binding capacity, is also relatively modest. Gel electrophoresis in SDS gives a wide choice of protein zones, but a peak of 28,000 molecular weight is prominent and others are fairly clearly in evidence at 45,000 and 38,000. Schmidt and Rafferty proclaim their confidence, nevertheless, that the first of these is the genuine article, and in spite of the small subunit weight that this implies, take their courage in both hands and commit themselves to the assertion that previous estimates, for both *Torpedo* and electric eel receptor, of 40–50,000 are incorrect.

It might perhaps be remarked that, although the isolation of the pure receptor is clearly altogether a good aim, many of its properties, particularly, as Franklin and Potter (*FEBS Lett.*, **28**, 101; 1972) have shown, its interaction with such ligands as bungarotoxin, can be usefully studied on the homogenized membrane particles.

Regarding the question of molecular weight and subunit structure, it may be noted that a different membrane-bound receptor—that for adrenergic molecules in heart—has been purified by affinity chromatography on columns containing a bound norepinephrine derivative (Lefkowitz, Haber and O'Hara, *Proc. US Nat. Acad. Sci.*, **69**, 2828; 1972), and comes in two sizes, peaks corresponding to about 40,000 and 160,000 molecular weight being eluted. The simplest explanation is that different states of aggregation of the receptor protein coexist in the membrane.

PALYNOLOGY

Making Pollen Diagrams

from our Plant Ecology Correspondent

AN article by A. D. Gordon and H. J. B. Birks in the current issue of *New Phytologist* (**71**, 961; 1972) provides new hope for the introduction of objective techniques into the interpretation of data obtained by pollen analysis of Quaternary deposits.

There are many statistical problems inherent in the presentation and interpretation of pollen data and only one of these is tackled here, namely the construction of an objectively defined zonation system for a pollen diagram. Before this can be done one must assume that the original data are an adequate representation of the pollen content of the sediment undergoing analysis and that the data are basically reliable. One must also assume that the sedimentary sequence of a deposit reflects its temporal development; in other words, that the stratified sediments have not been disturbed subsequent to their deposition.

For several decades it has been the practice of palynologists to divide their

data into subsidiary groups, or zones, to facilitate the task of describing temporal changes in pollen proportions and the vegetational developments which these changes reflect. The use of zonation systems has been long established (for example, Godwin, *New Phytol.*, **39**, 370; 1940), but only recently have there been attempts to define the criteria which should be used for the subdivision of pollen diagrams (for example, Birks, *J. Ecol.*, **58**, 827; 1970).

The problem of objective zonation has been approached by using computerized classificatory techniques similar to those applied to vegetational analysis (for example, Dale and Walker, *Pollen Spores*, **12**, 21; 1970), but these have usually been of limited value because of the absence of any stratigraphical constraint written into the programme. This has allowed the possibility of grouping samples together from different parts of the profile on the basis of their similar pollen spectra. Gordon and Birks have overcome this problem by requiring that samples grouped together in a zone should be stratigraphically contiguous.

They use a variety of techniques, both divisive and agglomerative, to construct objective zonation schemes for published data from Britain and the United States. The zones resulting from these analyses are in remarkable agreement with the subjective decisions of the original authors regardless of the precise numerical technique used. This study, in addition to the ratification which it provides for the intuitive divisions produced by earlier workers, also offers a means of objective zonation for future work.

There are some major disadvantages in this type of approach; first, the selection by the computer of abrupt rather than gradual changes as the basis for zone boundaries; second, the tendency

to select zones defined by local rather than regional pollen types; and, third, the inability of the computer to place additional emphasis upon changes in species of critical ecological importance (for example, elm and plantain). In spite of these residual problems, Gordon and Birks's study represents an important step towards the removal of palynology from the realms of mysticism.

NUCLEAR PHYSICS

Ambiguity Resolved

from a Correspondent

ANOTHER way of removing the so-called "discrete ambiguities" of nuclear physics has been discovered. It involves the scattering of α particles from aligned nuclei.

Elastic α particle scattering can be very well described using the optical model of the interaction. According to this model, the α particle moves in a complex potential with radius and surface diffuseness similar to that of the nucleus itself, and with appropriate choice of parameters the differential cross-section can be fitted to high accuracy. Unfortunately, it is frequently found that there are several different sets of potentials which give equally good fits to the data ("discrete" ambiguities), and within each set it is often possible to make correlated variations of the parameters that preserve the fit ("continuous" ambiguities). Physically this is easily understood; elastic scattering depends only on the asymptotic form of the wavefunction and in addition the α particles interact so strongly with the nuclear field that those that are elastically scattered can only have passed through the surface region, so that all potentials giving the correct behaviour in this surface region give the same scattering.

Separating Myosin Functions

IN next Wednesday's *Nature New Biology* (December 13), Silverman, Eisenberg and Kielley describe a study of the consequences of blocking one thiol group (SH_1) in the heavy chains of myosin. It was previously reported that these groups could be reacted with N-ethylmaleimide, and the resulting protein was inhibited in regard to EDTA-ATPase activity, whereas the calcium-ATPase was enhanced.

Working with the more tractable molecule, heavy meromyosin (HMM), Silverman *et al.* have found that SH_1 -blocked protein is activated by actin, but by a factor of only three, compared with 200 for unmodified HMM. From the dependence of this small activation

on the actin concentration, the authors exclude any likelihood that the activation effect arises from a contaminant of unmodified HMM.

Silverman *et al.* have also investigated the effect of the relaxing system, troponin and tropomyosin, on the activity of the modified acto-HMM complex. In the absence of calcium the activation of ATPase by actin is completely suppressed, just as in normal actomyosin. It is concluded that the SH_1 thiol group is required not only for EDTA-ATPase activity, but also for activation of magnesium ATPase by actin, whereas it is not involved in the interaction with the troponin-tropomyosin system.