is to be expected because Graf's mutants are non-transforming. Up to 50 per cent of the birds of the strains susceptible to leukosis virus developed either erythroid or lymphoid leukosis as a result of inoculation with the non-transforming Rous sarcoma mutants. This striking result indicates either that the mutant virus genome has the capacity to induce leukosis or it is able to recombine with an endogenous, latent leukosis virus genome in the chicks. But in any event the mutant viruses can be called leukosis viruses because they induce leukosis either directly or indirectly. Furthermore these experiments establish that more than one gene in avian leukosis/sarcoma viruses can cause neoplasia.

If all chick cells did not inherit the genetic information required to specify an avian leukosis virus (using that term in its taxonomic rather than pathological sense), the interpretation of the experiments of Biggs *et al.* would be simpler and more clear cut. But the fact is that all chicks do apparently inherit a DNA provirus of a leukosis virus ; where they differ is in the extent to which this endogenous viral genome is expressed. As Hayward and Hanafusa (*J. Virol.*, **11**, 157 ; 1973) report, chick cells which contain the group specific antigen of the avian RNA tumour viruses and the helper factor for replication of infectious BH.RSV contain between three and forty copies per cell of viral RNA which is apparently transcribed from less than about 50 per cent of the endogenous leukosis virus genome. By contrast, cells which lack the gs antigen and helper factor do not contain any detectable viral RNA but they do contain viral DNA. Further, cells which support the replication of an exogenous leukosis virus RAV-2 contain 3,000 to 4,000 copies of complete transcripts of the viral genome.

All these data are consonant with the dogma that all chick cells inherit a DNA provirus of an avian RNA "leukosis" virus and that the extent to which the endogenous genome is expressed is controlled by other cellular genes. Whether the endogenous virus has any oncogenic potential is an important question that has yet to be answered.

MAGNETIC RESONANCE

EPR in a Superconductor

from a Correspondent

THE first unequivocal observation of electron paramagnetic resonance (EPR) of a localized moment in a superconductor has been claimed by Rettori *et al.* of the University of California (*Phys. Rev. Lett.*, **30**, 437 ; 1973). The experiments were performed on the intermetallic compound $LaRu_2$ containing various concentrations of gadolinium. It is the Gd atoms which provide the local moments that are the source of the resonance signal.

The magnetic impurities reduce the tendency to superconductivity of the $LaRu_2$ as they act as an unpairing mechanism on the paired electrons, the so-called Cooper pairs, which are responsible for the superconductivity. For gadolinium concentrations which are not too high, however, the alloy remains a superconductor. The applied magnetic field needed to perform the resonance experiment also tends to destroy the superconductivity. But in spite of the destructive mechanisms, the alloys used by Rettori *et al.* were superconducting in the presence of the resonance field at temperatures less than about 3 K and, below 2.8 K, they were able to observe X band EPR in the superconducting state. EPR in the normal state was also observed at temperatures greater than 3.2 K.

From the results of the experiments it was possible to obtain estimates of the exchange and spin-orbit scattering rates. These rates determine how an excited Gd atom loses its energy. Initially the energy is lost to the conduction electrons by exchange scattering and then the conduction electrons lose the energy to the lattice by means of their coupling through the spin-orbit interaction. If the exchange scattering rate is higher than the spin-orbit scattering rate a "bottleneck" is formed because energy is piled up in the conduction electrons. It is rather like a tank which is being filled and emptied at the same time. If the filling rate is higher than the emptying rate then the tank becomes full and any further filling is prevented. For the $LaRu_2$:Gd system in the temperature range used in the experiments no bottleneck was observed in either the normal or superconducting states. But recent theory (K. Maki, unpublished) predicts an increasing exchange rate and a decreasing spin-orbit rate on going from the normal to the superconducting state. Thus, now that EPR has been observed, there is the exciting possibility that bottlenecked systems can be measured, and it should then be possible to determine directly the dynamics of the conduction electron spins in the superconducting state by making use of the changing EPR-bottleneck conditions.

GEOCHEMISTRY

Pulling Together

from a Correspondent

ENVIRONMENTAL biogeochemistry, the subject of a symposium held in Logan, Utah, from March 22 to 24, is more an area of common interest than a new discipline. The emphasis throughout the meeting was on the understanding of environmental processes involving chemistry and microbiology and the connexion between these studies and the geological record. Perhaps the principal achievement of the conference was that it highlighted the considerable current activity in the study of the interaction between microorganisms and inorganic materials. Microbiologists, chemists, soil chemists and so on often have slight knowledge of each other's disciplines, however, and it was in bringing people together to effect a cross fertilization of ideas and techniques that the confer-

Maturation of Ribosomal RNA

IN *Nature New Biology* next Wednesday (May 9) Chang and Irr report a series of experiments in which they have analysed the synthesis and maturation of ribosomal RNAs in stringent and relaxed strains of *Escherichia coli* starved for leucine. Their data indicate that in both strains ribosomal RNA genes are transcribed to yield precursor ribosomal RNAs, albeit in different amounts. Furthermore in both stringent and relaxed strains of *E. coli* in conditions of amino-acid starvation the maturation of the ribosomal precursor RNA is blocked at its terminal stages so that precursor 16S and precursor 23S ribosomal RNAs are not converted to mature 16S and mature 23S ribosomal RNAs. In other words "accumulation of rRNA precursors is not an artificial situation brought on by starvation of a mutant which has lost the ability to regulate the synthesis of RNA but, rather, a phenomenon which occurs in both rel^+ and rel^- bacteria during leucine starvation".

But why does amino-acid starvation, apart from any effect on RNA synthesis, block the maturation of ribosomal RNA precursors at some late stage in the maturation process? Chang and Irr suggest that certain ribosomal proteins are required to alter the configuration of precursor ribosomal RNAs and therefore protect them from complete degradation but make them available for the precise cleavages that result in correct maturation. If the pools of these ribosomal proteins are exhausted during amino-acid starvation, maturation will not go to completion. In short, Chang and Irr believe that during amino-acid starvation precursor ribosomal RNAs accumulate in *E. coli* because the supply of ribosomal proteins that are essential for maturation becomes limiting.