

the financing by the State of a system of modernised mutually co-operating co-operative colonies. In other words, it plans to bring into existence an organisation of people who would be customers to one another, and thereby independent of fluctuations in general trade prosperity. Capt. Petavel claims that co-operative colonies for education would be the easiest type to establish, and that in India they would enable an ideal educational programme to be planned. They would revive in a modern form the old Indian *Gurukul* education system as was strenuously advocated by the late Sir Asutosh Mookerjee. In the educational colonies, three hours per day might be devoted to productive work of a suitable kind, which it is claimed is the first item in any ideal educational programme. Another three hours devoted to organised games would serve to develop muscle, alertness and disciplined co-operation. In the ideal programme there would be time also for instruction conveyed by drama, song and similar methods. Class work need then occupy not more than four hours, leaving fourteen hours for rest and recreation. The colonies would be practically self-supporting, since the pupils would cultivate the land that would give them and those who taught them their food. In the Indian rural districts, the educational 'united communities' would be centres also of technical training of all kinds. They would be the seed farms, stock farms, demonstration farms and centres of rural reconstruction generally.

The Ministry of Health in 1933-34

THE fifteenth Annual Report of the Ministry of Health was issued on August 11 (Cmd. 4664. London: H.M. Stationery Office. 6s. net). The Report, which relates to the year ended March 31, 1934, is divided into six parts—public health, housing and town planning, local government and local finance, administration of the poor law, national health insurance and contributory pensions, and the Welsh Board of Health. As in previous years, the Annual Report of the Chief Medical Officer of the Ministry is published separately. During the twelve months, private enterprise built without subsidy 207,869 houses, which constitutes a record. The opportunity has been taken to include in the Report a full review of the public health services under the conditions created by the Local Government Act, 1929. The number of samples of food analysed by public analysts during the year 1933 was 138,171, of which 7,601 samples were reported as adulterated or not up to standard, a percentage of 5.5, being a slight increase over the two previous years. As regards infectious diseases, the notable features of the year were an increase in the prevalence of scarlet fever, concurrently with an increase in the prevalence in diphtheria, an increase in the prevalence of and mortality from cerebro-spinal fever, and a decline in the incidence of smallpox.

The Giorgi System of Units

AN interesting note on the metre, kilogram, second and 'another unit' system of units by Prof. G. Giorgi has been published by the International Electro-

technical Commission (I.E.C.) the central office of which is at 28, Victoria Street, S.W.1. This system of units has already been described in *NATURE* of April 21, p. 597. The committee for electric and magnetic units voted last year unanimously in favour of a proposal to arrange the system of practical electrotechnic units into a complete absolute system usually called the M.K.S. system. In this paper, Giorgi describes the three well-known groups of units, the C.G.S. electrostatic, the C.G.S. electromagnetic and the group of practical units. He commends the national system of units devised by Heaviside, in which the 4π is displaced and a perfect duality between electric and magnetic formulae is secured. The theory of physical dimensions is better understood than it was fifty years ago. No one now believes that everything in the physical world depends necessarily on three fundamental quantities, length, mass and time. Giorgi shows that by taking the ampere, or the volt or the coulomb as the fourth unit, he can build up a complete absolute system from four fundamental units. This set of units is neither electrostatic nor electromagnetic; it is in agreement with the principle of duality and can be used with either rational or non-rational derived units. All units of the system lie between the smallest and largest magnitudes that present science has to measure. It will simplify the learning of the theory of electricity by students of electrical engineering. No proposal is made to discard the existing systems of units. Each one will be employed according to the requirements of the subject and the preference of the user. Future practice will show which is the most convenient.

Before Papyrus: Beyond Rayon

AN interesting and brightly written paper by Dr. G. J. Esselen, the president of Inc. Chemical and Research Development of Boston, is published in the *Journal of the Franklin Institute* of March. It is entitled "Before Papyrus . . . Beyond Rayon". Rayon a few years ago was universally known as artificial silk. The basic chemical substance to which the writer refers is cellulose. It forms the structural framework of all vegetable life and is the raw material of great industries. The reason why the derivatives of cellulose were so slow in developing is that it is only a few years ago since its empirical composition was discovered. Transparent sheets of cellulose plastic are used in the manufacture of the laminated 'glass' used in automobiles. A recent discovery has so lowered the cost of the manufacture of cellulose acetate plastic that at the present time more than 70 per cent of all the laminated 'glass' manufactured in the United States is made from it. They also make bullet-proof 'glass' composed of five laminations, the centre one being a piece of plate glass about $\frac{3}{4}$ in. in thickness. It is being used for the windows of armoured cars and cashiers' cages in banks. In 1910, no rayon was being made in the United States. In 1931, 144 million pounds were produced. Methods of manufacturing rayon are continually improving, greatly increasing its strength and its resistance to

water. A new use of cellulose is the manufacture of shoes. With this material all sewing and nailing of the soles to the uppers are eliminated. The cement used to stick them together is a cellulose nitrate cement. It is now only necessary to hold them together for fifty seconds. A single operator in 8 hours 15 minutes applied soles to 1,580 pairs of shoes. The value of cellulose as a raw material is continually increasing as our knowledge increases.

Fenland Archæology

AMONG the objects which the recently founded Fenland Research Committee, of which Prof. A. C. Seward is chairman, has in view is the preparation and publication of a map, or series of maps, showing the extent of Roman or British occupation of the Fens and of the watercourses as they existed at that period. As was pointed out when the Committee was formed, the scientific investigation of the Fenland to a great extent has been neglected, and if it should be possible to complete the survey for the purpose of this map on the scale contemplated, it will prove of very considerable importance for the study of the physical and human geography of the period. It is estimated that something like a million acres will be added to the map of Roman Britain. In the meantime, an appeal has been issued by the Committee for assistance towards the cost of printing a map of the Fens on the scale of two inches to the mile in a series of twenty sheets, of which four have already been prepared. The maps are to be reproduced by photography from the six-inch Ordnance map and will show all that is shown on that map. It has been found by experience that the two-inch scale is more convenient for survey work than the six-inch, hence the necessity for the reproduction. The maps are intended for use as a basis for the research work of the Committee, especially in connexion with the work of plotting from air-photographs showing abandoned drainage channels, the Celtic, or Romano-British, system of fields and drainage and the like. A sum of £500 is required. Contributions may be sent to the Hon. Secretary, Dr. Grahame Clark, Peterhouse, Cambridge.

Afforestation in Great Britain

IN view of the conditions of drought experienced in 1933, the fourteenth Annual Report of the Forestry Commissioners for the year ending September 30, 1933 (H.M. Stationery Office, 1934) may be read with satisfaction. Since the Commissioners commenced their afforestation work, the only comparable drought in Great Britain was that of 1921; the losses in the nurseries and new plantations were far less in 1933 than in 1921. Equally satisfactory is the comparison of fire losses with those of the bad fire year 1928-29, even though the drought in 1933 was more prolonged. This is attributed to the fact that the whole system of fire prevention and fire protection was overhauled after 1928-29, and with success; since the acreage burnt in 1932-33 was 1,313 compared with 4,574 acres in 1928-29. It is of interest to note that 50 per cent of the fires in plantations

during 1932-33 originated from sparks from railway engines, whilst 19 per cent were caused by the general public. With the growing area of coniferous woods in the country, as a public property, it would appear that railway managements should take steps to minimise this wasteful destruction. The Commissioners continued their planting work, the total area dealt with (planted or sown) during the year amounting to 21,037 acres, of which 19,160 acres were conifers and 1,877 acres broad-leaved species. The total area planted by the Commissioners during the fourteen years amounts to 232,711 acres, of which 217,919 acres are under conifers and 14,792 under broad-leaved species. During the same period, 95,228 acres have been planted by local authorities and private owners with the help of State assistance; the area during 1932-33 amounting to 4,580 acres. Land acquisitions during the year amounted to 17,591 acres, 15,335 acres being classified as plantable land. The Commissioner's policy of establishing training camps for the unemployed resulted in five new camps being formed, the total number being thus augmented to twelve.

Agricultural Industries Congress

THE fourth International Congress of Agricultural Industries will be held in July 1935 in Brussels. The third congress was held last Easter in Paris. Many aspects of agricultural research and technology were considered, including the importance of pH (intensity of alkalinity-acidity) in agricultural practice; improvement of wheat and sugar beet by genetical methods; fermentation studies, and various other subjects connected with the food industry. The April number of the *Bulletin de l'Association des Chimistes de Sucrierie, de Distillerie et des Industries Agricoles* contains an account of the Congress, the final report and the resolutions passed. The scientific proceedings have been published in a separate volume. As a result of the last Congress, a permanent International Commission of Agricultural Industries has been established in Paris (156 boulevard de Magenta). Its purpose is to organise international congresses and exhibitions and to notify the various States and organisations concerned of the results of such activities. Among the resolutions passed by the last Congress was a recommendation that some suitable international organisation be requested to correlate the present knowledge concerning water pollution by industrial wastes, and to facilitate further study of the conditions that must be fulfilled by water from industrial wastes in order that it shall not be harmful.

Fauna of Caves

A BIBLIOGRAPHY of cave faunas is now being published (*"Animalium Cavernarum Catalogus"*, auctore B. Wolff, Pars 1: Vorwort; Einleitung, Band I, S. 1-16; Band II, S. 1-32; Band III, S. 1-64. 18 M. Pars 2: Band I, S. 17-32; Band II, S. 33-64; Band III, S. 65-144. 18 M. Berlin, W. Junk, 1934). This work is to be completed in three volumes which will form respectively a biblio-