

### Melanism in British Lepidoptera.

MELANISM has long been a subject of special interest to British entomologists owing to the rise and spread of melanic varieties in many British species of moths and butterflies, such groups as the Geometridæ showing many examples. Records of melanism go back at least to 1850, when the dark variety *Doubledayaria* of *Amphidasys betularia* appeared near Manchester. It afterwards spread until it became the prevalent or exclusive form in Lancashire and the Midland Counties, extending also to the Continent in later years. The earlier naturalists' point of view (as represented by the writings of Tutt and of Porritt) concerning its causation, related it to the progressive darkening of the background in the neighbourhood of cities as a result of industrialisation. When this explanation was found to be inadequate, moisture was added as a cause of melanism; and Tutt concluded that moisture would darken the surfaces of rocks in rural districts just as smoke darkens surfaces in urban areas, natural selection progressively favouring darker forms which habitually rested on such darkened backgrounds.

In a recent consideration (*Journal of Genetics*, vol. ix., No. 3) of melanism, based on extended observations and breeding experiments in Yorkshire, Mr. J. W. H. Harrison discards the older hypothesis and proposes a new one. This is based on a modification of the insect's metabolism by its feeding upon substances more or less impregnated with chemicals derived from the smoke. It is pointed out that certain melanic areas, such as the vicinity of Middlesbrough, Newcastle-upon-Tyne, and Moray Firth, are among the driest in the country, having a rainfall of 25-28 in. Also, in such species as *Boarmia repandata* and *Oporabia dilutata* the melanic varieties are confined to the towns, while the type occurs in the surrounding country. The melanic forms of different districts, moreover, differ from each other, showing that they have originated locally and irrespective of each other.

Observations showed that an increase in melanism was accompanied by a striking decadence of cryptogamic plants, especially mosses, liverworts, and lichens, many species having quite disappeared from affected areas owing to smoke contamination. This effect on vegetation, and also the degree of melanism, is found to diminish as one leaves the town.

Mr. Harrison compares melanism to such a condition as alkaptonuria in man. The latter condition is known to be inherited, and may be considered a chemical mutation in which the alkapton is not decomposed owing to the absence of a certain enzyme. He suggests that the taking in with the food of small quantities of such salts as KCl, NaCl, and MnSO<sub>4</sub>, present on the foliage in urban areas would lead to an increase in the amount of tyrosinase present, and so to an increased deposition of melanin, since the activity of various enzymes is increased by the presence of small quantities of these salts. The same interpretation is extended to melanic forms on coasts and islands, where the vegetation is impregnated with similar salts from the sea spray.

It is known that in many cases melanic varieties behave in inheritance as simple Mendelian dominants to the type (e.g. Onslow, *Journal of Genetics*, vol. ix., No. 1, on the melanic variety of *Boarmia (Tephrosia) consonaria*). In crosses with species of *Oporabia*, however, the author obtained a blend which remained true for two generations, and is interpreted as a gametic blend, the melanism being of a perfectly continuous type. Also, when the hybrids between *O. autumnata* and *O. filigrammaria* were crossed back with the parent forms, a blend resulted. In the

F<sub>2</sub> of the cross, however, a "pseudo-segregation" was observed, which is likened to the behaviour in *Oenothera Lamarckiana*. Many writers have suggested such a relation between hybridisation and mutation.

In this interesting and manifold study the author has discarded an original anti-Lamarckian bias, and concludes that various cases, such as the food instincts of *O. filigrammaria* and the period of emergence in a pinewood race of *O. autumnata*, are only explicable as true Lamarckian effects. Natural selection is believed to lead to the genesis of local races, "limiting the range of variation by the elimination of genetical strains less protected in any given habitat."

The haploid chromosome numbers are determined for *O. dilutata*, *autumnata*, and *filigrammaria* as 30, 38, and 37 respectively, and the behaviour of the chromosomes in meiosis furnishes a basis for a further interpretation of the hereditary phenomena.

### University Developments at Manchester.

THE University of Manchester is appealing for the comparatively small sum of 500,000*l.* in order to enable it to maintain its present activities effectively and to develop new features. These embrace not only additional buildings and equipment urgently required for the extension of the School of Medicine, especially in the departments of pharmacology and pathology, and for advanced scientific study and research in other important spheres of the University's many-sided work, but also a large increase in the professorial staff, including new professorships in social and political science, physiological chemistry, law, mathematical physics, and French. The present Department of Commerce, established in 1904, is stated to be hopelessly inadequate to the needs of a great commercial centre such as that of south-east Lancashire, and demands, if it is to serve its purpose worthily, a considerable strengthening of its teaching staff. The University has recently established a new degree, namely, the doctorate in philosophy (the Ph.D. degree), granted upon a course of advanced study and research, which will necessarily involve a large expenditure in staff and equipment.

The University is committed to an expenditure of a sum of 171,000*l.* in respect, among other items, of the building and equipment of the new arts building, where it is intended to house the subjects of languages, literature, history, and philosophy, the endowment of new chairs, the reconstruction and equipment of scientific departments, and the provision of women's hostels. It is further contemplated to set up a wide extension of extra-mural teaching so as to bring the influence of the University more closely in touch throughout its wide area with the needs and aspirations of working people by means of extension lectures and systematic three-year evening courses of tutorial classes.

Already in response to the appeal of the University a sum of about 160,000*l.* has been raised, and it ought not, having regard to the population and wealth of the area the University serves, to be difficult to secure the desired sum, and even more. With the view of inducing a large number of people of small means to participate in the effort to raise the money required, a novel scheme has been launched in the form of a prospectus, such as that issued on behalf of limited liability companies, entitled "Lancashire Development, Unlimited, The University of Manchester," inviting subscriptions for new capital to the extent of 500,000*l.* divided into 425,000 cumulative participating bonds of 1*l.* each and 1,500,000 people's



bonds of 1s. each, the interest upon which will be found in the enrichment of the whole life of the people served by the work of the University. The faculty of technology carried on in the Municipal College of Technology is also issuing an appeal for 150,000l., more than half of which has already been subscribed, for the extension of its building and for new equipment. The great and lasting benefit of the work of the University ought to rouse the active sympathy of the numerous municipalities and district councils, together with that of the County Council itself, and to induce these bodies to levy a rate which, if as low as  $\frac{1}{4}d.$  in the pound, would annually produce a sum equal to the interest upon the half-million it seeks to raise.

### Courses on the History of Science.

GERMAN and American universities long ago recognised the importance of the history of science as a subject of academic study. In British universities the subject is only just beginning to receive attention. In the University of London last year the Faculty of Arts passed a resolution in favour of including the history of science among the subjects for the B.A. degree, and, although the Senate has not yet dealt with the question, the inclusion of the subject in the curriculum for the new diploma in journalism has helped to advance matters. University College undertook to provide the necessary courses. During the first and second terms of the session 1919-20 Dr. Wolf delivered a course of elementary lectures on the general history and development of science until the end of the eighteenth century. During the present (summer) term Sir W. H. Bragg and others will deal with the history of physical science during the nineteenth century, and Dr. Singer will lecture on the history of medicine. A more elaborate programme will be provided next session. Sir W. H. Bragg and Dr. Wolf will repeat their courses, Prof. J. P. Hill and Dr. Singer will deal with the history of the biological and medical sciences, Prof. Filon will lecture on the history of astronomy, and Mr. Wren on the history of mathematics. The history of other sciences will also be dealt with as opportunity offers.

The primary aim of the elementary courses on the history of science is to provide an essential part of the history of culture. The modern treatment of history is marked by the attention paid to the daily life and habits of the people, as well as to the romance of Court life and the adventures of warriors. The kind of houses which our forefathers inhabited, the kind of dress they wore, and similar matters are receiving due attention in order to fill in the historic picture. All this is as it should be, but the picture can scarcely be complete without the realisation of the mental make-up of the ages, especially so in view of the important rôle played by scientific ideas in carrying forward the torch of civilisation.

Over and above its value as an essential part of human history, a course on the history of science should also have the moral and disciplinary value of inculcating a scientific frame of mind—the kind of attitude on which the future of mankind will depend more than ever now that the age of faith seems to be a thing of the long ago.

Such are some of the benefits that may be expected even by those who are not, and do not intend to be, scientific workers, to say nothing of the scientific knowledge which even such students are bound to acquire in following an elementary course on the

history of science. More advanced courses for scientific students can scarcely fail to confer the additional advantage of illuminating the methods and results of the makers of science, and so stimulating the latent originality of the student of science.

### Marine Biological Structures and Functions.

VOL. XIII. of Papers from the Department of Marine Biology of the Carnegie Institution of Washington, which has lately reached us, contains some contributions of considerable interest. Dealing with gland-cells of internal secretion in the spinal cord of the skates, C. C. Speidel describes large irregular cells of peculiar structure present to the number of some hundreds in the anterior horn. The nucleus is lobular and branched, and the cytoplasm of the resting cell is homogeneous, but in active stages granules of a protein substance are formed in it and discharged into the tissues of the spinal cord, where they persist for some time. These cells develop from neuroblast tissue, and cells homologous with them have been found in various other fishes. The author discusses their function, and concludes that they are gland-cells of internal secretion. He is unable to find that they are necessary to the life of the skate, or to show what their function may be. In a paper on the spermatophores of *Octopus americana*, G. A. Drew shows that these structures, while they are built on a similar plan to those of the squid, are adapted to act quite differently, being less complicated, under less tension, and suited for less rapid service, in correspondence with the less active life of the species. H. L. Clark finds in the distribution of littoral Echinoderms of the West Indies evidence of a much closer relationship between that region and the western coast of tropical America than between it and the Mediterranean, while the fauna of Tobago contains an element derived from the Brazilian coast. Studies on the chemistry of light production in luminous organisms by E. N. Harvey reveal that the substance formerly called photophelein by that author includes two bodies, one—luciferin—oxidisable by luciferase with production of light and formation of oxyluciferin, which can again be reduced to luciferin, the other—protophelein proper—assisting in the promotion of the luciferin-luciferase reaction. E. W. Gudger describes the ovary of *Felichthys felis*, the gaff-topsail catfish, the male of which carries the eggs and larvæ in his mouth.

### The Propagation of Flame in Gaseous Mixtures.

ALTHOUGH the large-scale experiments for which the Home Office Experimental Station at Eskmeals was designed have been discontinued since the outbreak of the war, the laboratories have continued to do good work under the direction of Dr. R. V. Wheeler, the chief chemist. In addition to Dr. Wheeler's own researches on the initiation of flame and its propagation through gaseous mixtures, Mr. W. Payman, a member of his staff, has recently published in the Journal of the Chemical Society a series of papers on the propagation of flame in complex gaseous mixtures (vols. cxv. and cxvii.).

Mr. Payman has determined the upper and lower "limits" of methane that will just propagate a flame along a horizontal glass tube 2.5 cm. in diameter when mixed with an atmosphere containing oxygen and nitrogen in which the oxygen varies from 13.7 to 100 per cent. He finds the speed of such flames