(MRC, Cambridge) described a *Xenopus* egg system in which chromatin assembly takes place. Each egg can convert an amount of DNA equivalent to 6000 nuclei into regularly spaced nucleosomes in the absence of DNA synthesis. Laskey has found that all the materials required for nucleosome assembly cofractionate in a single particulate fraction, suggesting that histones are organised into a nucleosome precursor complex before they bind DNA.

G. Tocchini-Valentini (CNR, Rome) described a *Xenopus* oocyte system which elongates and terminates replicating chromatin. But neither he nor Laskey could find evidence for initiation of DNA replication *in vitro*, although it can apparently be seen in micro-injected eggs.

The fusion of genetic and molecular approaches to the study of development provided a stimulating two-day meeting. □

Problems with pollen

from Peter D. Moore

PALYNOLOGISTS studying sediments of Quaternary origin have certain advantages over colleagues concerned with older materials for there is a higher likelihood that both the taxa and the plant communities with which they deal remain extant. There are exceptions, of course, such as the tundra communities which occupied low latitudes and low altitudes in the periglacial conditions obtaining at the close of the last glaciation. One cannot assume that tundra communities of modern high latitudes or high altitudes have the same composition. But generally the Quaternary palaeoecologist uses the present as a Rosetta stone by which to interpret the past.

Reconstruction of the past mosaic of plant communities on the basis of a subfossil assemblage of pollen grains is currently being greatly assisted by accumulating information concerning modern pollen rain from contemporary plant communities. It is remarkable that for many decades palynologists have been content to interpret their fossil data without such information. Fortunately, however, indications from most modern pollen rain studies have confirmed the broad correlation between vegetation and its pollen output which has always been assumed. The work of Lichti-Federovich and Ritchie (*Rev. Palaeobotan. Palynol.* 7, 297; 1968), for example, on surface lake sediments in central Canada, showed that the major forest belts of the region could be distinguished on the basis of their pollen spectra. Certain anomalies were evident, such as the transport of spruce pollen into the treeless tundra areas of the north, but there was generally an acceptable agreement between vegetation and pollen rain.

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Such studies have been chiefly concerned with the major components of both vegetation and the accumulating pollen assemblage, but detailed interpretation of palaeodata may also depend on the presence of relatively small quantities of a taxon with narrow ecological or phytosociological limits. It is often possible to infer the presence of certain vegetation types and hence certain habitats and microenvironments on the basis of the occurrence of these 'indicator types.' In this respect the work of Janssen has been of great value (for example *Ecol Monogr.* **37,** 145; 1967). He has used the technique of comparing vegetation transects along environmental gradients with the pollen accumulating along them; in this way it is possible to observe how closely certain pollen types are associated with particular plant communities, even when their overall representation in the pollen spectrum is small.

On the basis of Janssen's work it is evident that pollen samples taken from the surface sediments of a water body will differ quite considerably from those in adjacent reed swamps or woodlands. So when interpreting fossil data, the nature of the sediment under consideration should be taken into account. One further aspect of this type of study which still lacks detailed documentation is the degree to which surface samples of the same type and under the same vegetation vary in their pollen composition. Is it possible that the variation within certain plant communities is greater than that between communities? In many surface pollen studies it has not been possible to glean this type of information because duplicated samples have been bulked before analysis, but a recent study of pollen rain in Alaska by Birks (*Can. J. Bot.* **55,** 2367; 1977) now provides the necessary information for certain vegetation types.

Birks distinguished four major vegetation types, *Picea glauca* forest, which contained *Betula glandulosa* as a shrub layer, *Betula glandulosa* dominated shrub-tundra, *Populus balsamifera* stands within the forest, and open tundra vegetation dominated by *Dryas integrifolia*. In addition to the detailed description of these vegetation types, Birks collected samples of moss polsters, surface muds from lakes and superficial peat samples from sedge swamps from each of the plant communities. A visual inspection of the data resulting from the analysis of these samples suggests that certain pollen characteristics are specifically associated with certain vegetation types. For example, only in samples originating from the *Populus*-dominated stands does the *Populus* pollen type occur at levels greater than about 2%, and only in the *Dryas* tundra does the level of *Dryas*-type pollen exceed about 2%.

Birks has subjected the pollen data to principal coordinates analysis, in which the pollen samples are ordinated with respect to one another on axes which represent dissimilarity. On one axis he shows a polarisation of the *Populus* forests and the *Dryas* tundra with the *Picea* forests and shrub-tundra forming an undistinguishable group in the centre. On the other axis the extremes are occupied by swamp peat samples and moss polsters respectively. One of the most important criteria which may account for this latter separation is the relative proportion of Cyperaceae pollen in the samples. One must conclude from this analysis that the degree of variation found within both the *Picea* forest and the shrub-tundra samples are such that the two vegetation types cannot be separated on the basis of their pollen spectra. This being so, one would not be able to differentiate between them in subfossil pollen assemblages.

This analysis was based only on those pollen types having a relative abundance of 5% or more of the total pollen sum in at least one of the samples; in other words, only the major pollen types are used for differentiation. There remains the possibility that indicator types of lower abundance could be used. Inspection of the pollen data suggests that this is unlikely to be a particularly helpful approach. Only one terrestrial herb taxon, *Astragalus*, is found in a single *Picea* forest sample but in none of the shrub tundra samples. On the other hand there are ten such taxa found scattered among the shrub-tundra samples which are not found in the spruce forest sites. As a final straw at which to clutch, one could compare the overall herb pollen diversity in the two sets of samples. Inspection indicates that the shrub-tundra has a generally larger component of low abundance, herbaceous taxa, possibly reflecting the open vegetation. A comparison of the two sets of data using a diversity index such as the Shannon-Wiener function might provide a means of resolving these two communities on the basis of their pollen spectra. Meanwhile, the fact that such problems can arise in the separation of modern vegetation types should encourage caution among those who seek to interpret fossil assemblages. □