

## Research Items.

A SURVIVAL OF THE "THAMES PICK."—*Man* for September contains a note by Mrs. M. E. Cunnington on a "Thames Pick" found on a ledge or shelf in the chalk side of a pit-dwelling in Casterley Camp, Wilts. The flint is of a pale bluish-grey, the unground sharp nose shows no sign of use, and the whole surface is sharp and rough to the touch as if newly made, as it must have been when buried in the pit. The "Thames Pick" type of implement is usually held to be of late palæolithic or early neolithic date. In the present instance, however, it is recorded that it was found with three skeletons, two adult and one of a child, and under one of these were the remains of an iron brooch with a spiral spring of La Tène type, and under the child's skeleton was a second fragment of iron which was possibly the bow of another brooch. Pottery of a poor quality was also found which, taken in conjunction with the flint implement, might have led to an attribution to the Neolithic Age had it not been for the presence of iron. It is, however, clear from this find that implements of this type continued to be manufactured in Britain until well into the Iron Age.

PHYSICAL ANTHROPOLOGY OF THE HOS OF KOLHAN.—Mr. D. N. Majumdar has recently published several studies of the Hos or Kols and their culture. Of four in the current issue of the *Journal and Proceedings of the Asiatic Society of Bengal* (Vol. xx., N.S., Pt. 5) one deals with their physical characters, as shown in 10 measurements of 200 individuals which are given in a series of tables. They are short of stature, of dark complexion, with short, broad, and flat noses, small dark eyes, wavy to curly hair, beard or moustache being absent. The complexion varies from sooty black to dark brown. Fair Hos are occasionally encountered, but this is to be attributed to admixture with Rajput traders. The lips are medium, and slight prognathism is noticeable. The average cephalic index is 75.5, but 63 per cent. were dolichocephalic, 47 per cent. mesocephalic, and 12 per cent. brachycephalic. Cases of artificial deformation were noted. The highest nasal index was 91.1, the lowest 74.6. The average stature is about 161 cm., the lowest individual measurement being 158.2 cm., and the highest 170 cm. The arm's reach is proportionate to the stature, ranging from 166.6 cm. to 173.5 cm. Tattooing, formerly practised, has fallen out of favour, but where in use it is only on the fore-limbs, and especially the right hand. If a woman does not tattoo she commits a sin, as she takes nothing to the next world but these marks on her limbs.

THE BOSKOP SKULL.—Mr. W. P. Pycraft, who undertook to examine and report on the calvaria found at Boskop, Transvaal, in 1913, has contributed to the *Journal of the Royal Anthropological Institute*, Vol. LV., Part 1, a discussion of the conclusions at which he himself and Dr. H. S. Haughton, assistant director of the South African Museum, have arrived. Mr. Pycraft's reconstruction gives length 205 mm., breadth 150 mm., auricular height 125 mm., basi-bregmatic height 137 mm., cranial capacity probably 1717 c.c. In all its salient features the skull shows a likeness to the Bushman skull, but it is also comparable with the "Strandlooper" and the Cromagnon. The contours of the Strandlooper and Boskop skulls are almost identical except in the greater height of the latter. The Strandlooper stands midway between the Boskop and the Bushman skulls. Boskop Man is also genetically related to Cromagnon Man, the conclusion being that he would appear to be a derivative of Cromagnon Man and the progenitor of the

Bushman. It is therefore suggested that the proto-Bushman, *i.e.* the Boskop Man, arose out of the Neanthropic flux which gave rise to the Grimaldi people and the Cromagnards, the Australo-Dravidians and Rhodesian Man, the common stock from which all were derived being the smooth and "beetle-browed" Palæanthropic peoples. The apparently somewhat sudden appearance of the Neanthropic peoples is probably fictitious.

THE FLOODS OF THE NEVA.—The tendency of the lower Neva to inundate part of Leningrad has been a serious problem since the foundation of the town. It has been explained by river flooding due to precipitation, banking of the river flow by winds, and changes in the level of Lake Ladoga. In an article entitled "Les Crues de l'embouchure de la Neva" in *Matériaux pour l'étude des calamités* for April-June 1925, Dr. E. P. Pouichet shows that the main cause is a southerly and south-westerly gale in the southern part of the Baltic. This forces the water into the Gulf of Finland, especially since the free passage into the Gulf of Bothnia is obstructed by the Abo and Åland archipelagoes. In the narrow and shallow Gulf of Finland the waters are heaped up, if the westerly winds persist, and overflow the tidal reaches of the Neva. If the westerly winds give way to northerly or north-westerly winds, the floods rapidly subside, and indeed may not reach dangerous proportions. Dr. Pouichet gives synoptic charts showing the meteorological conditions on the occasion of several serious floods, and describes the system of warning instituted some years ago and improved by the existing government in Russia. He discusses the possibility of protective works, but concludes that their cost would be prohibitive.

RAIN AS A CAUSE OF SPOTTING OF FOLIAGE.—Field observations having led to the conclusion that spotting of the foliage in apple trees in the wet season of 1924 was associated with the abnormal rainfall, Messrs. C. E. T. Mann and T. Wallace, of the Horticultural Research Station at Long Ashton, proceeded to examine the effect upon the foliage of these trees of temporary immersion in distilled water. As somewhat similar blotches appeared on these leaves, and as analysis showed that the distilled water was leaching considerable quantities of potash out of the leaves, the experiments were continued and showed that a variety susceptible to this spotting in the field, Cox's Orange, lost no less than 64 per cent. of the total potassium in the leaves after 24 hours' immersion in the water, whilst a variety resistant to spotting in the field in a similar experiment lost only 12 per cent. in the 24 hours. In view of their experimental results with varieties of different susceptibility, as recorded in the *Journal of Pomology*, vol. iv. pp. 146-161, there seems little doubt that the conclusion drawn from the field observations was justified, that rain was responsible for the spotting of the leaves noted in this particular season. It would also seem that the action of the rain water is associated with this little suspected capacity it has for leaching considerable quantities of soluble substances, including potassium compounds, out of the foliage of the plant.

CREAMING OF SPRAY FLUIDS.—Rowland Marcus Woodman continues his investigation of the fundamental physics and chemistry of spray fluids in the *Journal of Pomology and Horticultural Science*, vol. iv. pp. 184-195, with an interesting discussion of the difference between the "cracking" of an emulsion,



*i.e.* a mass separation of the two liquid phases, and the "creaming," in which a stable emulsion, containing practically the theoretical amount of the disperse phase when present in spherical droplets packed as closely as possible, separates itself by creaming from the excess of the continuous, and in this case denser, solvent phase. He points out that cracking and creaming are very different and that they are not necessarily favoured by the same conditions; furthermore, in practice with spray fluids, the danger is creaming. As a result of creaming a paraffin wash may be pumped on to foliage, the bulk of which is too dilute to be effective, whilst the remainder, the cream, may be so concentrated as to do damage. Mr. Woodman discusses the factors that facilitate creaming; he shows that the farmer is justified in his traditional view that a wide pan favours rapid creaming, a fact which is to the disadvantage of the sprayer, whose concoction is usually mixed in wide tubs on the farm. The author analyses the methods available to retard creaming, and gives his reasons for selecting as the most practical that of bringing both liquid phases nearer to the same density. He describes some very successful results obtained by means of cresols added to paraffin oil emulsions with this end in view. Altogether this paper seems a very satisfactory example of pure science in the service of horticulture. Mr. Woodman is working at the Horticultural Research Station, University of Cambridge.

**PLIOCENE CLIMATE OF NORTHERN EUROPE.**—Some deductions regarding the climatic conditions of Pliocene times in Iceland have been drawn by Gudmundur G. Bárðarson from his study of the mollusca in the deposits of that age, estimated at about 700 metres in depth, at Tjörnes (*Det Kgl. Danske Videnskab. Selskab., Biolog. Medd.*, 4, 5, 1925). He finds that the remains of mollusca associated with warm-temperate seas occur chiefly in the older shell-bearing zones. These suggest climatic conditions similar to those of south and west Norway, or possibly of the British Isles. But during the period of the accumulation of the Pliocene deposits there was a gradual deterioration in temperature, for the southern forms of mollusca give place in the upper beds to an immigrant northern or arctic fauna, closely related to the molluscan fauna now existing on the shores of the North Atlantic. The Icelandic forms show, as geographical proximity would suggest, a closer relationship to the present-day fauna of America than do the fossils of the English Crag series, which the author considers to have been formed about the same time. There is no indication in the Tjörnes beds of a sea-temperature on the coasts of Iceland colder than that of the present day.

**PHYSIOGRAPHY OF THE SHIRÉ VALLEY.**—A paper on the physiography of the Shiré valley by Dr. F. Dixey has been published by the geological survey department of Nyasaland. Dr. Dixey shows that an examination of the uplands bordering the Shiré Rift exhibit several additional branches of the main rift of considerable importance. Parallel with the Upper Shiré Rift, which runs N.N.E., is the long depression that includes the Upper Lujenda, Lake Chilwa, and the plains to the south. Parallel with the Lower Shiré Rift, which runs N.N.W., is a depression that extends from the southern end of Lake Nyasa, and includes Lake Malombe, part of the Upper Shiré Rift, Lake Chilwa, and the eastern foot of the Mlanje mountains. These intersecting rifts thus account for the position of Lakes Chilwa and Malombe and the upland area of the Shiré highlands. Dr. Dixey discusses the succession of the faulting that caused these features, which he believes took

place at several distinct periods separated by appreciable intervals.

**CLIMATE OF GLASGOW.**—The Meteorological Office, Air Ministry, has published in Geophysical Memoirs, No. 23, a memoir on "The Climatology of Glasgow," by Prof. L. Becker, professor of astronomy in the University of Glasgow (M.O. 254 C., H.M. Stationery Office, 1925, 10s. net). Weather observations recorded at the Glasgow University Observatory since 1843 are dealt with; since 1868 the observations have been taken in association with the Meteorological Office. In the course of time much building has sprung up round the Observatory, and it seems quite possible that some of the weather changes may be due to artificial causes rather than to natural change of climate. The author attributes the lines followed in the discussion as "suggested by inquiries from engineers and lawyers." The charm of the work is the diversity of inquiry to which the several elements are subjected. The statistics are said to have been ready for publication since 1908, when forty years were available, but funds for publication were lacking. Barometric pressure, temperature, humidity, sunshine, cloud, visibility, and wind are analysed, and to take temperature as an illustration, the examination consists of more than twenty tables. In addition to the normals for the several months and years, the diurnal changes and 5-day means, there are tables of excesses and deficiencies in mean temperature relative to the average, number of warm days and warm nights in summer, number of cold days and cold nights in winter (these are given for each year), number of periods of warm weather in summer and cold in winter. An examination of the discussion has suggested the wish that it might be possible to submit the Greenwich Observatory records to similar diversities of inquiry. There the system and uniformity of observation, together with the relatively open position, would probably allow a change if ascertained to be attributed to cosmical effects.

**MAGNETIC DECLINATION AND THE MAGNETISATION OF ANCIENT LAVA.**—The lava flows of Mount Etna have been studied by M. R. Chevallier, who shows that it is possible to determine the magnetic declination at the time the lava solidified by observing the direction in which it is now magnetised (*Annales de Physique*, July-August). Although the actual field in which solidification took place was, in general, disturbed by the presence of other masses of magnetised lava, it appeared possible, by taking the mean between the directions obtained from a number of specimens chosen from points in a given lava flow where there has evidently been no displacement of the lava after solidification, to obtain a satisfactory value for the declination at the time of solidification. The values deduced in this way from the lava streams of 1669 and 1911 agree with the known declination curve; and when the declination values determined from observations on earlier lava flows of known date were plotted, it was found that a curve was obtained which continued the known curve symmetrically backward, passing through zero about 1630, through 18° E. about 1440, and again through zero towards westerly declinations about 1240. The time intervals from zero to zero are nearly equal, and the amplitudes of the easterly and westerly declination are the same. The curve of dip shows irregularities which are attributed to the influence of adjacent lava masses.

**ATMOSPHERIC IONISATION.**—In 1910 and 1911, by observation of the ionisation of the atmosphere at different heights, Gockel came to the conclusion that the radiations due to the radioactive processes taking



place in the earth's crust and in the lower atmosphere were not capable of explaining the conductivity of the upper atmosphere, and suggested that penetrating  $\gamma$ -radiations entered the atmosphere from outside. Since then a large amount of work on the subject has been done, which is summarised and discussed by Dr. Walter Schulze in the *Naturwissenschaftliche Umschau* for July. He comes to the conclusion that the existence of such a hard  $\gamma$ -radiation has been established, and that it originates either in the upper atmosphere itself, or more likely in the neighbourhood of the Milky Way.

**QUARTZ FILTERS.**—The *Chemiker-Zeitung* for August 25, p. 716, gives an account of some experimental tests on quartz crucibles with filtering bottoms made by the Jena firm of Schott und Gen. The porous bottoms are made from the same material as the crucibles themselves, and in the case of those made from rock-crystal the analytical results were highly satisfactory, even when normal solutions of ammonia or caustic alkalis were used for washing the precipitates. The speed of filtration is rather slower than with the ordinary asbestos pads in Gooch crucibles. The analytical results obtained with the opaque crucibles were not quite so good, but the latter are suitable for filtering very hot liquids.

**HIGH FREQUENCY VIBRATIONS IN PIEZOELECTRIC CRYSTALS.**—A new method for showing the vibrations produced in piezoelectric crystals by an alternating electric field is described by Messrs. E. Giebe and A. Scheibe in the *Zeitschrift für Physik* of August 8. A suitably cut rod of quartz, the length of which was either 100 or 80 mm., the breadth 3 mm., and the thickness 1.5 mm., was in the simplest case placed between two electrodes connected to an oscillating valve which could be tuned to different frequencies. One of the electrodes,  $E_2$ , was separated from the quartz rod by about 0.5 mm., and it was found that, when the bulb containing the electrodes was evacuated, a discharge took place in the space between  $E_2$  and the quartz rod when the frequency had a certain very definite value, which corresponded to a longitudinal vibration of the rod with a node at the centre. The luminosity was greatest at the centre. W. G. Cady showed in 1922 that a crystal rod was set into longitudinal vibration in a suitable alternating field in virtue of the reciprocal piezoelectric effect, and in the present experiments these vibrations produce in the crystal alternating positive and negative surface charges which depend on the alternating compressions and rarefactions, and are therefore greatest at the node; these charges alter the electric field and facilitate the electric discharge. It is possible by means of a suitable system of electrodes to obtain a similar effect for an upper harmonic of the fundamental vibration of the rod, and photographs are given showing the appearance of the discharges for a number of upper harmonics up to the fifteenth.

**THE PRODUCTION OF HELIUM IN GERMANY.**—Since there are no natural gas sources from which helium can be obtained in Germany, experiments are being carried out at the Physikalisch-Technische Reichsanstalt in Berlin on the production of helium by other methods. An account is given in *Die Naturwissenschaften* (1925, p. 695) of the isolation of the gas by Dr. Walther Meissner by liquefaction from the helium-neon mixture, which is a by-product of the Linde Oxygen works. The Linde process is applied, liquid air and liquid hydrogen being used as refrigerators. It is claimed that the method is simpler than those used by Prof. Kamerlingh Onnes in Leyden and by Prof. McLennan in Canada. A second method described by Kurt Peters (*ibid.* p. 746) is by

heating monazite sand, containing 5 to 7 per cent. of thoria, to 1000° C. One litre of helium was obtained thus from 1 kilogram of the sand. It is pointed out that the German thoria factories, which produce 60 tons of thorium nitrate annually from 500 tons of monazite sand, could recover between 250 and 500 cubic metres of helium.

**NITROGEN FIXATION.**—An interesting illustrated account of the synthetic ammonia processes of Casale and of Fauser is printed in *La Nature* of August 22. Both these processes are now in use on the manufacturing scale. The Casale process is more or less identical in principle with the well-known Haber process, but the details of working are different. Hydrogen is generated in the pure state by electrolysis of water; the nitrogen is obtained by mixing air and hydrogen in such proportions that on ignition all the atmospheric oxygen is removed as water, leaving nitrogen and hydrogen in the correct proportions for combination. The dried gas mixture is pumped through a heat recuperator and thence into the catalyst furnace. This consists of four concentric tubes. The electric heating element is placed in the centre tube; the next annular space is packed with catalyst (an active form of iron). The two outer annular spaces act as a heat exchanger. The gas mixture passes through the outer annular space (which is heated by hot gases from the catalyst chamber passing through the next space) and thence over the heating element in the centre tube. They pass from this to the next tube, containing the catalyst, and then into the third annular space, from which they are drawn off. This furnace economises heat. The exit gases pass once more through the heat recuperator and then to a refrigerator where liquid ammonia is condensed out. This economical process is now being worked at Terni and Nera Montoro (Italy), at Toulouse, in Belgium, Japan, France, Spain, Switzerland, and United States. In the Fauser process hydrogen is prepared electrolytically, mixed with nitrogen (see below) and compressed to 300 atm. During the compression a small quantity of water is added, which serves both as lubricant and to absorb the ammonia. The mixture is passed over the catalyst and then proceeds to the absorber. The aqueous ammonia solution thus obtained is distilled, the vapours being collected in a gasometer. The ammonia is then oxidised to nitric acid by mixing with air and passing over heated platinum. The excess nitrogen from the air, which proceeds from this apparatus, is used to mix with the hydrogen in the synthetic plant. The process is in use at Novara, Marengo, and other Italian towns.

**MODERN LOCOMOTIVES.**—The August issue of *La Science Moderne* has a well-illustrated article of 14 pages on the modern locomotive by M. Leflot, of the testing department of the Orleans Railway. The modern locomotive is the same in type as the one of 1845, and has now reached a stage in its development when increases of power or efficiency are only likely to be brought about by radical changes in construction or working. The present weight of European locomotives is about 12 tons, the steam pressure between 200 and 300 lb. on the square inch, and the power 2000 H.P. Oil fuel has been tried, but the increase of the price of oil has retarded progress in this direction. Powdered coal produced immediately before use in the furnace has been used successfully in America. Compounding and superheating are customary on some lines. The author considers that the future lies with the steam turbine and the heavy oil motor, and gives some details of European locomotives constructed on these lines.