

Research Items

Gallo-Roman Official in Early Britain

A RECENT accession to the British Museum (Bloomsbury) collections has enriched the Museum with a closely dated inscription of an interesting historical figure, and made possible a restoration of one of the most important sepulchral monuments surviving from the Roman Province of Britain. For more than eighty years, the Museum has possessed two stones from what must have been one of the most imposing sepulchral monuments of London, which had been dated tentatively as late first century or early second century of our era. One is a 'bolster' with imbricated leaves and central binding; the other bears the beginning of an inscription and is 2 ft. 6 in. in height and more than five feet long as found. Owing to the rarity of the name 'Classicianus' appearing in the mutilated inscription, some reserve was shown in attempting any solution of the problems of meaning and purpose. These stones had been found in 1852 built into one of the semi-circular bastions added in later Roman times to the walls of the city of London. They were found in Trinity Square, Minories. A small portion of the bastion survived until June 1935, when it was brought to light by the enlargement of the Minories Sub-station. An inscribed stone was then discovered upside down in the lowest course of masonry. This has now been presented to the Museum and identified as part of the Classicianus monument. In a description by Mr. C. F. C. Hawkes (*Brit. Mus. Quarterly*, 10, 2) it is pointed out that the stone had already been re-used before it was built into the bastion. It is suggested that the mortuary inscription, so far as now restored, points to this Classicianus being identical with the official of that name mentioned by Tacitus as taking over the procuratorship of Britain on the death of Catus Decianus in A.D. 61, the year of Boudicca's rebellion, and that his names indicate that he was probably a native of Gallia Comata—an interesting example of the tendency noted by Tacitus for natives of Gaul to occupy office even at this early date.

African Bark Canoes

MR. JAMES HORNELL describes and figures in *Man* of December a bark canoe which he saw on the shore in the native quarter of Mozambique in 1926, comparing it with a similar canoe recently described from the Pungwe River in Northern Rhodesia. The Mozambique example represents a great advance upon the Pungwe design. Instead of being made from a continuous length of bark stripped from one tree and sewn into shape without any internal framework, its construction was rather on the model of a sea-going Irish curragh, except that it was sharp at both ends, whale-boat fashion. The bottom was rounded and the sides had a distinct tumble-home form. The framework consisted of a large number of closely set transverse frames made of bamboo poles, bent into a wide U-shape. They were held in position and stiffened by two pairs of stout bamboo poles running longitudinally on the floor, each pair lashed about nine inches on either side of the median line; while another pair on each side formed a rude, but efficient, gunwale. A single lighter bamboo was made fast to

the ribs on each side, four or five inches below the gunwale. Five stout plank thwarts strengthened the framework transversely. Their ends were inserted beneath and hidden by the gunwale bamboos, to which they were fastened by stout cord passed through two holes made in each thwart end. A median hole in the midships thwart, and a hole in a short wooden bar on the floor below, showed that the canoe could be used for sail. The bark skin was sewn together in long thick sheets by palm-fibre cord. Where the bark sheets met at each end, they were sewn together at a considerable distance from the edges, the free ends acting as a fender and protecting the sewing. The sides were made of several lengths of bark, with an overlap. The bark skin was sewn to the gunwale by double stitches at short intervals with a single connecting cord running along the outside. The canoe was about fourteen feet in length with an extreme beam of four feet.

An Interesting Habitat for Copepods

IN A paper entitled "A New and Important Copepod Habitat" (*Smithsonian Misc. Coll.*, 94, No. 7, 1935), C. B. Wilson discusses the occurrence of copepods in the spaces between the sand grains of beaches, which he terms "terraqueous", and compares them with free-swimming, commensal and parasitic copepods. Such copepods, he states, are widely distributed in quartz sand, but are seldom found in coral sand and never in 'sand' composed of shell fragments, in which the interstices may be greatly reduced or absent. They occur, however, in mud, where the surface layers are more or less flocculent. They show a wide distribution within any given area of sand, occurring from high to low water and even below low water. Individual species usually show a restricted distribution within a given area, and species change not only from one bay or sand-bank to the next, but also with change in level from high-water downwards. Owing to the nature of the habitat, copepods inhabiting such a region are of minute size, seldom attaining a length greater than 0.5 mm. (in sand), and are usually many times longer than broad, the elongate shape being a necessary modification due to the habitat. This elongation is accompanied by increased flexibility, essential for movement in such surroundings. There is a large development of sensory setae on the antennules. At the same time, as Remane has pointed out (*Wiss. Meeresuntersuch.*, Kiel, 21, Pt. 2, 1933), there may be a reduction in the development of the eyes, analogous to that of the fauna of caves. These features may both be correlated with the habitat. It is interesting to note that members of the three chief groups of copepods are represented in this fauna, even Calanoids, though the majority appear to belong to the Harpacticoida, and all show the same type of modification in body structure. Owing to its inaccessibility by ordinary dredging methods, this fauna has remained undiscovered until the last few years, during which a large number of new genera and species of copepods and other animals has been described by W. Klie (*Zool. Jahrb. Syst.*, 57, 1929), C. B. Wilson (*U.S. Nat. Mus. Bull.*, 158, 1932) and others.

Structure of *Ctenoplana*

DR. TAKU KOMAI (*Mem. Coll. Sci., Kyoto Imp. Univ.*, B, 9, No. 4, Art. 6; 1934) describes a specimen of *Ctenoplana* found with a second individual attached to drift seaweed near the Misaki Marine Biological Station. This peculiar creeping ctenophore is very rare and extremely interesting. It is closely related to *Ceoloplana*, sharing with it the creeping sole, pigment, branching canals, compact testes, spermiducts, processes of polar plates and the absence of pharyngeal canals. It differs, however, in being much smaller, the ribs persisting, the musculature far less developed and the finger-like processes of the polar plates better differentiated than in *Ceoloplana*. These differences are apparently correlated with the swimming and creeping habit, whilst *Ceoloplana* is limited to creeping life in the adult stage. There is a close resemblance between *Ctenoplana* and the larvæ of *Ceoloplana* which has been already pointed out by Dawydoff. There are, however, differences in the gastro-vascular system, which is far better differentiated in *Ctenoplana*, and in the disposition of the tentacular apparatus—vertical in *Ceoloplana* larvæ and horizontal in *Ctenoplana*.

Cultivation of the Walnut

DR. JOYCE B. HAMOND, of the East Malling Research Station, contributes a paper on "Recent Developments in Walnut Growing in England" to the *Journal of the Royal Horticultural Society* for November. This account brings together the results of many original investigations. It may be claimed that the present satisfactory state of walnut culture in Great Britain is largely due to the efforts of research workers whose interest was primarily academic. Ten years ago, the walnuts of this country were poor in taste, unpleasing in colour, often covered by a gaping shell, and altogether unattractive. Then Mr. Howard Spence determined to improve the nut. His own work and wider stimulation laid the foundations for the investigation of methods of propagation by Mr. A. W. Witt, the study of graft diseases and methods of storage of nuts by Miss Hamond, and the control of bacterial blight by Dr. H. Wormald. These aspects are described with detail in the paper under review. Four nursery firms have now taken over the stock of improved trees raised by the East Malling Research Station. These are grafted upon standardised rootstocks, produce well-flavoured fruit of good taste, and are phenologically adapted to the English climate. Grafting of walnut trees is discussed, and bush specimens of this crop may be obtained by merely removing the tips of any shoots which tend to increase in length too vigorously. Miss Hamond shows how the nuts may be bleached and stored in coco-nut fibre mixed with salt. The would-be grower is provided with full information for production of nuts of the highest quality, and the account should go far to popularise the improved walnut as a crop, and extend its cultivation.

Stripe Disease of Daffodils

A DISEASE of daffodils where the leaves become mottled with yellow patches has attained rather serious proportions of late years. Various causes, ranging from 'inherent weakness' to the effects of soil and climate, have been propounded in the past, but it is now realised that a virus is responsible for the malady. Mr. N. K. Gould (*J. Roy. Hort. Soc.*, Nov.)

describes a number of experiments upon the incidence, transmission and control of the disease. The Poetaz and Tazetta sections of the Narcissæ are completely free from stripe or mottling, but the other groups can be kept free from the trouble only by the strict removal of infected plants. Treatment with hot water for three hours—the normal precaution against eel-worm—has no effect, either in transmitting or inactivating the causal agent. The virus is quite unaffected by treatment with fourteen disinfectants mentioned in the paper, and has not been transmitted from diseased to healthy plants by grafting or by needle inoculations.

Sooty Mould Fungi

MISS LILIAN FRASER, Linnean Macleay fellow of the Linnean Society of New South Wales, is making a detailed study of the peculiar aggregations of fungi known as sooty moulds. These usually consist of a member of the Capnodiaceæ, a species of *Atichia*, and a third organism belonging to Fungi Imperfecti. Three new papers have been contributed to the *Proceedings of the Linnean Society of New South Wales* (60) during the present year, and represent the third, fourth and fifth of the whole series. Part 3 (pp. 97–118, May 1935) describes "The Life Histories and Systematic Positions of *Aithaloderma* and *Capnodium*, together with Descriptions of New Species". Life-histories of four fungi are considered in detail, and three which are described for the first time are *Capnodium salicinum*, Mont., var. *uniseptatum*, *Aithaloderma ferruginea* and *A. viridis*. Much technical discussion of the systematic position of these fungi is included, and it is held that the Capnodiaceæ, as represented by *Capnodium* and *Aithaloderma*, should be included in the Dothideales. "Species of the Eucapnodiaceæ" is the title of the fourth part (pp. 159–178, Sept. 1935), which adds six new species and varieties. Amended descriptions of the incompletely known species *Capnodium Walteri*, *C. fuliginodes*, *C. anonæ* and *C. mucronatum* are given, and *Scorias philippinensis* is now recorded from Australia for the first time. Part 5 (pp. 280–290, Sept. 1935) is entitled "Species of the Chaetothyriaceæ", and therein eight new species of this subsection of the Capnodiaceæ are described in detail. The taxonomic conclusions of all three papers are based upon adequate culture experiments, and the series should go far towards an elucidation of the complexities of the commonly occurring sooty moulds.

New Current-Measuring Apparatus

FOR the last ten years or more, there have been in existence various types of continuous current meters for the direct measurement and automatic recording of the speed and direction of water flow past lightships and other moored vessels. Such meters are mainly fine-precision instruments, and therefore quite unsuitable for use in exposed positions during periods of severe storm. This has been a very serious drawback, for data relating to bad weather conditions are highly important from the biological point of view. In order that such data may in future become available for fishery research workers and others, Dr. J. N. Carruthers, of the Fisheries Laboratory, Lowestoft, has recently devised a simple, cheap and very sturdy current-measuring apparatus to which he has given the name 'Vertical Log' (*J. Con. Internat. Explor. Mer.*, 10, No. 2, 151–168 (1935)). The instrument, it is claimed, will

work continuously in very exacting conditions indeed. It is, however, not automatic in point of direction recording, but requires fleeting attention—often not more than a glance—every now and again. As experience in its use is acquired, it often becomes possible to leave the apparatus unread for several hours on end; at other times it will call for brief inspection every quarter-hour or so. It can be worked equally well from both wooden and steel ships and at all depths. The makers, Messrs. Elliott and Garrod, of Beccles, Suffolk, estimate that, after the first few instruments have been supplied, they will be able to make further 'logs' of this type at a cost of about £12 each. We hope that this new current meter will fully justify the high hopes of its inventor.

Noise Limitation in Valve Amplifiers

It is now well recognised that the chief factor which limits the amplification obtainable by means of thermionic valves is the electrical noise generated within the amplifier itself. It is not practicable to amplify any electrical signal unless the input voltage of this signal is greater than the electrical noise voltage developed in the early stages of the amplifier. The fundamental limiting sources of this noise are two, namely, thermal agitation of electricity in the input circuits and the voltage fluctuations within the valves themselves. The first of these, thermal agitation, is now fairly well understood and is actually used as a source of calibrating voltage in certain types of receiving and field measuring equipment. The second noise arises from the fact that the space current in a valve is not smooth, but is subject to rapid and irregular fluctuations in magnitude. This matter is discussed in an article by G. L. Pearson entitled "Quiet Amplifier Tubes" published in the October issue of the *Bell Laboratories Record*. The output noise of a valve amplifier due to the intermittent nature of the electron current has been measured for a variety of valves and over a wide range of frequencies. In order to reduce the noise to a minimum under conditions of high signal amplification, it was found that, in general, the valve cathode must be operated at as high a temperature as possible, without impairing the life of the valve. Also the negative bias of the control grid must be reduced to as near zero as possible without causing excessive grid current, while the anode and screen voltages must be reduced below the values normally recommended. Expressing this electrical noise as an equivalent input voltage, the value was found to vary between limits of about 0.7 and 1.5 microvolts for a selection of fifteen American valves. In general, the triodes gave a lower value than the multi-grid valves. At low audio frequencies, this noise is inversely proportional to the frequency, but it remains approximately constant for frequencies above one or two thousand cycles per second.

Toxicity of Cod Liver Oil

THE use of synthetic diets composed of the individual nutrient constituents in purified form has contributed largely to our modern knowledge of nutrition. Purified diets for Herbivora present special problems in that these animals normally consume rations containing large amounts of cellulose, and studies have been conducted on this subject by L. L. Madsen, C. M. McCay, and L. A. Maynard (Cornell

University Agricultural Experiment Station, Memoir 178, 1935). After trials, a regenerated cellulose known as washed 'Sylphrap' was adopted as the cellulose constituent, and the diet devised which proved successful in maintaining an adult goat over an extended period consisted, in percentages, of cellulose 30, corn starch 30, casein 15, sucrose 10, yeast 7, salt mixture 5 and lard 3, with the addition of about 1.6 per cent of cod liver oil. Sheep thus reared from weaning were successfully maintained for 480 days, similarly goats though not quite so satisfactorily, and less success was achieved with guinea pigs and rabbits. In the last-named, and to some extent with goats, eventual failure was due to the development of paralysis dependent upon muscular degeneration. It was demonstrated that the cod liver oil was the essential agent causing this lesion, which ensued unless the cod liver oil ration was kept below 0.1 gm. per kilo of live weight. As the authors are careful to state, the results, while furnishing no evidence applicable to the human species, should serve to direct further attention to the reports of Agduhr and others describing similar lesions in infants as being caused by cod liver oil.

New British Standard Glue Tests

THE British Standards Institution has just issued a series of British standard methods for the testing of bone, skin and fish glues. The tests laid down include methods for the determination of moisture content, jelly strength, viscosity, melting point, foam, water absorption, keeping quality, joint strength in shear, reaction, grease, ash, sulphur dioxide and chlorides. The relative importance of the tests described must necessarily depend largely on the purposes for which the glue is intended. The joinery trade is particularly interested in strength and spread, the gummed paper manufacturer in tackiness and foam, etc. It will be seen therefore that it is not necessary for any one particular trade to utilise all the tests laid down. Apart from the industry itself, these methods of test should prove particularly interesting to all those concerned with the examination of glues, both in the laboratory and in the workshop. Copies of this British standard (B.S. No. 647-1935) may be obtained from the Publications Department, British Standards Institution, 28 Victoria Street, London, S.W.1, price 3s. 8d., including postage.

Maximum Error of Observations

THE statistical properties of the mean of a set of N observations are well known. E. J. Gumbel (*Ann. l'Institut Henri Poincaré*, 5, 115; 1935) discusses the properties of the greatest and least observations of a set, a problem of importance when it is desired to estimate the maximum error of observations. If the distribution of the original observations is normal, or, more generally, what is called of exponential type, the distribution of the extreme values is doubly exponential. Similar conclusions hold for the second greatest and second least, and so on. The work is related to that of Prof. R. A. Fisher, but treated from a different point of view. M. Gumbel remarks that the theory has been applied to the determination of the greatest deviation of artillery fire, the intervals between radioactive emissions, the extreme duration of human life and the intelligence of a racial minority in a certain country of central Europe.