dently of the formation of synaptic connections by the neurones.

One must await either the identification of the 'specificity molecules' or, alternatively, an assay system which reveals their presence by a criterion other than the formation of synapses. What might be the first, and very exciting, step in the direction of such an assay is provided by the very elegant experiments of Barbera, Marchase and Roth (*Proc. natn. Acad. Sci. U.S.A.*, **70**, 2482; 1973).

Building upon earlier work which had demonstrated differences in adhesability between cells from different tissues, and from different brain regions, Barbera, Marchase and Roth decided to investigate whether there is preferential adhesion between cells which will become neuronally linked as opposed to cells that do not neuronally link. In their assay system a $^{32}$P-labelled cell suspension of either dorsal or ventral retina of embryonic chicks was placed in dishes containing both ventral and dorsal tectal halves. Cells from the dorsal retina were found to adhere preferentially to ventral tectum and cells from ventral retina adhered preferentially to dorsal tectum. This preferential adhesion is similar to the innervation pattern of the retinotectal system; dorsal retina normally connects with ventral tectum and ventral retina with dorsal tectum.

This interesting result is interpreted with appropriate caution by the authors. Indeed, some care is warranted before it can be accepted that the cell surface recognition phenomenon being demonstrated here is the one involved in specific synaptogenesis. Only a small proportion of the cells demonstrated the preferential adhesion that the authors monitored; most of the cells were easily displaced by light washing. Of those cells that did display the preferential adhesion, the difference in number between those adhering to the 'correct' tectal half exceeded those in contact with the 'wrong' half only by a factor of two, which is rather low for a system in which the differential specificity of neuronal connections is, in most models, viewed as very high.

As to the question of whether the mechanisms involved in cell adhesion are those involved in synapse formation, it must be accepted that the greatest part of the work on selective cell adhesion has emphasised the tissue-specific nature of these adhesions. Thus retinal cells selectively adhere to retinal cells, cerebellar cells to cerebellar cels (see Luis and Glaser (*Proc. natn. Acad. Sci. U.S.A.*, **70**, 2794; 1973)). This tissue-specific aggregation probably involves quite different surface receptors from those involved in synaptogenesis, because most neuronal connections link different populations rather than cells of the same population. In this context it is interesting to note that retinal pigment cells display the same preferential adhesion to tectal halves as do the neural retinal cells, even though retinal pigment cells are not neurones and most certainly do not form synaptic connections with the tectum.

Despite these caveats, this work of Barbera *et al.* is a most promising advance in attempts to understand the mechanisms of selective cell recognition. Such mechanisms will throw light on the formation of tissues and these experiments suggest that similar processes may underlie the elaboration of the intricate pattern of synaptic linkages that characterises the functioning nervous system.

# Endemism and environmental stability

*from our Plant Ecology Correspondent*

ENDEMIC organisms and the problems underlying their origin and survival have a peculiar fascination for biogeographers. As long ago as 1882 Engler had postulated that there are basically two types of endemics, ancient ones (palaeoendemics) and those of recent origin (neoendemics). Various criteria have been used for their differentiation, the most effective being the geographic proximity of closely related species. Palaeoendemics are normally disjunct in distribution, occurring in situations well isolated from similar species. Neoendemics, on the other hand, often have many closely related species in the same or adjacent areas.

Stebbins and Major (*Ecol. Mongr.*, **35**, 1; 1965) analysed the flora of California, where roughly a third of the indigenous plants are endemic, and concluded that the palaeoendemic species are chiefly found in either markedly damp or distinctly dry environments, whereas intermediate climatic regimes are typified by neoendemics. They explain this by suggesting that palaeoendemics are found only in stable climatic situations whereas an unstable climate is conducive to rapid extinction and evolution, resulting in the production of neoendemics.

Ultimately, the demonstration that long-term climatic stability is associated with palaeoendemism is in the hands of the palaeoecologist. Meyer (*Ecology*, **54**, 982; 1973) has now accomplished this in the Cuatro Ciénegas Basin in northern Mexico, another area rich in endemics. The Cuatro Ciénegas Basin lies at an altitude of 740 m and is surrounded by mountains rising to heights in excess of 2,500 m. Many aquatic animals are endemic in the basin, including nine species of fish, three isopod genera and thirteen species of hydrobiid snails. The character of this fauna suggests that long-term isolation, perhaps accompanied by climatic stability, has resulted in its survival and development. In other words, these organisms are palaeoendemics.

Meyer has analysed palynologically two cores from the central area of the basin in order to reconstruct the environmental history of the region. One of these cores, which was taken from a spring-head mire, reaches a depth of 13 m, and radiocarbon dating on material between 11 m and 13 m gave results of >31,400 BP and >26,800 BP. The record thus goes back to the middle of the last (Wisconsin) glacial advance, at which time the area would have been experiencing pluvial conditions.

The pollen diagrams are remarkably uniform and give no evidence of rapid climatic fluctuations. The main fluctuations are in the pollen of grasses and the Chenopodiaceae / Amaranthaceae group, which probably reflect local changes in soil salinity and hydrology rather than climatic change. Modern pollen grain studies in the region indicate that tree pollen (mainly *Pinus*, *Quercus* and Cupressaceae) is derived largely from the montane *Pinus ponderosa* forests and Compositae pollen comes mainly from the mixed xerophytic communities and creosote bush savannah of the basin floor. Since the tree pollen:Compositae ratio remains fairly constant throughout the profile, it is reasonable to postulate a long term stability in these major vegetation types.

In this particular locality it is therefore possible to associate a high incidence of palaeoendemism with a history of environmental stability, thus providing support for Stebbins and Major's hypothesis.

# Some somatic cell variants are mutants

*from a Correspondent*

ARE somatic cell variants true mutants, that is, are they really the result of stable and hereditary changes in nucleotide sequence? This question, which surely has disturbed the sleep of many a somatic cell geneticist, receives two positive replies in the November issue of the *Proceedings of the National Academy of Sciences.*

First, Thompson, Harkins and Stanners (**70**, 3094), continuing the Toronto group's work on temperature-sensitive (*ts*) variants, report that one of their *ts* Chinese hamster cells, *ts*H1, has a *ts* leucyl-transfer RNA synthetase. Mutant *ts*H1 grows normally at 34° C, but after shift up to 39.5° C, cell division stops and the cells disintegrate within 24 h. The mutant shows no subclone variation, has a low reversion frequency which is increased by exposure to muta-