pathological in one gene-complex may be harmless or even advantageous in another, and such effects are open to the influence of selection. This concept, ably elaborated in Dr. Huxley's address, was illustrated by Mr. E. B. Ford by an example drawn from work on *Gammarus chevreuxi*. A gene which changed the eye-colour from black to red at one mutation, changed it to brownish when it mutated in another stock. A mating between the two showed that the same locus was concerned. Furthermore, successive back-crossings of each type of red into the other stock reversed their effects, demonstrating that the phenotypic difference was due to the action of the total gene-complex, not to mutation to another allelomorph at the same locus.

The effects of the genes, then, are susceptible of modification by selection, and Mr. Ford pointed out that the evolution of polymorphic mimics can be explained by no other means. It is often found that two forms of mimetic butterflies, each highly adapted in a number of distinct characters, are controlled by a single factor-pair. The allelomorphic difference concerned must have originated spontaneously by mutation, but we cannot suppose that selection has had to wait for the fortuitous occurrence of a change producing all the characters required. Such would seem an almost impossible event even in a single instance, yet the condition is common. The alternative explanation of the occurrence of parallel variation in model and mimic is disposed of by the superficiality of the resemblances between them. Thus Mr. Ford has found that the red pigment produced by the mimetic forms of *Papilio polytes* is chemically different from that of the models, though this is well known to be an instance in which the polymorphism concerned is under simple Mendelian control.

Furthermore, the study of mimetic insects has clearly demonstrated the reality of selection as an agent in stabilizing the population. Prof. G. D. Hale Carpenter, who discussed the forms of *Pseudacræa eurytus*, which mimics various species of *Bematistes*, has collected this butterfly on an island in Lake Victoria in which the proportion of models to mimics varied in different years. He found that when the models were the commoner (70 per cent of the association), intermediates between the different forms of *P. eurytus* were rare (4 per cent or less); but when the mimics were in excess, such intermediates were quite frequent (11–30 per cent).

Finally, Darwin's view of sexual selection has evoked much criticism. It is rightly felt that his analysis of this subject is one of the least satisfactory steps in his argument. However, Mr. F. C. Minns provided evidence of sexual selection in budgerigars. He further pointed out that in some forms the process must favour vigour and activity in the male and the reverse in the female, a condition proved in *Drosophila*.

It was the duty of Prof. H. J. Muller to summarize the whole subject, and he performed this difficult task with success. There can be no doubt about the value of a carefully planned discussion such as this, illuminating, as it did, a single problem from widely different angles. Each of the speakers has himself worked on the particular aspect of selection which he developed, and took the opportunity to bring forward recently ascertained or unrecorded facts.

Obituary

Dr. W. H. Harrison

WE regret to record the very sudden death, on August 18, of William Hudson Harrison, late of the Indian Agricultural Service, at his home near Leeds. Harrison was born in 1876. He graduated with honours in chemistry at the Yorkshire College in 1897, having been highly distinguished as a student and personally beloved by all. After graduation he was appointed chemist and manager at Knostrop Sewerage Works, Leeds, which post he held for nine years, receiving the warmest appreciation for his work both from the Leeds authorities and from the Royal Commission on sewage disposal.

In 1906 Harrison was appointed agricultural chemist to the Government of Madras, India. Here he commenced work by carrying out some valuable soil surveys, and then went on to a study of rice cultivation as practised in India under swamp conditions. He discovered the most obscure phenomena, and proceeded to elucidate them step by step. His work was highly original and practical and is assuredly a classic in this field. His papers are a record of his resource and genius. For his earlier papers on this subject he was awarded the D.Sc. degree of the University of Manchester.

Harrison's extensive work on swamp soils can only be referred to here in mere outline. His preliminary observations showed that the anærobic fermentation of soil organic matter and green manure in these submerged soils produced large quantities of methane and nitrogen and relatively small amounts of carbon dioxide and hydrogen. On the other hand, anærobic fermentation of green manure without soil to hold up the gas produced much carbon dioxide and

hydrogen in the first phase and carbon dioxide and methane in the second phase. Only a small amount of gaseous nitrogen was formed. Other experiments showed that by a secondary reaction under swamp soil conditions, carbon dioxide and hydrogen are recombined by bacterial agencies with the formation of organic matter and even methane. Hence the important conclusion was reached that the gases actually found in swamp soils are a residue of the gases produced in the primary fermentation, thus providing a rational explanation for the peculiar composition of the soil gas.

The gas evolved from the surface of swamp soils was found to consist mainly of oxygen and nitrogen. This gas is entirely distinct from the gases in the soil, and the soil gases do not normally escape from the surface. The evolution of oxygen at the surface was shown to be the work of a mixed film composed of certain bacteria, diatoms and algæ. The bacteria were isolated and characterized and shown to have the power of oxidizing methane and hydrogen. The photosynthetic utilization of carbon dioxide with liberation of oxygen by the film was proved, and it was shown that the development of oxygen was dependent upon the supply of methane and carbon dioxide from the soil gases.

From these and other inquiries, Harrison demonstrated that an important indirect manurial effect of green manure is to aerate the soil water in this type of cultivation. Comparing cropped and uncropped soil, it was found, among other interesting facts, that cropping greatly increased the formation of gaseous nitrogen, especially during the later stages of growth. Evidence from numerous experiments showed that the extra nitrogen formed in cropped soils is derived from the fermentation of dead roots which accumulate as the plant grows. The nitrogen cycle did not seem favourable, and it is evident that Harrison was aiming at further work on this aspect of the subject, but at this stage he was appointed Imperial agricultural chemist and transferred to Pusa. The appointment was an honour and a call to greater responsibility. He had to abandon his work on rice, but he has left a contribution which is unique.

At Pusa, Harrison undertook inquiries into soil nitrates and phosphates and soil reaction. The work on the influence of calcium carbonate on the penetration of certain phosphatic manures into the soil yielded notable information. Eventually administrative duties filled more and more of his time. He was first appointed joint director of Pusa and later became head of the service as director and agricultural adviser to the Government of India, from which post he retired in 1931.

Dr. Panchanan Mitra

THE death occurred on July 25, after a short illness, of Dr. Panchanan Mitra, head of the Department of Anthropology of the University of Calcutta.

Panchanan Mitra, born in Calcutta on May 25, 1891, was a member of a family already distinguished in the study of Indian history and culture. His grandfather, Raja Rajendra Lal Mitra, was the first Indian president of the Asiatic Society of Bengal. After a distinguished career at the University of Calcutta and four years as a lecturer in English, Panchanan Mitra in 1919 was awarded the Premchand Raichand Scholarship of his university for a thesis afterwards (1923) published under the title "Prehistoric India"; and in the same year was appointed to the staff of the Department of Anthropology, of which he became head on the retirement of Diwan Bahadur Dr. Anantha Krishna Iyer in 1932. In 1929, at the instance of Dr. Craighill Handy, he was appointed to a fellowship of the Bernice P. Bishop Museum, Honolulu, and travelled extensively in Polynesia, collecting evidence bearing upon the problem of the influence of Indian cultural traits on Polynesia. His results are now on the point of publication. A period spent at Yale University working with Dr. Clark Wissler on distributional studies resulted in "A History of American Anthropology" (Calcutta, 1931), for which he was awarded a Ph.D. In 1931 also he visited Spain and southern France as a member of the American School of Archæology in France. Two years later he presided over the Anthropological Section of the Indian Science Congress.

Dr. Mitra was not only himself a distinguished research worker, but he was also an organizer of research. He was responsible for the close conjunction of research in the laboratory and in the field, which is now an important feature in the work of his Department. His premature death is a great loss to anthropological studies in India.

Prof. Eugene Lagrange

EUGENE LAGRANGE, seismologist and emeritus professor of physics at the Ecole militaire at Brussels, died in that city on June 15 (*Boll. Ital. Soc. Sism.*, **34**, 156; 1936). Born in 1855, he entered the Ecole militaire in 1873 and, after passing through its course, was appointed first as assistant professor, and then as professor, of physics, an office that he held until his retirement in 1907. In 1898, he spent some time in Strassburg, in order to become acquainted with the use of seismological instruments. Through the generosity of M. Ernest Solvay, he was enabled to construct a seismological station at the Royal Observatory of Uccle, where he installed three horizontal pendulums of the Rebeur-Ehlert type. His observations there were continued until the end of 1903, when M. Solvay presented the station to the Belgian Government. At the same time, two other stations were placed under his direction, one of them at a depth of more than half a mile in a disused passage of a coalmine, the principal object of which was to discover if any relation exists between microseismic movements and the emission of firedamp. From 1908, Prof. Lagrange directed the well-known journal *Ciel et Terre*, until, in 1910, it was combined with the *Bulletin de la Société belge d'Astronomie*.