of the Committee, was accepted by the Congress. Since 1938 is the Jubilee of the suggestion of the Physiological Society that an International Congress should be founded, and since the first Congress was held in Switzerland in 1889, the choice of Zurich is particularly suitable. The Committee, however, was sympathetic to the wish of the Hungarian Physiological Society that the Congress should meet some time in Hungary, possibly in 1941.

The International Committee suggested to the Swiss National Committee that applications for membership in the Congress be not accepted, except in special circumstances, from individuals, but only through national physiological organisations. It further advised the National Committee that, for the sake of economy, the programme, particularly in respect of entertainments, should be simplified.

The International Committee had the support of the Congress in recommending certain changes in programme arrangements. It advised that any registered member be entitled to submit a communication for printing, and that such communications should be circulated to all members some time before the Congress. Any member desiring to discuss any communication should then inform the officers of the Congress. The papers thus chosen for their general interest should be grouped, so that each meeting may form a co-ordinated discussion on a certain subject. There should be no actual presentation of individual papers.

At this third plenary session, the closing scientific meeting of the Congress, the International Committee expressed itself as deeply grateful to their Soviet colleagues for the welcome they had extended to the Congress. Prof. G. Barger (Edinburgh), speaking in eight languages, on behalf of members of the Congress, admirably expressed the general appreciation. D. Y. SOLANDT.

# The Species Problem

KING CHARLES'S head was a less recrudescent topic than the species problem, which was recently the theme of the presidential address to the Zoological Section of the British Association, and the text of a symposium occupying most of a morning session. The reason for the perennial airing of the problem is not far to seek; for it is fundamental to all biological science. Taxonomy, begun in the good old days when species *were* species, has to adapt itself to the sliding scale of evolution; and phylogeny and genetics have to attempt to account for the phenomena that once made the Linnean system appear reasonable. Zoology has been driven by the concept of evolution into its proper role of a science that transcends mere description; while palæontology has developed beyond its erstwhile function as a handmaid of geology into an essential part of biological science.

In this inquiry, zoology, labouring under the disadvantage of its ephemeral scope, is concerned mainly with the causes of variation; while palæontology records the effects, as best it may, from fragmentary evidence in which causative processes are matters of inference or speculation. The two sciences have a common aim, but widely contrasted outlook and methods. In the past, they have too often followed their own devices, the zoologist looking askance at the imperfection of fossil evidence and the palæontologist deriding phylogenetic speculations hopelessly at variance with his small, but definite, knowledge.

The problem is summarised in the question: What is a species? All biologists are agreed that a species is an abstract conception; for in real life there is no fixity. If a species is to be adequately defined, the definition must include an account of its birth and breeding as well as of its present state. Hence the answer to the question can be found only in the solution of the wider mystery of the 'origin of species'.

Variability is an essential attribute of organisms, and sexual reproduction merely develops permutations and combinations of differences already present in the parents. If this be granted, the problem is reduced (but scarcely simplified) into that of the causes of variation. Here evidently is a question for the geneticist; although it is doubtful if his experiments, carried out under some measure of artificial control, can give a true picture of natural causes. Zoologists and palæontologists can record the cumulative effects of untrammelled variation, and the truth can perhaps be approached most nearly by deduction from their observations.

Variation may be traced in space and time. The occurrence of local races in geographically separate areas is analogous with the succession of changes which give to fossils their value as zonal indices. But whereas the area of any one type of environment is necessarily much less than the already limited area of the surface of the globe, the time during which such an environment may persist, in one part of the world or another,

is almost inconceivably great. It is possible to argue that a species whose variability can produce nothing more than local races during the period of its dispersion will, in the course of geological time, give rise to differences of specific or even greater significance. Such an argument, while bringing us no nearer to the root of the problem, serves to emphasise the importance of the time-element.

Many, but not all, of the differences shown by local races can be correlated with the conditions of their habitat, so that the direct influence of environment on the trend of variation becomes conceivable. Almost the same generalisation can be applied to palæontological 'lineages', with the same reservation. In both cases, any influence due to environment must be slight, and within the capacity of the organism; the alternative is extinction.

In this connexion, it is salutary to remember that almost every conceivable kind of environment exists somewhere on the globe; and, for many types of organisms, is not wholly inaccessible. When viewed in geological perspective, this condition is just as true, and its implications seem clear. An episode in the history of the sea-urchins may be cited in illustration.

So far as can be determined, the earliest sea-urchins lived quietly on the silt of sheltered lagoons; throughout the Palæozoic era they remained for the most part content with this kind of environment. But near the beginning of Mesozoic time a strange 'wanderlust' seems to have overcome some of these sea-urchins, evoking rock-dwelling types of which *Echinus* is a familiar representative. There must have been wave-swept rocks around Palæozoic seas; and there are plenty of areas of sheltered water to-day. *Cidaris* (by conservatism) and the heart-urchins (by reversion) still frequent the traditional quiet places; but *Echinus* and its relatives prefer the buffeting of the surge. The adaptation of each type to its habitat is almost teleologically perfect. But which came first, the habitat or the structures to fit it? Herein lies the dilemma. We must envisage either a gradual migration of successive generations of selected Triassic sea-urchins, travelling further into rough water as their variations permitted; or an almost infinitely slow invasion of some lagoons by the breakers. Both explanations seem to the last degree improbable.

An impasse of this kind can only mean that an essential factor has been left out of the calculation. In his laudable endeavour to avoid crediting lower types of organisms with attributes that belong to himself, the biologist has perhaps gone too far, and has treated his subjects as if they were as passive as inorganic matter.

To be alive is to be in active revolt against the cruder physical laws. Without the instinctive urge that is expressed among mankind in pioneering exploits, all protoplasm might still be content to remain amœboid.

This contention does not in any way solve the mystery of variation; but it widens the scope of the inquiry. For living beings, the attributes of variability and 'choice' must be stronger influences than the impact of inanimate environment. Every organism must triumph over its environment, find a new one, or perish in the attempt.

HERBERT L. HAWKINS.

# Obituary

## Mr. E. Thurston, C.I.E.

WE regret to record the death of Mr. Edgar Thurston, formerly superintendent of the Government Museum, Madras, which took place at Penzance on October 5 at the age of eighty years.

Edgar Thurston, the second son of Charles Bosworth Thurston, was born at Kew and educated at Eton and the medical school of King's College, London, qualifying as L.R.C.P. in 1877. He was appointed superintendent of the Government Museum, Madras, in 1885, retaining that position until his retirement just under twenty-five years later, when he was made C.I.E. He had already received the award of the Kaisar-i-Hind gold medal in 1902. After his retirement he returned to England, and continued to devote himself to research. He was much interested in the study of the Cornish flora, publishing "British and Foreign Trees and Shrubs in Cornwall" in 1930.

As superintendent of the Madras Museum, Thurston took an active interest in all the branches of scientific study in the Presidency which came within the purview of his duties; but as was shown by his numerous contributions to the official publication of the Museum, his main preoccupation lay with anthropology. Here he took the broadest view of the functions of the museum man, and by no means confined his attention to material culture and its contributory research. He acquired a knowledge of the mentality of the varied peoples of the Presidency and a keen appreciation of their differences, which at times was little short of surprising. The results of his earlier studies were embodied in "Ethnographic Studies in Southern India"; but his