

Research Items.

Art of the Bush Negroes of Dutch Guiana.—For some years, Dr. Morton H. Kahn has conducted expeditions to Dutch Guiana on behalf of the American Museum of Natural History, with the object of investigating the culture of the descendants of the West African Negro slaves who revolted from the Dutch in the seventeenth century, and have remained practically untouched by white or Indian influence ever since. He has now contributed to the *Journal* of the Museum an advance account of their art in anticipation of a book on these people which he is about to publish. Their art is a well-developed highly conventionalised form with considerable social significance. Common objects of every-day life are developed by carving into highly elaborated forms. Combs, paddles, stools, and other objects show great beauty of form and design with a sense of line and balance. The carving is done by men, and the objects have a ceremonial significance, for these wooden pieces are tokens of love. Though the people are largely promiscuous, there is a certain amount of wooing necessary, which is done by means of the presentation of a carved object. A woman is, therefore, proud of her collection of carved objects and does not part with them readily, for each piece is the token of the affection of a male. As a skilful carver is held in considerable repute, and those who are not skilful must obtain their services by trading game or fish, wood-carving is practised assiduously from boyhood. The carved objects are made of hard jungle wood, some of *lignum vitae*, those of light wood not being popular. The carving is done with a jack knife and a pair of compasses and finished with matted grass and river sand. The objects are not used for trade purposes. Colour other than that natural to the wood is not usually shown, though occasionally inlay of other woods is employed. The objects are sometimes so highly carved as to be useless. The symbolism of the designs is individual. Prominent motives are the snake, the vulva, and the human scapula.

Ecological Methods and the Tsetse Problem.—In *Ecology*, vol. 11 (1930), pp. 713-733, Dr. J. F. V. Phillips discusses the application of ecological methods to a better understanding of the behaviour of the tsetse fly (*Glossina* spp.) in Tanganyika Territory. At least 60 per cent of the country is either lightly or densely infested by various species of *Glossina*, the most important being *G. morsitans* and *G. swynnertoni*. In 1925 funds became available, through the Tsetse Subcommittee of the Committee of Civil Research, for the establishment of a special department for the scientific study of the vectors of trypanosomiasis and its organisation upon lines of modern ecology. The detailed application of the latter method, it may be added, is under the direction of Dr. Phillips. The conception of the plan of campaign is based upon the fact that tsetse flies are associated in varying degrees not only with the specific animals upon the blood of which they feed, but also with vegetation communities. The tsetse fly investigator requires, therefore, to be versed both in the purely entomological aspects of the problem, and also to have a knowledge of the relationships of the biotic communities whereof the insect is a constituent. It would appear that a productive method of helping to solve the menace of these insects lies in an understanding of its ecology. The principal lines of investigation include the detailed study of the insects in relation to the physical and biological characters of their environment; their interrelations with the vertebrate fauna; their biological control and the experimental alteration of the biotic and physical characters of selected areas. These and other aspects of

this great problem are discussed in this paper which outlines a comprehensive and far-reaching plan of campaign.

Fauna of the Dutch East Indies.—The scientific results of the expedition of the Prince and Princess Leopold of Belgium accompanied by Prof. Van Straelen in 1929 (Résultats scientifiques du Voyage aux Indes Orientales Néerlandaises de LL. AA. RR. le Prince et la Princesse Léopold de Belgique, publiés par V. van Straelen, Directeur du Musée Royal d'Histoire Naturelle. *Mémoires* du Musée Royal d'Histoire Naturelle de Belgique) are being published handsomely in quarto form, eight parts of which have been issued in 1930. These cover a wide field, and each is written by an expert. Vol. 2 contains "Suesswasserschwaemme", fas. 2, by Walther Arndt; "Cœlentères hydropolytes", fas. 3, by E. Leloup; "Schyphomedusen", fas. 4, by G. Stiasny; and "Oligochæten", fas. 5, by W. Michaelssen: vol. 3 includes fas. 1, "Isopoda (excl. Oniscoidea and Epicaridea)" by A. F. Nierstrasz, and "Isopoda Epicaridea" by H. F. Nierstrasz and G. A. Brender a Brandis; fas. 2, "Parasitic Copepoda" by W. H. Leigh-Sharpe, and fas. 3, "Cirripedes" by C. A. Nilsson-Cantelli—vol. 5, fas. 1, containing "Batraciens" by S. F. de Witte. The most comprehensive are the parts on the oligochætes and the crustacea; fourteen species of cirripedes being recorded from various parts of the Malay Archipelago, including a new genus and two new species, two new species of parasitic copepods, and some interesting new isopods. The oligochætes collected belong mostly to the large genus *Pheretima*, and these are very carefully worked out. Most of the papers are illustrated by text figures, but there are line drawing plates in Leigh-Sharpe's "Parasitic Copepoda" and photographic plates in Leloup's "Hydroids", all of which are good.

Growth of Lobsters.—An appendix to the *Interim Report* (Report on Crabs and Lobsters, 1930) of the Interdepartmental Committee on Crabs and Lobsters (London: H.M. Stationery Office), by Mr. Richard Elmhirst, brings out some interesting facts with regard to the growth of lobsters. The growth curves from all available data show that a three-year-old lobster is about 110 mm. long. These data are from lobsters reared in captivity and also from those marked and recaptured. After about seven years the growth is slow. At about ten years old the males and females are of equal size, but nearly all very large lobsters are males. At first the females grow faster than the males, but when maturity sets in the growth is slower. Weighing experiments which have been undertaken at the Millport Laboratory, especially with reference to the increase of weight at moult, show that this increase may be as much as 30 per cent; but exceptional cases are cited and one lobster was actually lighter after the moult. The cast shell is eaten by the lobster, even if this is withheld for some time. There is no relation between the weight of exuviae consumed and the increase of weight during the shell-eating period, the lime taken in during hardening probably replacing water in the skin. The data available show that the inter-moult increase is about 10 per cent in males and 8 per cent in females. Tables are given showing details both of lengths and weights.

Parapseudecheneis, a New Genus.—Dr. Sunda Lal Hora and Dr. Paul Chabanaud have studied the siluroid fish *Pseudecheneis paviei* in much detail, and find that it is undoubtedly not congeneric with *Pseudecheneis sulcatus*, the only other species ascribed

to the genus. In their paper "The Siluroid Fish *Pseudecheneis* and an Allied New Genus" (*Records of the Indian Museum*, 32, 3, Oct. 1930) they describe the characters of both genera. *Pseudecheneis* and *Parapseudecheneis* both have an adhesive apparatus composed of a series of transverse lamellæ resembling in superficial appearance and form the adhesive disc of *Echeneis* or *Remora*, but they are quite different in general form, especially in the head region. It is suggested that both genera are derived from those members of the genus *Glyptosternum* which live in calm and placid waters of the highlands of Central Asia. The fact that the pectoral fins are placed somewhat higher than the ventral surface of the body shows that they have taken to life in rapid waters comparatively recently, and that their ancestors were probably well adapted for life in deep and calm waters. *Pseudecheneis* and *Parapseudecheneis* appear to have been evolved from two different stocks, but, under the influence of the current, have developed a similar type of adhesive apparatus.

Larch Poles for Transmission Lines.—Experiments have been carried out at the Forest Products Research Laboratory at Princes Risborough in the treatment of home-grown larch poles to render them suitable for use in telegraph, telephone, and power transmission lines. The objections to larch (which for many purposes has long been held in high repute in Great Britain) for transmission lines are apparently based on the behaviour of creosoted poles used during the War. It was recorded of these poles that the creosote did not penetrate the pole to any depth when subjected to the methods of treatment then in use; consequently after erection the poles were liable to crack or split severely. Experiments carried out with consignments of poles from the well-known larch woods in Tintern Forest have shown that with suitable treatment these difficulties can be overcome. By peeling and making a number of incisions in the poles with a broad knife, a satisfactory penetration of the preservative is obtainable. Although the incisions have a slight weakening effect on their strength, home-grown larch poles so treated are said to be 25–30 per cent stronger than imported poles of Scots pine of the same dimensions. Provided, therefore, that the larch poles are grown as clean as the imported pine, they should easily be able to hold their own in competition. *Bulletin* No. 8 of the Forest Products Research Laboratory (Jan. 1931), recently issued by the Department of Scientific and Industrial Research, gives full technical details of the experiments carried out.

The Old English Mile.—In a paper recently published in the *Geographical Journal*, Sir Charles Close showed that the mile in use in the fourteenth century in England was not less than ten furlongs. Lieut.-Col. J. B. P. Karslake returns to this matter in the *Geographical Journal* for April, and shows that the old English mile was actually eleven furlongs. This can be proved to be the mile of 1500 paces. It was identical with the *leuga*, the common unit of maximum linear measurement in early Saxon times. It was introduced into England in the first century B.C., and it is the measurement that was used in the Domesday survey. Apparently it was replaced by the mile of eight furlongs by the use in Saxon times of the Roman mile of 1000 *passus*, divided into eight *stadia*. So early as the ninth century, the *stadium* became the equivalent of the furlong. This mile of eight furlongs was adopted by the Post Office on its establishment in the reign of James I. for the determination of rates of horse hire for postal purposes. Thus milestones eight furlongs apart were set up, and this mile became the accepted standard of measurement in Great Britain.

The Labrador Current.—In a report on the coastal waters of Labrador based on explorations in 1926 (*Proceedings of the American Academy of Arts and Sciences*, vol. 66, No. 1), Mr. C. Iselin directs attention to certain features of the Labrador current revealed by sections across its waters. Two sections showed that the colder water is separated from the coast by a band of fresher warm water derived from land drainage, and that the coldest water in the current lies at a depth of about one hundred metres. A further comparison with sections of the current taken some years ago in Davis Strait shows that the current keeps practically the same temperatures and salinities throughout. A cross section in Davis Strait gives 10 square miles of water below 0° C., and a cross section off Sandwich Bay in the south of Labrador gives a comparable figure of 12.45 miles. The temperature of the body of the current (–1° to –1.5° C.) is maintained by scanty solar warming, the shortness of the summer, and the melting of bergs and floes, which hinder any rise in temperature. Mr. Iselin points out how the water supply from the surface of Labrador supplies an urge for the current, just as he believes that the chief source of the current is the urge supplied in Baffin Bay by land drainage and the northward-setting West Greenland current. Low salinity, in spite of low temperature, gives a reduced salinity on the west of the bay. The eastern side has a higher salinity by the inflow of Atlantic water. This difference forces the western waters southward.

Magnetic Analysis of α -Rays.—An article by S. Rosenblum in the December number of the *Journal de Physique*, on recent progress in the study of the magnetic spectra of α -rays, contains some details of the apparatus by means of which he was able to show that certain α -rays, for a long time accepted as simple, actually consisted of discrete groups. The magnet employed was the large one of the Paris Academy of Sciences. The largest pair of pole-pieces used had a diameter of 75 cm., and gave a constant field of 24,000 gauss over a region 35 cm. in diameter, which was adequate to enable him to apply to α -particles the focusing method with large deviations that had already been used with much success with β -particles by Ellis, Meitner, and others. The paper contains several interesting photographs of apparatus, as well as a number of reproductions of the magnetic spectra of the α -rays from thorium C.

Past and Future in Quantum Mechanics.—In a short communication appearing in the second March issue of the *Physical Review*, Prof. A. Einstein, R. C. Tolman, and B. Podolsky have raised the question of whether or not the quantum mechanics limits knowledge of the past path of a particle in the same way that it does knowledge of its future. The test is made by consideration of an idealised experiment of a type now familiar in demonstrations of the uncertainty principle. The history of two particles proceeding from one region of space to another by different routes is followed out in detail; and, to avoid a paradox in connexion with measurement of time and energy, it is first shown that momentum cannot be determined without changing its value, and then the original problem is decided in the negative. A final remark is added to the effect that it is desirable to emphasise that quantum mechanics imposes limitations on the localisation in time of a macroscopic phenomenon like the opening and closing of a shutter.

Reduction of Potassium Per-rhenate.—Noddack, one of the discoverers of the new element rhenium, found that the yellow oxide, Re_2O_7 , when heated in sulphur dioxide, was reduced to a blue oxide of indefinite composition, and this when heated in

hydrogen gave a black oxide ReO_2 . This was not obtained with milder reducing agents on a per-rhenate solution, these yielding a yellow solution which when made alkaline with barium hydroxide gave a yellow precipitate believed to be barium rhenate. The yellow solution was believed by Noddack to be rhenic acid. In the March number of the *Journal of the Chemical Society*, Briscoe, Robinson, and Stoddart describe experiments which show that the first light-coloured product of reduction is a colloidal suspension of the black material which it afterwards yields. This black product is ReO_2 , $2\text{H}_2\text{O}$, and can be obtained quantitatively from the per-rhenate, a reaction reminiscent of that by which the black reduction product of osmic acid, namely, OsO_2 , $2\text{H}_2\text{O}$, is produced. No evidence of the formation of rhenic acid or the precipitation of barium rhenate was obtained. The action of various reducing agents under varying conditions is described in the paper. The hydrate ReO_2 , $2\text{H}_2\text{O}$, when heated at 250° for twelve hours in an evacuated tube gave the anhydrous oxide, ReO_2 , in the pure state.

Cosmic Rays.—M. F. Baldet contributes to *L'Astronomie* for March an interesting review of the progress of knowledge about these rays. So far back as 1903, Rutherford and McLennan had noticed the tendency of electroscopes to lose their charge; they thought that this might arise from gamma-rays of terrestrial origin. To test this, an electroscope was carried up to a great height by a free balloon in 1910; it was found that the loss of charge was more rapid than on the ground, suggesting that the rays had a cosmic origin. Prof. Millikan discovered in 1913 their remarkable penetrating power, finding that it needed 20.8 metres of water, or 1.8 of lead, to quench them. It was inferred that their wave-length was only 1/50 of that of the gamma-rays. It was shown that the rays did not come from the sun, since there was no appreciable difference between the strength by day and by night. When Prof. Størmer traced auroræ to the impact of electrons from the sun, it was thought that these rays might arise in a similar manner; accordingly Prof. Millikan made an expedition last year to Hudson's Bay, near the magnetic pole; there were bright auroræ on three nights, but the strength of the cosmic rays was no stronger than at Pasadena. It was concluded that they are not connected with the aurora. A slight tendency has been found for the strength of the rays to vary with the barometer; this is explained by atmospheric absorption, since the barometer measures the mass of air above the place. M. Baldet goes on to explain Prof. Millikan's suggestion that these rays may have their origin in the coming together of hydrogen atoms in space, to build up more complex atoms; such transformations would be accompanied by an emission of energy. Sir James Jeans prefers to explain them by the annihilation of protons and electrons, showing that this would give rays of the right wave-length.

The Antimony Electrode.—The electrode consisting of metallic antimony in a solution containing solid antimonous oxide (Sb , Sb_2O_3) has been used in electrometric titrations and can be applied in cases where the hydrogen and quinhydrone electrodes do not function satisfactorily. It has also been used to measure $p\text{H}$ values. In the March number of the *Journal of the Chemical Society*, Britton and Robinson describe experiments made with the object of determining the scope of the electrode as a titrimetric indicator and the extent to which the electromotive forces may be accurately converted into $p\text{H}$ values, previous researches on the latter not being in good agreement. The work dealt with acids (including

hydrocyanic acid) and salts which could not be titrated in the presence of the hydrogen or quinhydrone electrode. The results show that the antimony electrode possesses a wide range of applicability and is capable of rapidly indicating prevailing $p\text{H}$ values with a moderately high degree of accuracy. A single universal buffer solution was employed, composed (according to the work of Prideaux and Ward) of a mixture of phosphoric, phenylacetic, and boric acids, each 0.04 molar, neutralised with 0.2 normal sodium hydroxide. Rods of pure cast antimony, cleaned with emery paper at the beginning of each titration, and purified antimonous oxide added to the buffer solution, were used, but it was found that addition of the oxide was unnecessary. Vigorous mechanical stirring is essential.

Flame Temperatures.—Jones, Lewis, Friauf and Perrott in the March number of the *Journal of the American Chemical Society* record measurements of the temperatures of hydrocarbon flames made at the Pittsburgh station of the U.S. Bureau of Mines. The method used was the reversal of spectrum lines of sodium and lithium salts in the flame, a heated tungsten strip examined by an optical pyrometer providing the light transmitted through the flame. The flame temperature increases rapidly, starting with a mixture near the lower limit of inflammability, and reaches a maximum with a gas-air mixture containing combustible slightly in excess (due to dissociation of the products) of that requisite to consume all the oxygen present. With further increase in percentage of combustible the flame temperature falls again, although not so sharply as for mixtures containing excess oxygen. The maximum flame temperatures of the gases tested vary from 1880° for methane to 1975° for ethylene; the maximum variation for the different hydrocarbons is less than 100° . The maximum flame temperatures of the unsaturated hydrocarbons (ethylene, propylene, butylene) are higher than those of the saturated hydrocarbons (methane, ethane, propane, butane, isobutane). The combustible gas-air mixture which gives the highest flame temperature does not correspond to that which gives the highest speed of uniform propagation of flame, except for methane and possibly Pittsburgh natural gas. In other cases the mixtures for highest flame temperature contain less combustible gas. Attempts to calculate the flame temperatures, making use of specific heats, gave satisfactory results, the temperatures being 100° higher for the unsaturated and 40° – 70° higher for the saturated hydrocarbons, in such a direction as to account for the difference by radiation losses from the flame.

Deformation of a Single Crystal of Silver.—A normal sample of silver consisting of an aggregate of crystals when worked and annealed is known to twin readily. This metal was, therefore, chosen by Gough and Cox (Institute of Metals, annual general meeting, Mar. 11) to investigate the formation of such twins in a single crystal. After being subjected to alternating torsional stress, however, no definite twin markings were to be observed, though the surface was covered by slip-bands on octahedral planes and in good agreement with the maximum shear-stress hypothesis of elastic failure. After complete fracture, the specimen was vacuum annealed without, however, any twins being produced. Under compressional stress, both static and dynamic, the same result was obtained. The complete failure to produce twins in these experiments must be held to constitute proof of an essential difference of the mode of deformation between the single crystal and an aggregate.