science on television

Visceral learning

John Wilson

DR NEAL MILLER, of Rockefeller University, New York, believes that we can learn to control our blood pressure, and other regular bodily functions, just as we control the movement of our limbs—if only we try hard enough. With my overdraft in mind, I thought that my bank manager might benefit from the technique so when Yorkshire Television asked "What's Visceral Learning Anyway?" I settled back to learn the answer.

It was not long in coming. Before the opening credits had rolled there was Dr Miller's most successful hypertensive patient, a woman, telling all. She did not know how she did it, she said, it just happened (or rather more accurately, it later transpired that she provided explanations, such as thoughts of old Bogart movies, which her doctor discounted).

Having given the game away at the outset, the programme went on to relate the history of visceral learning, and did so very well. The phenomenon was introduced by way of examples (a young boy controlling the temperature of his hand, a gunshot victim regulating his blood pressure and Dr Miller himself wiggling one ear only), followed by a brief description of the relative impor-

tance of the somatic and autonomic nervous systems.

Dr Miller, we learned, first came to doubt classical theory on the independence of the autonomic system as a result of some very courageous experiments involving 16 human volunteers. When paralysed from the waist down by injections of curare or acetylcholine, these volunteers could still control their urine. If the bladder could be regulated in this way, he reasoned, might not other usually automatic functions of the body be controlled also?

For his experiments on rats, Dr Miller implanted electrodes into their brains so that he could reward them for a 'correct' response in blood pressure even when they were totally paralysed with curare. In living colour, the surgery involved must have turned off nearly as many sets as the recent party political broadcasts but to those of us inured to this kind of bloodshed it provided a fascinating insight into the procedure involved in this elegant experiment which, incidentally, took three years to develop. It was also good to see the ambiguities of the experimental work being admitted to the public and the importance of control experiments emphasised. In view of the *dénouement* to follow, this was just as well.

For the sombre truth about Dr Miller's experiments is that nobody has ever been able to verify them, although five years

and 2,000 unfortunate rats later another researcher, Dr Barry Dworkin, is still trying. Various reasons for his failure were presented to the viewer and then demolished, just as they were gaining credibility.

Had the company supplying the rats been rearing its charges in too much luxury and thus making them less susceptible to stress? No, when the animals were subjected to what Dr Dworkin called the "summer camp" treatment by dropping them in ice-cold water (heaven preserve me from American summer camps) they continued to turn in contradictory results. Could the curare used in the original experiments have been altered? Apparently not—but perhaps a placebo effect was taking place.

This sort of criticism in a television science programme is rare and could have been handled in a most destructive manner but the "Discovery" team should be congratulated on its balanced view of a most interesting topic.

The programme did contain a rather surprising flaw, however. Against a picture of a row of oriental mystics, seated deep in meditation and with electrodes taped to their shining heads, we were told of their amazing ability to confound modern science, represented by the scribbles of an electroencephalogram. No sooner seen than gone, the achievements of these people surely deserved more than this cursory mention.

matters arising

African swells, magmatism and plate tectonics

SIR,—Gill¹ states that the 'basin-and-swallow' topography of Africa is now widely regarded as the product of heat flow anomalies in the upper mantle. Are these anomalies fixed with respect to the Earth's rotational axis or not? My contention is that they are not. The great Mesozoic to late Tertiary magmatic provinces of eastern Africa become progressively younger northward, when the overall movement of the African plate was in general northward and north eastward; and the mag-

matic provinces of west Africa have remained in more or less the same place since mid Jurassic times.

My ice-floe analogy⁴ was intended only to suggest that gentle lithospheric buckling might initiate the development of these broad thermal anomalies, or megaplumes, perhaps by enabling an asthenospheric up-current to develop, which would then be the source of magmatism and the main agent of crustal doming, and which could easily give rise to tensional features, such as rift valleys.

Gill quotes a figure of 10 km as the maximum possible wavelength for 'compressional warp structures', which seems improbable in a lithosphere 70–100 km

thick. I also question whether the idea that gentle warping in response to stresses arising from interplate 'jostling' is invalidated by reference to post-glacial isostatic recovery rates.

It is therefore still not impossible that a small degree of pressure-relief partial melting could trigger development of asthenospheric upcurrents. Gill is correct in inferring that I emphasise the mantle as a source of much saline magmatism, but whether such magmas are produced directly by partial melting or indirectly by high pressure fractionation is not important—what is important is that the mantle is demonstrably the source of some phonolites and trachytes. I still prefer the partial