Research Items.

THE HUNGARIAN BRONZE AGE.—In *Man* for August, Dr. Lajos Zoltai describes two bronze hoards from Hajdusámson, near Debreczen. The finest examples of the Hungarian bronze industry come from the region known as the Nyirség in the north-east bend of the Tisza, which would appear to have been densely populated and a centre of culture in the Bronze Age. The hoards here described are now in the City Museum of Debreczen. The first consists of a sword and twelve axes found in an orderly grouping which suggests a votive deposit. The leaf-shaped sword is only 53·2 cm. long and has a pommel of which the button consists of closely fitting superimposed rhombs, diminishing in area from the base, the smallest being pointed. Such a pommel is unique in Hungary but is met in Scandinavian swords. Analogous forms of sword are figured by Montelius from north Germany and north Italy. The scroll decoration of the blade is peculiar to Hungary. Three of the axes are similarly decorated. Hajdusámson lies near the centre of the region in which axes ornamented with this scroll pattern are found. It may be described as the centre of the area of fabrication. The second hoard consisted of a number of bronze vessels of which the peculiarity lay in the double handles and their mode of attachment. Mr. Gordon Childe, in an appended note discussing the chronology of the finds, points out that they illustrate two periods of the Hungarian Bronze Age. The leaf-shaped sword belongs to the earliest variety and, being stamped clearly with marks of local manufacture, supplies a link missing in Peake's argument for the Hungarian origin of the type.

PHYSICAL CHARACTERS OF THE FRANKS.—A detailed study of skeletal remains from a Franco-Merovingian cemetery at Baye (Marne) by M. H. V. Vallois in Fasc. 4-5-6, Vol. 6, VII^{e} Série of the *Bull. Soc. d'Anthropologie de Paris*, concludes with a comparative study of such material relating to these invaders of France as is available. The typical Franks would appear to be comparable to the tall dolichocephals of the *Reihengräber*. The type is found with some frequency in Flanders, but in France it rapidly merges into the rest of the population. Thus the Frankish cemeteries of the centre and east of France show a fairly homogenous population in which the skeletal characters agree, generally, with those of the Franks of Belgium, in being dolicho- or sub-dolichocephalic, mesoseme, mesorrhine, or leptorrhine, to some extent prognathous and with a marked protuberance of the occiput. But in the south of Belgium and the more central parts of France these characters rapidly undergo progressive modification, dolichocephaly becomes sub-dolichocephaly, leptorrhiny, mesorrhiny, and the effect of crossing with the Gallo-Roman populations is more and more marked as the distance from the Frankish centre of origin increases. The decrease in stature is considerable, and the measurements given here, 1·64-1·67 m. (males), 1·53-1·58 m. (females), while higher than those of the neolithic peoples, do not exceed those of the Gauls or medieval or modern Parisians. It is noted that while the early crania are predominantly dolichocephalic, and brachycephals are rare, the face being long and narrow of the typical Nordic character, in the cemeteries of Normandy by Merovingian times the dolichocephals are becoming more rare and are mixed with brachycephals, and by the tenth and eleventh centuries the brachycephals are almost the only type, showing that by then the original Gallo-Roman population had resumed preponderance. Yet it is remarkable that while the tall stature and leptorrhiny disappeared almost at once, dolichocephaly, prognathism and the protuberance in the occipital region persist for a much greater length of time.

MODERN WHEAT BREEDING.—The aim and present position of modern wheat breeding is outlined by Sir Rowland Biffen and F. L. Engledow in *Research Monograph* No. 4 of the Ministry of Agriculture and Fisheries. So far as possible the account is couched in non-technical language to render it intelligible to farmers and other non-academic readers, and it presents a clear and concise picture of the methods adopted and the results attained. After a general statement of the problem the principles of heredity and various theories bearing thereon are discussed, together with the complications associated with linkage, chromosomes, races and species. Breeding may be for increased yield or better quality of grain, for greater resistance to disease or for straw less liable to lodging, and in each case specific methods have to be adopted. Increased strength of straw is a most important point, as in many cases farmers are afraid to cultivate in such a way as to obtain the maximum possible yield, for fear lest the crop should lodge and the expense of the extra cultivation and manuring be lost without adequate return. The process of breeding new cereals is necessarily slow, since, owing to the rigid tests that are needed for purity for milling and baking, about ten years must elapse before any promising new variety can be placed on the market. The need in British farming is for a strong wheat with good yielding capacity, and in 1916, Yeoman wheat was introduced to meet these demands so far as possible. After several years' further experiments a still better wheat has been produced, known as Yeoman II., and it now remains to be seen whether this will fulfil its promise under ordinary methods of general cultivation.

HERRING, MACKEREL, AND PLANKTON. — Many naturalists have expressed the belief that movements or occurrences of herring and mackerel at certain seasons are influenced by the presence or absence of certain planktonic organisms. If this is so, then fishermen might benefit greatly by an instrument which would give them a quick indication of the state of the water in which they were proposing to fish. An instrument for use on commercial fishing craft must, however, be simple, strong, easily handled and rapid to use. In his paper, entitled "The Herring in Relation to its Animate Environment," Part 2 (Min. Agric. and Fish., Fishery Investigations, Ser. 2, Vol. 8, No. 7. London, H.M.S.O., 1925), Mr. A. C. Hardy describes trials of his 'plankton recorder,' which consists essentially of a cylinder carrying a white gauze filtering-disc. When the instrument is towed end-on through the water, plankton is deposited on the disc, imparting to the latter a distinctive colour which is dependent on the nature and number of the plankton organisms present. Discs used from commercial drifters in 1922 and 1923 during the herring fishery in the North Sea, and the south-west mackerel fishery from Newlyn, strongly suggested that poor fishing occurred in waters which gave a green disc (due to the predominance of Diatomacea or Phaeocystis). On the other hand, no very convincing correlation could be demonstrated between the number of copepods (red, pink or yellowish-pink disc) and the quantity of fish caught. Confirmation of the results of these preliminary trials is needed, and much interesting and useful information may be expected from an extensive use of this plankton recorder.

FISHERIES INVESTIGATIONS IN DENMARK.—The report of the Danish Biological Station for 1925 covers a wide range of work. Dr. Petersen, in a short discussion on the influence of fishing upon the stock of plaice in the Baltic, gives figures, based on official statistics of landings, which show that since the War there has been a steady decrease in the annual yield of plaice in that region. He suggests that the time has come for a suitable protection of plaice in the Belt sea, and, if possible, by the aid of international legislation, also in the Kattegat and certain parts of the Baltic. A report on the estimation of the density of oyster-population in the Limfjord gives instructive data of collections made by divers. In 1907 the density was estimated to be 1 oyster for each 3·2 square metres, but in 1924 it had dropped to only 1 oyster for each 38 square metres—a reduction to $\frac{1}{12}$. In addition to living oysters, the diver collected the shells of dead individuals. The shells of oysters which had died since the previous summer were easily recognisable, and thus an estimate could be made of the mortality during the season 1923–1924. An alarmingly heavy death-rate of 71 per cent. of the stock was indicated for the hard bottom area in the western parts of the Broad of Livo. Dr. Blegvad gives an account of his continued studies on the quantity of fish-food in the sea bottom, by means of the Petersen bottom sampler, and the detailed examination of the stomach contents of fishes. He attributes the considerable variations in quantity of food for fishes, from year to year, to (1) good brood years of the chief food species, alternating with bad years; (2) the consumption by fishes and other predatory animals, although the effect of the consumption by fishes has probably been exaggerated; (3) physical reasons, such as cold and lack of oxygen, which often kill off large numbers of food animals, especially during the winter.

FERTILITY IN THE DOMESTIC FOWL.—Dr. F. A. E. Crew gives (*Proc. R. Soc. Edin.*, vol. 46, pt. 2, 1926) the results of a series of experiments designed to determine the time of the onset of fertility in the domestic hen after the introduction of the male and the duration of fertility after his removal. He found that fertile eggs can be expected within 24-48 hours after the introduction of the male, though the onset of fertility varies with different matings. The length of life of the sperm within the body of the female is 15-20 days, but the eggs laid after the first week commonly fail to complete their development. If after the removal of the male a second male is introduced, the influence of the first sire is removed by the seventh-tenth day and there appears to be a relation between the general vigour of the male and the fertilising power of the sperm it produces. These results have an important practical bearing for the poultry farmer.

THE ANATOMY OF THE ELEPHANT.—Dr. N. B. Eales has made a careful and detailed dissection of the head of a fœtal elephant and has given an account of her results (*Trans. R. Soc. Edin.*, vol. 54, pt. 3, 1926) illustrated by twelve plates of beautifully clear and well-executed drawings. The work amplifies and corrects that of earlier workers and, as the specimen is unique, Dr. Eales has made the fullest possible use of it. The most interesting result obtained by the author is the evidence of ancestral history revealed by the characters of the lower jaw. The upper part of the skull is essentially like that of the adult and of all modern elephants, the differences being due to fœtal characters entirely. But the lower jaw exhibits the *longirostris* phase of the modern elephant's ancestry. It is relatively longer than in the adult, and the change to the adult condition is accompanied by a definite metamorphosis involving a relative shortening of the anterior part of the mandible. This interesting observation is of the utmost importance as corroborative evidence supporting the accepted facts of palæontology. Dr. Eales is to be congratulated on the completion of a distinguished piece of work.

CULTIVATION OF DROSOPHILA FOR LABORATORY PURPOSES.—Drosophila is now widely used as a laboratory animal especially in genetic investigations, and there is no reason why it should not be used extensively for class purposes to demonstrate the most important results of modern research in genetics, provided it can be kept successfully in the laboratory. With this end in view Prof. Raymond Pearl has investigated the possibilities of making a satisfactory synthetic food medium, free from the uncertainties of the standard banana medium now in use, which would give the required degree of quantitative precision desirable in genetical work. Such a medium is described in a recent paper by Prof. Pearl (*Journ. Gen. Physiol.*, March 1926, vol. 9, No. 4). It is an entirely artificial medium, containing no natural fruit juice and with a higher degree of acidity than the banana medium. On account of its high acidity there is practically never any contamination of the cultures by troublesome bacteria. Experiments with this medium have shown that it is greatly superior to the banana medium in respect of both the fertility and the mortality of the flies kept on it. These results should be of great service to laboratory workers and teachers who may wish to keep Drosophila for class purposes.

YIELD AND POSITION OF FIELD CROPS.—The effect of outside rows on the yields of kafir and milo crops has been determined by J. S. Cole and A. L. Hallsted in the United States over a period of eight years (*Jour. Agric. Research*, **32**, 10). The outside rows of 10-row plots gave heavier yields than the inside rows except in 1915, a year of unusually low temperature and heavy rainfall. The increase was much greater in the yield of grain than of stover. On an 8-year average, the acre yield of kafir grain from the outside rows was 30 per cent. higher than that from the inside rows, but the stover was only 7·5 per cent. higher. With milo the figures were 43 per cent. excess grain and 8 per cent. excess stover in favour of the outside rows. The increased yield of grain from the latter proved to be roughly proportionate to the increased area of soil available to them. The relationship between the yields from all ten rows and the inside eight rows of each plot proved to be linear, the correlation being very nearly perfect, and consequently the relative merits of the methods represented could be equally well determined by either including or rejecting the outside rows. The yields determined from the entire 10-row plots were, however, subject to a systematic error arising from the fact that the effective areas of the plots were somewhat greater than the conventional areas assigned to them in converting the plot yields to acre yields.

A NEW SPHYGMO-MANOMETER.—Messrs. Hawksley and Sons, Ltd., 83 Wigmore Street, London, W. 1, have submitted to us for inspection a specimen of the 'Baumanometer' devised by Messrs. W. A. Baum and Co. Inc., New York, for the measurement of arterial blood pressure. The instrument is a modified form of the well-known mercury sphygmo-manometer. To justify the introduction of still another instrument

for measuring blood pressure the booklet supplied with the instrument finds two faults with the existing U-tube manometer, namely, the smallness and variability in the bore of the tube. It states that errors so great as 20 mm. may occur with the old pattern. We are not aware that such an error could be possible, especially as we know in Great Britain that the pressure depends merely on the difference in level in the two limbs of the U-tube, the capillarity effects being negligible. This head of pressure is independent of the shape and course of the intervening tube, and the exhortation by the makers to the physician "to admit his shortcomings on the mechanical side and review his elementary physics" might well be reciprocated. The desk-model submitted to us has a good appearance and is a well-finished instrument. The U-tube consists of a tubular left limb (bore $\simeq$ 0·5 cm.) and a much wider right limb (bore $\simeq$ 2 cm.). The change of zero is compensated for by graduating the left limb in 'calibrated millimetres.' The shift and disregard of the right limb reading also necessitates the bore of the left tube being taken into account, which we find has been done. The instrument possesses two definite advantages which will be appreciated by the busy clinician, namely (1) the wider left bore prevents air pockets and (2) the scale divisions ($\simeq$ 0·9 mm.) are easier to read and only the left limb has to be read. It must be pointed out, however, that the scale calibration stressed in this instrument has become necessary owing to the makers' deviation from the usual simple manometer with uniform bore and double reading. Further, the great increase in size of the bore of the tube involves a corresponding increase in the inertia of the moving mercury and consequent damping of oscillations.

MAGNETIC ALLOYS.—Mr. P. E. Billinghurst, writing from Camp Mizine, Salween River, Burma (c/o Messrs. Thomas Cook and Son, Rangoon), points out that if the atomic weight of each constituent of Heusler's alloy is multiplied by the fraction by weight of the element present and the sum taken, it is equal very nearly to the atomic weight of iron. He states that he has produced a number of similar magnetic alloys containing gold, bismuth, tin, silver, copper, and zinc, and found that the above relation holds for them equally well. Owing to the loss of his records by fire he is unable to give the actual figures.

LENGTHENED CHAIN COMPOUNDS OF SULPHUR.—We have received the advance proof of a paper on lengthened chain compounds of sulphur by P. C. Rây and K. C. Bose-Rây which is to be published in the *Journal of the Indian Chemical Society*, vol. 3, No. 2. According to V. Meyer, dithioethylene glycol reacts with ethylene bromide to give a mixture of 1 : 4 dithian and its polymer, the product varying according to the conditions. The polymer has been investigated by the authors and found to consist of a mixture of brominated long-chain compounds, including the substance $BrC_2H_4(S \cdot C_2H_4)_{48}Br$, which is the first example of an organic sulphur compound with a molecular weight so high as 3068.

CADMIUM PHOTO-ELECTRIC CELL.—A cadmium photo-electric cell has been designed by Messrs. H. D. Griffiths and John S. Taylor to measure ultra-violet radiation of the range of wave-lengths which are of therapeutic importance. It consists of the cell itself, in which cadmium forms the active element, and a simple electroscope. The cadmium is deposited by distillation on a plate in front of which is a grid insulated from the plate. The radiation is admitted through a quartz plate and the cell is filled with hydrogen at a low pressure. In use, the grid is charged positively and thus attracts the electrons released from the illuminated plate. The instrument was found very sensitive to unscreened radiation from a quartz mercury lamp. By the use of various filters, it was found that visible and ultra-violet radiation of a wave-length longer than 3500 ft. had no appreciable effect on the instrument. There was no fatigue to be detected during a prolonged exposure. The instrument is sold by Messrs. Watson and Son, Ltd.

WAVE-LENGTH AND THE PHOTO-ELECTRIC BEHAVIOUR OF CRYSTALS.—In the *Zeitschrift für Physik* of July 12, Messrs. B. Gudden and R. Pohl direct attention to the apparent antagonism between the action of long and short wave-lengths when photo-electric absorption of light takes place in solid bodies. They show that it is not due to any real difference between the specific behaviour of the different waves. The essential effect of all wave-lengths is to split off electrons from the atoms, and the observed phenomena can be explained by assuming, in agreement with the experimental results, that a space element of the lattice is only able to support a definite maximum disturbance due to the photo-electric splitting off of electrons, the value of this maximum depending on the temperature. When the maximum is reached, a kind of breakdown takes place and the excited centres go back to their original unexcited state. The disturbances cause a widening of the spectrum on the long wave-length side, similar to that caused by thermal movements or lattice defects. The disturbances vanish as soon as the extra long wave-length light absorbed owing to the above widening has split off enough electrons to increase them above the critical limit.

RESISTANT STEELS.—A paper communicated to the recent Congress of Chemists in London by Messrs. T. G. Elliot and G. B. Willey, dealt with various types of steel now produced commercially by Messrs. Hadfields, Ltd., having great resistance to high and to low temperatures and to attack by chemical agents. The steels are of the austenitic type, and are characterised by high ductility, and by a tensile strength which is retained at high temperatures, one of them giving a value of 31 tons per sq. in. at 700° C. The creep test is even more important than the ordinary tensile test, as it indicates the stress at which a heated mass of the metal could stand for an indefinite time without change of form. The steel in question has a creep stress of so much as 11 tons per sq. in. at 700°. Alloy steels of this class also resist both scaling and warping when heated for long periods in air and subjected to rapid heating and cooling, so that they find a wide application as furnace fittings, hardening boxes, recuperator tubes, etc. Another variety, apparently differing somewhat in composition, is used for turbine blading. A third is used in low-temperature plant, retaining its ductility even in liquid air. For example, a Frémont shock test figure of 50 kg.m. has been obtained at −195°, mild steel only giving 3 kg.m. The paper contains numerous figures relating to mechanical tests, and records of performance in use, including resistance to acids and other corrosive substances, a field in which so much progress has been made in recent years by the introduction of steels highly alloyed with nickel and chromium. The greater initial expense of such steels, and the greater difficulty of working them, are offset by the very greatly increased durability under the conditions to which the steels are exposed in chemical works and elsewhere.