Research Items.

MAORI GAMES.—A valuable monograph by Mr. Elsdon Best on the games and pastimes of the Maori has been published under the direction of the Board of Ethnological Research of the Dominion Museum, N.Z., as Bulletin No. 8. Not only is the account of Maori games given by early travellers meagre, but, owing to the disapproval of these games by the missionaries, notwithstanding their harmless character, few of them survived until the beginning of the present century. Like other features of Maori life, the arts of amusement were attributed to a mythical originator. The practice of the arts of Ruhanui followed the rising of Whanui (the star Vega) when the main crops were lifted. The indulgence in games thus depended to some extent on the leisure afforded by seasonal occupations, but they were also played at night. The recreations may be classified into (1) children's games played at all times; (2) games played at night or at free times when members of two or more families met in a house or on the village plaza; (3) at large meetings such as ceremonial feasts, harvest festivals, etc., when members of one or more sub-tribes gathered together, contests of skill or strength forming a special feature of the occasion; or (4) specially arranged contests between members of different village communities, in wrestling, canoe rowing, dart throwing, posture dancing, and the like. Kite-flying contests were also held. Certain of the games, such as the duels and combats in the school for arms for men, and the posture dances for women, were looked upon not merely as recreation but also as a training for the arts of life, the grace of action, for example, to be acquired through the dance being regarded as an essential in a girl's deportment. The monograph includes in its scope a careful and detailed study of the songs and musical instruments. The Maori did not use stringed instruments, but only wind and percussion.

SUGAR BEET IN ENGLAND.—Mr. G. Turville Brown, in Paper No. 507 of the Surveyors' Institution, gives a full account of the British sugar beet industry. Beginning with a general history of the sugar industry, he shows that the introduction and development of beet sugar in Europe can be traced largely to political conditions, and that the chief reasons why it was not possible to establish its cultivation in England earlier were the facts that the bulk of the beet sugar exported from the Continent, a practice encouraged by European governments with bounties, came to Great Britain, and that British interests were largely vested in the production of cane sugar in the British Empire. The first attempt to introduce the cultivation of sugar beet into England in 1870 was unsuccessful, and even in 1921 the revived industry suffered heavy loss in spite of Government aid. The passing of the Beet Sugar Subsidy Act in 1925, however, details of which are appended to the paper, has resulted in the industry attaining national importance, and in the first year five of the ten factories showed a profit. Although in comparison with countries where the growers are experienced the tonnage obtained is low, the quality and sugar content have been high, and when the farmer has learnt to make the best use of the by-products, namely, the fodder portion of the crop, there is good augury for the success of the industry in Great Britain. With regard to the return which the farmer receives, an average figure based on the prices for 1925 and 1926 shows a £10 profit on a 10-ton crop, without including the feeding value of the residual tops and leaves. Further, any increase in the cultivation of a profitable root crop would help to check the modern tendency of putting arable land down to grass. As regards climate, England and the lowlands of Scotland are quite suitable for sugar beet, and indeed Great Britain, in being less liable to late frosts, has a distinct advantage over northern Europe. The importance of this is manifest, since much seed-selection work is being carried out in Holland with the view of securing a variety able to withstand late frost without going to seed. Some points with regard to the choice of suitable factory sites, and the methods of working which will secure the greatest possible economy, are included, matters which will prove themselves all the more important to the life of the industry as the subsidy decreases.

AGE AND AREA.—In an article in the *Quarterly Review of Biology* (vol. 1, No. 4) Dr. J. C. Willis replies in part to various criticisms of the age and area hypothesis, and particularly to those of Prof. Fernald in the same journal (vol. 1, No. 2). Many points of difference are involved, some of which cannot at present be settled. For example, as regards rate of distribution, Willis estimates that the wing-fruited Dipterocarp trees of Malaya and the Philippines would be dispersed at the rate of 100 miles in 60,000 years, while Fernald points out that nearly the whole of Canada must have been forested from farther south since the retreat of the ice not more than 25,000 years ago. Notwithstanding the rapid dispersal of weeds, Willis concludes that generally whole associations of plants must advance together but with extreme slowness. Again, the need is recognised for distinguishing between local endemics and epibiotics or survivors from a larger area; and the fossil history, which often cannot be traced, must also be considered. Again, it appears that, *e.g.* in the Ericas of South Africa, a wide-ranging northern form has quickly produced a whole series of new local types after reaching what must be regarded as favourable conditions for the genus. Willis insists upon the necessity of treating his results statistically, but it appears unnecessary to make the improbable assumption that new species have generally arisen as the result of a single mutation. His work has brought fresh interest to the old problems of distribution; and further investigations should show in how far time, which no one denies is a factor in dispersal, can be disentangled statistically from the many other factors such as barriers, the rate and conditions of variation, etc., which will play a part in determining the area occupied by a particular species or group of species at a particular time.

TORTOISESHELL CATS.—The tortoiseshell cat remains a genetic anomaly, although the work of Mrs. Bisbee and Miss Catherine Herdman (*Jour. Genetics*, vol. 18, No. 1) sheds further light on the subject. Normally tortoiseshells are females derived from a cross between yellow and black, but in rare cases a male tortoiseshell may occur. Numerous theories have been put forward to explain these and related facts. It appears that either there is a difference in the dominance of black and yellow in the two sexes or both colours are sex-linked. The authors favour the latter view, having found that all yellow cats of either sex have a few scattered black hairs. In the breeding experiments an anomalous yellow female appeared, which showed and transmitted a very small amount of black spotting. This is accounted for by a theory of fractionation of a factor—yellow; the

'anomalous yellow' and black being regarded as a series of multiple allelomorphs.

NEW COTTON SPECIES.—Five new species of cotton have recently been described by Messrs. O. F. Cook and J. W. Hubbard, who give a general account of these primitive cottons in *Jour. of Heredity*, vol. 17, No. 12. They were found among desert vegetation or in door-yards and along roadsides in the provinces of Sonora and Sinaloa in north-western Mexico. One species, *Gossypium Morrilli*, found growing in natural undisturbed conditions in the Yaqui Valley, produces great numbers of bolls and has commercial possibilities. *G. contextum* has the interesting peculiarity that numerous additional fibres form a lining to the inner walls of the carpels, but it is not yet certain that they are actually attached to the wall. Another desert species, *G. davidsoni*, has no lint, but only a short brown fuzz on the seeds. The different types are well illustrated by photographs, and some of them will be useful for crossing with the cottons in cultivation.

AGRICULTURE IN NIGERIA.—The fifth annual bulletin (1926) of the Nigerian Department of Agriculture contains the reports of the various agricultural stations for the previous year, together with a number of papers dealing in detail with some of the investigations in progress at the different centres. A scheme is proposed, which of necessity will extend over a long term of years, the object of which is to increase the production of palm fruit, but social and administrative considerations, arising largely from the manner of ownership of the groves, tend to increase the difficulties entailed in carrying out any improvements. The ground-nut trade is another important industry, but possesses many problems, which if solved would greatly enhance the value of the product. The best time for lifting the crop, and suitable preparation for export, such as efficient decorticating, grading, and packing, are some of the principal subjects under present consideration. An improved method for the extraction of palm oil by natives, the Cooker-Press process, is described and its advantages over the current methods pointed out. Research as to the most suitable preparation of palm nuts before cracking and the subsequent treatment of the nuts and kernels affords another example of investigations which are likely to prove of immense help to the native industries. Variety trials, cultivation and manurial experiments of all kinds, are reported from the various agricultural stations, and fungoid diseases of cotton and, to a less extent, the control of insect pests such as the yam beetle, are being investigated.

WATER AND INDUSTRIAL DEVELOPMENT.—The relation between the quality of the water and manufacturing activity in the United States is discussed by Mr. W. D. Collins in Water Supply Paper 559 (United States Geological Survey). The supply of water is a factor of equal importance with raw materials, power, labour, and transport, in deciding the location and growth of manufactures, and though water can be artificially improved, the cost of so doing is generally too great in manufactures that require large quantities of water of definite quality. A comparison between the location of industries fifty years ago and the present time appears to show that soft water was then more important than it is now, since manufacturing activity has increased most rapidly in States which have hard water. However, Mr. Collins shows that the growth of industry in hard water regions is mainly of two kinds: first, industries that do not depend on the quality of the water, such as metal and wood industries, canning and preserving, glass and rubber works; and secondly, industries in which numbers of population are more important than any other factor, as flour mills, confectionery, printing, gas-making, etc. The industries dependent on the quality of water, which include chemical, textiles, leather and paper, within the last fifty years have grown almost entirely in those States where the water is soft or only slightly hard, and they do not show any tendency to shift from those regions. The whole subject is treated statistically and illustrated with distribution maps.

IRON ORE IN WESTERN CANADA.—Messrs. G. A. Young and W. L. Uglow have provided an account of the iron ores in the western part of Canada in a recent memoir (Canada. Department of Mines; Geological Survey. Economic Geology Series No. 3: Vol. 1: British Columbia and Yukon. (No. 2093.) 40 cents. Ottawa: F. A. Acland.) It must be admitted that from the economic point of view the report is not particularly hopeful. There are 24 deposits listed believed to contain upwards of 25,000 tons of iron ore; the amount of ore considered to be almost certainly present is only 137,000 tons; the amount of ore probably present is estimated at 1,200,000 tons and the total possible ore contents only 5,000,000 tons; these figures refer to magnetite deposits, of which the greater part of the iron ore deposits in the area discussed consist; with a couple of exceptions of deposits rich in apatite, all the known magnetite deposits are of Bessemer quality. There are also a few deposits of limonite, but these do not appear to be of any great importance. Furthermore, the difficulties of transport in several cases are at present very serious. The report considers that the magnetite deposits of the coast districts must be looked upon as the primary sources of native iron ore that might support an iron-making industry in British Columbia, but evidently the prospects of such an industry being formed on an economic basis do not at present appear to be very promising.

THE ORIGIN OF METEORITES.—In *Gerlands Beitrage z. Geophysik* (1927, pp. 195-222), R. Schwinner discusses the origin of meteorites in greater detail than has hitherto been attempted. He suggests that meteorites cannot be descendants from any part of our solar system, but that they form a cosmic cloud which the solar system entered for the first time in early Quaternary time. This deduction is based partly on the orbits of meteorites and partly on the remarkable fact that no meteorites from beds of Tertiary or older formations have ever been discovered. The origin of the cosmic cloud is ascribed to a collision between two small stars which is estimated to have occurred between 10^{10} and 10^{11} years ago. It is claimed that the structure of meteorites supports the view that they were formed like explosive tuffs and that some parts of them cooled rapidly in a weak gravity field. Though meteorites as a whole may provide a kind of cross-section through a formerly existing heavenly body, the supposition that they provide any information as to the interior of the earth must be regarded with extreme caution. As to the origin of tektites, the author is unable to decide whether or not they are of meteoric origin.

FRACTIONAL PRECIPITATION OF BARIUM AND RADIUM CHROMATES.—Several methods are available for the separation of radium and barium by fractional precipitation. In the *Journal of the American Chemical Society* for March, Henderson and

Kracek describe a method of separation by means of the chromates which compares very favourably with the best of those previously employed. In general, the radium-barium solutions were treated with hydrochloric acid followed by definite quantities of potassium chromate solution. Partial separation follows from the fact that barium chromate is appreciably more soluble than the corresponding radium salt. This method may be used with advantage when the radium content of such mixtures is too small to be treated by the chloride method.

CHEMICAL TREATMENT OF FLOUR.—We have received a copy of the Report of the Departmental Committee which has been considering the treatment of flour with chemical substances, published by H.M. Stationery Office (6*d*. net). Chemical substances are introduced into flour in the first case as bleaching agents, and secondly as improvers, which are said to enhance the natural baking qualities of the flour, which may be deficient in one or more respects. Among these substances are calcium and ammonium acid phosphates, persulphates, chlorine, nitrogen trichloride, nitrogen peroxide, nitrites, and benzoyl peroxide. The Report recommends that when bleaching and improving are necessary the use of chlorine, nitrogen trichloride, and benzoyl peroxide should be avoided. An alternative method of improving by physical means is suggested. By heating wheat or flour at a given temperature for some time, the baking properties are considerably improved, and under certain conditions this flour itself may be used as an improver. At least one mill has discontinued the use of chemical improvers in favour of the physical method.

THERMAL DISSOCIATION OF IODINE AND BROMINE.—The method usually employed for the measurement of the dissociation of iodine and bromine, namely, by measuring the pressure produced by a known amount of halogen sealed in a quartz bulb of known capacity in the presence of an inert gas, has yielded values which are in poor agreement with those predicted by theory. In order to establish with greater certainty the values of the thermal quantities involved, Devries and Rodebush have adapted the method of Knudsen for the determination of vapour pressure by the measurement of the rate of diffusion through a small orifice. Their work is described in detail in the *Journal of the American Chemical Society* for Mar. 1927. The previously accepted value for the entropy of monatomic iodine at 298° K. and 1 atmosphere is 42·6, while the calculated entropy is 40·4. Although the newly determined number is 40·5, Devries and Rodebush consider that the true value of the entropy lies between 42·6 and 40·5, since spectroscopic data indicate that the iodine molecule should possess a magnetic moment and consequently a higher entropy. The calculated entropy of monatomic bromine is 39·0, but this is only approximate, and for this reason no significance can be attached to the agreement of this value with that of 38·2 determined experimentally.

ATOMIC PHYSICS.—The issue of the *Physikalische Zeitschrift* for Mar. 15 contains an address on the present position of atomic physics, delivered by Prof. A. Sommerfeld before the Faculty of Science at Hamburg. One of its objects was to counteract the pessimistic opinion held by many, of the inability of the quantum theories to give a comprehensive view of the physics of matter capable of replacing entirely the electromagnetic theory of thirty years ago. While Heisenberg introduces into his specifications of atomic systems only such quantities as can be directly observed, Schrödinger and de Broglie in their wave mechanics go behind observed phenomena, and their method has led to great developments in the mathematical treatment of atomic problems. Unfortunately, the new mechanics destroys the sharpness of the picture of the planetary atom to which we have grown accustomed, but the gain in mathematical simplicity is of much greater importance than this loss, and there can be no suggestion of entirely giving up the Bohr theory of the atom.

COMPRESSIBILITY OF HYDROGEN AND NITROGEN.—In view of the number of processes now in use for the production of ammonia from mixtures of hydrogen and nitrogen at pressures from 100 to 1000 atmospheres, data concerning the properties of the compressed gases are of great value. The compressibility isotherms of hydrogen and nitrogen and mixtures of these gases at 0° and pressures up to 1000 atmospheres have been determined at the Fixed Nitrogen Research Laboratory of the American Bureau of Soils by E. P. Bartlett. A quantity of gas at a given pressure and temperature, confined in a heavy steel pipette of known volume, is allowed to expand into a gas burette, and the amount of gas determined by measurement of a fixed volume at a known pressure differing but slightly from atmospheric. Details and the results of this work are given in the *Journal of the American Chemical Society*, Mar. 1927. The compressibility factor of a mixture cannot be calculated from those of the separate gases, since the compressibilities are not linear functions of the composition, but certain empirical equations have been derived connecting these two quantities.

AN ALUMINIUM FILM FILTER IN TELEPHONY.—In a modern telephone system there is a battery of accumulators at the central office which serves as a common reservoir of energy for talking and signalling. It is necessary to charge this battery while it is connected to the system. The alternating components of voice frequency in the output of the charging generator appear as objectionable noise currents in the telephone lines, and therefore great pains are taken to design the direct current generator so as to eliminate all ripples from the voltage wave. This more than doubles the cost of the machines, reduces their efficiency and increases the maintenance cost. In the *Bell Laboratories Record* for April, Mr. Siegmund describes a filtering device which prevents the disturbing ripples from entering the talking circuit even when only a cheap commercial dynamo is used for charging. As condensers having capacities of several thousand microfarads have to be employed, the device would not be economical were it not for the high capacities and the little space occupied by aluminium electrolytic condensers. When an aluminium rod is maintained positive to a suitable electrolyte, a very thin non-conducting film is formed on it which forms the dielectric of the condenser. The electrolytic condenser resembles a single-cell storage battery. The anode plate is corrugated and the cathode plate is flat. They are fastened to the porcelain cover of the jar. For 24-volt operation one jar has a capacity of about 1000 microfarads. They require no routine maintenance. The oscillograph records shown by Mr. Siegmund prove the utility of the device. The properties of the aluminium film have been already used in chemical rectifiers, in lightning arresters and in condensers for power work. Their application in telephony, however, is of particular value at the present time, when the power required for machine switching in automatic systems is growing so rapidly.