

spread of a tumour simply as the result of its presence in the local environment. Furthermore, a tumour might become responsive to the presence of the factor as the result of the expression or amplification of *c-met* receptors present on the cell surface. As a consequence an invasive phenotype would be induced. A further possibility is that the tumour itself might come to synthesize the factor. Up to now HGF-SF has been found

largely to be synthesized by one cell type but to have its effects on another (that is, it is paracrine in action). But one report has demonstrated the autocrine synthesis of the cytokine by a keratinocyte line¹⁶ and a similar mechanism may operate in the development of some tumours. □

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RÉSUMÉ

In a nutshell

A TECTONIC history of the Himalayas based on a single mineral grain is the bold promise of F. M. Richter *et al.* (*Earth planet. Sci. Lett.* **105**, 266–278; 1991). The authors' claim is that different domains in their feldspar sample retain ⁴⁰Ar, a radiogenic daughter of ⁴⁰K, up to different maximum temperatures. By step heating the sample and analysing the composition of gas drawn off it at each temperature, they reconstruct the (reverse) cooling history of the grain based on the range of argon isotope ages. The authors then deduce that up to around 20 million years ago, the sample was buried 10 km below the Earth's surface; 5 million years later it was only 2 km deep. The simple inference is that this was the period over which rapid tectonic uplift occurred, accompanied by erosion of the overlying rocks from the evolving mountains.

Counter current

A PROMISING form of treatment to halt the lung disease in cystic fibrosis (CF) patients is described by M. R. Knowles *et al.* in the *New England Journal of Medicine* (**325**, 533–538; 1991). The severe bacterial lung infections associated with CF are closely tied to defective chloride secretion and raised sodium absorption through the airway epithelia, which alter the chemical environment in the lung. In preliminary tests on cultured nasal epithelial cells from 12 CF patients, Knowles *et al.* find that a combination of the nucleotide adenosine (or uridine) triphosphate with amiloride induces chloride secretion. The extracellular nucleotides possibly bypass the defective CF chloride channel by stimulating a class of cell-surface nucleotide receptor. The results raise hope that an aerosol preparation may be an effective form of therapy.

Outer limit

THE discovery of a quasar at record-breaking distance at the start of a large-scale quasar survey bodes well for the investigators, D. P. Schneider, M. Schmidt and J. E. Gunn (*Astr. J.* **102**, 837–840; 1991). The survey is intended to discover quasars at redshifts of 4.0–5.5 — at the limits of the observable Universe. Until the new discovery, the most distant known quasar had a redshift of 4.73. The new one, PC1247+3406, has a redshift of 4.897 so that the light now reaching Earth from it was radiated when the Universe was only 7 per cent of its current age. Although it is not the brightest quasar yet seen, its image is well above the sensitivity of the astronomers' detector. This and the fact that the quasar was discovered after only 3 square degrees of the sky had been surveyed, suggests that we may hope soon to learn of even more distant objects.

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CHEMICAL PHYSICS

Gas-phase liquids

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AT a qualitative level, the distinction between the spectroscopy of a gas-phase molecule and that of a molecular liquid can be summarized quite simply: isolated molecules yield very high-resolution spectra, whereas the spectra of liquids are poorly resolved because of the line-broadening processes which result from frequent collisions. But experiments by Sands *et al.*¹ now suggest that this distinction may not be as obvious as was previously believed. Results from experiments on the structure and dynamics of small, gas-phase clusters containing a

simple molecule and helium show that even when very cold (below 1 K), the inert-gas atoms continue to exhibit the type of large-amplitude motion normally associated with a liquid rather than a rigid complex.

Clusters can be formed by the adiabatic expansion of a high-pressure gas (20 atmospheres) through a small orifice (150 μm) into a vacuum (10^{-6} atmospheres). The rapid cooling (10^8 K s^{-1}) that accompanies such an expansion process has two beneficial effects for spectroscopy: single molecules achieve very low rotational and vibrational temperatures, which results in a considerable simplification of spectra through a reduction in the range of possible spectral transitions; and condensation can take place which leads to the formation of complexes. Thus, by a suitable choice of gas/vapour mixtures, species such as He_nI_2 , Ar_nSF_6 , $(\text{H}_2\text{O})_n\text{C}_6\text{H}_6$ (with n a small number) can be generated. The experiments of Sands *et al.*¹ rely on a combination of these factors in an attempt to measure the high-resolution spectra of He_2Cl_2 .

In the spectroscopic analysis of isolated molecules like Cl_2 or C_6H_6 , a first approximation is to assume that the molecules vibrate harmonically and that they remain more or less rigid as they rotate (the rigid rotor approx-

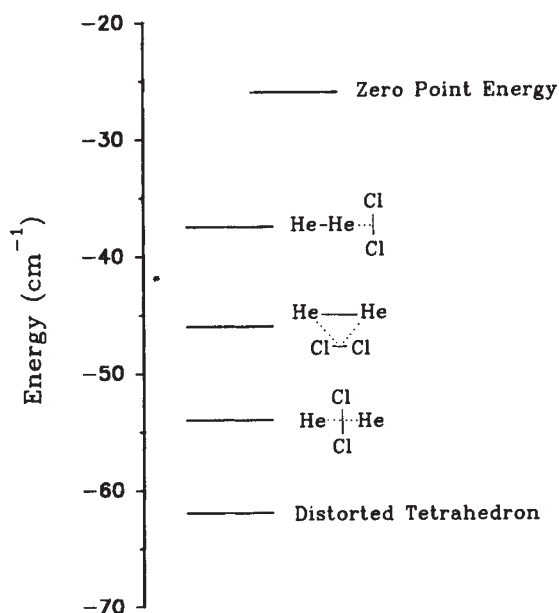


FIG. 1 Potential energy diagram for the possible configurations of the complex He_2Cl_2 . Note that each configuration lies below the minimum energy (the zero-point energy) attainable by the complex.