according to the rules of Watson–Crick base pairing and nucleic acid replication. This implies that there is an enzyme which adds this final adenine base to the phage RNA. It could be a specific enzyme or the enzyme responsible for the turnover of the CCA residues of transfer RNA.

All these questions boil down to the suggestion that the 3′ terminal sequence of phage RNAs and by implication messenger RNAs in general has some function other than coding for an amino-acid. Why else should evolution have produced a system which goes to the lengths of adding a base to a completed molecule unless it has some extremely important function ?

EVOLUTION

New Species in the Tropics

A LARGE audience gathered at the British Museum (Natural History) last week to hear a group of experts talk about speciation in the tropical environment. The proceedings, under the auspices of the Linnean Society and the British Ecological Society Tropical Group, were important not only for their interest to the academic taxonomers and ecological geneticists. A rational conservation policy for the tropics must be backed by information about the factors—genetic and ecological—which have produced the richness of species in the flora and fauna of this area. As Dr K. Mellanby said, in his introduction to the two day symposium, our knowledge must catch up with our powers to alter the environment.

Dr Ernst Mayr from Harvard referred to the proverbial richness of tropical floras and faunas and said that a tropical area may have five to seven times as many species of birds as a temperate zone area. There are two possible explanations for such large numbers of species. The genetic explanation is that factors such as increased rates of mutation or shorter generation times accelerate the production of new species. The ecological explanation requires that the tropical environment favours the development and continued coexistence of a very large number of species. In the case of birds the evidence favours the ecological interpretation. Factors which may accelerate the rate of bird speciation include the possibility that populations are more sedentary in the tropics so that the efficiency of geographic barriers is increased. And perhaps the conditions of the tropics provide a greater variety of ecological niches so that a new species has a good chance of finding a niche, thus satisfying its requirements without competing with other species.

There was vociferous astonishment and disagreement in response to Professor C. C. G. J. van Steenis of Leiden, who suggested that the richness of the flora of the tropical rain forest is in part a result of a very low intensity of competition; the bare soil is free for all, and each of the many species has its own microniche. This low level of competition has led in some cases to the survival of what Professor van Steenis calls "nature's experiments"—plants of extraordinary structure and habit which are found in quite large numbers in tropical rain forest. Such structures are often the sort that can be produced by sudden genetic changes such as single gene mutations or polyploidy. In the tropical rain forest, evolution may sometimes have occurred by these sudden large steps resulting in the monstrosities found today.

New and old ideas about the tropical rain forest were also discussed by Professor P. W. Richards of Bangor, who read his own paper and one by Dr P. S. Ashton of Aberdeen. It has always been hard to explain why this flora contains so many closely allied tree species living together in the same complex but ecologically monotonous vegetation. The traditional view is that in such conditions natural selection is weak; there is little integration between plants and their environment, and variation is mostly non-adaptive. Professor Richards, however, talking about speciation and the concept of the niche, cast doubt on this view by pointing out that there are many characteristics of possible ecological importance in which trees can differ, so that they may be more adapted to their environment than previously thought. Much more information is needed about the autecology of forest trees before the problem of speciation in these conditions can be worked out satisfactorily. Evidence collected by Dr Ashton, working on the South East Asian dipterocarp trees, suggests that it is not necessary to formulate modes of speciation for the tropical rain forest that differ essentially from those in other terrestrial ecosystems.

NUTRITION

Providing More Protein

from a Correspondent

A SYMPOSIUM on new sources of food protein was held by the Scottish Group of the Nutrition Society on October 26 at the University of Strathclyde. The chairman, Dr R. L. M. Synge (ARC Food Research Institute, Norwich), said that the idea of new sources of protein was founded on two simple facts—that all proteins were formed from twenty amino-acids and that, of these, monogastric animals were unable to synthesize ten.

Dr A. A. Woodham (Rowett Research Institute, Aberdeen) said that the efficiency of conversion of plant protein into animal protein is only about 25 per cent, so that human beings may ultimately be forced to forgo the luxury of eating meat. Much could be done, however, to avoid the wastage involved in the overproduction of protein in certain areas by supplying this to areas abnormally short of protein. One approach is the extraction of protein from vegetable products. The highest yield can be obtained from forage crops and it may be possible to develop an economic system involving the extraction of protein from these crops and feeding the residue to ruminants, possibly in conjunction with urea. Some success has already been achieved with soya bean extracts. Another approach is the fractionation of certain proteins to obtain a material of higher biological value. This has been tried, but some results have been disappointing, possibly because of the low availability of certain essential amino-acids. It may also be possible to develop the cultivation of certain plant species not normally cultivated; attempts have already been