

tional measurements can be obtained and further information secured relative to special conditions arising in practice.

Special Matters.—As usual, a large number of special questions have been referred to the committee for advice or investigation. The experiments relating to bombs have been continued, and valuable communications relative to the flight of bombs have been received from the Air Department of the Admiralty and from the Central Flying School. The committee is indebted to Prof. Karl Pearson, F.R.S., for communicating to it the results of his calculations of bomb trajectories. This question has also been the subject of investigation at the National Physical Laboratory.

Questions relating to the attack of aircraft from aircraft have been examined. Problems in connection with the aeroplane compass have been further considered. Other instruments and apparatus for use on aircraft have been investigated.

As previously, a number of inquiries have been received from the Board of Invention and Research and the Munitions Inventions Department, and investigations have been carried out at their request at the National Physical Laboratory and at the Royal Aircraft Factory.

Reports from the Experimental Stations of the Air Services.—A number of communications have been received during the year relating to experimental work carried out by the R.N.A.S., and by the Testing Squadron of the Royal Flying Corps. Many of these have been of great interest and value, and of much assistance in the application of the results obtained from the model experiments and in the estimation of aeroplane performance.

The committee visited on various occasions during the year military and naval air stations, as well as the Royal Aircraft Factory and the National Physical Laboratory, and witnessed many interesting experiments and trial flights.

EXPERIMENTAL WORK AT THE ROYAL AIRCRAFT FACTORY.—*Engine Experiments.*—Much research has been made into various methods for improving the output and the trustworthiness of aeroplane engines. A large number of radiators of various types have been tested, and an efficient type has been standardised. Great progress has been made in the development of the air-cooled engine. Work has been done on the compensation of carburettors for variation of air density, and a device for improving the performance of engines at great heights has been tested on several engines.

Full-Scale Aeroplane Experiments.—The measurement of the resistance of aeroplanes in flight has been continued with the object of confirming the model experiments, and an instrument for measuring the resistance directly has been developed. The distribution of air-pressure over the surface of the wing of an aeroplane in flight has been measured, and further experiments on these lines are in progress. Experiments have been made on longitudinal and lateral stability of aeroplanes in flight, and much theoretical work on the same subjects has been done. Measurements have also been made of the disturbance of the air behind a propeller to obtain data which are required in the design of new machines.

Instruments.—The behaviour of various types of magnetic compass in an aeroplane in flight has been investigated. Two new types of bombsight have been developed, and are now being tested. The improvement of the standard aeroplane instruments has been continued, and a number of special instruments have been devised for use in connection with full-scale experiments on aeroplanes. The means of communication between pilot and observer have been improved.

Fabrics, Dopes, etc.—Weathering tests on fabrics

and experiments on the influence of humidity on their strength have been made. The development of a calendered fabric has received attention. The deteriorating effect of various agents (bacteria, light, etc.) has formed the subject of considerable research. The experiments on the composition of dopes, varnishes, and pigments, and on fluxes, paints, and oils have been continued.

Light Alloys.—Much experimental work has been done to arrive at the most suitable aluminium alloys for engine parts. Experiments have also been carried out in the application of the alloys which have been developed at the National Physical Laboratory.

METEOROLOGICAL WORK.—Experimental work in meteorology has been mainly in connection with the inquiry into the location of distant thunderstorms and the tracing of their progress across the map by means of a properly organised system of observations at various stations.

On some occasions the progression of thunderstorms across the map has been satisfactorily identified, although the identification on other occasions was uncertain.

Further attention is necessary in order to develop an apparatus which is more directly suitable for the purpose than that which is at present in use, in consequence of the variability of the sensitiveness, which with the present form of apparatus is unavoidable.

In addition, an inquiry into the variation of the gustiness of wind between day and night has been provided for by the erection of an anemometer with its vane at 140 ft. above the ground.

Observations have also been made of the variation of the wind with height close to the ground; and a large number of observations of pilot-balloons have been made and duly reported.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

We learn that Dr. W. C. M'Intosh, professor of natural history in the University of St. Andrews since 1882, is about to retire from the position, in consequence of advanced years and conditions of health.

MR. W. BREW, hitherto lecturer in electrical engineering at the Belfast Municipal Technical Institute, has been appointed head of the electrical department of the Birmingham Municipal Technical School.

ACCORDING to the *Aftonbladet*, special lectures are to be given during the coming winter at Greifswald University on "Germany's Commercial Relations with Scandinavia," and a chair of the Swedish language is to be founded in the University after the war.

THE new session of the Sir John Cass Technical Institute commences on September 24. The syllabuses of classes which have reached us show that special courses of higher technological instruction in connection with the fermentation industries have been arranged; instruction will be given in brewing and malting, and in the microbiology of the fermentation industries. The methods of differential and integral calculus and their application to chemical and physical problems will be studied in the department of physics and mathematics. Courses of an advanced character will be provided in the metallurgy department on gold, silver, and allied metals, and on the heat treatment of metals and alloys. The courses of instruction are for the most part designed to supply a technical training for persons engaged in chemical, metallurgical, and electrical industries, and in trades connected with them. A number of the more specialised courses of instruction which in former years formed a characteristic of the work of the institute have for the present been discontinued.

TECHNICAL schools and colleges are now issuing particulars of the courses of study they have arranged for the forthcoming winter session, and we have received a number of college calendars and prospectuses from various districts. At the Battersea Polytechnic, in the Technical College for Day Students, the usual courses are offered in mechanical, civil, electrical, and motor engineering, building science, and applied chemistry. In addition, new courses have been arranged in gas engineering and manufacture, and in the technique of paper-making. The polytechnic is continuing its special war work, which includes classes for the training of men and women munition workers, courses for women in engineering tracing, and free instruction for disabled soldiers and sailors in motor-car engineering, electrical testing, sanitary inspectors' duties, and other forms of remunerative work. The City of Bradford Technical College offers a complete training for the various branches of the textile, chemical, and engineering industries, including the underlying sciences. The diploma courses extend over three, or in some cases four, years, and occupy the full time of the student, much of whose work is of an advanced character. A special characteristic of the courses is the great importance attached to scientific research. At the West of Scotland Agricultural College, Glasgow, students are provided with facilities for the study of agriculture, dairying, forestry, horticulture, and poultry-keeping. Some of the courses have been arranged in conjunction with the University of Glasgow, and under conditions explained in the prospectus students may qualify for the B.Sc. degree in agriculture of the University.

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, August 27.—M. Ed. Perrier in the chair.—A. **Lacroix**: The composition and modes of alteration of the ophiolites of the Pyrenees.—G. **Humbert**: Some properties of binary indefinite quadratic forms.—H. **Deslandres**: Contribution to the supposed influence of the cannonade on the fall of rain. The opinion of M. C. Saint-Saëns.—A. **Laveran**: The experimental inoculation of *Leishmania tropica* in apes: multiplication of the primary lesions by auto-inoculations in a *Circopithecus mona*: Paul **Sabatier** and G. **Gaudion**: The various modes of decomposition of amines by catalysis: return to aniline and the substituted anilines. Examples are given of the various types of decomposition effected by metallic nickel, removal of hydrogen, separation of ammonia, and separation of aromatic amine.—F. **Delhaye** and **Sluys**: The formation of the Karoo in the western Congo.—MM. **Lapicque** and **Legendre**: The improvement of war bread by neutralisation of the ferments of the bran. An extraction of 85 per cent. of the wheat gives a flour containing such a proportion of bran that the bread made from it is unpleasant in taste and rapidly goes mouldy. The addition of a proportion of lime water in making the bread neutralises the acidity of the bran and gives a bread which has a better taste and keeps longer than bread made from the same flour without the addition of lime water.

BOOKS RECEIVED.

British Museum (Natural History). British Antarctic (*Terra Nova*) Expedition, 1910. Natural History Report. Zoology. Vol. iv. No. 1, Echinoderma. Part 1. Actinogonidiata. By Prof. F. J. Bell. Pp. 10+plates. (London: British Museum (Natural History) and others.) 2s. 6d.

Transactions of the Royal Society of Edinburgh.

NO. 2498, VOL. 100]

Vol. li. Part iv. Sessions 1915-16-17. (Edinburgh: R. Grant and Son.) 31s. 6d.

Jacob and the Mandrakes. By Sir J. G. Frazer. Pp. 23. (London: H. Milford.) 2s. 6d. net.

Primitive Man. By Prof. G. Elliot Smith. Pp. 50. (London: H. Milford.) 3s. 6d. net.

Shells as Evidence of the Migrations of Early Culture. By J. W. Jackson. Pp. xxviii+216. (Manchester: At the University Press; London: Longmans and Co.) 6s. net.

Our Analytical Chemistry and its Future. By Dr. W. F. Hillebrand. Pp. 36. (New York: Columbia University Press; London: H. Milford.) 1s. 6d. net.

Thomas A. Edison. Pp. 216+plates 8. (London: G. G. Harrap and Co.) 3s. 6d. net.

Thrice through the Dark Continent. By Prof. J. Du Plessis. Pp. viii+350+map and illustrations. (London: Longmans and Co.) 14s. net.

Founder's Day in War Time: An Address delivered on March 23, 1917, at a Memorial Service for Members of Manchester University who have Fallen in the War. By Sir A. W. Ward. Pp. 55. (Manchester: At the University Press; London: Longmans and Co.) 1s. 6d. net.

Carnegie Endowment for International Peace. Year Book for 1917. Pp. xvii+213. (Washington.)

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Editorial and Publishing Offices:

MACMILLAN AND CO., LTD.,

ST. MARTIN'S STREET, LONDON, W.C.2.

Advertisements and business letters to be addressed to the Publishers.

Editorial Communications to the Editor

Telegraphic Address: PHUSIS, LONDON.

Telephone Number: GERRARD 8830.