RÉSUMÉ

Mice and men

MULTIDRUG resistance is a major barrier to cancer chemotherapy, and the evidence points to the source of the problem in many cases being overexpression in tumour cells of the so-called P-glycoprotein. This membrane protein, the product in humans of the *MDR1* gene, is a transmembrane transporter which facilitates extrusion of a number of different anti-cancer drugs from the cells in which it is expressed. G.H. Mickisch *et al.* now report (*Proc. natn. Acad. Sci. U.S.A.* **88**, 547–551; 1991) that they have made transgenic mice expressing the human *MDR1* gene in their bone marrow, and that the leukocytes of the mice are indeed resistant to anti-cancer drugs. So these animals provide what could be an ideal system for testing ways in which the P-glycoprotein can be prevented from working.

Winding up

DIFFERENT mechanisms are responsible for cyclones to the east and west of Mexico, according to J.A. Zehnder and R.L. Gall (*Tellus* **43**A, 25–36; 1991). In the Gulf of Mexico and further to the east, cyclones arise from temperature contrasts over the land and sea. But these anomalies do not occur to the west of Mexico, in the eastern North Pacific. Instead the authors argue that the Sierra Madres mountain chain, which runs northwest to southeast in the western United States, is responsible. Zehnder and Gall's model shows that the cyclonic seeds are shed by southeasterly winds, blowing parallel to the mountain range. The winds must be neither too strong nor too weak for the cyclonic vortices they generate over the Pacific to be of the right scale to draw heat efficiently from the warm ocean to develop into full-blown cyclones. This mechanism explains why cyclones tend to develop close to the Mexican coast in the Pacific; by contrast, they are distributed widely over the Gulf of Mexico and Caribbean.

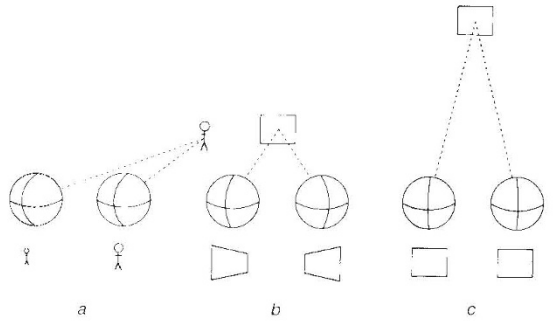
Crystal tips

THE search for undue human exposure to lead turns to the drinks' cabinet with a report by J.H. Graziano and C. Blum of Columbia University in *The Lancet* (**337**, 141–142; 1991). The authors found that the lead concentration of port kept in lead crystal decanters for four months rose from the 89 $\mu g\ l^{-1}$ measured when it was fresh from the bottle to as much as 5,331 $\mu g\ l^{-1}$ — that is, lead had been eluted from the decanter into the port. In a further analysis, lead concentrations of the contents of decanters provided by colleagues were tested; in one instance, brandy that had been stored for over five years yielded a value of 21,530 $\mu g\ l^{-1}$. The implication of the study is that lead-free crystal may lack sparkle but that it is less of a potential hazard to health than the leaded variety.

mation or shear between two stereoscopic images[8]. Thus the evidence for the second prediction is inconclusive.

With hindsight, it is surprising that it has taken nearly eight years for anyone to test the third main prediction — that vertical disparities could be used to scale horizontal disparities to achieve depth constancy. In their report Cumming *et al.*[4] describe the results of an experiment in which observers were asked to judge the perceived shape of horizontal cylinders with an elliptical profile defined by disparity information alone. By using a series of cylinders which were more elongated or flattened in the third dimension, the authors were able to determine the point at which the cylinders appeared to have a circular profile, like the side view of a length of pipe. Given the inverse-square law relationship between disparities and absolute distance, the vertical disparity hypothesis would predict that a simulated cylindrical surface with the same disparity profile should be perceived as having a different amount of depth and thus a different shape when vertical disparities appropriate to different viewing distances are introduced. But Cumming *et al.* show conclusively that manipulations of vertical disparity have no effect on the perceived shape of the cylinders.

Manipulations of vergence angle, on the other hand, did alter perceived shape to the extent of 45 per cent of the constancy produced by a real change in the viewing distance in their set-up. The authors interpret these findings as strong evidence that the human visual system does not use vertical disparities to estimate absolute viewing distance and to scale horizontal disparities. Additional support for their conclusion comes from our own unpublished results and those of E. Sobel and T. Collett (personal communication) which show that manipulations of vertical disparity do not affect the amount of perceived depth in either 3D sinusoidal corrugations or a simple step change in disparity respectively.



a, When the eyes are directed towards an object which is not directly in front of the observer, the image of that object will be uniformly larger in the one eye than the other, because one eye (in this case the right eye) is closer to the object. This difference in image size increases with the eccentricity of gaze and therefore could provide a clue to gaze angle, although the size difference also depends on the object's distance from the observer. *b*, With fixation on a rectangular surface directly in front of the observer, the images on the retina will be trapezoidal in shape rather than rectangular. This arises because the left-hand edge of the surface is closer to the left eye than the right-hand edge and, consequently, it will subtend a larger angle. *c*, For the same surface, much further away, the size difference is minimal and both images will be approximately rectangular in shape. Hence, in principle, vertical size differences could be used to provide information about the absolute distance of the surface from the observer, as was originally suggested by Mayhew and Longuet-Higgins[2]. (In reality, the retinal images would be inverted, left–right reversed and their shapes would be distorted by the curvature of the retina.)

Under normal viewing conditions, our ability to judge the relative depth of objects at different distances is quite good, at least for objects within a few metres of the observer[5,6]. If disparities are not scaled by vertical disparity information, what factors are responsible for depth constancy in normal viewing? In their experiment, Cumming *et al.* show that extraretinal cues in the form of vergence angle manipulations have a "substantial" scaling effect, although this accounted for only 25 per cent of that required for complete constancy. The degree of constancy was still low (less than 50 per cent) when the authors altered the physical viewing distance (rather than just the vergence angle), suggesting that shape constancy is not well maintained by the visual system. Alternatively, the answer might lie in the way constancy was calculated. The authors have assumed that the same estimate of absolute distance is used to scale both disparities and angular size for their shape judgements, which may not be the case. If constancy were calculated on the basis that only disparities are incorrectly scaled, then the degree of constancy would be much higher and closer to that found in other studies. □

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