a concentration gradient and will degrade it far more slowly than non-target organs. The receptor has a molecular weight of 360,000 and seems to be a unique compound. It has a very high affinity for the active substance, a very low affinity for the breakdown products. It contains RNA in association with protein.

Filling the gap with the pin cherry

from Peter D. Moore
Plant Ecology Correspondent

IT is now fairly well established that during the course of succession leading to deciduous forest in temperate climates, the peak in plant species diversity occurs at about 100–200 years (Loucks, *Am. Zool.*, **10**, 17; 1970). Following this the full attainment of dominance by deep shade-casting trees and the establishment of a shade tolerant understorey community lead to the elimination of many light demanding plant species more typical of the seral stages. Natural climax forest, however, has an uneven population age structure and is subject to random perturbations resulting in the opening of the canopy, for example as a consequence of lightning strikes and windblows. A mature, stable forest in equilibrium with its environment possesses fragments of seral vegetation within its clearings, and its species diversity is therefore greater than one might suppose, if an adequate sample area is studied (see Hope Jones, *Br. Birds*, **65**, 291; 1972).

Marks (*Ecol. Monogr.*, **44**, 73; 1974) has made specific studies of these self-healing attributes of climax ecosystems. In particular he has concentrated on the modifications in life cycle, and dormancy and seed dispersal mechanisms associated with those species which recolonise areas laid bare by natural perturbations. In ecosystem terms, a gap represents a suboptimal utilisation of the available resources—for example, light, moisture, nutrients—and the species which are to exploit such a situation must either arrive rapidly by seed, or their dormant seeds already present in the soil must germinate and grow.

In New Hampshire, an important species which fills this role is the pin cherry (*Prunus pensylvanica*). It is not found in mature forest communities, but is restricted to clearings in which the forest has suffered disturbance. If the soil of a disturbed area contains abundant pin cherry seeds in a viable state, then a dense stand with a closed canopy develops within about 3 yr. In this case the climax species, sugar maple (*Acer saccharum*) and beech (*Fagus grandifolia*) grow beneath the canopy and assume dominance after about 25–35 yr. If the original soil density of pin cherry seeds is low, then birch and aspen become established at an early stage by seed coming from outside the system, and the final dominance of sugar maple and beech may be delayed until 80–90 yr have passed.

This buried seed strategy which results in the maintenance of pin cherry populations, demands a fairly high density of viable seeds surviving in the soil of the mature phase of the forest. Marks found densities varying between 300,000 and 500,000 viable seeds per hectare at two such mature forest sites in which pin cherry was rare or absent. Original fruit production by dense pin cherry stands was estimated to be between 2 and 3×10^6 fruits ha^{-1}. Germination is triggered by forest disturbance; in laboratory tests removal of endocarps stimulated germination. The longevity of seeds in soil is difficult to examine experimentally, but was estimated to be about 50 yr. The clearance of forest which had been in mature phase for 80–100 yr resulted in little pin cherry regeneration.

Once established, pin cherry grows and accumulates nutrients more rapidly than the final climax dominants, which accounts for its success during the early stages of forest recovery. As far as ecosystem regrowth is concerned, the nutrient demand of pin cherry results in the conservation of nutrient capital which might otherwise have been lost by leaching.

Stability in climax ecosystems is usually defined in terms of the system's capacity to recover from disruption. Evidently this stability depends ultimately on species, like the pin cherry, which may be totally absent from stands of mature climax dominants, or represented only by seeds lying dormant in the soil.

Polyadenylation in the cytoplasm

from Benjamin Lewin
Molecular Genetics Correspondent

THE purpose of nuclear polyadenylation remains obscure and an addition to this puzzle is now made by the observation of Slater and Slater (*Proc. natn. Acad. Sci. U.S.A.*, **71**, 1103–1107; 1974) that cytoplasmic polyadenylation takes place in sea urchin eggs. It is by now well established that in mammalian cells a sequence of about 200 adenine residues is added to the 3′ end of an heterogeneous nuclear (hn) RNA molecule before cleavage of this region. The poly(A)-containing sequence is then transported to the cytoplasm to serve as messenger RNA. Addition of poly(A) takes place only in the nucleus of mammalian cells; since inhibiting the addition of poly(A) prevents processing of mRNA, it seems reasonable to suppose that poly(A) is implicated in some essential way in the maturation process.

But poly(A) is also present in viral messengers found only in the cytoplasm and in mitochondrial messengers. Speculation that it may therefore also have a direct role in translation seems to have been refuted by research in several laboratories, which has shown that mRNA lacking poly(A) can be translated as efficiently as mRNA containing it. But force to the argument that nevertheless poly(A) must be implicated in some way in the cytoplasmic function of mRNA is now lent by the results that Slater and Slater report.

Fertilisation of sea urchin eggs causes a sudden burst of synthesis of poly(A); the recent experiments of Slater *et al.* (*Proc. natn. Acad. Sci. U.S.A.*, **70**, 406–411; 1973) and Wilt (*ibid.*, 2345–2349) have suggested that this might represent the addition of poly(A) to previously existing messengers, a situation which contrasts with the addition of poly(A) only to newly synthesised nuclear transcripts in mammalian cells. Slater and Slater now report experiments to test this model. By incubating fertilised eggs with both ^{3}H-adenosine and ^{14}C-uridine, they distinguished newly synthesised mRNA (which possesses the ^{14}C label) from mRNA synthesised before fertilisation (which lacks this label). All RNA possessing poly(A) should contain a tritium label; and if this mRNA was synthesised previously the ^{3}H-adenosine should be located exclusively in the poly(A) segment, whereas if these molecules are newly synthesised some labelled adenosine should be present also in the other parts of the messenger.

The ^{3}H and ^{14}C labels show a different sedimentation distribution, which implies that they must enter different mRNA species; that is, the poly(A) is not added simply to newly synthesised messengers. The ^{3}H-adenosine which enters the mRNA fraction is found very largely in the poly(A) fraction which can be reclaimed after digestion with ribonuclease; this suggests that only the poly(A) part of the molecule is newly synthesised.

This implies that some mechanism must exist in the cytoplasm for polyadenylating messenger RNA, a conclusion which raises many important questions about the possible role of this polyadenylation. One obvious question is whether the messengers to which poly(A) is added after fertilisation possessed any poly(A) to start with or whether they completely lacked it. If messengers synthesised before fertilisation lack poly(A), then they must be produced by a mechanism in part different from that prevailing when