

Research Items

Discoveries at Troy. The long-awaited discovery of a cemetery at Troy is announced by Dr. Carl Blegen, of the University of Cincinnati, in a communication issued by Science Service, Washington, D.C. This find was made by the third expedition of the University to Hissarlik. A second discovery of importance was on a site about three and a half miles from the actual citadel, at a marginal point of the area. Here Dr. Blegen found four graves, apparently of neolithic age, containing skeletons which in his opinion belong to a period antecedent to any settlement hitherto found on the site and representing the earliest inhabitants. At the same point, but at a higher level, were later remains, dating from the time of the fourth and fifth layers of the citadel. The cemetery belonging to Troy itself was found just outside the citadel. It is contemporary with the sixth city and consists of a series of urn burials containing ashes, remnants of burnt bones and traces of ornaments which had not been entirely consumed by the funerary pyres. The practice of cremation burial, naturally and unfortunately, has destroyed all evidence of the physical characters of the inhabitants of the city. A further discovery among the ruined houses was that of a well-preserved buried floor, which affords the first opportunity here for the investigation of a habitation site. The stone bases of columns which supported the upper story are still in place; but determining the alignment of the columns and the recovery of any household goods which the floor may have preserved will be the work of the expedition's next season.

Glazed Stones in Antiquity. The first of a series of notes on glazed stones, dealing with glazed steatite, is contributed by Mr. Horace C. Beck to *Ancient Egypt and the East* (pt. 2; 1934). The surface of steatite is found to have been altered by chemical processes due to at least three different methods of treatment. The first was to apply a vitreous glaze to the surface and then fire it. This is true glazed steatite; and even when the whole layer of glaze is flaked away, a very hard surface is left on the steatite. A second method was to apply an alkali and fire it, or to apply a glaze of such a nature that when it is flaked away, it leaves a very soft surface on the steatite. The third, perhaps a modification of the second, was to whiten the surface, probably with an alkali only and, after heating, to paint on a pattern. The effects of the various processes on the stone are different. All the Egyptian specimens of glazed steatite belong to the first class, and it is almost entirely an Egyptian product. It has been found extending in time from the Badarian period, being earlier than glazed faience, which does not appear until pre-dynastic times, down to the twenty-seventh dynasty. The process was used extensively for beads, amulets and scarabs; but after the twelfth dynasty the beads are rare. There are a few very fine specimens of glazed steatite of considerable size, belonging for the most part to the period from the twelfth to the eighteenth dynasty. The beads with the best glaze are the Badarian. The seals from Mohenjo-daro and Harappa, some early seals of a similar nature from Kish and Ur and the great majority of the beads from Harappa belong to the second type, while the third type comprises only a

comparatively small number of important beads from Harappa. An examination of six seals and several hundred beads from Mohenjo-daro and Harappa indicates that a different method was employed there from that used in Egypt, and it seems probable that more than one method was practised in the Indus valley.

Phenological Observations in Great Britain. The "Phenological Report, 1933" (*Quart. J. Met. Soc.*, 60, No. 255, 1934) deals as usual with facts relating to birds, insects and plants, such as the earliest date of arrival of a migrating species of bird, the earliest date of appearance of a particular insect or plant, supplied by voluntary observers distributed at more than five hundred places throughout the British Isles. The events recorded number more than sixteen thousand. This unwieldy mass of statistics is condensed and to some extent summarised with the aid of various tables and maps, and comparison between these and similar tables and maps in the reports for previous years will enable anyone interested in the natural history of the countryside to study the peculiarities of its seasonal course in this particular year. There is a sufficiently full meteorological summary to allow the influence of the weather in these matters to be gauged, and the year was remarkable enough for its deficient rainfall, its warmth and abundant sunshine to make it a good one for the pursuit of such studies. These reports must be of the greatest possible value for many branches of study, such, for example, as that of bird migration. Average arrival dates for twenty species of bird for this year and for the seventeen years 1914-30 are shown side by side by means of lines of equal arrival date (isophenes). The extraordinary warmth of March and April 1933 in those regions from the south-west of Ireland across to Sussex and Kent where this date falls on average rather late in April, did not produce any notable departure from the normal, and in general normality appears to have been the rule. Autumn migrations, both incoming and outgoing, appear to have been decidedly early; no reason for this is suggested in the report. It is interesting to learn that a phenological record has been maintained by one family at Hevingham (Norfolk) since 1736, with only one long break (1811-35). This establishes the average dates of arrival of the swallow, cuckoo and nightingale there as April 19, 25 and 26 respectively.

Echiuridæ, Sipunculidæ and Priapulidæ of Scottish and Adjacent Waters. Dr. A. C. Stephen has investigated the distribution of the species of these groups in the Scottish area by examining collections made by the Fishery Board for Scotland in the North Sea and adjacent waters. The greater part of the material was taken with the small Petersen bottom sampler, and has come from all over the North Sea, from coastal waters to the edge of the continental shelf (*Proc. Roy. Phys. Soc.*, 22, Part 4; 1934). *Priapulus*, *Sipunculus*, *Phascolosoma* and *Echiurus* are of economic importance for they serve as food for several food fishes such as plaice, lemon sole, common dab, witch, gurnard, whiting and haddock. Of these, *Priapulus caudatus* is by far the most frequently consumed, especially by haddocks caught in the

Firth of Forth and St. Andrews Bay; also in fish from the east coast of Scotland, Moray Firth and from over the North Sea. As many as ten specimens have been taken from a single plaice in the Cumbrae district, where it is generally distributed on muddy ground. In the North Sea more than 1,200 stations have been examined with the Petersen grab, and many hauls with other apparatus have been made. *Phascolion strombi* is the only species captured with regularity: the other species have been found at few stations and in small numbers, the reason apparently being, not that they are scarce, but that they burrow beyond the reach of the collecting gear. Little is known about the breeding periods or larval histories of these animals, but a few notes on the subject are given.

Earthworm Migrations. In his fourth paper on the earthworms of Burma, G. E. Gates (*Records Indian Mus.*, 35, Pt. 4, Dec. 1933) emphasises the need for the study of the extent of variation of the characters by means of which species are diagnosed and defined. He states that the lack of this information has resulted in the erection of unnecessary varieties and species, and that it is often difficult, if not impossible, to determine whether a particular individual or series of *Drawida* and *Eutyphoeus* belongs to an old or a new species, and therefore it is imperative that the types of all old species be re-examined. In an interesting reference to migrations of earthworms, the author records an observation that "in the early morning on certain days in October and November at the beginning of the cold season the road is almost covered with worms; one can see worms tumbling down from the banks above on to the road. In the evenings not a worm is to be found. I have always assumed that the worms were moving down-hill perhaps in search of water". The author states that others who have been in the Chin Hills District during the same months reported that all the migrating worms were of the same kind and were all going down-hill. The specimens collected were all *Perionyx* (possibly *P. excavatus*) without clitellum.

Protozoan Parasites of Fishes. R. R. Kudo (*Illinois Biol. Mon.*, 13, No. 1, 1934) reports on a preliminary survey of the protozoan parasites of the fishes of Illinois. About 1,300 fishes belonging to 35 species and 13 families were examined, mainly for Protozoa attacking the tissues. The specimens of *Polyodon spathula*, *Lepisosteus osseus*, *Amia calva* and twenty-two other species were not infected but nine others belonging to the families Catostomidae, Cyprinidae and Siluridae were found to be common hosts of histozoic Protozoa, especially Myxosporidia, of which nineteen new species are described. In reservoirs near Peoria were observed large numbers of carp (*Cyprinus carpio*) suffering from an extremely heavy infection by a parasitic ciliate, *Ichthyophthirius multifiliis*. On the integument, gills and mucous membrane of the mouth cavity this ciliate was so numerous that the entire fish appeared whitish. In addition another ciliate, *Cyclochoeta*, and a flagellate, *Costia*, were found abundantly in the lesions produced by the *Ichthyophthirius*, and the fishes appeared to be much weakened. *Ichthyophthirius* is world-wide in distribution and is often present in large numbers in fish kept in small aquaria, but it is unusual for such an epidemic to occur among fully grown fishes kept in large outdoor ponds.

A New Permian Fish. Mr. James Brough describes *Lekanichthys housei*, n.sp., a new dorypterid fish from the Permian (*Ann. and Mag. Nat. Hist.*, 10, 14, No. 81, Sept. 1934). The family Dorypteridae has up to the present only contained *Dorypterus*. The new form displays many of the peculiarities of that genus, but shows clearly an intermediate grade of structure between the highly modified *Dorypterus* and the normal Palæoniscid. The type specimen, which is unique, was collected apparently many years ago, and has since lain in the Hancock Museum, Newcastle-upon-Tyne. It was unlabelled, but Mr. Brough has little doubt as to the horizon from which it was obtained, as both fossil and matrix possess all the characters of the Marl Slate (Lower Permian), particularly as it occurs in the south of Durham County, and the specimen was probably obtained from this stratum in the Middridge-Thichley Area. The fish is well preserved. Its general shape is similar to that of *Dorypterus*, showing specialisations of a like nature, but not developed to the same extent. In the characters in which it differs, it displays Palæoniscid affinities, and has therefore all the necessary qualities of a form ancestral to *Dorypterus* and intermediate in structure between it and the Palæoniscidae; but, as the author states, this relationship is impossible since the remains are found in the same thin stratum, indicating that they lived side by side. He concludes that "*Lekanichthys* was a collateral ancestor—a form in the same group which either had evolved more slowly, or had reached a certain stage of specialisation and then halted, so that, although it is not a true ancestor, it reproduces the essential form of the ancestor at a certain stage".

Seasonal Variations of Carbohydrates in Fruit Trees. The second of a series of papers on "The Seasonal Cycles of Nitrogenous and Carbohydrate Materials in Fruit Trees" by members of the staff of Long Ashton Research Station (*J. Pomol. and Hort. Sci.*, 12, No. 4, pp. 249–292, December, 1934) deals with the seasonal cycles of alcohol-soluble materials, of carbohydrate fractions and lignin in the wood, bark and leaves of terminal shoots of apple trees. Two cultural systems are involved, namely, trees grown on grassland, with annual dressings of nitrate in spring, and trees grown on arable land, without nitrogenous fertiliser. It is the work of Dr. Elsie S. Smyth. Well-defined seasonal variations in the amounts of all the carbohydrate fractions were found, and changes in the wood and bark were similar. Difference in cultural treatment did not greatly affect the seasonal changes, though reducing sugars were rather more abundant in material from the arable plot in summer, than in trees grown on grass. There were also differences in starch content. Carbohydrate-nitrogen ratios were, however, higher in the trees grown on grassland, than in the arable crop. Variations in the contents of alcohol-soluble matter, in reducing sugars, sucrose, starch, hemicellulose, total carbohydrates, cellulose and crude lignin, are all set out in detail.

A 'Traversing' Microscope. An example of a travelling or traversing microscope has been submitted to us for examination by Prof. E. W. Scripture, by whom it was designed for the examination and measurement of ordinates of curves having a considerable area, such as are obtained by tracings produced by changes of air pressure at the mouth during speech. It consists of a large rectangular base-plate of thick plate glass in metal frame supported on feet, which

can be inclined if necessary so as to tilt it. The microscope barrel is held by a carrier which can be moved by means of racks and pinion-screws, so that it traverses 145 mm. back to front along a transverse bar, and 545 mm. longitudinally along a longitudinal bar. The bars are graduated, and by means of verniers, readings to 0.01 mm. can be taken. The verniers are provided with lenses for reading, and are illuminated by small electric bulbs worked off a dry cell, and opaque objects may be illuminated by a bulb attached to the microscope tube near the objective. For transparent objects, a sheet of white paper placed on the table beneath the base-plate usually suffices. The objects to be viewed can be clamped to the base-plate by longitudinal or transverse adjustable bars, or kept in place by a piece of glass laid upon them. While there is, perhaps, nothing very novel in design and construction, the instrument is noteworthy for the large area it can cover, and in addition to tracings is obviously adapted for the examination of large sections, membranes, fabrics, etc. The instrument is well constructed in white metal, and was made by Messrs. F. Homan, 13 Florence Road, S.E.14.

Organic Sulphur Compounds. A paper by Messrs. F. Challenger and J. B. Harrison on sulphur compounds of technical interest, in particular the isomeric thiophthens, was read before a meeting of the Institution of Petroleum Technologists on January 8. Recently the occurrence of naphthalene, thiophen and thionaphthen in coal tar and Kimmeridge shale has led to the belief that thiophthen might also be an ingredient of similar substances, and the work undertaken on thiophthen and its derivatives and described in this paper was felt to be a necessary preliminary to proving or discounting that theory. Published technical data on these compounds are scanty. Various methods of preparation of thiophthen are reviewed and a precise account of that of Capelle, which was employed in this case, is given. In addition, notes are made on phenomena observed during reduction of solid thiophthen with sodium and alcohol and on the structure of the thiophthens as revealed by X-ray analysis. Part of the paper is devoted to reports of various experiments undertaken and apparatus and methods employed. These include purification of liquid thiophthen with mercuric chloride, preparation of liquid thiophthen with citric acid and phosphorus bisulphide, isolation of a by-product in the preparation of liquid thiophthen, oxidation and nitration of thiophthens, etc. Accounts are also given of the preparation of certain derivatives of isomeric thiophthens.

Cold Test for Fuels. Messrs. B. H. Moerbeek and A. C. Van Beest presented a paper on "Cold Test for Fuels" for discussion at a meeting of the Institution of Petroleum Technologists on January 8. Present methods of pour-point determinations of fuels were criticised and in particular the A.S.T.M. test was condemned on the grounds that results are dependent on the temperature at which the sample is pre-heated and on the thermal history of the batch of which it is part. Furthermore, maximum and minimum pour-point figures are returned which may lie far apart, and thus cause confusion in the mind of the consumer. The sensitiveness of residual fuels to their thermal history is attributed to the asphaltenes present, which are natural pour-point reducers, and experiments prove that their removal

renders the fuel temperature-insensible. A new method of pour-point determination is therefore proposed which, it is hoped, will give more practical results. To this end the influence normally exerted by asphaltenes is eliminated by pre-heating followed by pre-cooling to such a temperature that the asphaltenes do not dissolve again. Results are returned in such a way as to indicate a temperature at which fuel can be shifted under a fixed pressure. The data collected as a result of these investigations are as yet insufficient to indicate whether the new method would be entirely satisfactory in practice; but there is enough information to arouse criticism and discussion of the principles involved.

Colour Indices of Stars in Open Clusters. A number of plates of open star clusters were taken by Prof. K. Lundmark at the Mount Wilson Observatory in 1922-23, using the 60-in. reflector with a wire grating placed in front of the mirror. These plates are now being measured by J. M. Ramberg, of the Lund Observatory, and a preliminary account of his results has just been published (*Lunds Medd.*, Ser. 2, No. 70). A brief account of the theory of obtaining effective wave-lengths from coarse-wire grating spectra is given, together with a description of the methods used in measuring the plates and correcting the results for various sources of error. The main object, however, was to standardise the measures for future work by comparing the resulting colour equivalents with the previously determined colour indices. For this purpose, five plates of Messier 37 were measured and the results correlated with colour indices by von Zeipel and Lindgren for stars in this cluster. The mean error of an effective wave-length was found to be $\pm 9.84 \text{ \AA}$, or ± 0.055 expressed in magnitudes. The final results are included in a catalogue giving the measured effective wave-lengths and calculated colour indices of 659 stars in Messier 37.

Nova Herculis. The *Observatory* of January publishes a summary of all further observations on this nova, which was discovered by Mr. J. P. M. Prentice, of Stowmarket, on December 13, 1934. The editors of the *Astronomische Nachrichten* have also published supplements and numbers containing short accounts of observations, sent in by numerous Continental observers. The nova when discovered had a visual magnitude of 2.9^m; after an initial decline, the magnitude rose to 1.3^m on December 23. The brightness then declined sharply to 3.4^m on December 26; it then increased very rapidly to 2.6^m one day later. Since then there have been more fluctuations. The nova has exhibited characteristic spectra, namely, emission lines and bands due to hydrogen, helium and ionised metals, especially when decreasing in brightness. On December 20, when approaching maximum, the nova showed a spectrum which corresponded line for line with α Cygni (type cA2p). On December 23, the only marked emission line was H α . On the other hand, on December 30, when the brightness had declined, the continuous spectrum had nearly vanished, leaving a strong emission band spectrum. The nova has been identified with a star of magnitude 15.4^m on the Franklin Adams plates. There is some evidence to show that the star was a variable before the present outburst. An estimate of the star's distance, based on the intensity of the interstellar Ca⁺ lines, makes the distance 200 light years (a previous estimate was 2,000 light years).