

the *laevis* rDNA even though they contain both *laevis* and *mulleri* rDNA complements, which is consistent with the 'chromosome copy' mechanism but not with the 'episome' model since the latter demands maternal inheritance. It is not known at present whether the mechanism for repression of *mulleri* rRNA synthesis has anything to do with the selective amplification of *laevis* rDNA, although the mechanism of rDNA amplification proposed by Crippa and Tocchini-Valentini (*Proc. natn. Acad. Sci. U.S.A.*, **68**, 2769; 1971) based on RNA-dependent DNA synthesis would specifically predict amplification of only *laevis* rDNA if *mulleri* rRNA synthesis is repressed.

WILDLIFE

Death on the Road

from a Correspondent

THE question of what motivates a domestic fowl to traverse a highway has occupied the mind of man ever since roads were invented and chickens were domesticated. This problem was not solved at a symposium entitled "Motorways and the Biologist" which was held at the North East London Polytechnic on October 25, but similar questions were raised; such as the reason why deer and badgers make suicidal excursions across trunk roads and motorways and how they can be discouraged.

D. Venner (Forestry Commission) described attempts to discourage deer from crossing roads in the Forest of Dean by mounting 3-inch square mirrors on posts at the side of the roads which reflect motorcar headlights into surrounding woodland and give animals advance warning of approaching vehicles. The highly predictable nature of deer in both the time and location of crossing roads can be used to advantage in planning the siting of such mirrors. Unfortunately, the data on deer mortality before and after the erection of mirrors are ambiguous and adequately controlled experimentation is needed before this system can be evaluated.

Badgers are also creatures of habit and they often insist on using their well-worn trails between sett and foraging ground even when a motorway is constructed across them. M. Clark and E. P. Ratcliffe described experiences in Hertfordshire and Cheshire respectively in which elaborate attempts have been made to accommodate the inflexible attitudes of local badgers disturbed by motorway construction. In certain situations, where badger trails are well known, special culverts have been incorporated into the design of new motorways, together with badger-proof fencing which channels the animals into the tunnels. Stream culverts can easily

be modified for badger use, but it costs £1,200 to construct a culvert 1 m in diameter especially for badgers. One must admire the motivation behind such expenditure, but so far only circumstantial evidence exists that badgers have demonstrated their appreciation by using these tunnels. It is possible that in the long term a great deal of money could be saved if research into such problems were commissioned before such expenditure was incurred.

The other major topic considered at this meeting was the value of Britain's motorway verges for wildlife conservation. J. M. Way (Nature Conservancy, Monk's Wood) has conducted a survey of the plant life of the M1 motorway between Hendon and Leeds and has found more than 380 plant species on its verges. It is possible to devise management procedures in which the demands of the highway engineer can be reconciled with the desires of the botanist. Some of the most interesting plant communities of verges develop in situations where rocks such as chalk and limestone, which may be exposed by excavation, have not been covered by topsoil after construction. Perhaps arrangements could be made to leave such areas bare. Herbicide treatment is obviously not conducive to a varied flora, nor is it necessarily in the economic interest of those managing a verge. Experiments on cutting frequency reveal that just two mowings, one in May and a second in June, can be effective in maintaining vegetation below 30 inches in height (the recommended level), thus avoiding any herbicide treatment.

The conservation of roadside flora may have some economic as well as amenity value. J. Free (Rothamsted Experimental Station) in a survey of the M1 near St Albans found sixty-seven insect species, of which hoverflies constituted the most important group, carrying pollen on their bodies from a total of thirty-nine plant species. Verges with a high floral diversity may thus act as reservoirs for such beneficial insects.

A further consideration in the conservation of verge flora and fauna is pollution. P. Williamson (Portsmouth Polytechnic) described a survey of lead pollution on the verge of A1 (M) at Catterick. Traffic levels during the survey period were 34,000 vehicles per day. Lead, presumably originating from exhaust fumes, attained levels of 200 p.p.m. in the soil of the central reservation and at the edge of the carriageway. Pitfall traps were used to sample invertebrate populations at various distances from the carriageway and their lead concentrations were measured. Isopoda beside the road were found to contain 700 p.p.m. lead and Diplopoda 100 p.p.m., but despite this the species composition of the invertebrate communities did not seem to be affected by lead. Lead accumulation of this order was not reflected in small mammals, which had liver concentrations of only 10–15 p.p.m. and there was no evidence of further concentration at higher levels in the food chains.

The overall impression given by this conference is that the biologist is not yet in a position to solve many of the ecological problems posed by motorways.

Thiols and Membrane Structure

IN the next issue of *Nature New Biology* (November 14) Dupont and Hasselbach describe some extensive changes in the structure of the sarcoplasmic reticulum membrane that ensue when the ATPase is poisoned by thiol reagents. Titration with a mercurial, or with N-ethylmaleimide, reveals that there are ten to twelve reactive thiols per 10^5 molecular weight of protein in sarcoplasmic reticulum vesicles. The two types of ATPase activity that reside in this membrane respond differently to the elimination of free thiols: calcium-activated ATPase decreases linearly while four groups are reacted, whereas the basic magnesium-dependent ATPase evinces slight activation until five of the thiols have reacted, and thereafter falls off rapidly.

That extensive structural changes accompany the reaction of the thiol groups was at once apparent from an increase in turbidity, betokening aggregation of the vesicles. The changes are reflected in progressive alterations in intensity and position of the X-ray

spacings obtained from stacked oriented membranes. These are of relatively minor extent at low levels of substitution, but when more than about four thiols groups have been blocked the character of the X-ray pattern changes in a manner that can be interpreted in terms of the loss of the asymmetric structure which characterises the native membrane. The protein is not released but redistributed so that its average disposition with respect to the plane of the bilayer is symmetrical.

It seems then that substitution of the thiol groups causes the protein molecules to sink into the bilayer, either continuously or, according to a plausible hypothesis offered by the authors, on dissociation of a putative ATPase oligomer, which occurs when a critical number of thiol groups has been blocked. This will expose new protein surfaces and the nature of the interaction with the phospholipids in the bilayer will be changed in such a way as to favour a new and symmetrical structure.