not enter into the scheme at all. Whereas β-chains can add directly to the complex, the reactive species in haemoglobin is the $\alpha\beta$ dimer, and the slow step is then the dissociation of each α-chain from the haptoglobin to allow an $\alpha\beta$ unit to bind in its stead.

UPPER MANTLE

Tasman Conductivity

from our Geomagnetism Correspondent

THE Tasman Geosyncline, which lies along the southern part of the east coast of Australia, is a long structure generally some 200–300 km wide and includes two major topographic features, the Australian Alps and the Main Dividing Range, as well as the three major cities of Canberra, Melbourne and Sydney. Geologically it comprises folded and metamorphosed rock belts of Ordovician to mid-Devonian age and includes the major granite batholith which forms Mount Kosciusko, at 2,219 m the highest point of the Australian continent. Seismic refraction studies have shown that the crustal rocks beneath Canberra are about 40 km thick but thin to about half of that in the coastal region. The eastern boundary of the geosyncline is not particularly clear although seismicity extends to the continental shelf. The western boundary, on the other hand, is rather different; seismological studies have indicated quite a clear boundary to the current tectonically active belt. Little, however, is known about the region immediately to the west of the geosyncline in spite of its proximity to the three principal Australian cities. Outcrops are poor there and the only major structure mapped, and that superficially, is a sedimentary basin.

To learn something about the behaviour of the upper mantle, both beneath the geosyncline and to the west of it, Tammemagi and Lilley (*Geophys. J.*, **22**, 505; 1971) have made four magnetotelluric soundings at 150 km intervals roughly along the latitude of Canberra—at Moruya on the east coast, Spring Valley near Canberra almost on the crest of the belt, Wagga Wagga slightly to the west of the geosyncline and Griffith well to the west. The magnetotelluric method itself is not new, although in this case automatic equipment was operated at each site for at least four weeks, a rather longer than usual period, to ensure that enough events were recorded. In spite of the long history of the method only a handful of magnetotelluric measurements have ever been made in Australia and none at all in what could be regarded as Australia's best known geological region.

Three events or periods of activity, including at least one magnetic storm, were frequency analysed for each site and for signals in the period range 10^3 to 10^4; and the usual curves of apparent resistivity (of the upper mantle) were constructed. As is well known, the interpretation of magnetotelluric data is frequently hampered by the inherent ambiguities, especially where the frequency range is limited and where the curves of apparent resistivity show anisotropy. In this particular work, three of the four stations were troubled by anisotropy. At Moruya, on the east coast, ocean-induced anisotropy is clearly present. The data are most consistent with a two-layer conductivity model although because of the anisotropy a large number of detailed models within this classification are possible. At Wagga Wagga and Griffith the situations are similar except that three-layer models are more appropriate. But at Spring Valley, close to the crest of the geosyncline, there is no anisotropy. A two-layer conductivity model is again most appropriate here although a range of electrical conductivity structures is possible.

But although anisotropy and the limited frequency range have prevented Tammemagi and Lilley from making detailed conductivity models, one important fact has emerged from the data —this is that in the depth range 100–300 km the electrical conductivity under the stations Moruya and Spring Valley is an order of magnitude higher than that under Wagga Wagga and Griffith.

In other words, the conductivity is higher under the Tasman Geosyncline than under the region to the west of it. In view of the correlation between electrical conductivity and heat flow discovered in Utah and Colorado by Reitzel *et al.* (*Geophys. J.*, **19**, 213; 1970), Tammemagi and Lilley interpret this as a temperature difference in the upper mantle between the two regions. Using the relationships presented by Tozer (*J. Geomagn. Geoelect.*, **22**, 35; 1970), they calculate that at a depth of about 200 km the temperature difference should be about 200° C; but whatever the precise figures, the existence of a

Helping Human Adenovirus to Replicate

SEVERAL human adenoviruses infect only abortively African green monkey kidney cells—the virus particles penetrate these cells and are uncoated; viral RNA is made, the viral genome replicates and at least some viral proteins are synthesized, but very few progeny virus particles are produced. In these monkey cells it seems that either some crucial viral proteins are not synthesized or the transport of the viral proteins from the cytoplasm where they are made to the nucleus where progeny virus particles are assembled is blocked. By coinfecting the cells with simian virus 40, however, these blocks are removed and the yield of adenovirus is greatly increased. In other words, SV40 provides some helper function which permits human adenoviruses to complete their replication in non-permissive monkey cells. In next Wednesday's *Nature New Biology*, Henry, Slifkin and Merkow report experiments which shed some light on this intriguing phenomenon.

Henry *et al.* infected with human adenovirus 2 coverslip cultures of non-permissive African green monkey kidney cells and permissive VERO and HeLa cells, which support the complete replication of this virus. Some of the monkey cell cultures were also co-infected with SV40 either immediately or within 24 h and 5-fluorodeoxyuridine (FUdR) was added to some of the co-infected cultures. This drug blocks the synthesis of "late" SV40 proteins but does not impair the SV40 helper function(s). At 24 or 45 h after infection 2 min pulses of labelled amino-acid were fed to the cultures which were then chased with cold medium. The synthesis and transport of protein made during the pulse could then be measured by autoradiography.

In brief Henry *et al.* found, using an immunological precipitation assay to differentiate between viral and host proteins, that some 60–70 per cent of the viral protein made in permissive cells is transported into the cell nuclei. In the monkey cells infected by adenovirus 2 alone only about 20 to 30 per cent of the protein labelled during the pulse is in the nucleus some 2 h later, the remainder is still in the cytoplasm concentrated about the periphery of the nucleus. By contrast, in monkey cells coinfected with SV40 and exposed to FUdR about 50 per cent of the adenovirus protein is transported to the nucleus. Further, the amount of viral protein made in the coinfected cells is significantly greater than the amount made by the cells infected with adenovirus alone.

It seems therefore that some SV40 gene product(s) not only enhances the synthesis of adenovirus proteins but also promotes the transport of these proteins into the nucleus where they are assembled into capsomeres and capsids. It is probably this second helper function which is chiefly responsible for increasing the yield of progeny virus particles; its molecular basis, needless to say, awaits elucidation.