tochemical reaction of sunlight with water molecules high in the atmosphere, thereby providing an escape route with the hydrogen leaving the planet

$$H_2O + h\nu \rightarrow 2H + O \qquad (1)$$

where h is Planck's constant and ν is the frequency of light. However, the oxygen cross section for the absorption of photons in the pertinent range of energy is so large that the net reaction rate for the relatively small number of water molecules high in the atmosphere is quite small. Thus, this method for the removal of water from the planet is not realistic.

It should be emphasized that, if the last Venera 4 measurements were not from the surface of Venus as reported, then the arguments for the ice cap model and the above considerations are weakened.

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Positions of Ribosomal Subunits

Morgan believes that he has located the exact positions of the large (50*S*) and the small (30*S*) ribosomal subunits in a three-dimensional array of ribosomes known as the chromatoid body (*1*). We suggest that it is unlikely that he has done so.

In electron micrographs of longitudinal sections through the chromatoid body, one sees an array of closely packed fibers. Optical diffraction patterns of the electron micrographs show the fibers to be helical chains of subunits (ribosomes) (*2*). Making use of the helical nature of the fibers, Morgan says he was able to calculate "the distribution of electron density within one ribosome, which the data of Fig. 2 [an optical transform of a longitudinal section] implies" (*1*). The calculation is based on an inverse Fourier-Bessel transformation for which one needs to supply both the phases and amplitudes of the Fourier-Bessel coefficient; however, only the amplitudes are directly available from the optical transform. The result was a density map which shows a large peak and a small peak in the asymmetric unit. Morgan then supposes that these peaks correspond to the large and small subunits of the ribosome.

We raise three objections.

1) The amplitudes required for the calculation of the density map were measured from photographs of the optical diffraction pattern. A rigorous application of the Fourier-Bessel transformation requires that the amplitudes of the coefficients correspond to a single helical chain. Morgan, however, has substituted amplitudes which correspond to some portion of a tightly packed array of chains and has ignored the effects on his density map of not dealing with a single chain.

2) The prospect of Morgan's having a correct density map is made even more unlikely because his calculation was carried out with assumed phases rather than with phases corresponding to those of the actual chain of ribosomes. It is fairly well known (*3*) that if the amplitudes of one structure are assigned the phases of another, the resulting density map bears no resemblance to the structure from which the amplitudes are obtained but that it resembles the structure from which the phases are obtained. The phases for Morgan's calculation were obtained by his assuming that the phases of a helical chain of points approximate those of a helical chain of ribosomes. Therefore, Morgan's density map, at best, describes a ribosome only to a resolution at which a ribosome looks like a point. One is suspicious of the two peaks in the map, moreover, because, as Morgan himself points out, the choice of phases constrains the two peaks to sit on dyad axes although a priori there is no such constraint on the ribosomal subunits. Rather than assign physical significance to these two peaks, it is more reasonable to suppose that they were the result of some mathematical artifact, for example, series termination in the transformation. Finally, of course, the correctness of the result could have been checked by ascertaining whether the model could be used to reproduce the distribution of density in the electron micrographs.

3) We object to Morgan's basic approach to the interpretation of electron micrographs. By relying entirely on a photograph of the optical diffraction pattern which records intensities only, he has unnecessarily placed himself in the awkward position of having to guess at phases. As we have pointed out (*4*), the phases are contained in the electron micrograph. We have set out procedures for obtaining the phases from the electron micrographs as well as procedures for the final three-dimensional reconstruction of the structure.

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