Research Items

The Capsian Industry. A preliminary reconsideration of the Capsian phase of the Stone Age in North Africa is put forward by M. R. Vaufrey in L'Anthropologie, 43, Nos. 5-6 in the light of the results of investigations in the shell-heaps of southern Tunisia in 1931-32. The evidence then collected gives an entirely different view of the Capsian industry from that generally accepted, according to which the Capsian is regarded as the ancestor of the Upper Palæolithic and the Mesolithic of Europe, and an upper and lower Capsian are distinguished, microliths being rare in the latter, the older culture. These investigations, which have been conducted in accordance with a more stringent method than that employed by previous investigators, show that the conception of an ancient Capsian composed almost exclusively of large implements is entirely due to an incomplete view of the evidence. More exacting methods of investigation show that the microlith is abundant in this early stage, and is already highly developed. The Capsian, it appears, is essentially one, but is divisible into three chronological stages-a homogeneous body in which the microlith forms the binding material. The three stages are : typical Capsian in which points, burins and scrapers occur with a typical microlithic industry; (2) interogetulian neolithic or upper Capsian, in which the burin becomes exceptional, though scrapers are more or less numerous, while among the microliths, triangles and scalene points predominate, but true geometrical forms are rare, geometrical forms, however, characterising a divergent development in Algeria; (3) neolithic of Capsian tradition, in which shell heaps are rare, the characteristic Capsian implement, the point à dos rabattu disappears, and evidence of Saharan influence appears. Typologically the Capsian is late Palæolithic or Mesolithic, and does not belong to geologically ancient deposits. Hence it could not be the ancestor of Aurignacian, nor does it lend support to the African origin of Homo sapiens.

Maya Archæology in South-West Guatemala. In 1932 Mr. and Mrs. S. K. Lothrop made a reconnaissance of some thirty sites containing ancient remains and excavated the ruins of Chukumuk and Chuitinamit on the shores of Lake Atitlan in south-west Guatemala, a region archæologically almost unknown. In a report on the excavations ("Atitlan". Pub. No. 444, Carnegie Institution, Washington) it is stated that the remains may be classified into several stylistic and chronological categories, and exhibit both strongly developed local characteristics and connexion with other areas. Thus the most ancient types of pottery embrace non-Mayan elements which may have come from south and east; but it is premature to decide whether it represents a transitional pre-Mayan population or a primitive Maya. The second pottery period shows connexion with 'early' Mexican culture as represented by Ticoman. It is related to late phases of Maya Old Empire as exemplified in Peten, western Salvador and western Honduras. At the same time it preserves non-Mayan elements of the previous schools. The last pottery period is typified by styles found at other highland sites such as Utatlan. As a whole, it has little resemblance to finds in other regions. It is believed to cover the period of the political ascendancy of the historic highland tribes and ended with the Spanish conquest. Architectural features do not accord with those of other Maya remains. Ruined residences are of two kinds, which, it is believed, are of different epochs. As a whole, the remains indicate the early period in which the inhabitants drew inspiration from western Salvador and to a less extent from Central Mexico. At a later period they were in contact with the Maya Old Empire, and in the centuries before the conquest developed a culture of strongly local type.

Di-iodothyronine in Myxædema. Although dried thyroid gland is physiologically active by mouth, the pure active principle, thyroxine, only exerts a comparable effect when given by injection : it is generally supposed that this is due to failure of absorption from the gut, since thyroxine is very insoluble. In the digestion in the intestine of the iodothyreoglobulin of the gland, a peptide of thyroxine is set free which is much more soluble than thyroxine itself. and so is readily absorbed. The synthetic production of such a soluble peptide, however, has not been successful. A derivative of thyroxine which exerts a significant amount of thyroid like activity is 3: 5-di-iodothyronine, which has the same structural skeleton as thyroxine but contains only two iodine atoms. Gaddum found that its activity was 1/15-1/40 that of thyroxine according to the method of test employed. It is, however, more soluble than the latter, and this difference between the two compounds is still more marked in the case of their salts both with acids and alkalis. The clinical value of the disodium salt in myxcedema has recently been investigated by A. B. Anderson, C. R. Harington and D. Murray Lyon (Lancet, 1081, Nov. 11, 1933). Daily doses of 50 mgm. of the di-iodothyronine in water were given by mouth to six cases, and in each the basal metabolic rate was raised to, or nearly to, the normal level, the pulse rate was quickened and the weight was reduced when the patient was initially overweight. No toxic symptoms were observed with continued administration over periods of two to three weeks : on withdrawal of the drug, the metabolic and pulse rates fell and the weight rose again. The magnitude of the effects produced was similar to what might be anticipated from the daily injection of 1 mgm. of thyroxine. Since di-iodothyronine can be prepared in the pure condition and moreover appears to exert its physiological activity with a remarkable degree of constancy, it may prove to be a valuable substitute for thyroid gland in all cases in which administration of the latter is indicated.

Structure of Larvæ of Hispine Beetles. An interesting case in which a study of the larval morphology has måde it possible to correct the systematic position of the adult insect is offered by a recent paper of S. Maulik (Proc. Zool. Soc. London, 1933, part 3). The beetle Platyauchenia latreillei, Cast. has been referred to the subfamily Cassidinæ, but its larva lacks the prolongations at the end of the body which are used for carrying on the back of a mass of excreta, and constitute a character peculiar to larvæ of the subfamily Cassidinæ. On the other hand, the structure of the partially fused eighth and ninth segments of the abdomen is such as is often observed amongst larvæ of Hispinæ. Other larval and adult characters of Platyauchenia are discussed at length and it is concluded that the genus should be removed to Hispinæ. At the same time the larva shows some modifications in the position of spiracles not previously recorded amongst Hispinæ, while its head, though that of a true miner, shows a structure different from any so far observed in other leaf-mining larvæ.

Entry of Water into the Germinating Seed. A study of the brief communication on this subject by Alexander Nelson and Jas. C. Macsween (Trans. and Proc. Bot. Soc. Edin., 31, Part 2) will dispel certain popular illusions. The least study of the broad bean would show that the micropyle is far from being a hole permitting access of water to the interior of the seed, and careful measurements with beans floating in a 'lifebelt' of paraffin wax show that intake of water is about the same whether the half immersed includes the micropyle or not. Reasons are given for concluding that two factors are at work in facilitating water entrance: (1) the hydration of the colloids of the testa, (2) an osmotic action through the semipermeable coat due to the release of carbohydrates in the inner lining of the testa. Emphasis is laid in this paper upon the great variation in the behaviour of individual seeds.

Growth of Evergeens. According to the Science Service, Washington, D.C., Prof. Ansel F. Hemenway, of the University of Arizona, has recorded evidence concerning the growth of the great evergreen trees of the Pacific north-west. Prof. Hemenway points out that the cambium, and also certain elongated cells, the function of which is considered by botanists to be the transportation of dissolved food substances, appear to be in active condition from early autumn until the commencement of the summer drought of this region. In other words, that these species continue their growth throughout the winter. Similar structures in deciduous or broad-leaved species in the same region, and also in conifers and broad-leaved trees in Kentucky, do not appear to be functioning in specimens collected during the winter. The Oregon broad-leaved trees also appear to have a period of little or no growth during the midsummer drought of the region. It is thus apparent that there are two long periods in the year during which the broad-leaved trees do not grow; whereas the evergreens are able to grow continuously through nine or ten months of the mild, moist autumn, winter and spring. The author holds that the broad-leaved species have lost the race for supremacy in the northwest coast region. For this reason the forest of this region now consists almost entirely of Douglas spruce, grand fir, coast cedar and yellow pine.

Geographical Distribution of Tea Cultivation. Tea cultivation has a peculiar geographical distribution, for apart from recent plantings in Africa and Russian Georgia, commercial tea-growing is practically limited to the south-east of Asia and the adjoining islands, none being as yet carried on in America or South The reasons for this have been recently Europe. discussed by H. H. Mann (J. Exp. Agric., 1, 245). The centre from which the plant originated, coupled with the availability of cheap hand labour, have naturally played an important part in the distribution of the crop as a commercial proposition, but despite these factors, the areas in which tea is grown are curiously limited. In certain directions the plant is very tolerant of variations in soil or climate, for it is found in comparatively temperate regions where frost is common and also in the neighbourhood of the

In other respects, however, the crop are equator. precise in its demands, certain conditions of soil and climate being essential for vigorous growth. Although most of the important tea estates lie on alluvial soils, the crop can be grown successfully on varied types provided certain physical and chemical conditions are satisfied. In the first place, the soil must be deep and well drained, with a porous lower layer into which the roots of the plant can easily penetrate, and secondly, an acid reaction is essential, commercial success being unlikely if the pH is higher than 6.0. As regards manurial requirements the position is less clear. Abundant available nitrogen is known to be important, but excessive quantities, particularly if not accompanied by adequate dressings of phosphoric acid and potash, prove harmful. Recent work has, further, shown that other nutrients such as sulphur may sometimes be important, the diseased condition known as 'tea yellows' being attributed to a deficiency of this element.

Long Beach Earthquake of March 10, 1933. The Californian earthquake of March 10, known as the Long Beach earthquake, is the subject of a valuable preliminary report by Mr. H. O. Wood (Bull. Amer. Seis. Soc., 23, 43-56; 1933). Notwithstanding the great amount of damage caused in Long Beach and other towns, the shock does not belong to the class of great earthquakes, but was rather a fairly strong local shock originating near a thickly populated region. From the records obtained at seven stations in southern California, the epicentre was found to be in about lat. 33° 34.5' N., long. 117° 59' W., or $3\frac{1}{2}$ miles south-west of Newport Beach and in the general course of the Inglewood fault continued towards the south-east. The shock was felt in the ten southern counties of California and in a few places beyond, but serious damage to badly constructed houses was confined to an area of about 450 square miles, and was greatest in and near Compton and Long Beach. No fault displacement was found at the surface. The earthquake was followed by many after-shocks, some thousands being recorded by seismographs, but none of them comparable in strength with the principal shock, though a few increased the damage in buildings already injured.

Acoustic Absorption. In two recent papers (Rend. R. Ist. Lombardo Sci. Let., Parts 11-15, 1933), Dr. D. Faggiani discusses the question of acoustic absorption by porous materials. Previous theories which have been propounded lead to consequences which are not in agreement with the phenomena observed. The new theory advanced by Faggiani is based on a consideration of the conditions of resonance of the very small channels into which the porous absorbing strata may be regarded as subdivided, and on the hypothesis that, in such conditions, the coefficient of absorption has, within suitable limits, a single value. Application of these conceptions to the ideal case of a number of parallel channels of uniform radius and length leads to two conclusions which are in accord with certain of the empirical laws. Actually, in absorbent materials it may be assumed that the values for the lengths of the different channels are not constant, but are distributed about a certain most probable value. When such variation is taken into account, there emerge further conclusions, all of which receive confirmation from the experimental data obtained by various observers with the most diverse porous materials.

Infra-Red Emission from Heated Metals. C. Hurst has recently published some observations on the emission of infra-red radiation by surfaces of copper and nickel (*Proc. Roy. Soc.*, A, Nov.). The temperatures used were 700° -850° C. for copper and 850° and 1,000° C. for nickel, and the wave-length ranges lay between 1 μ and 6.5 μ . In the near infra-red region of the spectrum, the emissive properties change from 'optical' type to those characteristic of the electrical properties of the metal, and this change appears in the results of the present investigation. The experimental method adopted was to compare the radiation from the metal surface with the black-body radiation from a wedge-shaped cavity in the metal. The emitter was mounted in a vacuum chamber and heated by an internal tungsten spiral. The surface and the cavity were focused alternately on the slit of a rock-salt spectrometer, and the intensities compared by a thermopile and Paschen galvanometer. A rotating sector cut down the black radiation to a convenient value for comparison. The surface was prepared by grinding with emery paper and polishing with chamois leather, the metal was reduced with hydrogen to remove oxide films, and the values of the emissivity remained stable, in the case of copper, over weeks of work. The experiments, taken in conjunction with the reflectivity measurements of Hagen and Rubens, made at room temperature, show that while the emissivity at short wave-lengths is not much affected by temperature, the emissivity at the longer wave-lengths increases considerably with temperature as required by the classical electro-magnetic theory. The results have been compared with the theory of Kronig, who attempted to calculate with appropriate simplifying assumptions the motion of electrons in the periodic field of a metal lattice. The Kronig theory agrees less well with the experi-mental results in this region than does the classical theory of Drude, and the author shows that no simple modification of Kronig's theory is likely to explain the observed temperature variation of emissivity.

Oscillations in an Ionised Gas. It has been known for some time that oscillations may exist in a mass of ionised gas. R. W. Revans has recently described experiments in which stationary waves were set up in a bulb containing a hot cathode are in mercury vapour (Phys. Rev., Nov. 15). In a 9 cm. spherical bulb the strongest oscillation was just within the upper audible range, and a long train of harmonics could be detected. The oscillations are apparently due to the vibrations of the glow as a whole comparably to those of the air in a Helmholtz reson-Over wide ranges of the arc current the ator frequency would remain constant and then at a certain value of the current the frequency would drop or increase suddenly due to a change to a different mode of vibration. The 'temperature' of the electron velocity distribution increases greatly when the glow begins to oscillate. A positively charged probe moved across the discharge showed maxima and minima in the collected electron current, indicating the presence of stationary waves, The fundamental frequency agreed with that cal-culated from a formula of J. J. Thomson giving the velocity of waves travelling in an ionised gas. The author intends to apply the idea of trans-mission of waves to the ionised atmospheres of stars, and in particular to disturbed areas such as sunspots.

Carbon Dioxide to prevent Ignition of Firedamp by Sparks. The Safety in Mines Research Board has just issued Paper No. 81 on "The Prevention of Ignition of Firedamp by the Heat of Impact of Coal-Cutter Picks against Hard Rocks", written by Messrs. M. J. Burgess and R. V. Wheeler (H.M.S.O., 6d. net). It may be remembered that these same authors showed that firedamp could be ignited by the impact of coal-cutter picks against highly siliceous rocks. They now point out that it is possible to prevent such ignition by discharging carbon dioxide into the cut made by the coal-cutter jib. They arranged a flow of carbon dioxide by means of the solid form 'Drikold', manufactured for the market by Imperial Chemical Industries, Ltd., and usually in cylindrical blocks, 25 lb. in weight, used in a standard liquifier, from which the gas could be delivered at known Their experiments are not very convincing, rates. but their conclusions are that the possible ignition of firedamp when a coal-cutter pick strikes against a hard rock can be prevented by discharging carbon dioxide at the rate of at least $1\frac{1}{2}$ cub. ft. per minute into the cut. Imperial Chemical Industries, Ltd., state that a continuous discharge of 11 cub. ft. of carbon dioxide per minute would be obtained from 75 lb. of Drikold, costing about 15s. 6d. As in 34 tests there were only 22 ignitions without the use of carbon dioxide at all, it is doubtful whether the coal mining industry will pay the price for a probable insurance against a possible accident, but the fact that a fair proportion of carbon dioxide prevents any ignition is decidedly interesting.

The Gas Pressure Cable. Recent progress in electrical engineering has been in the direction of ever-increasing voltages, but until quite recently this has not been accompanied by any radical change in cable design. Up to 66 kilovolts, cables with solid insulating materials have proved satisfactory, but beyond this pressure new methods have to be devised. In the Electrical Power Engineer of November-December 1933 an interesting lecture on this subject by Dr. E. Bowden and F. W. Main, given to the London Section of the Electrical Power Engineers' Association, is given in full. The principle of the method used in the 'pressure cable' is to apply mechanical pressure radially to the insulation so that the vacuous spaces which tend to form in the material are either closed up or the pressure in them is raised to such an extent that no ionisation occurs. The main difficulty to be overcome was to separate the pressure medium from the dielectric by an impermeable membrane. This was done by means of a thin lead sheath. The gaseous pressure was applied from the outside, being confined in a pipe line. The effect of this pressure produced a very marked improvement in the ionisa-tion curve of the cable. It was found that with nitrogen gas as the compressing medium, a pressure of eight atmospheres was sufficient to maintain the cable in a stable state. The first installation of pressure cable at 66 kilovolts on a commercial scale was completed about a year ago between Hackney and Walthamstow, the length of the line being about 21 miles. The route went through a thickly populated suburban district and the pipes had to be threaded through gas and water mains, sewers, etc. The pipe is filled with nitrogen and a working pressure of 12 atmospheres is maintained. The current carrying capacity of this type of cable is about 30 per cent higher than that of the usual type and its cost is about 25 per cent lower.