tumour viruses and an RNA genome which in size and response to denaturation is remarkably similar to those of the RNA tumour viruses (Lin and Thormar, *J. Virol.*, **7**, 582; 1971), should be grouped with the oncornaviruses. Moreover, Stone and Takemoto's findings, which are fully in keeping with Temin's hypothesis, should spur on the screening of other RNA viruses initially for reverse transcriptase and then oncogenicity if they have the enzyme.

But why do visna virus and PPV contain a reverse transcriptase when they do not apparently cause tumours in their natural host, the sheep? Both are so called slow viruses which chronically infect sheep for many months and even years; both cause very slowly progressing diseases (the parallels with tumour viruses and cancers are obvious enough), and it may well be that the maintenance of slow virus infections depends on the production of a DNA provirus, as does tumour virus infection. As Takemoto and Stone point out, the concept of a DNA provirus should not be overlooked in studies of any slowly progressing disease which has been suspected of having a viral aetiology.

JUPITER

Great Red Spot

from a Correspondent

JUPITER'S Great Red Spot is an unsolved problem of long-standing in astronomy. Nobody to date has produced a satisfactory explanation for the features of this elliptical blemish, although high resolution observations and subtle theorizing are now reducing the number of possibilities.

Observers at the New Mexico State Observatory have photographed Jupiter with a 61-cm telescope on every possible opportunity since 1963, and they can fix the position of the red spot to within 0.2°. A summary of the 1970 observing season prepared by E. J. Reese (*Icarus*, **14**, 343; 1971) gives a good impression of the motions of the surface markings. Last year the red spot was very dark and well defined, and it had mean lateral dimensions of 27,800 km by 13,800 km. There is now considerable information on the detailed motion of the spot, particularly its drift in longitude. In Reese's data the 3-month oscillation discovered five years ago shows up strikingly, with an amplitude of around 1°, and Reese comments that the motion is sufficiently regular for the extreme points of this harmonic motion to be predicted with an uncertainty of only 4 days. Moreover, on longer time scales, the spot probably has a 9-year oscillatory motion, and there is a systematic long term wandering which is aperiodic.

High quality observations such as these are winnowing down the possible models of the red spot, and Carl Sagan, of Cornell University, has recently tackled the problem using propositional calculus (*Comments Astrophys. Space Sci.*, **3**, 65; 1971). His method is to set down a few well established facts with which an acceptable theory must be consistent; these include such properties as the red colouration of the spot, its uniqueness, its periodic longitude excursions and its long term stability. These features are then assembled into a "truth table" or check list for interrogating the theories.

The floating raft hypothesis advanced in 1881 has had a good run; basically it says the red spot is something floating in something else, and is careful not to be too precise. The Jovian raft founders, however, because it cannot really explain the oscillations, and Sagan's table prognosis is decidedly negative. Another class of theories treats the red spot as a meteorological phenomenon. Foremost of these theories is Raymond Hide's Taylor column hypothesis: when a homogeneous fluid flows over an obstacle a relatively stagnant tube of fluid is formed; the red spot is a visible manifestation of a Taylor column caused by a topographical feature on the planet. Sagan's analysis, however, gives this idea a bruising, and he questions how the uniqueness, colour and motion of the red spot can be fitted into such a model.

A novel approach to the problem of the red spot is advocated by W. B. Street, H. I. Ringermacher and G. Veronis (*Icarus*, **3**, 319; 1971). They fuse the attractive parts of the raft and column hypotheses to produce a Cartesian diver model which gives a good account of the mobility of the red spot. In its simplest form the Cartesian diver is an inverted float, containing a small amount of trapped gas, in a jar of fluid. The diver can be made neutrally buoyant at a fixed level by exerting a pressure on the fluid. The Jovian diver is visualized as a light phase of solid hydrogen floating in a dense hydrogen–helium fluid; it lies at depths of several thousand kilometres, in the megabar pressure regime, and its base is heated by the planetary interior. Consequently the diver rises to a higher level, where the lower pressure causes some of the hydrogen to melt. As the solid erodes the bubble of heat is released, and so the Cartesian diver can descend to a lower level and grow again.

Although the argument put forward by Street *et al.* is highly speculative the physical processes behind it are reasonable and they are consistent with the observed changes in the size and colour of the spot over the past century. The value of the hypothesis comes in considering the oscillations, because the equations of motion for a diver in a rotating ocean suggest that the longitudinal motion of the red spot consists of several oscillatory components of different amplitude and frequency. These predictions are in precise agreement with periods derived by Reese *et al.*

Nitric Acid in the Stratosphere

RECENT developments in infrared and submillimetre techniques have led to the identification of several previously unknown molecules in the Earth's atmosphere and stratosphere. But in order to make quantitative determinations of the concentration and distribution of such species it has also been necessary to undertake new laboratory investigations of the molecular vibrational and rotational spectra. The necessary use of long optical paths in infrared observations carries with it the great advantage over chemical probe techniques that local contamination by the observation system can be minimized. Recently Murcray *et al.* (*J. Opt. Soc. Amer.*, **59**, 1131; 1969) detected nitric acid in the stratosphere by studying the near infrared absorption of solar radiation using a balloon at a height of 30 km. The spectra were recorded near sunset to obtain a long path length through the stratosphere, and the minimum altitude observed was about 20 km.

These authors have suggested that the nitric acid is associated with the ozone layer in the upper atmosphere but it is also important to know whether nitric acid is a characteristic constituent of the stratosphere or whether it is accumulating because of pollution in the lower atmosphere. New measurements by Drs Harries, Burroughs and Duxbury (National Physical Laboratory and Bristol University) are reported in the forthcoming issue of *Nature Physical Science*, and these confirm that the nitric acid concentration does indeed decrease with decreasing height as does the concentration of ozone. The new observations are of the submillimetre emission spectrum of the stratosphere observed from a Comet aircraft flying along a controlled path at a height of 12.5 km. At this height there are several important advantages in the emission technique compared with the solar radiation method.

The emission spectrum between 18 and 34 cm^{-1} shows the well known atmospheric emission lines of H_2O, O_2 and O_3 and several unidentified lines. A parallel laboratory study has, however, shown that, although nitric acid has a strong characteristic rotational spectrum in this region, the unidentified lines cannot be attributed to HNO_3.