Research Items.

DREAMS IN AFRICA.—In *Man* for August, Mr. J. P. Driberg records a number of dreams of different types and their interpretation which he has collected, at the suggestion of Prof. C. G. Seligman, among the Lango and Didinga of the south-eastern Sudan. The Lotuko-speaking Lango provide eleven varieties of dream, the Didinga fourteen. Among the Lango no greater significance attaches to the dream of a magician than of a layman, but among the Didinga, although the magician does not have a different class of dream from that of the layman, all his dreams have a greater significance, and if the significance is ill-omened a sacrifice must be made of a bull or a goat to avert the threatened evil. Among both peoples the significance of many of the dreams is a simple prognostication. For example, among the Lango a dream that some one kills the dreamer is considered a true forecast; to dream of killing an elephant means that one will do so; among the Didinga, to dream of hunting means that success on the next expedition will correspond, and so forth. Certain dreams, however, have a special significance. Among the Lango, to dream of being carried away in a flood causes the dreamer fear, though whether this is because of an ill omen is not clear. To dream of being bitten by a snake is a very bad omen. A piece of charcoal must be bitten and spat out and the dreamer must prick himself with a thorn. Among the Didinga, a similar use of charcoal and thorns follows on a dream that *A* kills *B* by witchcraft. The dreamer must the next day call on *B*, bite a piece of charcoal and spit it on *B*, rub soot on his forehead and scratch him with thorns. The same procedure follows a dream that *A* accidentally spears himself; but it must be done immediately on waking even if this involves a journey in the night. To dream of falling in the fire must be followed by the sacrifice of a white goat and the tying of a goatskin bracelet on the person of whom one dreams.

BETH-SHAN IN 1926.—In the *Museum Journal* (Philadelphia) for March, Mr. Alan Rowe surveys the work carried out by the Palestine Expedition of the University of Pennsylvania at Beisan in the season of 1926. In addition to the actual work of excavation on the Tel and in the vast cemetery to the north, a comprehensive survey of the area was made, which showed that the original top of the mound was 346 ft. below the level of the Mediterranean, and the height 213 ft. at the north and 134 ft. at the south ends. Eight successive periods are represented by superimposed layers, but the occupation of some of the principal buildings extended from one period to another, they being used over and over again. For example, the two temples of Rameses II, which are identified as the House of Astaroth and the Temple of Dagon of the Bible, and belong to the fifth level dated 1295–1225 B.C., were used until at least Israelitish times, say 1000 B.C. The period covered by the eight levels extends from some date before 1412 B.C. not yet determined down to modern times. In 1926 all the strata from the second to the eighth were worked. Up to the present that of Amenophis III, the seventh, is regarded as the most important. The material recovered from this level admits of certain inferences of great historical importance. Among the finds are a number of inscribed Syro-Hittite cylinder seals, a bronze Syrian dagger, and a Hittite axe-head of which one end is in the shape of a hand with outstretched fingers, unique but similar to an axe held by a Hittite king on a sculpture at Boghaz-Keui. This affords supporting evidence of the extent of the advance of the Hittites known to be taking place at about this time into North Syria. Further, the model of a chair or throne of Cretan (Minoan) type with Egyptian emblems and a model of a table, also of Cretan type, doubtless parts of a group of cult objects, with other finds, point to an infiltration during the Bronze Age of Ægean influence via Cyprus, of which the final phase was represented by the domination of the iron-using Philistines. This Ægean-Cypriote influence in the old religion of Palestine was not recognised fully before these discoveries at Beth-Shan.

THE INSECTS OF SAMOA.—Reference has recently been made in these columns to a monograph dealing with the insects and other land arthropods of Samoa that is being issued by the British Museum (Natural History). This work is based upon collections made by Dr. P. A. Buxton and Mr. G. H. E. Hopkins, who visited the islands under the auspices of the London School of Hygiene and Tropical Medicine in 1924–25. Within the last few weeks three new fascicles of this monograph have come to hand. Micro-lepidoptera are dealt with by Mr. E. Meyrick and his contribution forms Fasc. II. of Part 3. It appears that scarcely half-a-dozen named species of these insects were recorded from Samoa before the receipt of the present collection, which raises the total number to 137. Of these, two-thirds of the species are endemic, and the remainder also occur elsewhere, being probably introduced through shipping. Mr. Meyrick concludes that Samoa constitutes, by the test of specific endemicity, a perfectly distinct and isolated faunal region. Another noteworthy feature is the total absence of representatives of the families Pterophoridæ and Œcophoridæ from the indigenous fauna. Part 2, Fasc. I. is devoted to certain families of Hemiptera. The Fulgoroidea are dealt with by Mr. F. Muir, who finds that eight families, twenty-seven genera, and fifty-one species are now known from the islands. He describes a new genus, Buxtoniella, the systematic position of which appears to be an enigma but it is relegated to the Lophopidæ. The Psyllidæ are reported on by Prof. D. L. Crawford, and Mr. F. Laing has dealt with the Coccidæ, Aphididæ, and Aleyrodidæ. Part 7, Fasc. I. contains Mr. G. F. Hill's account of the Termitidæ and Lieut.-Col. Fraser's description of the Odonata.

ACCELERATION OF PLANT GROWTH.—At the Boyce-Thompson Institute for Plant Research in New York, experiments are being carried on for the purpose of investigating the conditions necessary to accelerate plant growth. In a *News Bulletin* recently issued by Science Service of Washington, Dr. John M. Arthur gives a review of the work being carried on. The results include spring wheat harvested 35 days after sowing, red clover in flower 38 days after seeding, and a large head of lettuce grown in three weeks. These remarkable results have been obtained by the use of artificial light, heat, and atmosphere. The process of photosynthesis in a plant is somewhat inefficient, only about one per cent. of the radiant energy falling on its leaves being utilised. More than a century ago de Saussure showed that green plants could utilise more carbon dioxide than is actually available in the atmosphere, but no application was made of that fact until the War. Then, under pressure of food shortage in Germany, processes were perfected by Riedel and others for scrubbing gases from combustion of coal, coke, and charcoal to produce carbon dioxide, which was piped into greenhouses among growing plants. With high temperature and

high light intensity, a concentration of less than 0·5 per cent. of carbon dioxide (the normal amount present in the air is 0·03 per cent.) just about doubled the dry weight of plant tissue produced. Similarly, many plants can use more light than they get in Nature. If such plants are kept continually under an arc lamp, or if artificial light is used to supplement daylight, their growth is hastened. Wheat and clover can stand 24 hours of light a day. The tomato, however, grows fastest with 12 hours of daylight supplemented by 6 hours of artificial light. Unfortunately, commercial application of these facts is not yet in sight, and will not be until electrical power can be produced at a much cheaper rate than at present.

WEED SPRAYS.—Mr. A. Åslander, in the *Journal of Agricultural Science*, vol. 3, p. 1065, describes some interesting experiments with weed sprays. Cornellian oats and field mustard (*Brassica arvensis*) were grown together in pots and sprayed when the mustard had developed four leaves. Concentrations of 5-15 per cent. of iron sulphate and 1-2 per cent. of sulphuric acid were used, and after the treatment the pots were kept under various conditions of humidity. In all cases the oat plants were uninjured by the sprays, but the effect on the mustard varied. Iron sulphate was only effective when the relative humidity was high (100 per cent.), a 5 per cent. solution completely killing the plants in twenty-four hours under such conditions, whereas in dry air (relative humidity 30-60 per cent.) concentrations up to 15 per cent. were used without injury. The effectiveness of sulphuric acid, however, was much less dependent on the humidity, though the best results were obtained in dry air. The plants were completely killed by 1·5 or 2 per cent. solutions, the higher concentration being necessary if the soil in the pots had been kept dry. Temperature had a marked influence on the effect of the spray. Whereas at 30° C., a 2 per cent. solution proved fatal after one hour, at 6° C., the same result was only obtained after five hours. Artificial rain, produced by sprinkling the plants with water, failed to decrease the action of the acid. Experiments with *Elodea canadensis* bore out the spraying results with mustard, since protoplasmic streaming continued for two hours in a 10 per cent. solution of iron sulphate, but ceased in 30 seconds in 1 per cent. sulphuric acid.

NEMATODA OF THE LEIDY COLLECTIONS.—A. C. Walton has examined the extensive collection of Nematoda made by the late Dr. Joseph Leidy and presents the first of a series of reports on this material (*Proc. Acad. Nat. Sci. Philadelphia*, vol. 79, pp. 49-163; 1927). The worms were obtained chiefly from American hosts, but a few were from imported animals in captivity in America. Many of the original Leidy species are present in the collection, and in some cases it has been possible to designate type specimens. The main interest of this account is that it contains descriptions with drawings of species which, since Leidy's time, have been either unrecognised or but doubtfully identified by later workers. More than a hundred definitely recognised species are recorded, twenty-four of which are described as new. Appended is a list of hosts and their respective Nematoda.

OIL IN MUD FROM SEA-FLOOR.—Some interesting research on the oil content of sea-bottom muds and sands accumulating at the present time is being conducted by Dr. P. D. Trask, of the American Petroleum Institute. Samples of muds were taken from shoal-waters off the coasts of Southern California and North Carolina; such samples are then subjected to destructive distillation and other chemical and physical tests. According to Science Service, No. 326 F, Washington, D.C., of June 25, 1927, oil was produced from all these types of sediment; "the yield was low, and in general varied in amount with the degree of fineness of the sediments, ranging from a maximum of 2·7 gallons per ton in a clay-silt to almost nothing in a sand. This maximum yield of 2·7 gallons per ton is but 5 or 10 per cent. of the amount obtained from the better grades of oil shale, which run from 30 to 50 or even more gallons per ton." This work has obvious bearings on modern theories of the origin of petroleum, particularly those which invoke marine mother-substance and primary environment; so far it is only in the preliminary experimental stage, but it is backed by a grant from the John D. Rockefeller fund of the Institute, and exhaustive investigations along these lines are contemplated.

IONISATION POTENTIALS OF MERCURY.—Dr. E. O. Lawrence, who recently obtained very strong evidence that the ionisation potential of mercury was multiple, with at least four distinct types of inelastic electron impacts between 10·6 volts and 12·1 volts, has described experiments in the July number of the *Journal of the Franklin Institute*, in which he has confirmed this with different apparatus. In the earlier form, he obtained a homogeneous pencil by magnetic sorting: with the present arrangement he has worked with electrons from an oxide-coated filament, with a thermal distribution of velocities. He used very small electron currents, of the order of 10^{-9} amp., and measured the positive ion currents by a null electrometer method, employing a slightly modified Lenard system of fields. There is little doubt that the effect is real, and not due to some action of magnetic fields, or to diffusion of positive ions, but it would be interesting to repeat the work with other monatomic gases, and with a continuous variation of the accelerating potential.

OPTICAL ISOMERISM.—In a recent paper in the *Zeitschrift für Physik* on the quantum theory of polyatomic molecules (vol. 43, p. 805), Dr. F. Hund arrived at an interesting paradox. According to his analysis, molecules possessing the mirror symmetry associated with optical activity should not have stationary states which correspond to small displacements from the two main positions of equilibrium, but should undergo transitions between the right and left handed forms. This is evidently not in agreement with the permanence of the properties of many optically active substances. The solution follows when the expression for the average time of life in either state is evaluated numerically. This contains an exponential term involving the internal energy, and seven-fold increase of the latter could change the time of relaxation from 10^{-9} second to 10^{9} years. It seems as if apparently stable bodies of this class are actually undergoing slow spontaneous transformation into an inactive mixture which contains equal quantities of the lævo and dextro forms.

LOW-TEMPERATURE PROCESS.—The *Chemiker-Zeitung* of July 16 contains an account, given by Dr. F. Simon of Berlin at the recent meeting of the Deutscher Kälteverein, of a new laboratory method of producing low temperatures by pumping adsorbed gases from charcoal, silica-gels, or from zeolites. Thus helium, adsorbed by charcoal and cooled by immersion in liquid hydrogen, could be further cooled to − 269° C. The process is not continuous, and is at present only available for the production of small quantities of liquid helium, hydrogen, and other gases.

A CRYSTALLINE POTASSIUM HYDROGEN DIOLEATE. —No acid soaps of definite composition analogous to

the two acid sodium acetates have been shown to exist. In the *Journal of the Chemical Society* for June, McBain and Stewart describe the preparation of the first definite crystalline compound of this type observed with soaps. Potassium hydrogen dioleate is prepared from oleic acid and potassium oleate in alcoholic solution. Well-defined crystalline plates separate on cooling in ice. The substance shows a transition point at 43°, at which it breaks up into potassium oleate and a solution of oleate and oleic acid. On account of the ease with which it crystallises from alcoholic solution, it offers a means of purifying oleic acid.

SULPHUR DIOXIDE IN FOODS.—The determination of sulphur dioxide in foods forms the subject of the Ministry of Health Report on Public Health, No. 43, recently published by H.M. Stationery Office (1*s.* 3*d.* net). The only preservatives now permitted to be used in foods and drinks are benzoic acid and sulphur dioxide. The determination of benzoic acid has already been dealt with in Report No. 39 of this series, and the present Report deals on similar lines with sulphur dioxide. Although the Public Health Regulations specify the total amount of sulphur dioxide permitted in various foods, no distinction between free and combined sulphurous acid is made. It is, however, important to know the nature and extent of the combination between sulphur dioxide and certain constituents of food, since the presence of comparatively stable compounds with sulphur dioxide will affect the determinations unless due precautions are taken. The sulphur dioxide is separated from combination on the addition of alkali or on distillation with acid. Gravimetric determination as barium sulphate gives accurate results in nearly all cases.

IGNITION TEMPERATURES AND 'ANTI-KNOCK' INVESTIGATIONS.—The effect of small amounts of lead tetraethyl and other substances in allaying the 'knock' which occurs with some fuels under certain conditions in an internal combustion engine has evoked considerable interest. Much work has been done on the effect of various compounds on the knocking characteristics of fuels by Egerton and Gates, and we have received a series of four papers reprinted from the *Journal of the Institution of Petroleum Technologists*, vol. 13, No. 61, April 1927, which summarises their work. The first three papers deal with the effect of metallic vapours on the ignition of substances, the significance of ignition temperatures, and the effect of certain organic compounds on the igniting and 'knocking' character of petrol. The fourth paper reviews the above work and discusses the reasons for the effects observed. It suggests processes of combustion and ignition and supplies a theory of 'anti-knock' action. A full report of this work was sent to the Aeronautical Research Committee, and is also summarised in the Air Ministry's Reports and Memoranda, No. 1079, which has recently been published. The experiments show that the use of anti-knocks' retards the initial processes of combustion and the 'anti-knock' may be regarded as a negative catalyst which reacts with and removes those substances which autocatalyse combustion. Ten theories which have been advanced in explanation of the action of anti-knocks are briefly described, including Callendar's nuclear drop theory (see NATURE, April 9, p. 542). With regard to the latter, it is remarked that no account is taken of the chemical behaviour of 'anti-knock' compounds, and experiments show that more is required of an 'anti-knock' than protection or dilution of the droplet. There is reason to expect that Callendar's suggestions may come in as a secondary effect, and by concentrating the dope in the droplets the tendency would be to enhance its effect where most required.

ELECTRICAL APPARATUS FOR MINES.—A further report on flame-proof electrical apparatus for use in coal-mines, by H. Rainford and R. V. Wheeler, has just been published (Safety in Mines Research Board Paper, No. 37. London: H.M. Stationery Office). The research was made principally to discover the means of preventing the flames due to fire-damp explosions which sometimes occur within the casing of electrical apparatus from passing to the outside atmosphere. Experiments were also made on the ring-relief device, which is intended to provide additional means of pressure-release when the volume contained by the casings is large. In this case neither flange nor perforated plate protection, as shown in previous reports, is adequate. The ring-relief device consists roughly of a number of metallic rings separated from one another by narrow radial distance pieces. These are assembled in the form of a cage and held securely in position by a circular brass end plate which is connected to the end plate by bolts. The interior of the casing is thus in communication with the outer air by the series of gaps formed by the separation of the rings. The general conclusion drawn from the experiments described in the report is that the use of the ring-relief device forms both a satisfactory method of releasing the pressure due to the fire-damp explosion in the interior of the electrical apparatus and also prevents the passage of the flame to the outside. The British Electrical and Allied Industries Research Association assisted in carrying out the work.

THE ACTION OF LIGHTNING ARRESTERS.—Devices called 'lightning arresters' or electrical safety valves, have been in use for many years to protect electrical machines, more particularly those which are connected with overhead systems of distribution. The phenomena that take place on electric lines during thunderstorms are well known. Sparks take place from conductors to neighbouring conductors connected with the earth. If the electric pressure of supply be high, an arc may be established, causing a short circuit, which may overstress the dynamos or burn out the device, leaving the system unprotected. At the recent international conference on high tension supply in Paris, Mr. McEachron, of the General Electric Co., U.S.A., gave a theory of the action of the safety-valve which explains well what happens in practice. During a thunderstorm, owing to the electrically charged clouds, quite appreciable charges of electricity are induced on the conductors. A lightning flash sets these charges free by suddenly altering the potentials of the clouds. The charges now travel in both directions along the conductors, half of the initial electrostatic energy being converted into electromagnetic energy. The potential gradient of the wave-front causes the safety-valve to act, and if a sufficient charge passes to earth in a very brief interval, the pressure drops to its working value, the valve ceases to operate, and the system again works normally. In California, a working voltage of 220 kilovolts is employed. It was thought that the necessary high insulation would completely protect the line. This it fails to do. Even when fourteen disc insulators in series are used to support the conductors, 'flash overs' occur repeatedly. This proves that the impulse voltage causing them must exceed 2000 kilovolts. The insulation only breaks down when the time of application of the applied voltage is excessive.