

comprehensive bibliography the value of which unfortunately is considerably diminished by the incompleteness of the bibliographic detail.

The Service of Unified Knowledge

SOME time ago (November 18, 1936) we discussed, under the above heading, Mr. H. G. Wells's "Idea of a World Encyclopædia", a project designed "to hold men's minds together in something like a common interpretation of reality". Six months later (May 29), we published an article discussing Prof. Dobrowolski's scheme for paving the way for such a common interpretation by equipping every university with a "faculty of general knowledge". A full translation of its author's own account of the scheme appeared later in the *Sociological Review* (October 1937), including a description of the organization, subject-matter, time-tables and method of instruction of "Universitas Rediviva", a working model of the proposed faculty of general knowledge in operation in Warsaw. In the meantime, Mr. H. G. Wells has outlined in his address at Nottingham to Section L (Education) of the British Association, his ideas as to the informative content of the kind of liberal education that might be expected to produce minds capable of being held together by his world encyclopædia. The importance of such a "holding together of men's minds" has been clearly seen by the creators of the modern dictatorial regimes. In democracies it is equally important but much more difficult to achieve. Both Wells and Dobrowolski would probably subscribe to A. N. Whitehead's dictum: "There can be no successful democratic society till general education conveys a philosophic outlook" ("Adventures of Ideas". Cambridge: University Press, 1933).

Accessions to the British Museum (Bloomsbury)

AMONG accessions to the collections of the British Museum (Bloomsbury) reported at the June meeting of the Trustees is a remarkably fine spearhead found in the Thames at London, which has been on loan since 1931, and has now been presented to the Museum by the owner, Capt. John Ball. The spearhead, on account of its graceful shape, ranks with the famous Battersea shield and other examples of Celtic art in Britain of the period of high æsthetic qualities. It is of iron with two applied plates of bronze on each side, ornamented with Celtic scroll pattern. It dates from the beginning of the first century A.D. The most important accession to the Ethnographical Department consists of a generous selection of the antiquities from the Bay Islands off British Honduras, which were recently on exhibition in London (see *NATURE*, May 21, p. 932). These have been given by Lord Moyne, by whom the excavations were carried out. The remainder of the collection has been sent to Cambridge for study and distribution among various institutions. The examples of the Bay Islands culture allotted to the British Museum include a number of ocarinas or pottery whistles of various shapes, including a notable specimen in the form of a jaguar, while a remarkable product of the potter's art is a monkey swinging from a bough.

The selection also includes a number of the small carvings in jadeite and soapstone and several of the stone hoes, while a large pottery beaker is especially interesting, as being comparable with one carved in white stone coming from the mainland of Honduras, which was already in the Museum. The Bay Islands culture is thought to date from between A.D. 1000 and 1500.

Recent Advances in Bird-Ringing

BIRD-RINGING in Britain, now organized from the bird room of the British Museum (Natural History), shows an increase not in the actual number of birds marked, but in the number of adult birds 'trapped' and thus marked and released, and a decrease in the number of nestlings marked; the mortality amongst nestlings is naturally high and thus the chances of recovery of ringed nestlings fewer. The statistics for 1937 show that 45,181 birds were ringed in Britain (*British Birds*, April 1938), as against 48,663 the previous year, bringing the grand total of birds marked in the country since the scheme was started in 1907 to 575,914. There was a record total of 'trapped' birds last year of 21,900 compared with 19,235 birds last year, and it includes a number of rarities not marked before, such as the waxwing and little bunting. Skokholm Bird Observatory, South Wales, for example, marked 4,402 birds in 1937, including the valuable total of 1,448 Manx shearwaters, 904 gannets and 603 razorbills. Mr. G. Charteris's list of 3,044 birds marked included 1,396 chaffinches, mostly at a winter roost; Mr. P. Morshead's total of 2,546 birds included 1,272 'trapped' starlings; Mr. A. Maynall's 2,024 birds including 348 nestling nightingales. The Zoological Society of London (through Mr. E. A. Billet) ringed a total of 1,144 birds at Whipsnade last year, these including 333 'trapped' jackdaws. Some of the leading boys' schools again take a prominent place in the ringing returns. Owing to the increased cost of the rings and the organization, there is an appeal for funds in addition to the general charges for the rings used.

Systems of Units

THE February issue of the *Journal of the Franklin Institute* contains a paper by Prof. W. M. Hall, of the Massachusetts Institute of Technology, on the formation of systems of units, which embodies portions of a 1936 copyright publication on the subject. The conditions for a self-consistent system of units are laid down and for translational kinematics length and time taken as fundamental. Translational kinetics then gives mass and rotational angle. Thermodynamics introduces temperature, light visibility and sound audibility. Electrodynamics admits of two possibilities: permittivity or permeability may be taken as fundamental and give the electrostatic or electromagnetic systems respectively. The questions of the sizes of the units to be chosen for convenience and of rationalizing or subrationalizing the units in which the coefficient 4π appears are discussed. Tables are given in which the units of the following systems are compared. The electro-

magnet with centimetre, gram, second and permeability of vacuum fundamental, the electrostatic with permittivity replacing permeability, and rationalized and subrationalized forms of each, the Gaussian mixed system with some quantities expressed in electromagnetic others in electrostatic units, the rationalized form of this, introduced by Heaviside and Lorentz, the Maxwell quadrant (10^9 cm.), 10^{-11} gram, second and permeability of vacuum, the Bennett and others, centimetre, 10^7 gram, and a unit of permittivity of vacuum = $1/(8.989 \times 10^{11})$, the Giorgi, metre, kilogram, second and 10^7 times the permeability of vacuum. The last three systems all have the ampere, volt and watt as units of current, potential and power respectively.

Trend of Design of Electric Locomotives

THE paper on the trend of the design of electric locomotives during the last ten years, read to the Institution of Electrical Engineers by C. E. Fairburn, the electrical engineer to the L.M.S. railway, is a valuable contribution to electric traction. He shows clearly that there is a growing demand for locomotives of greater power and speed. This is due partly to the necessity of improving running schedules with heavier trains and of avoiding the higher cost of multiple operation. Fairly complete data are given of ten electric railways in eight different countries and from twelve manufacturing companies. To analyse them is difficult because the outlook and methods vary not only from country to country but also from railway to railway in the same country. In Austria, Germany, Switzerland and Sweden low-frequency alternating current is employed; in Belgium, Italy and Poland, 3,000 volts direct current; France, Holland, Japan and much of the British Empire, use 1,500 volts direct current. Three-phase systems seem to be making little progress. In Germany, the express locomotive of the German State Railways is of 4,150 horse-power. Recent Swiss locomotives have 8,630 horse-power and the articulated express locomotives of the Pennsylvania Railroad can supply 9,500 horse-power for a short period. General experience with high-power locomotives, in particular on the Pennsylvania Railroad, shows that even larger horse-powers are desirable, especially on lines carrying heavy traffic. It is definitely stated that the advantages of electric braking on long gradients lie more in the reduction of wear in the mechanical parts than in the value of the energy returned to the supply system. With high speeds it is advisable to retain mechanical brakes for emergency operation as this makes higher speeds possible with safety.

Water Heating by Electricity

At a meeting of the Association of Supervising Electrical Engineers held in London on April 12, P. Honey discussed the technical aspects of water heating by electricity. Since two trades were involved, namely, plumbing and wiring, the question of responsibility for satisfactory working has to be considered. The retailer of the appliance has to take upon himself the responsibility of planning the installation and, with the co-operation of a hot-water

fitter, make certain that the workmanship is good. The problems of the water authorities are similar, in some respects, to those of supply undertakings. Unlike electric supply they have not the stimulus of competition. As water for domestic purposes is rarely charged for by quantity, the most urgent need is to prevent waste. They have therefore insisted that the fittings and appliances should be in accordance with certain specifications. To eliminate 'peak' demands which would cause serious drop in water pressure, the use of feed cisterns is insisted on by many authorities to ensure a more even demand. The amount of storage water held in this way in the houses of consumers is a considerable fraction of the total stored by the authorities. Regulations, therefore, were issued which restricted the connexion of electric water heaters of the thermal storage type direct to the cold water main. For example, in London, no heater larger than three gallons must be connected in such a manner. Those of larger size must be fed from an adequate storage system. No water authority in Great Britain would permit the connexion of a pressure water heater direct to the cold mains in the way frequently done abroad. The cost of servicing electric water heaters of all kinds is not a serious item. The majority of the few electrical defects which occur are probably due to the thermostat and are not serious.

Education in 1932-1934 in the United States

THE United States Office of Education has recently published its "Biennial Survey of Education 1932-1934" (Washington: Government Printing Office. Pp. 1222. Price 1.10 dollars). The effects of the economic depression, which touched its lowest point in 1932, are reflected in many of the statistical tables. The total aggregate income for education from kindergarten upwards in 1933-34 was about 2,604 million dollars, of which huge sum more than five sixths represent income of publicly controlled institutions. Compared with the corresponding figures for 1931-32, there was a decrease of 15.5 per cent, and compared with those for 1929-30 a decrease of 22.6 per cent. It is noteworthy that the decrease was twice as heavy in privately controlled as in publicly controlled institutions from 1932 to 1934, although it had been much lighter in the preceding biennium. Statistics of university enrolments which had risen continuously for many years showed a sharp drop after 1932. It is estimated that the percentage of boys and girls who on completion of their secondary school education entered a university or other institution for further education was in 1933 about 26. This is a high figure compared with the corresponding percentage in Great Britain, but it is low compared with the average percentage (44) of the years 1921-1929 in the United States.

University College, London

Its recently issued annual report shows that this most cosmopolitan of all colleges in Great Britain numbered last year among its 3,284 students no fewer than 910 visitors from 52 countries outside the British Isles. By far the biggest contingent, 228,