crystal blocking, takes advantage of the atomic lattice in a crystalline solid to provide a very short distance scale against which the very short nuclear decay times can be measured. A germanium crystal is bombarded with 5 MeV protons to produce highly excited arsenic nuclei which are knocked out of the original lattice site. The lifetime is determined by observing how far the nuclei move from their original position before they decay. Lifetimes as short as 10^{-18} have now been measured by Dr Maruyama and his colleagues.

Dr R. Madey (Kent State University) presented a possible explanation for the "streaks and flashes" of light seen by the Apollo astronauts. It was found that two processes induce visual sensations when a particle with sufficient charge interacts with the retina of the dark-adapted eye. He and his collaborator (P. S. McNulty of Clarkson College) contend that the light reported by the astronauts results from visible Čerenkov light generated by heavy nuclei. The light flash frequencies observed agree with those calculated and the variation in frequencies reported by the astronauts can be explained by differences in the individual's efficiency for detection. A nucleus stopping in or passing slowly through the retina at a speed slower than the Čerenkov threshold creates a visual sensation through "virtual" photons which are carried by the nucleus. Madey and McNulty demonstrate the distinctions by interpreting the data obtained through exposure of human volunteers to accelerator produced radiation.

PALAEOECOLOGY

Quaternary Methodology

from a Correspondent

STUDENTS of the palaeoecology of the Quaternary period have long been in the unfortunate position of possessing a large volume of quantitative data and yet having no precise system for its interpretation. Since the work of von Post early in this century there has accumulated in Europe and North America a wealth of information concerning the fossil pollen content of peats and lake sediments, yet the account of vegetational history constructed from such evidence has been based upon intuitive interpretation. At last palaeoecologists are giving serious attention to methods available for the reconstruction of past vegetation from fossil pollen and seed assemblages, as was illustrated by the theme of the symposium of the British Ecological Society held at Cambridge on April 10-12. Although entitled "Quaternary Plant Ecology", this conference was entirely devoted to the methodology involved in dealing with

data from fossil pollen and seeds.

A number of problems are involved in environmental reconstructions using fossils, including, first, the variable rates of sediment accumulation which cause difficulty in expressing fossil deposition rates in absolute terms, and, second, the relationship between such rates and the population density of the respective species in the surrounding area. Results presented at the conference suggest that considerable advances have been made in overcoming both of these problems.

One of the most complete pieces of work presented was by Dr M. Davis (University of Michigan), who has studied the absolute pollen influx of a variety of lakes in deciduous forest and mixed forest areas of Michigan, her absolute data being derived from measurements of pollen concentrations in lake sediments formed in the period since intensive agriculture began in 1830. The start of this agricultural activity is marked in lake sediments by a sudden increase in weed pollen. Total pollen influx each year since then has been of the order of 20,000 to 40,000 pollen grains per square centimetre and its specific composition varies between the different forest types in Michigan. Because the composition of these forests is well known, this work provides data on the relationship between the abundance of a tree species and its pollen representation in absolute terms.

Similarly, fossil pollen cores can be analysed to give absolute pollen influx figures for various periods in the past, sedimentation rates being provided by radiocarbon dating at fairly close intervals in the cores. These influx data can then be interpreted in the light of the modern sedimentation studies and the contemporary vegetation can be reconstructed with some accuracy.

Although this method represents a considerable improvement upon the traditional system where pollen types are expressed in percentage terms, there remain some difficulties; first, variation of pollen influx within a single lake can be as great as three-fold, depending upon water depth; second, the pollen influx figures are obtained largely from densely wooded areas. It is possible that pollen representation of a species present at the same density in woodland or in open conditions may differ considerably. This makes it difficult to extrapolate from modern conditions to those prevailing in, say, late Wisconsin times when tundra occupied these middle latitudes of North America. Thus a direct translation from absolute pollen influx to plant density is still not possible.

In spite of these drawbacks, however, this work represents a profound advance in palaeoecological techniques. When coupled with available computerized, multivariate statistical methods and with

the rapidly accumulating information on modern pollen rain in a variety of vegetation types, all of which received considerable attention at the Cambridge symposium, such techniques may provide an opportunity for a greater degree of precision in the reconstruction of Quaternary plant communities.

ZOOLOGY

Breeding Rare Species

from a Correspondent

A RECENT conference on the breeding of endangered animal species in captivity as an aid to their survival may well mark a turning point in the history of maintenance of rare animals away from their natural habitats. The conference, which was held in Jersey on May 1-3, was jointly organized by the Jersey Wildlife Preservation Trust (hon. director, Gerald Durrell) and the Fauna Preservation Society of London (chairman, Peter Scott) and attracted more than three hundred participants from many parts of the world.

The speakers provided an impressive series of contributions on the practical techniques which have been developed for maintaining and breeding individual, rare species, ranging from the Indian rhino (Dr E. Lang, director of Basle Zoological Gardens) to several species of marmoset (Mr J. Mallinson, deputy director of Jersey Zoological Park). The conference proceedings will thus provide an extremely useful reference work for anybody who is concerned with maintaining and breeding a captive colony of an endangered species. It repeatedly emerged that the past ten years have seen unprecedented progress in the development of techniques for encouraging wild animals to breed in captivity. It was therefore very appropriate that the conference should have been held in Jersey, where Gerald Durrell has laid particular stress on breeding the rare animals in his charge—with notable success.

This new trend towards successful breeding has been accompanied by a significant change in attitudes among directors of zoos and other animal collections. Whereas it was previously true that zoos were mere museums for living animals, with breeding occurring in spite of the system, it is now widely regarded as essential to ensure successful reproduction. It is no longer justifiable, or respectable, to have just one specimen of a rare species simply for display purposes, and zoos now compete amicably for outstanding achievements in the breeding of unusual species.

This change has taken place against a background of increasing concern about the conservation of rare species in their natural habitats, and zoos can no longer justify the purchase of rare