do have some defect in their ability to replicate DNA with any accuracy. Does this result from errors in synthesis or through a failure of the nuclease to "edit" any errors introduced during DNA synthesis? Other questions concern the origin of the faulty polymerase. Is this of viral origin, or does it reflect the presence of an altered lymphocyte polymerase which is defective in base selection? On a more positive note, it is certain that such errors will enhance the mutation rate of these leukaemic cells and it is highly probable that this is responsible for the increasing variation which occurs during their proliferation.

The selective advantage which such random genetic mutation would confer on leukaemic cells is obvious, and what one now needs to know is whether DNA polymerases from the cells of other tumours show the same propensity for mis-replication. Is there, in fact, any relationship between mis-replication of DNA and a viral or non-viral origin of the malignancy?

EARTH MODELS

New Oceanic Model

from our Geomagnetism Correspondent

THE classical Earth models were seismically based on body wave travel-time data. In recent years, however, the range of geophysical information available to potential model makers has greatly increased, not least through the development of seismic arrays. This has led to several attempts to produce more realistic models. Haddon and Bullen (*Phys. Earth Planet. Interiors*, 2, 35; 1969), for example, tried to update the Bullen-A model using eigenperiod data, although modes were only taken up to 44. Press (*Science*, 165, 174; 1969; and others) generated by computer about 5 million random models which he reduced to a handful of successful models consistent with travel-time, eigenperiod and surface wave phase velocity data, although most of these were not entirely consistent with the group velocity data of both Love and Rayleigh waves. This fault was partly remedied by Kanamori (*Phys. Earth Planet. Interiors*, 2, 259; 1970) who modified one of Press's most successful models, although even in this new model (5.08 M) Rayleigh wave velocities deviated from observation at periods below 150 s. Moreover, a predicted layer of very low density between 221 and 421 km may not be physically reasonable.

Appreciating the importance of group velocity data, Mizutani and Abe (*Phys. Earth Planet. Interiors*, 5, 345; 1972) have now derived a new oceanic Earth model (designated OC-1) using a trial and error technique in conjunction with the equations of state for silicates and oxides, which are potential mantle

materials. The model has been designed to fit the Earth's total mass and moment of inertia, free oscillation periods for fundamental spheroidal and torsional modes up to 60, Love and Rayleigh wave phase velocities for purely oceanic paths in the period range 100 to 325 s, and Love and Rayleigh wave group velocities for predominantly oceanic paths in the same period range.

The chief characteristics of the model include a pronounced low-velocity layer between 70 km and 210 km (P wave velocity = 7.70 to 7.74 km s⁻¹, S wave velocity = 4.25 km s⁻¹ and density = 3,400 kg m⁻³). Immediately above the low-velocity layer lies a region about 50 to 60 km thick with a high density (3,500 kg m⁻³) and a high S wave velocity (4.72 km s⁻¹). Moreover, between 220 km and 340 km the S wave velocity has a negative gradient (thought to arise from an increase in the iron and pyroxene contents with depth) and there is a suggestion of chemical inhomogeneity with depth in the upper mantle.

The only problems of any significance (and that is debatable) seem to be that the predicted eigenperiods of the torsional mode are systematically higher than the observed ones by about 0.5 s, and the predicted Love wave phase velocities are about 0.01 km s⁻¹ lower than the observed velocities at periods below 200 s. In this the Love waves and torsional modes differ from the Rayleigh waves and spheroidal modes for which prediction and observation agree. Mizutani and Abe note, however, that even these small discrepancies disappear if a small anisotropy of 0.7% is assumed to occur in the low-velocity layer. From the physical point of view, this is not an unreasonable supposition in a low-velocity layer caused by partial melting.

Structure in Solar Radio Bursts

THE solar radio bursts known as type V have been a puzzle since their discovery in 1958. At first, it was thought that their continuum radiation indicated a synchrotron origin, but more detailed observations suggested that Cerenkov radiation from coherent plasma waves is a better explanation, the waves being caused by electrons travelling at about $1/3 c$ which are magnetically trapped in the corona. In that case, harmonic structure ought to be detectable in the type V bursts; in next Monday's

POLLUTION

Atmospheric Oxidation

from a Correspondent

IN a recent issue of the *Journal of the Chemical Society, Faraday Transactions I*, Cox and Penkett report their latest work on oxidation mechanisms in polluted atmospheres (68, 1735; 1972). They have carried out laboratory experiments in which mixtures of SO₂ and ozone are reacted with gaseous olefinic hydrocarbons. On injection of the olefin into the gas mixture the SO₂ is rapidly oxidized to form aerosol particles of sulphuric acid of sub-micron size, with a concomitant drop in the concentration of both ozone and SO₂ (see diagram).

The burning of fossil fuels at present introduces approximately 100 million tons of sulphur dioxide a year into the atmosphere. The fate of the gas after injection has received considerable attention of late, the chief impetus for these studies coming from the realization that increased levels of atmospheric SO₂ might have several harmful effects. These could include increased acidity of rain, and the formation of sulphate aerosols leading to decreased visibility in industrial areas where the input of man-made SO₂ is greatest.

Once in the atmosphere SO₂ may be directly adsorbed onto solid surfaces, taken up by plant leaves or, because of its considerable solubility and reactivity, dissolved in water droplets. Gaseous SO₂ may be oxidized to SO₃ by the action of ultraviolet radiation, atomic oxygen, oxygen or ozone, but such photochemical reactions in the gas phase are probably much less important

Nature Physical Science (March 19) Benz reports the detection of just such a structure.

The observation was associated with a radio flare which began on October 25, 1972. There is no doubt that this was a type V burst, says Benz, and it shows a distinct double structure (see figure). Because the shape of the two humps in the intensity curve is the same, and because two unrelated type V bursts are most unlikely to occur together in this way, it seems that this burst shows harmonic structure with a frequency ratio of 2 to 3.

If type V radiation is preferentially excited in a second harmonic, as has been suggested, the latest observations presumably include second and third harmonics—third order emission from the Sun has previously been found only in one U burst. What the theoreticians will make of this observation remains to be seen.