitable difficulties during the first year or two of teaching.

COMMONWEALTH Fund fellowships will be available early in 1932 for British students who desire to continue their studies in American universities. Last year there were 121 candidates (99 men and 22 women) for ordinary and Dominion fellowships, and 29 fellowships were granted; 56 candidates applied for service fellowships (open to those in government service only), and 6 appointments were made. Of the 35 fellows appointed, 20 came from faculties of science. These fellowships are available to research graduates and also to students who have just taken their first degree. There is no fixed stipend attached to a fellowship, but each is of the approximate annual value of 3000 dollars. Each fellowship includes provision for an equipment allowance of 200 dollars, and a travel allowance, tuition fees, etc., 150 dollars per month for living expenses, allowance for travel during the Christmas recess, and allowance for three months' travel (which is compulsory) at the end of the first academic year. A fellowship is tenable for two years, with possible extension to a third year. There is very little limitation to the subject of study which a fellow may choose. Applications for fellowships must be

sent to the authorities of the college or university of which the candidate is, or has been, a member, and must reach the Secretary by Feb. 8, 1932. Further information can be obtained from the Secretary, Commonwealth Fund Fellowships, 35 Portman Square, London, W.1.

Calendar of Geographical Exploration.

Jan. 1, 1841.—The Antarctic and the Ice-Barrier.

Under the direction of Capt. J. Clark Ross, R.N., an expedition consisting of two ships, the *Erebus* and the *Terror*, crossed the antarctic circle to prosecute surveys for the British Government. From the point of view of geographical discovery, this was the most fruitful of all antarctic voyages. Ross was an experienced arctic traveller and had located the north magnetic pole in 1831. Under his direction, ships for the first time deliberately pushed their way into the pack ice. This ice, previously thought to stretch on indefinitely to the remote land, proved to be a belt about a hundred miles wide, and the *Erebus* and *Terror* passed through it to open waters now known as Ross Sea. By Jan. 11, Ross had sighted the rocky coast of South Victoria Land and had noted the Admiralty Range running north-west along the coast, and a further range going southwards. Unable to reach the mainland, he landed on Possession Island and claimed the newly discovered land for Britain. Later he sighted an active and an extinct volcano, named respectively Erebus and Terror after the vessels. The great ice barrier, with peaks 200 ft.-300 ft. in height and extending for 250 miles, seen for the first time, checked his farther southward progress. Like the Frenchman, Dumont d'Urville, who had set out from Hobart on Jan. 1 of the previous year, he was compelled to give up the dream of reaching the south magnetic pole, though he penetrated nearer to it than any previous explorer.

Sixty-one years later, on Jan. 1, 1902, the *Discovery*, with Lieut. R. F. Scott, R.N., as its commander, and with E. H. Shackleton, R.N.R., as one of its lieutenants, met the pack ice and thence penetrated to Ross Sea. The ice-barrier had retreated 30 miles since Ross was there. Scott found that the land which Ross had believed to lie east of the ice-barrier, but which he had cautiously charted as an "appearance of land", was plainly visible. Its higher summits rising 2000 ft.-3000 ft. above the sea. It was further discovered that McMurdo Bay, charted by Ross, was in reality the opening of a strait leading southwards between Ross Island and the mainland. Mt. Erebus proved to be not on the mainland, but on what is now mapped as Ross Island.

Jan. 2, 1923.—The Libyan Desert.

A. M. Hassanein Bey left Sollum, a small port on the Mediterranean near the western frontier of Egypt, on his difficult journey southward through the Libyan desert to Darfur. As a result of his work important new facts about the orography and geology of the region were recorded. His discovery of the rock basin oases of Arkenu and Owenat makes possible further desert travel in the still unexplored regions of the Libyan desert. His route linked up with Tilho's explorations in the French Sudan and confirmed the latter's conclusion that Lake Chad has no possible drainage outlet in an easterly direction.

Jan. 7, 1830.—The Murray River.

Charles Sturt launched a boat on the Murrumbidgee and sailed thence along the Murray to the sea. He had previously discovered a portion of the Darling River; this second "bold and desperate" venture solved the nature of the inland river drainage of south-eastern Australia.

Societies and Academies.

CAMBRIDGE.

Philosophical Society, Nov. 23.—T. M. Lowry and C. B. Allsopp: Refractive dispersion and the problem of 'optical exaltation'. A thin film of liquid is placed between the plates of a quartz etalon and the interference bands are focused on the slit of a spectrograph. The order of the interference bands is deduced from pairs of refractive indices determined with a refractometer. Refractive indices can then be deduced to four places of decimals in the visible or ultra-violet regions up to the limit of transparency of the film.—T. M. Lowry and H. K. Gore: Optical rotatory power of vapours. Measurements have been made of the rotatory dispersion of camphor and of camphorquinone as vapour and in solution. In the region of absorption, camphor gives a curve with a composite maximum. This is explained by the composite character of the ketonic absorption band, as evidenced by the fact that the curve of circular dichroism covers a smaller range of wave-lengths than the absorption curve.—T. M. Lowry and H. Hudson: Absorption and circular dichroism of optically active substances. Measurements have been made of the absorption, circular dichroism, and rotatory dispersion of a series of bornyl xanthates. The two absorption bands are optically active but of opposite sign. The curve of circular dichroism therefore crosses the axis, as is observed experimentally in the methyl xanthate.—C. P. Snow: Fine structure of absorption bands in crystals. The absorption bands of compounds of the rare earths in the crystalline state show well-marked discontinuities similar to the line spectra of the atoms. This has recently been shown to be due to the 'shielding' of an inner incomplete electronic group throughout the series of the rare earths. There is a marked sharpening of the lines when the crystals are cooled to liquid air temperature and below. Reasons for this have been discussed (see Snow and Rawlins, *NATURE*, 125, p. 349; 1930).—R. G. W. Norrish: Predissociation in relation to photochemical activity. A large group of primary photochemical effects may be correlated with the condition known as predissociation in the molecular absorption spectrum. With aldehydes and ketones, however, although photodecomposition coincides with predissociation, it is difficult to envisage the mechanism of the change, since the chemical data for some fifteen examples indicate that no free radicals are produced. It would appear that molecular rearrangement involving more than one bond occurs within the molecule.

PARIS.

Academy of Sciences, Nov. 23.—H. Vincent and L. Velluz: The immunigenic properties of the diiodosalicylic cryptotoxin. From experiments on guinea-pigs, it has been proved that the diiodosalicylic cryptotoxin, the preparation of which is given, is capable of rapidly conferring immunity against pure tetanus toxin. This cryptotoxin neutralises the tetanus toxin, the latter not being destroyed but converted into a harmless complex. This non-toxic complex rapidly immunises animals.—C. Sauvageau: The third kind of plurilocular organs of *Ectocarpus secundus*.—Paul Montel: The upper limit of the moduli of the zeros of polynomials.—Eduard Cech: The theory of dimensions.—Maurice Janet: The minimum of the ratio of certain integrals.—J. A. Lappo-Danilevski: The decomposition of the normal integral matrix of a system of linear differential equations and the construction of the primitive