

exists. There are now more than seventy towns and villages where electric supply is available. There are several large poultry farms where electric hatcheries are in operation. Farms also use the electric supply for fruit and vegetable canning, and there are flour mills, small water and sewerage schemes, gravel and sand pits, brick-making and timber yards and sawing mills where it is employed. In addition to supplying electricity in bulk to many supply undertakings, it also supplies for traction purposes the London, Midland and Scottish Railway and the London Passenger Transport Board (Morden Tube).

The new extensions of the Barking power station work with a boiler pressure of 600 lb. per sq. inch. The temperature of the steam is therefore about 800° F. A few years ago it looked as if a still higher pressure would become the standard. In America, steam pressures of 1,200 lb. per sq. inch were first used; later, pressures above 3,000 lb. per sq. inch were used in Europe. Seeing that the new Battersea power station works at between 600 lb. and 650 lb. pressure and that the new Fulham station is being designed for this pressure, it looks as if 650 lb. would become the standard pressure. It is interesting to remember that early steam boilers worked with pressures of about 8 lb.

University and Educational Intelligence

CAMBRIDGE.—The following appointments have been made:—J. H. Driberg, University lecturer in anthropology, Dr. S. Dickinson, University lecturer in mycology in the Department of Agriculture, W. J. Dowson (Christ's College), University lecturer in mycology in the Department of Botany and Dr. H. Godwin (Clare College), University lecturer in botany.

The degree of M.A. *honoris causa* has been conferred on Sir Charles Martin, formerly director of the Lister Institute of Preventive Medicine and professor of experimental pathology in the University of London.

At Girton College Dr. O. Taussky and Dr. C. Leubuscher have been elected to research fellowships.

On June 6, the following honorary degrees, among others, were conferred: Sc.D., Prof. Alfred Fowler, Yarrow research professor of the Royal Society and professor of astrophysics in the Imperial College of Science; Litt.D., Prof. Samuel Alexander, honorary professor of philosophy in the University of Manchester.

LIVERPOOL.—The Council of the University has accepted with regret the resignation of Mr. R. O. Street, senior lecturer in applied mathematics, on his appointment to the chair of mathematics in the Royal Technical College, Glasgow.

The University of Berne has conferred the honorary degree of D.Sc. on Prof. Share Jones, director of veterinary studies and professor of veterinary anatomy in the University, in recognition of his services to veterinary education and his distinction in his own branch of research.

SHEFFIELD.—The title of emeritus professor has been conferred on Prof. Edward Mellanby, formerly professor of pharmacology in the University.

Science News a Century Ago

The Royal Society

At the meeting held on June 19, 1834, fourteen papers were taken; amongst these, a paper submitted on borings and ravages in timber, by William Thompson, vice-president of the Natural History Society of Belfast, was widely reported at the time. The opinion advanced that the *Teredo navalis* had ceased to be found on the British coast was shown by the author to be erroneous, since numerous specimens had been collected from the piles used in the formation of the pier at Portpatrick, in Ayrshire.

The subjoined letter from Mr. J. G. Children, Sec. R.S., addressed to Mr. Francis Baily, vice-president, was read: "British Museum, June 19, 1834. . . . His Royal Highness the President requests that, when you adjourn the meeting this evening to the 20th of November, you will have the goodness to express his great regret, that unfortunately, the state of his health and sight has lately been such as to render it impossible for him to preside at the ordinary meetings of the Society so regularly as it was his anxious wish to have done. His Royal Highness begs you will assure the Society that his absence has been occasioned by the cause alluded to alone, and from no feeling of diminished interest in the prosperity of the Royal Society, or of regard and respect for the Fellows; on the contrary His Royal Highness hopes that by the blessing of Providence, his health will soon be in all respects so far re-established as to enable him, on the reassembling of the Society, to resume the chair and fill it with that uninterrupted regularity which it is His Royal Highness's most anxious wish to observe, in whatever duty he undertakes. PS. His Royal Highness requests you will in his name bid the Fellows heartily farewell till he meets them again in November. (*Proc. Roy. Soc.*, vol. 3.)

Cause of the Aurora Borealis

A paper "On the Nature and Origin of the Aurora Borealis" by the Rev. George Fisher, read before the Royal Society on June 19, forms an excellent illustration of the state of geophysics in 1834. Arguing from "the general fact that the Aurora Borealis is developed chiefly on the edge of the Frozen Sea, or wherever there is a vast accumulation of ice", the author concludes that it "is an electrical phenomenon, arising from the positive electricity of the atmosphere, developed by the rapid condensation of the atmosphere in the act of freezing, and the induced negative electricity of the surrounding portions of the atmosphere; and that it is the immediate consequence of the restoration of the equilibrium by the intervention of the frozen particles, which being imperfect conductors, become luminous while transmitting this electricity. In tropical and temperate climates this phenomenon does not occur, because the electric equilibrium is restored by means of aqueous vapours, a process which often gives rise to thunder and lightning. . . ."

Lardner on Babbage's Calculating Machine

A century ago, few men of science were more widely known than Dr. Dionysius Lardner (1793–1859), who from 1827 until 1840 held the chair of natural philosophy and astronomy in University College, London. The writer of many textbooks, he projected the "Cabinet Cyclopaedia" and secured for it the

co-operation of Herschel, Brewster, Powell and other distinguished men. He was also well known as a lecturer, and on June 21, 1834, he lectured to a crowded audience in the theatre of the Mechanics' Institution on Babbage's calculating machine, to the cost of which the Government had contributed largely, but the construction of which was then at a standstill. Lardner dealt with the history and the principles of calculating machines and referred to their importance for the construction of correct mathematical tables. In its report of the lecture, the *Times* said that it would be considered a matter of national concern if means were withheld for the completion of Babbage's machine. The occasion was rendered notable by the presence in the chair of Lord Brougham and the attendance of M. A. Dupin, the president of the French Chamber of Deputies, whom the Committee of Management elected an honorary member of the Institution. M. Dupin was the brother of Baron Charles Dupin (1784-1873), the mathematician who had written on the manufactures and industries of England. In announcing M. Dupin's election, Dr. Birkbeck said he trusted, after what M. Dupin had heard that evening, that he would be induced to continue to lend his powerful aid and assistance to his brother in promoting the establishment of similar institutions to their own in France.

McCormick patents his Reaping Machine

There were many pioneers of the reaping machine but the outstanding inventor was Cyrus Hall McCormick (1809-84). His machine was exhibited at the Great Exhibition of 1837 and the *Times* said of it that "if it fulfilled its promise, [it] was worth the whole cost of the Exhibition". McCormick was the son of Robert McCormick (1780-1846) of "Walnut Grove" Farm, Virginia, a man of many interests who himself attempted but abandoned the task of constructing a reaping machine. At the age of twenty-two years, young McCormick, undaunted by his father's failures, took up the problem and in a year or two produced a machine which was tried with considerable success. "The fundamental principles in this reaper," a recent writer has said, "the divider, reel, straight reciprocating knife, fingers or guard, main wheel and gearing, and front-side draft traction, together with their peculiar combination, have proved essential to reaping machinery down to the present time." McCormick, faced with a rival in Obed Hussey, patented his important invention on June 21, 1834. He spent several years in perfecting it, but finding difficulty in getting his machines constructed, in 1847 founded a works at Chicago, then a small lake-side port. By 1851 he was building 1,000 machines a year and in 1857 constructed 23,000. The firm he founded is now the International Harvester Company. McCormick became very wealthy and many honours came to him, the Paris Academy of Sciences in 1879 electing him a foreign member "as having done more for agriculture than any other living man".

Magnetic Survey of the British Isles

In 1834 Capt. (afterwards Sir Edward) Sabine commenced, in conjunction with the Rev. Humphrey Lloyd and Capt. (afterwards Sir James) Ross, the first systematic magnetic survey ever made of the British Islands. The results were published in a series of reports to the British Association, commencing 1835, and the first observations (apart from

some preliminary tests of instruments) appear to have been made by Sabine at Limerick on June 21, 1834. The British Association report for 1835 contains a "Magnetic Chart of Ireland A.D. 1835". In 1836 Sabine, almost single-handed, extended the survey to Scotland and in 1837, with Lloyd, Ross and other collaborators, to England. The recording, plotting and combining of the observations to obtain the most probable mean results represent a very large undertaking.

The Overland Route to India

At a meeting of the Royal Geographical Society held on June 23, 1834, presided over by John Barrow, a paper was read "On the Manners of the Inhabitants of the Southern Coast of Arabia and Shores of the Red Sea, with Remarks on the Ancient and Modern Geography of that Quarter, and the Road through the Desert from Kosir to Kenah". This paper was communicated by James Bird, who had lately returned by that route from India. Bird had made the passage from Bombay to Aden, and thence to Jeddah and Kosir by a steam packet, and the interest in his account was heightened by the project of steam navigation to India having just been made the subject for a public inquiry.

Societies and Academies

LONDON

Royal Society, June 7. G. I. TAYLOR: (1) The mechanism of plastic deformation of crystals. Plastic strain is chiefly due to the sliding of one plane of atoms over its immediate neighbour in such a way that the perfect crystal structure is re-formed after each atomic jump. Slipping occurs over limited lengths of the slip plane, and this type of plastic strain necessarily gives rise to elastic stresses near the two dislocations which occur at the two ends of each of these lengths. The assumption that such dislocations will migrate through the crystal, owing perhaps to temperature agitation, under the influence of even the smallest shear stress, leads to a definite picture of the mechanics of plastic distortion. (2) The strength of rock salt. Experiment shows that plastic strain in rock salt is the main factor determining the strength of well annealed crystals. A recent theory of the strength of metals is applied to rock salt and shown to lead to a parabolic relationship between tensile stress and plastic strain. It is concluded that the strain in rock salt occurs in the crystalline parts of the structure where the crystal order is perfect, and that the strength is determined by the mean free path of the centres of dislocation. The latter, which is of the order of 10^{-4} cm., is determined by the distance apart of the faults and by the temperature. The theory therefore assigns a definite function to the faults in determining the strength of crystals irrespective of their actual crystallographic or atomic nature. C. A. BEEVERS and H. LIPSON: The crystal structure of copper sulphate pentahydrate, $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$. The copper atoms lie on the special positions (000) and $(\frac{1}{2}\frac{1}{2}0)$ and the sulphur upon the general position (0.01 0.29 0.64). Four of the waters are arranged in squares around the coppers, and two oxygens make with these approximate octahedra. The fifth water is not co-ordinated, but is in contact with two oxygens and two waters. All the waters show two oxygen bonds each, in accordance with recent ideas.