

Mystery object amid the chromosomes

SIR—The very tiny object shown below, much like a fragmented crossword in appearance, was recently found in one of our routine chromosome preparations for prenatal diagnosis following amniocentesis. But what is it?

Is it a man-made device? Packing text as binary coded information on the miniature scale (the scale bar is 10µm) would seem advantageous. Or is it a naturally occurring substance? None of the possibilities we have been able to think of would



seem to be appropriate for amniotic fluid, so if anybody is able to suggest an answer to this mystery we would like to have it. We are as intrigued as we are ignorant.

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Prospects for rabies control by vaccination

SIR—The successful vaccination of foxes against rabies using a recombinant vaccinia virus expressing rabies G glycoprotein¹ is an exciting advance and one can only look forward to field trials with great anticipation. But R.M. Anderson's News and Views summary² of this work contained some omissions and errors.

Anderson states: "... the instability of the attenuated strains and the possibility of reversion to full virulence have prevented their use in natural habitats". One awaits data on the stability of the vaccinia recombinant but for the past several years, thousands of doses of live attenuated rabies vaccines have been released in Switzerland, West Germany and Ontario, Canada. Not only have these releases apparently been effective in preventing the spread (Switzerland) or reducing the incidence (Germany) of rabies, but the

trials have been conducted without any evidence of reversion to virulence. Given the hurdles that face us in obtaining approval for field trials of any recombinant DNA products and the continuing severe global threat of rabies, use of attenuated live-virus vaccines is likely to continue for many years.

Anderson's analysis of the proportion of a wild fox population that must be vaccinated in order to interrupt or prevent a rabies epidemic is based on a model; clearly, his predictions are only as good as the data entering the model and its structure. None of the several rabies models has been adequately field tested. When they are, we may get indications that suppression (if not eradication) of rabies may be obtainable with much lower proportions of immune individuals than is supposed.

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2. Anderson, R.M. *Nature* **322**, 304–305 (1986).

Body temperature and the specific heat of water

SIR—The majority of homoiothermic animals maintain their body temperatures, during non-hibernation, within a few degrees of 36°C. Various explanations for this have been advanced, most centering on the temperature-dependent change in rate constants of enzyme-mediated chemical reactions. These explanations appear to beg the question, why 36°C? Why not 25°C or 48°C? Is it possible that the enzyme systems of cells evolved as a result of being encouraged to work at 36°C rather than the reverse? If so, the 36°C setpoint assumes some importance and a reason for its occurrence in 'warm blooded' organisms must be sought.

The reason seems to be found in the table recording the specific heat of water of Kaye and Laby's *Tables of Physical and Chemical Constants* (page 55, 14th edn, Longman, London, 1973). As usual the key to much of life's mystery lies in the extraordinary behaviour of water. As plotted in the figure, the relationship between the specific heat of water and temperature reveals that at 35°C the specific heat of water is at its minimum value of 4.1779 J g⁻¹ °C⁻¹.

In the case of living organisms the significance of this strange behaviour of water is immediately obvious. An organism functioning at this temperature will find it necessary to generate or dissipate the minimum amount of heat energy in order to maintain its temperature constant. From the point of view of the organism's energy economy this temperature is clearly the most efficient at which to function. It seems likely that since the environmental temperatures on Earth are,

with few exceptions, lower than 35°C, organisms which have been able to set their working temperatures at a point just

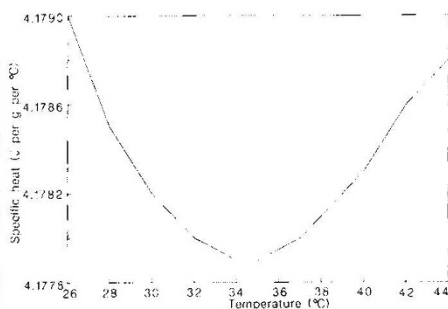


Fig. 1 Specific heat of water as a function of temperature.

slightly above the temperature at which the specific heat of water is at its minimum value have thrived. Some of your readers may care to elaborate further on the implications of this observation.

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FRP is follicle regulatory protein

SIR—Confusion may be caused by the use of FRP as the acronym for the FSH releasing protein in follicular fluid described by Vale *et al.* (*Nature* **321**, 776–779; 1986). Since first reporting the presence of a follicle regulatory protein in the ovary in 1982¹ we have referred to it as FRP in numerous publications, for example ref. 2. FRP, which has a role in both ovarian and testicular physiology as a paracrine and autocrine modulator of gonadal response to gonadotropins, is biochemically similar to Vale's protein and the two may even eventually turn out to be the same. However until and unless they do, one FRP is surely enough.

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2. Kling, O.R., Roche, P.C., Campeau, J.D., & deZerega, G.A. *Biol. Reprod.* **30**, 564–572 (1984).

Scientific Correspondence

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