which he demonstrated in use. Dr. Dixon (Cambridge) is his collaborator in the research not yet completed, for which the apparatus was designed.

Prof. Fano (Florence) described at some length a series of electrometer photograms registering electromotive phenomena of the heart beat. The photographic records shown in illustration of several new points he brought forward were particularly fine specimens of what such records can be in the hands of the skilful.

Prof. Moussu (Alfort) had studied the lymph flow in the limbs of the larger animals (horse, ox, &c.) during physiological repose and inaction, and then under conditions of local vasoconstriction and vasodilatation and under those of general augmentation of blood pressure and of copious venous depletion. He had further observed the lymph flow under the influence of muscular work and under conditions of great activity of the tissues in general. A very large series of observations was presented in a number of tables together with diagrams of the apparatus employed for measuring the quantities of mechanical work given by the animals in certain of the experiments dealing with the effect of muscular activity. The conclusions arrived at were (1) that the lymph is not the simple product of a transudation from the blood plasma through the capillary wall under the mechanical pressure of the blood-circulation; (2) that filtration is always quite a minor factor in the production of lymph; (3) that the lymph is mainly a product of the tissues comparable to a secretion from them; (4) that the quantity of its production is in direct relation to the functional activity of the tissues; (5) that the peripheral (limb) lymphatic apparatus is in large measure an apparatus for excretion.

Prof. Stirling (Manchester) demonstrated his simple and successful method of injecting the sublingual lymph-sac of the frog and of applying drugs to the muscles related to it. Fluid, *e.g.* solution, of Berlin blue is injected under slight pressure into the dorsal lymph-sac and finds its way to the sac below the tongue. Excellent anatomical preparations are thus obtainable; drugs, *e.g.* veratrin, may thus be applied directly to the hyoglossus *in situ*.

Prof. Kemp (Illinois) on behalf of Miss Calhoun and himself made an interesting communication upon blood-platelets and their relation to coagulation of the blood-plasma. After thorough control of the method for fixing the platelets they attempted their methodic enumeration. The number varied between 961,500 and 730,000 per cub. mill. in man; a larger number than they found in dogs. The authors confirmed Bizzozero's observation that if the blood of the living dog be reduced to an incoagulable condition by repeated "whippings" and reinjections the incoagulable blood contains no platelets. But it contains some, though few, leucocytes. The authors find that in normal clotting the blood-platelets break down, the leucocytes do not. The fibrin filaments radiate from disintegrating blood-platelets at the nodes of the network they form.

Prof. Hédou (Montpellier) showed that the hæmolytic glycosides are more globulicidal in saline solutions than in serum. Substances therefore exist in the serum that may be regarded as protecting the red corpuscles against the toxicity of these glycosides. A little serum added to the water in which they are swimming protects tadpoles against the toxicity of glycosides (saponine, cyclamine) that are otherwise violently poisonous for them. Similarly, acid sodium phosphate protects the red corpuscles from the action of solanine and protects fish if added to the water of the aquarium.

The large attendance of active workers in the field of sense-organ physiology and in psycho-physiology was a notable feature of the Congress, and the communications made upon those subjects were numerous. Dr. Tschermak (Halle) gave a lucid account of interesting and exact work upon the extent of the binocular field of vision in various vertebrate types. Prof. Hensen (Kiel) demonstrated experiments in evidence of an accommodation mechanism for the ear. Prof. Cavazzani (Ferrara) demonstrated an instrument for the estimation of the visual purple. Dr. Sante de Sanctis (Rome) reported the results of prolonged researches upon the depth of sleep. The stimulus required to break sleep was found usually to be greatest in the first half of the second hour. The increase of stimulus required to pass from provocation of a subconscious reaction to actual waking amounted on an average to three degrees of the scale of the Griessbach æsthesiometer. Prof. Osawa (Tokio) described observations indicating that most monkeys are right-handed, only a few left-handed; that birds, on the other hand,

are usually left-footed. Drs. Broca and Sulzer (Paris) communicated a research into the latent period for visual acuity. Dr. S. Vaschide (Paris) had made numerous measurements of the simple reaction time for olfactory sensations. Dr. Marco Treves (Turin) reported observations on the thermo-æsthesiometry of the various mucous membranes accessible to external examination. The sensitivity was in all cases found to be markedly less than is that possessed by the skin. The mucosa of the urethra and of the cervix uteri were quite incapable of heat and cold sensations, and even the cautery excited only slight, and that painful, sensation from them.

Dr. Kiesow (Turin) brought forward observations proving that the laryngeal aspect of the epiglottis is endowed with sentience for taste, and so also the greater part of the mucosa lining the interior of the larynx itself. The whole of the soft palate (but not the hard palate) and the back of the pharynx were found endowed with taste. On the other hand, taste sensations could not be evoked from the uvula, the tonsils, the anterior or posterior pillars of the fauces. In regard to other species of sense, the uvula, tonsils and pillars of the fauces were found to be very defective in regard to touch and temperature stimuli, but fairly responsive as regards "painful"; the combination of sense-organs is in this respect almost the converse of that obtaining on inner surface of the cheek. Dr. Kiesow gave further communications upon the "temperature spots" of the skin. He laid stress upon the considerable amount of evidence that the "cold spots" lie much nearer the surface of the skin than do the "hot spots." Regarding the topographical distribution of the spots, his own very extensive observations differed in no important respect from those of Blix and Goldscheider, but in detail agreed better with those of the former, although he did find the cold spots rather more sparse than had Blix.

Dr. Kiesow also brought forward an important result for which his observations on "touch spots" gave basis, namely, that the value of the median threshold of the touch spot is within narrow limits practically the same for all touch spots the whole body-surface over. This is in strong contrast to the wide variation which the median threshold for pain exhibits. This discovery is of much significance for the analysis of spatial perception.

Among those present, in addition to those mentioned above, were Profs. Aducco (Pisa), Albanese (Pavia), Albertoni (Bologna), Axenfeld (Perugia), de Burgh Birch (Leeds), Bohr (Copenhagen), Bowditch (Boston), Chauveau (Paris), v. Cyon (Territet), Dastre (Paris), Dupuy (Paris), Ebbinghaus (Breslau), Einthoven (Leyden), Fano (Florence), Foster (Cambridge), Fredericq (Liege), Gad (Prague), Gaule (Zurich), Gley (Paris), Golgi (Pavia), O. S. F. Grünbaum (London), Héger (Brussels), Henriquez (Copenhagen), Hering (Prague), Hopkins (Cambridge), Johansson (Stockholm), Kossel (Heidelberg), Kronecker (Berne), Laulané (Toulouse), Lépine (Lyons), Lombard (Ann Arbor, U.S.A.), Luciani (Rome), Marey (Paris), Nicolaides (Athens), Oehrwald (Upsala), Onimus (Munich), Osawa (Tokio), Perroncito (Turin), Physalix (Paris), Prévois (Geneva), Querton (Brussels), Sergi (Rome), Shore (Cambridge), Sowton (Liverpool), Stafford (Nottingham), Starling (London), Stefani (Padua), Stirling (Manchester), v. Tarchanow (St. Petersburg), Thompson (Belfast), Tigerstedt (Helsingfors), Toulouse (Paris), Tschermak (Halle), v. Uexküll (Naples), Verworn (Göttengen), Vintsgau (Innsbruck), Welby (London). The Congress was more numerously attended than any previous one. The courtesy and hospitality of their Italian colleagues will always remain a memory with the members present. The Italian committee consisted of Profs. Aducco, Cavazzani, Corona, Fano, Luciani, Angelo Mosso, Patrizi, Sertoli and Stefani. Drs. Treves and Herlitzka proved indefatigable local secretaries. The Italian language was an official language for the Congress, and it was formally decided that it should henceforth remain so.

ON A LATE PLEISTOCENE DEPOSIT CONTAINING MAMMOTH.

AMONG the districts in which there is a fair probability of obtaining satisfactory evidence as to the sequence of events which have occurred since the glacial episode, there is none more promising than the northern part of East Anglia, nor is there any region where the history of that early post-Glacial age, if it could be clearly made out, would throw light upon so many vexed questions in geology.

It is therefore very desirable that any new bit of evidence bearing upon the case should be placed on record, and, from this point of view, a discovery recently made at Didlington Hall seems to be of value, especially as the conditions which it indicates are exceptional in the district and the facies of the animal remains found is unusual. The bones and shells were carefully collected by Lady Amherst and are now preserved in the museum at the Hall.

Didlington Hall is built on the margin of an extensive bed of Boulder Clay, into which the river has cut back, forming a cliff which now rises from 26 feet, the level of the water in the lake, to about 38 feet above ordnance datum. It is no longer seen as a cliff just here, because the original form of the ground has been much modified by natural and artificial operations. Down the valley, however, this cliff forms a well-marked feature along the right bank, but up stream it is generally softened down into a gentle slope. Owing to the overlap of the artificial soil and rainwash near the Hall, nothing was known of the character of the marginal deposits of the river until, in carrying out some alterations in the boat-house, it was found necessary to cut off and dry a portion of the bed of the lake and remove some of the clay close to the original bank.

The lowest part of the bed was full of large stones out of the Boulder Clay, most of them covered with glacial striæ. With them were the bones of large animals which had probably been also washed in from the bank in floods. It appeared to be a deposit thrown down in an embayed curve of the river, perhaps even cut off from the stream so as to form a pond or "broad." The velocity of the stream cannot have been great, for the rest of the deposit consisted of fine blue mud and the shells were well preserved, as were also the plant remains, though these were very fragmentary. There were, moreover, no signs of sorting by water in any part of the deposit exposed, which was not more than 18 inches or two feet in thickness. The river must have been diverted or its velocity somehow checked and this small patch left as a record of some of its latest efforts in this part of the valley.

This clay was covered by a few feet of later deposits from the existing lake, and was penetrated by the roots of water lilies and other aquatic plants.

The following shells were found in it and determined by Mrs. McKenny Hughes:—*Sphaerium Corneum*, Linn., *Pisidium amnicum*, Müll., *P. fontinale*, Drap., *Unio* sp. fragments only, *Bythinia tentaculata*, Linn., *Valvata piscinalis*, Müll., *Planorbis carinatus*, Müll., *Limnaea peregra*, Müll. (several varieties), *L. auricularia*, Linn. (and varieties), *L. stagnalis*, Linn., *L. palustris*? Müll., *Succinea putris*, Linn., *Helix* (*Fruticicola*) *hispida*, Linn., *H. (Xerophila) Ericetorum*, Müll., *Pupa marginalis*, Drap. The larger animals were:—*Elephas primigenius*, *Equus caballus*, *Bos longifrons*. *Cervus elaphus* of very large size has been found in a similar deposit in the immediate neighbourhood.

We notice the absence of the older forms of *Bos*, viz. *Bison priscus* and *Bos Urus*; whereas a strain of *Bos longifrons* occurs here, though it has never been found associated with the mammoth in the gravels.

Bos longifrons has not yet been satisfactorily described. There is certainly a larger and a smaller variety in the peat of both Ireland and England, but whether they were wild or all domesticated or derived from a domesticated breed is not clear.

It may be that further search would yield some of the forms whose absence we remark, but the evidence, so far as it goes, points to the Didlington Clay being more recent than the gravels in which the mammoth occurs elsewhere in East Anglia. It might be, of course, that it was made up of the washings of earlier deposits of various age, but there is nothing in the condition of the mammoth bones to suggest that they are not of the same age as the other remains found here. Moreover, several consecutive vertebrae of the mammoth found together in their natural order prove that the ligaments had not perished when the bones were buried in the clay.

Some of the bones, especially those of horse, were grooved and striated in such a manner as to remind one of ice action, and of course the close proximity of the Boulder Clay suggested the possibility of their being derived from it; while we have to bear in mind also the probability of the agency of river ice at a later period.

On the other hand, similar striæ on the bones found in other sections in East Anglia have undoubtedly been caused by settlements in the stony mass by which the gravel has been squeezed

against and even into the inside of the bones while the process of decomposition was going on. This fact and the occurrence of similar striæ on the bones of saurians in Jurassic clays throw great doubt upon the inference that the scratches on the Didlington bones are due to any kind of ice action. None of the plant remains have been determined.

There is much evidence in favour of the view that after that not so very remote yet very exceptional episode, in which glacial conditions prevailed over this area, the whole of the district stood at a higher level. Then the basin of the Wash and its tributaries was re-excavated and extended, and a considerable resultant river found its way into the sea through the chalk escarpment between Hunstanton and Skegness. Into this river the Wissey and other streams of west Norfolk found their way. Some time later the area was depressed, and the rivers, which had descended with considerable force, especially in times of flood, were met by the tides at higher and higher points as their valleys gradually sank to sea-level. But this was not a sudden or even a rapid change, and the species of plants and animals disappeared by degrees as the conditions became unsuited for them. The Didlington Clay belongs to this period of changing conditions and is a late Pleistocene formation laid down after the arrival of *Bos longifrons*, but before the mammoth had ceased to inhabit, or at any rate to be a visitor in, the district.

Almost all the remains of the earlier Pleistocene times have been obtained from sands and gravels of a torrential character, and we have seldom had any opportunity of examining the embayed corners where they have been preserved in fine mud. This is partly due to the fact that the sand and gravel are of commercial value, but the mud is only excavated to get at something below it, as, for instance, at the marl for cement, or the gault for bricks, or, as in the case to which attention is now called, where the excavations were made for a new boat-house which exposed this blue river clay at Didlington Hall.

But another, and perhaps the more common, reason is that it was generally near the mouths of the sinking river valleys which have been since submerged and buried under later deposits that the velocity of the stream was checked so as to allow of the deposition of fine mud instead of sand and gravel.

T. MCKENNY HUGHES.

SOME SEASONAL VARIATIONS IN THE BRITISH ISLES.

IN a paper just published by the Royal Society¹ attention is directed to a peculiarity in the seasonal variation of temperature in the British Isles disclosed by the resolution into harmonic components of the curves of day to day variation derived from the 25-year means of the 24-hourly readings at Kew, Falmouth, Aberdeen and Valencia. The peculiarity in question is the second harmonic component which is represented by a curve with two maxima and two minima in the year. In the 25-year curves for each of the observatories the maxima of the second components come within four days on either side of January 31 and August 1 respectively, and the minima are in the first week of May and November. They represent a temperature effect which exaggerates the height and shortens by nearly two weeks the duration of the summer portion of the compound curve; it also moderates the depth and lengthens by an equal amount the duration of the winter portion. The effect has a range of nearly 3° F. at Kew in the 25-year mean curve, out of a whole range of 24° F. Its magnitude at the other stations is approximately the same fraction of the whole range at those stations. It is much larger in curves for single years at Kew, but the epoch varies somewhat. It is called meteorological, as distinguished from planetary, because in the mean curves for the Continental stations Vienna and Agra it is quite different either in magnitude, or epoch, or both.

An attempt is made to account for this peculiarity by the prevalence of winds from different quarters at different times of the year. The mean temperatures of 3288 successive days (nine years) at Kew are grouped according to wind direction from eight compass points or, more strictly speaking, according to the direction at right angles to barometric gradient. The method

¹ "On the Seasonal Variation of Atmospheric Temperature in the British Isles and its Relation to Wind-direction, with a Note on the Effect of Sea Temperature on the Seasonal Variation of Air Temperature." By W. N. Shaw, F.R.S., and R. Waley Cohen. Read before the Royal Society, June 20.