these pulse sequence measurements were made, it is clear that the greater part of the free induction decay in these experiments would be lost by the time of the first Carr–Purcell pulse, and thus only the tail of the decay could contribute to the echo signal. These Carr–Purcell results therefore do not provide insight into the dominant relaxation mechanism.

To sum up, nuclear relaxation measurements can elucidate the state of molecular motion in bilayer phases. In the case of lecithin bilayers, we have shown that the motion of the hydrocarbon chain is sufficiently slow to lead to incomplete averaging of dipole–dipole interactions. But it seems that the end of the hydrocarbon chain is significantly more mobile than the rest of the chain.

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Radiocarbon Dating of Proto-Solutrean in Wales

IN his report on radiocarbon evidence of the age of the Irish Sea Glaciation in the Vale of Clwyd[1], Rowlands expressed surprise that the radiocarbon dating of a mammoth carpal from deposits in Ffynnon Beuno cave containing "Aurignacian and Proto-Solutrean artefacts" was only 18,000 ± 1,400–1,200 yr BP (Birm.–146); because, on the basis of comparison with the radiocarbon ages of such industries in France, the dating was expected to be 10,000 yr older. I believe that he will be reassured to hear that a fossil bone found in the same archaeological context at another Welsh site proved to be of almost identical antiquity. In 1968, the radiocarbon age of collagen extracted from the skeleton of Paviland Man, preserved in the University Museum, Oxford, was measured by Richard Burleigh in the British Museum Research Laboratory, and the result he obtained was: 18,460 ± 340 yr BP (BM–374). In reporting this date of the "Red Lady of Paviland"[2] I pointed out that the records of excavation at the site (Goat's Hole) showed that the human skeleton was associated with remains of mammoth and with Upper Palaeolithic artefacts including types identified by D. A. E. Garrod as Final Aurignacian and Proto-Solutrean. Some archaeologists were surprised that the Paviland dating was not higher, but I was sufficiently sure of its reliability to infer provisionally that in South-West Britain, Proto-Solutrean points and Aurignacoid artefacts were being made long after they had been superseded in France. In the forthcoming *Catalogue of Fossil Hominids*, Part 2 (Europe), I have therefore indicated the cultural horizon of Paviland Man as late Proto-Solutrean.

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BIOLOGICAL SCIENCES

Environmental Fluctuations and Population Size

BOROWSKY has analysed the magnitude and pattern of the temporal fluctuations of experimental populations of *Drosophila*[1], and has shown that the fluctuations are not randomly distributed in their direction; the frequencies of the competing species change in the same direction (upwards or downwards) more frequently than would be expected by chance alone. Moreover, he has demonstrated that the fluctuations are larger in amplitude than is expected in a binomial distribution. He concludes correctly that some external factor or factors are responsible for the magnitude and non-random association of the fluctuations, on which the most important environmental influence is probably temperature. I believe, however, that other uncontrolled variations in the quality and quantity of food, humidity, and so on, may have contributed as much as, or more than, temperature to the pattern and amplitude of the fluctuations of the experimental populations.

At 23.5° C *Drosophila serrata* and *D. pseudoobscura* coexist in competitive conditions in laboratory populations[2]. The average number of flies of both species in the mixed populations is considerably less than their mean number in single species populations. Borowsky contends that this difference can be accounted for if the experimental temperature fluctuates between 23° and 24° C. I have plotted in Fig. 1 the number of flies, in the ordinate, against temperature, in the abscissa. If a represents the mean number of flies at 23° C and b the mean number of flies at 24° C, and if temperature fluctuates between 23° and 24° C with a mean of 23.5° C, and the function relating number of flies to temperature is linear, then the average number of flies with oscillating temperature is c, the same as the number of flies at the mean temperature. If the function is convex the number of flies at the mean temperature (d) will be smaller, and if it is concave (e) it will be greater, than the average number of flies in a fluctuating environment. These conclusions can be extended to any other fluctuating environmental variables.

Borowsky assumes that the number of flies is a linear function of temperature. In that case, the average number of flies with fluctuating temperature will be the same as the number at the mean temperature. Changes in temperature will result in a change in the frequency of the species. When the frequency of one species decreases, the numbers of that species decrease and those of the other species increase. Borowsky points out only the decrease in the numbers of one of the species. If changes in frequency are accomplished exclusively by a decrease in the numbers of one of the species, then tempera-