

area, a conclusion already reached by the Wests (1909) and by Pearsall (1932). In the peaty loughs where acid conditions predominate these dissolved solids include a large proportion of vegetable organic matter in a slightly oxidized condition with a small amount of decomposition products, in contrast to the less peaty loughs where the organic matter carried into the loughs is comparatively highly oxidized with a large amount of products of oxidation including nitrates. The general effect of such conditions is the greater proportion of diatoms most noticeable in the calcareous loughs.

'BOG-BUTTER' FROM SKYE

THE practice of burying kegs of butter or body fat with the object of preserving or improving the flavour of the product continued in Ireland from an uncertain period of antiquity until the end of the eighteenth century. In Scotland, too, similar kegs of fat have been recovered from the peat bogs, though none of as recent date as some of the Irish finds that have come to light. The preservation of fatty substances has always been a problem of human economy which has only been partially solved in our own times with the advent of cold-storage, and the burying of kegs of fat in deep peat holes and leaving them there for any length of time up to seven years, when the flavour is said to be at its best, was probably a considerable contribution towards its solution.

The particular example now described by Prof. J. Ritchie (*Proc. Soc. Antiq. Scotland*, 75; 1940-41) was discovered by Dr. Hugh Mackay in 1931, while peat was being cut about one mile east of the inn at Kilmaluag at the northern end of Skye. When found, the wooden keg was embedded in the solid peat bank, being tilted a little to one side. It would seem that it had been lowered into a fairly deep peat hole and for some reason forgotten or lost. The body of the barrel was hewn from a solid piece of wood, as also were the circular lid and bottom, though the diameter of the keg was some 15 inches and the tree from which it was made a birch. The workmanship was excellent, the thickness surprisingly uniform throughout. At the top of the barrel where the rim is otherwise bevelled off there are two upward projections nearly three inches high and each pierced by two holes, through one pair of which a cord could be passed for lowering the keg, while a small stick placed through the lower pair would have held the lid in place. Half-way up the body of the keg and not symmetrically placed on its circumference there are two more projections, this time lug-like, the holes having been burnt through the solid wood. It is suggested that these were useful when the keg was slung over a horse's back.

The mass of buttery fat itself has been analysed, but what it was originally could not be certainly determined. Some hairs were present, however, in the amorphous mass, which were mostly those of cattle, though a few human, dog and horse ones were also identified. On the whole, this would tend to suggest that the fat was originally a true butter.

Various methods were used in attempts to date the find—pollen analysis, associated finds, etc.—but no conclusive results could be given. Considering everything the writers are inclined to ascribe the find to the opening years of the Christian era.

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MELLON INSTITUTE OF INDUSTRIAL RESEARCH

THE twenty-ninth report of the Director of the Mellon Institute of Industrial Research, covering the year ended February 28, 1942, refers to the increase of the industrial research staff from 187 to 205 fellows and from 114 to 150 fellowship assistants engaged on some ninety-five industrial fellowships. Of the eight fellowships terminated during the year, that on carbon blacks as absorbents was concluded by a study of the activation of colloidal carbons with the object of determining their possibilities for use in absorption either in their original form or after treatment. Some carbon blacks prepared in pellet form with a suitable binder and activated by steam showed remarkable increases in their capacities for absorbing vapours and for purifying water.

Special interest is attached to the investigations of the Department for Research in Pure Chemistry, and studies in the chemistry and chemotherapy of modified cinchona alkaloids and related drugs have continued. In experience to date, no beneficial result of quinine cannot be obtained equally well with hydroxyethyl-apocupreine, a drug which is greatly superior to quinine in pneumonia, in infections of the eye and throat and in certain asthmatic conditions. In view of possible difficulty in obtaining adequate supplies, cinchona alkaloids investigations are in progress aiming at the preparation of simpler compounds which can be prepared from more easily available materials. Studies have also been carried out for the twelfth revision of the U.S. Pharmacopeia, and a number of projects have been subsidized by the Mellon Institute at the Institute of Pathology of the Western Pennsylvania Hospital, particularly on the effects of the sulphonamides on the tissues of the host and on the infecting agent in the tissues. A new sulphhydryl preparation ('Hydrosulphosol') has been found to be of value in the treatment of burns, stimulating rapid healing and discouraging infection. Other work has continued on natural resistance and the common cold, and on the role of certain enzymes in the metabolism of oxygen and carbon dioxide.

Particular reference is made to the work of the Industrial Hygiene Foundation, a combined research and service association for health protection in industry which maintains its headquarters at the Mellon Institute; this Foundation was originally known as the Air Hygiene Foundation, the change of name having been made during the past year. The investigations of the Foundation have covered the effect of arc-welding fumes on susceptibility to tuberculosis, the reactions of living tissues to silica granules, the evaluation of X-ray films for use in physical examinations in industry, and on the present exhaust ventilation systems for control of health hazards. Since early in 1941, the Foundation has been studying sickness absenteeism in industry, and fatigue is also receiving constant consideration. Work on aluminium powder as a possible preventative in silicosis is also reviewed in the report.

Of other industrial fellowships completed during the year reference is made to work on new pre-cast concrete units such as columns, girders and hollow floor and wall panels, the speed of erection of which is the basis of their utility, and an investigation on safety fuses initiated in 1930 has also been completed. With regard to fellowship researches in progress, 'Anthrafloss' is a high-grade mineral wool for insulat-

ing purposes developed from anthracite by-products by the multiple fellowship of the Anthracite Industries Incorporated. The multiple fellowship on heat insulation and proofing has assisted in the development of an efficient insulating material suitable for use for temperatures up to and including 800° C. The research programme of the multiple fellowship on plastic metals has resulted in the construction of a large commercial sponge-iron plant. Other fellowships have led to improvement in the manufacture of grey cast iron and steel, while a further fellowship has been devoted to the refining of chromium. Steady progress has been made in the utilization of waste pickle liquor under a multiple fellowship of the American Iron and Steel Institute. Five potential processes for the recovery of materials from this industrial waste have been investigated, including the recovery of free sulphuric acid and ferrous sulphate, the manufacture of iron carbonate and ammonium sulphate, the manufacture of magnesium from low-grade ores by heating with waste pickle liquor and the preparation of sodium sulphate and ferric chloride. Other fellowship researches have related to cast iron enamelling, hollow-ware enamelling materials, flat glass and waste grinding sand from plate glass manufacture. Substantial advances in methods for evaluating the flatness and texture of surfaces has been achieved under the multiple fellowship on plate glass technology.

Under the multiple industrial fellowship on sulphur investigations relating to sulphur cements, reaction of gaseous olefines with sulphur and the use of sulphur as a filtering medium are in progress. The same group has discovered a novel series of accelerators for rubber, as well as prepared further organic derivatives from ammonium thiocyanate. The upgrading of the components of coke-oven light oil, the physical properties of tars and pitches and their improvement, as well as the development of new products from tars, the commercial recovery of cyclopentadiene and the recovery of isobutane and isopentane from natural petroleum and casing-head petroleum have been investigated under other fellowships. The feasibility of installing a butane extraction plant, a product used in the manufacture of butadiene for synthetic rubber, has been demonstrated. Other work in the field of natural gas technology has related to corrosion problems. The multiple fellowship on petroleum has again been very active, its investigations including a study of the chemical constitution of high-melting waxes, research on fractional distillation under diffusion pump vacuum and on the chemistry of petroleum.

The multiple fellowship on organic syntheses established by the Carbide and Carbon Chemical Co. has extended its investigations on the manufacture and application of amines, detergents, lubricants, hydraulic fluids and synthetic resins, and a soluble lubricant for processing woollen fibres has been developed. The fellowship on chemical hygiene has continued its investigations on the physiological effects of new chemical compounds including the 'Tergetol' penetrants and the acute oral toxicity of glycol derivatives. The multiple fellowship on food varieties has perfected a new type of instant baby cereal, and initiated a project which will survey the whole field of fruit flavours; problems of the rapid tenderization of meat have also been investigated.

Cotton investigations have included studies on the fibre, the practicability and methods of adapting virgin cotton to the manufacture of high-grade

papers, and fundamental research on the properties and structure of cotton cellulose and the influence of such processes as mercerization. Encouraging progress has been made in research on cotton-seed, and the industrial fellowship on felt has devised methods for imparting to paper, machine felts and other woollen industrial fabrics markedly improved physical characteristics and resistance to chemical injury, and has also devised a process for rendering wool and woollen fabrics non-shrinking and non-felting. An improved system of wool scouring and scouring control has given an average daily increase in production of more than 75 per cent. A third textile fellowship has led to important advances in processing hosiery yarn, particularly 'Nylon'. Yields and grades of glue have been improved by a fellowship on bone products which has also investigated granular absorbents for use in sugar refining. The fundamental problems of rubber technology are being studied by another fellowship, and 'Raolin', a special chlorinated rubber, developed by a Mellon fellowship research, is being allocated according to Federal Government instructions. Research on polymerizable silicon compounds is being carried on under a further fellowship and certain applications have been proposed which are of potential utility in warfare. Other research is related to the use of plastics in water- and gas-meters and for many other purposes.

HEAT ENERGY FROM RADIO-ACTIVE SOURCES IN THE EARTH

THE supremely important subject of the amount of heat derived from radioactivity within the earth is the subject of a recent paper by William D. Urry, of the Geophysical Laboratory, Washington ("Heat Energy from Radioactive Sources in the Earth", *J. Wash. Acad. Sci.*, 31, 273-84; July, 1941), who has arrived at some very important conclusions. Older methods of determining the rate of heat production in particular specimens by examining the radon or thoron content were very cumbersome and thus few specimens were examined. Urry has taken a suggestion by the Director of the Laboratory and has examined a method of finding this rate of heat production merely by counting the rate of alpha particle emission in an ionization chamber. He finds that

$$H = 2.1 \times 10^{-9} N,$$

where H is the heat produced in calories per gram of specimen per year and N is the total number of alpha particles emitted per gram per hour from the specimen. Heat accompanying the disintegration of potassium must be added to this and is equal to $4.3 \times 10^{-6} a$ calories per gram per year, where a is gm. K_2O per gm. of specimen. This equation is possible since an error of less than 5 per cent is introduced by taking a fixed thorium uranium ratio in all previously examined types of rocks (acid to ultrabasic) and meteorites (iron and stony) where this ratio ranges from 0 to 20.

The author has examined the question of the variation of this heat production in geological history, and estimates that no significant increase in heat production within the structure of the earth has occurred during the accepted age of the earth (2×10^9 years). Further, in the opinion of Urry, hitherto undetected