afternoon was spent seeing some of these at the Clinical Laboratory, Royal Infirmary. Amongst these demonstrations were Dr. R. K. S. Lim, demonstration of the mucoid cells of the stomach; Dr. E. P. Poulton and Dr. W. W. Payne, peristalsis of the human œsophagus; Mr. McClure, psychogalvanic reflex; and Prof. J. Meakins, respiration with decreased volume per respiration, with and without oxygen, and effect of resistance to breathing on respiration at rest and whilst working.

The Week in West Africa

AT a meeting of the Royal Anthropological Institute held on December 13 Mr. Northcote W. Thomas read a paper on "The Week in West Africa." He said there were in West Africa a number of sub-divisions of the lunar month, such as 16-day periods, 10-day periods, and the like, the origin of which was either in the market or in some religious belief. There were, in addition, a number of shorter units, comparable to our week, of more uncertain origin; they ranged in length from two to eight days. They were very rarely sub-divisions of the month, and there was reason, where the week is synchronised with the month, to suspect foreign influence. Generally speaking, the month in West Africa was of small importance and played no part in economic or religious life; it was reckoned from the day on which the new moon was first seen, but the native can only very rarely say of how many days it consists. There was no less uncertainty as to the length of the year; few, if any, tribes had any exact knowledge of its length. The calendar was sometimes adjusted by the recognition of two years of different length, as in Benin, where the female year seems to have been about 340 days in length.

The week has been traced to a religious origin. Webster has regarded the "rest day" as its germ, but the rest day is an institution of agricultural people, and there are many such peoples in Africa who have no week. On the other hand, the distribution of the market is practically conterminous with that of the week, and it is probable that the calendar first came into existence as a means of indicating the market day. We have, however, little or no evidence to show why the different units were chosen. A certain number of day-names are derived from names of deities, notably on the Gold Coast, but, generally speaking, the kind of work done on a given day or the market attended is the decisive factor, and consequently they are used only in a small area. To this there is one striking exception; the Ibo day-names, used also in a different order in Benin City, are found everywhere from the Niger to the Cross River, but we are ignorant of their meaning.

The four-day week of the Lower Niger, which appears to be independent of the week of the Congo, seems to occupy the largest area; but we know too little of the distribution of the five- and six-day weeks, especially in French territory, to make any very definite assertion. There is good reason to suppose that a non-Mohammedan seven-day week was known; some of these weeks are clearly expanded from an earlier four-day week, but they have native, not Arabic, names.

Scientific Research and Industrial Development.

IN a lecture on "The Benefits of Research to Corporations" (No. 18, R. and C. Series of Nat. Res. Council, U.S.A., 1921) Dr. Charles L. Reese, chemical director of the de Pont de Nemours Explosives Co., U.S.A., gives examples of the advantages which accrue when a large industrial concern is equipped with a staff capable of applying scientific knowledge to the improvement of materials and processes.

Before the war this important company had already systematised its procedure by developing a system of records and costing, and had completed a number of investigations which had been the means of saving money, resulting, for example, in methods for shortening the time of separation of nitroglycerine from its acids, increasing its yield, preventing its freezing in dynamites, and for nitrating cellulose by the use of the mechanical dipper. Studies from the company's laboratories on the nitration of toluene and of the characteristics of nitrocellulose propellants became of great importance when war broke out, as did also a process for the recovery of a considerable proportion of the alcohol used in gelatinising the propellant, this leading to a direct saving in corn—estimated at ten million bushels—which thus escaped being fermented.

During the war enormous extensions were made by the company for the production of nitrocellulose powder, trinitrotoluene, picric acid, amatol, and tetryl, and in this connection it is stated that the staff of the chemical and mechanical research departments of the firm was increased in number from 212 to 987, with an expenditure on experiment and research of 3,360,000 dollars for four years of the war, the output of military explosives being seven million tons.

Since the war the company has transferred its research organisation with success to the production of dyes, and is spending, and is prepared to spend, many millions of dollars on research to meet German competition, but protection is considered to be essential at present to the existence of the industry.

The address is interesting as giving an idea of the scope and the methods of a large chemical concern in utilising the services of scientific men for the investigation of new processes and the conservation of materials. A custom obtains with the company of recompensing inventors by means of a bonus in the form of the company's stock, in some cases sufficient to make them independent.

Little mention is made, however, of research on the theory of explosives, on which doubtless much work has been done by the staff. A few remarks may be made as to some subject-matter of the claims. Thus, while the mechanical dipper was undoubtedly an advance for obtaining output on the old pot-process of making nitrocellulose, the Thomson displacement process as used in this country and in France also greatly reduces handling of the material and eliminates fuming off, which appears still to occur occasionally with the mechanical dipper. Much is made of the "work found necessary to develop satisfactory methods for loading that very successful high explosive developed in England known as amatol, a mixture of trinitrotoluene and ammonium nitrate," but it is understood that an enormous

number of shell was filled with amatol by the methods supplied from this country. Again, tetryl, trinitrophenylmethylnitroamine, not "tetranitro-dimethylaniline," as stated, was not used exclusively in Germany before the war, but was made here also on the manufacturing scale.

The address, however, is of interest as showing a practical appreciation of the need for the application of scientific method in the development of old, and the acquisition of new, industries.

University and Educational Intelligence.

BIRMINGHAM.—The reports of the Council and of the Principal to be presented to the Court of Governors at the annual meeting on February 9 have been issued. The Principal appeals for more liberal provision of both undergraduate and post-graduate scholarships, and lays stress upon the difficulties which financial stringency imposes on the advancement of research. He reminds the Governors that "the war revealed the obvious, but often forgotten, truth that trained minds cannot be improvised, and that success in international competition will go to the nation which, by laborious and patient organisation, provides, through its universities, disciplined workers."

The extension of the University library is reported with satisfaction as a step in the direction of a more complete provision of that vital need of research workers. The overcrowding of the Mason College buildings is regarded as a grave menace to the continued expansion of the departments of medicine, biology, arts, and education. The obvious remedy is to transfer the biological departments to new buildings at Edgbaston, but as this would involve great expenditure of money the alternative of restricting entries to all the departments at present housed in Mason College may have to be faced in the near future.

The Principal appeals especially for more support from the districts surrounding the city, which send a large proportion of the students at present in the University, reminding them that "we cannot have it both ways: unrestricted admission of all the fully qualified and the withholding of a substantial contribution towards the financial cost of a university education."

Reference is made to the problem of adult education and the way in which the University is trying to do its share of this important work. "All who keep closely in touch with the main currents of educational opinion are impressed with the increasing insistence of the demand as well as with the complexity of the task involved in an 'educated democracy.' It would be disastrous if the handling of the problem became political; the provincial universities by sympathy and wise statesmanship, perhaps more than any other organisations, can avert this danger."

The Court of Governors is to be asked to confer the title of emeritus professor on Prof. J. H. Muirhead.

The assistance of the Birmingham Chamber of Commerce in completing the fund for a chair of Italian (which was started by Mr. Arthur Serena's gift of 5000*l.*) is gratefully acknowledged by the Council.

The appointment of Mr. Maurice Nicoll to the lectureship in psychotherapy, endowed by Sir Charles Hyde, is reported.

In commemoration of the work of Prof. P. F. Frankland, a fund has been subscribed for providing a Frankland medal and a prize of books to be given annually to the best student in practical chemistry.

A bequest of 2000*l.* under the will of the late Richard Peyton becomes available, by the death of his widow, "for the advancement of music."

Calendar of Industrial Pioneers.

January 26, 1891. Nicolas August Otto died.—Originally a commercial traveller, Otto began work on the gas engine in 1854. In 1867 with Langen he brought out the Langen and Otto atmospheric engine, and in 1876 he introduced the engine working on the Otto cycle, which proved to be the turning point in the history of gas motors.

January 27, 1848. Josiah Christopher Gamble died.—A pioneer among alkali manufacturers, Gamble was born in Ireland in 1776. He graduated at Glasgow University and became a Presbyterian minister. After a few years he abandoned the Church, started small works at Dublin for the manufacture of sulphuric acid, bleaching powder, and alum, and in 1828 with Muspratt founded the first chemical works at St. Helens.

January 27, 1885. Edward Davy died.—A contemporary of Wheatstone and Cooke, Davy invented an electric telegraph, experimented with a mile of wire in Regent's Park, and in 1837 at Exeter Hall exhibited his needle telegraph. In 1839 he sailed for Australia, where he became medical officer of health and Mayor of Malmesbury.

January 28, 1829. Thomas Tredgold died.—Known for his valuable writings on carpentry, the strength of materials, and the steam engine. Tredgold began life in the North of England as a journeyman carpenter. He studied mathematics, chemistry, and architecture, contributed to the "Encyclopædia Britannica" and the *Philosophical Magazine*, and made original investigations. He died in London at the age of forty, worn out by his labours.

January 28, 1864. Benoit Paule Emile Clapeyron died.—From the Ecole Polytechnique Clapeyron entered the mining service, taught in the School of Public Works at St. Petersburg, and on his return to France took part in the construction of some of the earliest French railways. He wrote on the mechanical theory of heat, and it was through his work that Kelvin was led to the study of Carnot's famous memoir. Clapeyron in 1858 succeeded Cauchy as a member of the Paris Academy of Sciences.

January 29, 1882. Alexander Lyman Holley died.—A graduate of the Brown University, Providence, Holley engaged in practical engineering, and in 1860 published an important work on American and European railway practice. He afterwards became a great ironmaster. The inscription on his monument in Washington Square, New York, states that he was "foremost among those whose genius and energy established in America and improved throughout the world the manufacture of Bessemer steel."

February 1, 1885. Stanislas Charles Henri Laurent Dupuy de Lôme died.—In 1848–52 Dupuy de Lôme built the *Napoléon*, the first steam line of battleship. About five years later he converted the finest two-decker in the French Navy, also called the *Napoléon*, into the *Gloire*, the first fully armoured sea-going ship ever seen. She was 256 ft. long, of 900 h.p., carried thirty-six guns, and was protected by 5 in. of iron and 26 in. of timber. Dupuy de Lôme was for some years Chief Constructor of the French Navy.

February 1, 1885. Sidney Gilchrist Thomas died.—A clerk in a London police court, Thomas studied chemistry and in 1870 attacked the problem of the dephosphorisation of pig-iron in the Bessemer converter. By 1875 he had solved the problem, and with the assistance of his cousin, Percy Gilchrist, and others, the commercial triumph of his important discovery was assured. His grave is in the Passy Cemetery in Paris. E. C. S.