

Research Items.

CAVE EXPLORATION AT LESPUGUE, FRANCE.—Cultural and chronological relations of some importance have been established by excavations in the Grotte de Gouéris at Lespugue, which have been carried out by M. Comte de Saint Périer, and are described by him in *L'Anthropologie*, T. 37, Nos. 3-4. The cave was first discovered by Miss D. Garrod. When excavated it was found to contain three levels of occupation. Of these the latest was neolithic, when the cave was not used as a dwelling-place but solely for purposes of burial. Traces of fire have been discovered, which probably points to the preparation of funeral feasts in the cave. No signs of the habitation-sites of the people using the cave for burial purposes have been found in the neighbourhood. Of the two preceding occupation levels, the earliest was that of a palaeolithic people, who, it is suggested, made no prolonged stay. Probably they were hunters following the herds of reindeer of which the remains are abundant. They belonged to an early stage of the Magdalenian epoch when the harpoon was still unknown. They appear to have been related to the population of Périgord rather than that of the Pyrenees. After a period which allowed of a considerable deposit of stalagmite, they were followed by a people of low culture. The climate by then had become warmer and more moist. This people, as is indicated by their culture, belonged to the very beginning of the transition period. There are many Magdalenian types of implement. The harpoons are not of the typical Magdalenian style, yet they have not yet attained the Azilian form with teeth on both edges. A comparison with Mas d'Azil establishes the position of this culture as between the latest Magdalenian stratum at Mas d'Azil (Couche D of Piette) and the stratum E in which the coloured pebbles and the full-fledged Azilian culture were found. Thus Piette's contention that the large flat harpoon with unilateral barbs belonged to quite the beginning of the transition period is not only supported but also is given greater precision in date.

CRIMINAL STATISTICS.—Statistics relating to criminal proceedings, police offenders, prisons, and criminal lunatics for the year 1925, have recently been published (London: H.M. Stationery Office. 4s. net). Not only are the actual figures given for the period surveyed, but also comparative tables and graphs, so that the 'peak' periods and the variations at different periods can be studied. Allowance has of course to be made for the increase in population by about seven millions since 1899: it is suggested that the safer figure for comparative purposes is the proportion the indictable offences known to the police have borne to every 100,000 of the estimated population. The crime rate would seem to have fallen since 1857: for the period since 1899 the worst year is 1908. Here would appear to be reflected the effect of the Boer War. Six years after this war the increase in indictable offences was checked, and it is hoped that the similar increase since the War of 1914-18 will also be arrested. While there has been a tendency for the number of homicides to decrease in number, crimes against property, i.e. burglary, etc., have increased during the period 1899-1925. The volume will be of very great service to all those interested in social conditions, as well as to those officially concerned with the problems involved.

QUANTITATIVE METHODS IN GEOGRAPHY.—In an attempt to test and compare the intelligence of communities, Prof. E. Huntington has utilised the census figures showing the number of persons of

various ages in the American States. Arguing that these figures should show a steady decrease from one upwards and so be represented, when plotted, by a smooth curve, he shows that the curves are extremely irregular in many of the States where negroes are numerous. This he maintains is due to carelessness or ignorance. The age of the children is forgotten or merely stated in a round figure in order to save trouble. Several of these curves are produced in an article in the *Scientific Monthly* for October entitled "The Quantitative Phases of Human Geography." Prof. Huntington has also compiled a map of the United States showing accuracy of census returns as to age based only on native whites of native parentage in order to eliminate, so far as possible, questions of race. This map shows the highest degree of accuracy in the northern States, with a steady falling off towards the south and especially the south-east, except for Florida, where recent migration from northern States has been marked. In Nevada the standard is low, probably due to the decay of the mining industry and the drifting away of the more intelligent classes. The paper also contains other maps compiled from census statistics.

LIMNOLOGY IN CALIFORNIA.—The region in which Stanford University lies, the Santa Clara Valley, California, owing to its brief rainy season, is dependent throughout the summer on irrigation. The university supply is from a small artificial reservoir $\frac{3}{4}$ mile long and $\frac{1}{4}$ mile wide, the Searsville Lake. Dr. Flora M. Scott has recently carried out a preliminary survey of this lake ("Introduction to the Limnology of Searsville Lake," *Stanford University Publications*, University Series, Biol. Sci., vol. 5, No. 1, 1927, pp. 1-83). According to Whipple's classification, this is a 'tropical' lake, the surface temperature never falling below 4° C. The greatest depth does not exceed 7 m., and circulation is therefore ensured. The plankton content is, however, temperate in character and shows a seasonal rotation of sub-arctic to sub-tropical forms in the course of the year. The Bacillariæ as a group culminate in the spring, the Chlorophyceæ and Cyanophyceæ give rise to the summer maximum, while flagellates persist throughout the entire season. In the summer of 1924 the level of the lake became so low that the fish died off, and for hygienic reasons the lake had to be drained. Opportunity was then taken of carrying out some culture experiments with the dry surface mud from the lake bottom. If the solutions were kept acid (pH 5) no plankton organisms could be cultured from the mud samples, but under alkaline conditions the plankton soon became abundant. When the cultures were maintained at a temperature of approximately 34° C., the blue-green alga *Oscillatoria* alone succeeded in thriving.

FRESH WATER BIOLOGY IN NORWAY.—In 1905 the Academy of Science in Oslo received, by will, an estate from Herr O. Guldberg on condition that a biological research station was set up. The first aim was by means of farming to secure a fund; and in 1925 sufficient had accumulated to buy a property on the Hurdals-See for which a boat-house, motor-boat, etc., were provided. In a recent report Prof. H. H. Gran and Miss Birgithe Raud give some preliminary results ("Über die Planktonproduktion im Hurdals-See," *Vidensk. Acad. Oslo I. Mat.-Naturvid. Klasse*, 1927, No. 1, pp. 1-33). The Hurdals-See is a lake of average depth and of the type with stagnation in the bottom water in summer

and winter, and vertical circulation to the bottom in spring (May) and autumn (November). The discontinuity layer lies in summer between 10 m. and 25 m. Lowering leaves of *Ranunculus aquatilis pellatus* in bottles to different depths, and noting the oxygen exchange, showed that the point at which assimilation equalled respiration lay between 6 m. and 8 m. For diatoms and brown flagellates this depth was greater. Quantitative investigations of the centrifuge plankton showed that whereas the flagellate *Dinobryon sertularia* had a summer maximum in June, all other species increased slowly throughout summer, reaching a maximum in September. The chief forms were *Tabellaria fenestrata*, *Cyclotella comta*, *Melosira distans*, and *Staurastrum jaculiferum*. As regards quantity of phytoplankton, the Hurdals-See does not differ essentially from most lakes in central Norway. It is, according to Naumann's designation, an 'oligotroph' lake.

AMPHIOXUS.—Dr. V. Franz of Jena has given in "Die Tierwelt der Nord- und Ostsee" (Leipzig: Akademische Verlagsgesellschaft, 1927, Lieferung 8, Teil XII. b, "Branchiostoma") an account of Amphioxus which is a beautiful little monograph in itself. *Branchiostoma lanceolatum*, as Amphioxus is now called, is the only European representative of the class Acrania, which altogether includes about a dozen species. This is, however, the only really well-known form which both on account of its primitive vertebrate character and its comparative accessibility is beloved of all zoologists, and an enormous amount of literature has been amassed dealing with this single animal. From the collection Dr. Franz has sifted out the interesting and important, and made a most useful summary, anatomical, embryological, and physiological. He is well equipped for undertaking such a work, as he has himself made considerable contributions during the last few years to the minute anatomy and behaviour of Amphioxus, including studies of the methods of movement, reactions to light and researches on the sense organs and sense cells.

THE LUNG-WORM AND THE STOMACH-WORM OF THE CAT.—Dr. T. W. M. Cameron (*Jour. of Helminthology*, June 1927) has investigated the life history of the lung-worm and of the stomach-worm of the cat. The former, *Ælurostrongylus abstrusus*, lays its eggs in the alveoli and in the parenchymatous tissue of the lungs and there the larvæ hatch, pass up the trachea, are swallowed and pass out with the fæces. A description is given of the morphology and biology of the larva. When infected fæces are eaten by mice the larvæ migrate from the stomach of the mouse to the muscles and subcutaneous tissue where they encyst, and within three weeks develop into the infective stage, which may remain viable in the muscles for at least a year. If an infected mouse is eaten by a cat the larvæ escape from their cysts, reach the lungs, and within six weeks become mature adults. The stomach worm, *Ollulanus tricuspis*, lives on the surface of the gastric mucosa and in the acini of the glands. The first-stage larva emerges from the egg in the uterus of the worm and moults there. The second-stage larva develops into the third-stage larva which is found outside the parent worm, but the exact period at which it left the parent was not determined. This larva leaves the stomach of the cat in the vomit (and possibly in other ways, though no other has been discovered) and is swallowed by a new host in which it develops into the fourth-stage larva and finally into the adult. The characters of these four larval stages are described and figured. Hitherto it has generally been accepted that *Ollulanus tricuspis* had a complex life history requiring an intermediate host—the mouse.

This view arose through the confusion of the larvæ of *Ollulanus* and *Ælurostrongylus*. Leuckart found larvæ in the cat and the mouse which he believed to be those of *Ollulanus*, but they were really larvæ of *Ælurostrongylus*.

THE BORING UNIONID OF ASSAM.—The distribution and habits of the remarkable boring unionid, at first referred in 1836 to the genus *Anodonta*, but now known as *Balwanitia spleniformis* (Benson), have lately received the attention of Dr. Sunder Lal Hora (*Jour. Proc. Asiatic Soc. Bengal*, vol. 21). Owing to its retiring habits it has been greatly overlooked, but Dr. Lal Hora is confident that it will prove widely distributed in South Cachar and several other places in the Surma valley. The animal lives in inclined burrows excavated in hard blue clay or in friable sandstone, after the manner of marine boring molluscs. The burrow is of uniform calibre throughout and its cross section corresponds with that of the shell, but is a little larger, while its length is about two inches more. The bivalve is anchored to the far end of the burrow by its foot, by the expansion and contraction of which it can move to and fro in the burrow, and thus by the aid of the coarse ridges on the shell enlarge its tenement at will. There is no proof that the young animal starts a burrow *de novo*: it probably takes possession of some pre-existing hole or crack and enlarges it as required. The mollusc is considered a great delicacy by the Uriya coolies, who have an ingenious way, that is fully described, of extracting it from its crypt.

AFFORESTATION IN MICHIGAN.—Those interested in the afforestation work proceeding in Britain should read the *Special Bulletin* (No. 163, June 1927) on "Forest Planting in Michigan" by Alfred K. Chittenden of the Michigan State College of Agriculture. Planting work experiments have apparently been undertaken during the past thirty years at this institution. The present-day problem of the United States in connexion with timber supplies is well known and has been alluded to in *NATURE* on several occasions during the past year. The position of the several individual States in the matter is therefore not without considerable interest in Europe. The author writes, "One of Michigan's greatest problems is that of replacing her forests. This is becoming increasingly important as the timber of the United States as a whole is being cut." Nature, he says, if given a chance will restore the forests of her own accord, but this is a slow process; nor will the composition of the second growth consist of the most valuable species. If these latter are required, planting must be resorted to. The author regards the matter from a different view-point to that usually accepted in Europe. "Although trees," he says, "will grow on the poorest soils, they, like farm crops, will do better on richer soils. So, while the forests will probably ultimately be confined to the poorer classes of soils which will not be needed for agriculture, it is better to plant forests in the meanwhile on the best lands available for the purpose." This may be the correct solution at the present time in a country where extensive areas of land are available, but would scarcely be applicable in England where the growth of food crops on all lands of suitable quality must be a first desideratum. The brochure is mainly confined to and intended for the planting of wood lots on farms. In several sections it deals with the questions of raising trees from seed in the nursery, the season to plant, field planting with costs, soil requirements, and the suitable species to make use of both from the point of view of soils and the uses to which the material grown can be put. Brief descriptions of the species advocated are given. The *Bulletin*

concludes with a note on the afforestation of sand dunes and the method of planting windbreaks and shelter-belts.

NEW EOCENE MOLLUSCA FROM TEXAS.—An interesting paper on some new species of Mollusca from the Claiborne and Wilcox groups of the Eocene of Texas comes from the pen of Julia Gardner (*Jour. Washington Acad. Sci.*, vol. 17). Twenty-one new species and subspecies are described and figured on four excellent plates. The only freshwater form recorded belongs to the genus *Planorbis*, which has not been previously reported from the Eocene of Texas, and is represented by *P. andersoni*, n. sp. It is fairly common at the single locality where it was found.

NEW SILURIAN PELECYPOD (PYCNODESMA) FROM ALASKA.—Mr. Edwin Kirk places on record a new pelecypod genus *Pycnodesma*, from the Upper Silurian of Alaska (*Proc. U.S. Nat. Mus.*, vol. 71, art. 20). It is a large massive shell, sometimes attaining a size of 12 inches across and upwards of 2 inches in thickness at the umbonal region. The author refers it to the *Megalodontidae* and compares it with *Megalodon* and *Megalomus*, from both of which it differs in its hinge characters. His figure of the hinge shows its peculiar features, which are such as to raise the question whether, possibly, this new genus may not be an ancestral form of his earlier described Devonian *Tanaodon* (*NATURE*, vol. 120, July 2, 1927, p. 25), although the author himself does not make the comparison.

DISCHARGE PHENOMENA.—Important quantitative contributions to the theory of glow discharges have been made by Prof. K. T. Compton and Mr. Morse in the September number of the *Physical Review*, and by Dr. J. Taylor in an Utrecht thesis presented on Sept. 28. The former have deduced a relation between the cathode constants of a discharge which is just self-maintained, and Prof. Townsend's 'ionization constants' for the gas. The new feature in their work is the use of the principle that the fields within the tube must be distributed so that there shall be a minimum dissipation of energy; Poisson's space-charge equation does not occur in the main analysis. Their predictions are verified as well as can be expected from the present meagre experimental data. Dr. Taylor has been more concerned with the initiation of the discharge, where he has been able to correlate the sparking potentials with the normal current-voltage curves, and those obtained when the supply of energy is restricted externally.

STEREOGRAPHIC SURVEY.—In the *Geographical Journal* for September Major K. Mason describes, with maps, the results of his experiments in the Shaksgam with the Wild photo-theodolite. The instrument proved most satisfactory and the criticisms that are offered refer only to minor points of design and very superficial matters. The tests included an area already within the planetable survey of India, an area at the edge of the survey, to ascertain the value of the instrument for long distance reconnaissance survey, and an area without any control points identified for certain to find the limitations of the method for the revision of old maps. The plotting of the photographs was done on the Wild Autograph, which is designed to plot and contour four pairs of plates taken with the photo-theodolite. Mr. A. R. Hinks describes this machine and explains its principles in the same issue. The method has proved so successful that the Swiss Federal Topographical Survey has decided to use it in the re-survey of the whole of Switzerland.

MEASURING QUARTZ FIBRES.—In the October issue of the *Journal of Scientific Instruments*, Messrs. G. A. Tomlinson and H. Barrel, of the National Physical Laboratory, describe the two methods they have used for measuring the diameters of fine quartz fibres. If the fibre is placed in a parallel beam of white light and the deviations of the coloured bands seen on each side of the fibre are measured, then, on the theory that the fibre acts as a slit, its diameter can be calculated. Owing to reflection and refraction at the fibre, the results are not very accurate, but the method provides a simple means of testing the uniformity of the fibre by observing the bands as the fibre is moved along parallel to itself. The more trustworthy method is to clamp the ends of the fibre so that it is horizontal, and to hang a weight of about a milligram to its centre and measure the sag. The elasticity of quartz is taken as 5.18×10^{11} dynes per sq. cm. The arrangement is that adopted to determine the breaking stress in wires by s'Gravesande, "*Physices Elementa Mathematica*" (1742).

A MECHANICAL MAXWELL DEMON.—Small particles are notoriously more difficult to examine when they are neutral than when they are charged, and although the distribution of velocities amongst groups of electrons and ions has been analysed frequently, it has hitherto been impracticable to do this satisfactorily for ordinary gas-molecules. A considerable advance in this direction is described by J. L. Costa, H. D. Smyth, and K. T. Compton in a recent paper in the *Physical Review* (vol. 30, p. 349). A shaft carrying two slotted wheels was rotated at high speed within a stout metal container, the space between the wheels being evacuated by a powerful diffusion pump. Gas was fed into a lateral chamber, and those molecules the velocity of which had the appropriate relation to the speed of rotation and to the geometry of the apparatus, passed through gaps in both wheels and fell on the vane of a delicate radiometer. When the deflexion of the latter was plotted as a function of the rate of revolution, curves were obtained which agreed with those predicted on the assumption that the molecules had a Maxwellian distribution of velocities. The experiments were, however, difficult—in particular, the radiometer had to be used almost at the limit of its sensitivity—and it is unfortunately not yet possible to obtain the 'velocity spectrum' which was the original aim of the investigation.

THE IGNITION OF GASES BY HOT WIRES.—A recent publication (Paper No. 10) of the Safety in Mines Research Board (London: H.M. Stationery Office, 1927) contains an account of a research carried out to discover whether the glowing filament of a two-volt miner's electric lamp-bulb might cause the ignition of mixtures of firedamp and air and thus constitute a source of danger in a coal-mine. The tungsten filaments of bulbs of recent manufacture burn at a high temperature (about 1500° C.) and, if breaking the glass did not fracture the filament, were found capable of igniting mixtures containing not more than about 12 per cent. of methane. With platinum wire of a given diameter, ignition can only occur within a narrow range of current, below which flameless surface combustion takes place. Above this limit, the wire fuses without igniting the mixture, providing it is less than 0.1 mm. in diameter. Heated tungsten wire, however, oxidises rapidly in the presence of oxygen, the temperature increasing until the metal burns with a bright flame of short duration but high temperature. This flame causes the ignition of firedamp. It is therefore recommended that the lamps should incorporate an automatic circuit-breaker operated by breaking the outer protecting glass.