

RÉSUMÉ

**Plumbing volcanoes**

FROM analyses of radioactive decay series in erupted lavas, D. M. Pyle (*Earth planet. Sci. Lett.* **112**, 61–73; 1992) has estimated the residence time of magma in reservoirs beneath Etna, Stromboli and Oldoinyo Lengai, volcanoes in Italy and the East African rift valley. Decay series are a chain of nuclear reactions like a succession of waterfalls pouring at different rates from one pool to the next; unstable parents decay rapidly and nuclide concentrations build up in front of slow reactions causing so-called radioactive disequilibria. Taking volcano plumbing to be a reservoir with balanced input and output, Pyle concludes that magmas reside beneath these volcanoes for as little as 10–100 years.

**Count down**

WARNINGS that the quality of human semen has declined in recent years are well founded, say E. Carlsen *et al.* in the *British Medical Journal* (**305**, 609–613; 1992). The authors looked at 61 papers that appeared between 1938 and 1990 and contained data from nearly 15,000 men; the geographical spread was wide, though almost half of the studies came from the United States. From their statistical analysis it seems that the mean sperm count dropped from  $113 \times 10^6 \text{ ml}^{-1}$  in 1940 to  $66 \times 10^6 \text{ ml}^{-1}$  in 1990, the corresponding figures for seminal volume being 3.40 ml and 2.75 ml. Could these apparent declines be due to variation in methods over the years, or bias in the populations sampled? Carlsen *et al.* think not, and point to an increase in certain genitourinary complaints over the same period as a possible cause.

**Riding along**

MASSIVE black holes are thought to be common in galaxy cores, and at least some galaxies formed through the merging of others. So some galaxies must contain two massive black holes, which will themselves eventually merge. T. Fukushige, T. Ebisuzaki and J. Makino (*Astrophys. J.* **396**, L61–L63; 1992) say that such mergers take a billion years or less, and estimate that every 5 years or so, somewhere in the Universe, two black holes will swallow each other. The coalescence causes a temporary but large twisting of spacetime, whose effects propagate outwards as a burst of gravitational radiation. Precise tracking of interplanetary spacecraft might reveal the passage of the gravity waves, although Voyager 1's trajectory, monitored briefly in 1981, showed nothing out of the ordinary. But with an event expected every few years, Fukushige *et al.* urge more patience.

which may control the force-generating activities of a subset of inner dynein arms and mediate their interactions with radial spokes.

To fulfil their functions, the actin-related proteins might form short filaments or oligomers that could be used as scaffolds to assemble additional regulatory proteins. Another possibility is raised by sequence comparison, which reveals<sup>1,2</sup> that cetractin/actin-RPV is most similar to conventional actin in the ATP-binding and hydrolysis regions, and less so in the regions involved in polymerization. So perhaps these divergent actins do not form polymers like conventional actin, but instead use nucleotide hydrolysis as a switch to control their association with other centrosomal or dynein-associated proteins. In this sense, cetractin/actin-RPV may be more similar to HSC70, an even more distant relative that shares a similar

three-dimensional structure with actin<sup>14</sup>.

Although information is sparse, the interaction between microfilaments and microtubules promises to be an exciting area of research. Besides the examples described here, interactions of microtubules with the actin cortex determine the position of the cleavage furrow and may be involved in positioning centrosomes and nuclei during the early divisions in development. Such systems should provide fertile grounds for discovering molecules that interconnect and communicate information between the microfilament and microtubule systems. □

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DIABETES

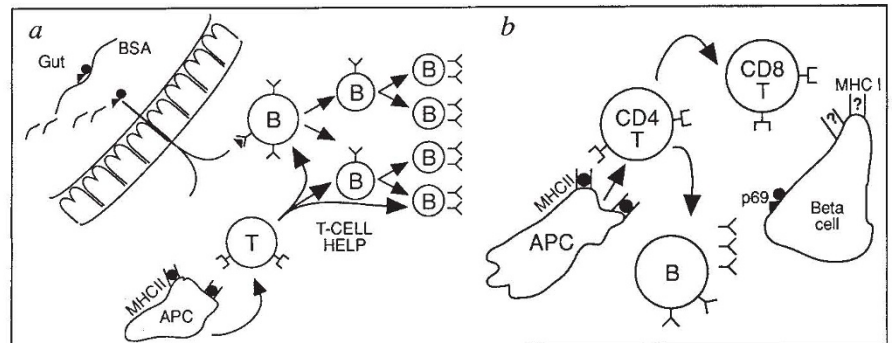
**Breast may well be best**

Alan G. Baxter and Anne Cooke

ENVIRONMENTAL factors are known to play a role in breaking tolerance to pancreatic  $\beta$ -cell antigens and precipitating the onset of autoimmune (type 1) diabetes mellitus in those individuals genetically prone to develop the disease. But the nature of these antigens, whether they are viral or dietary, remains controversial. Considerable effort has been put into the identification of the  $\beta$ -cell antigens recognized by auto-reactive B or T cells, and several candidate antigens have been identified. Now, Karjalainen and colleagues<sup>1</sup> describe observations supporting their intriguing hypothesis that destruction of the insulin-producing  $\beta$ -cells is caused by an immune response to cows' milk.

Karjalainen *et al.* found that serum

concentrations of antibodies against bovine serum albumin (BSA) were higher in patients with recent onset diabetes than in controls. Patients did not show raised concentrations of antibody to other antigens in cows' milk. Most of the anti-BSA antibody appeared to be directed against a 17-amino-acid section of the molecule (amino acids 152–168) which differs in sequence between humans and cattle. The authors previously showed that immunization with a synthesized peptide from this region of BSA, which they called ABBOS, induced an antibody capable of reacting with a pancreatic  $\beta$ -cell surface protein, p69. Although p69 is not normally expressed, it can be induced to appear on  $\beta$ -cells by the inflammatory mediator,  $\gamma$ -interferon.



a, Bovine serum albumin (BSA) from cows' milk is partially digested within the immature gut and large peptide fragments are absorbed. One such peptide contains an antigenic epitope recognized by T cells (●) and an epitope recognized by B cells (▲). This peptide triggers an immune response and, with T-cell help, B cells produce an antibody that binds BSA. b, Infection subsequently triggers expression of p69 on pancreatic  $\beta$ -cells. By coincidence, p69 contains both the B-cell epitope and the T-cell epitope of the BSA peptide and stimulates a secondary immune response which destroys  $\beta$ -cells. APC, antigen-presenting cell.