In fact, the travel times and velocities to all seven stations were all within ±2.0% of their respective mean values, and most were within ±1.0%. Moreover, the measurements with the largest deviations from the means are most easily accounted for by known sources of error such as source locations and origin times. And, finally, a comparison with the times of occurrence of earthquakes in the magnitude range 4.5–5.5 gave no indication whatsoever of any premonitory velocity changes prior to the earthquakes.

McEvilly and Johnson suggest four possible explanations of these results. The first is that although the dilatancy effect exists, it was not observed in this case because of poor sampling in time. But this argument is held to be weak because, notwithstanding the sampling problem, at least one change of greater than 2% would have been expected, especially bearing in mind the occurrence in the area of a large number of earthquakes with magnitudes less than 4.5. The second explanation also assumes that the dilatancy effect exists but that it is obscured by poor sampling in space. This requires that the effect of a velocity decrease of at least 10% in the earthquake source region should be such as to give an overall velocity change of less than 2% out to the recording stations; and this in turn requires that the region affected by dilatancy in the vicinity of magnitude 4.5–5.5 earthquakes should be less than 10–20 km in diameter. Such restrictions, however, do not seem to be impossible.

The third possibility is that the region investigated is uniformly dilated as a result of either the usual seismicity in central California or of an impending major earthquake. The main argument against such a situation is that the v_p/v_s ratio seems to be "normal" at about 1.75. The final explanation proposed is simply that dilatancy is not an important effect at all in the vicinity of a major strike-slip fault, possibly because either the stress levels are insufficient to cause dilatancy or, if sufficient, are more or less stable without large fluctuations.

So where does that leave the general question of premonitory seismic velocity variations? The answer is probably that there has been little real change. These new results must certainly temper the euphoria induced by the Whitcomb report; but at the same time they emphasise that the data are insufficient to support either of the extremes of pessimism or optimism. Assuming that one snowflake makes a winter is no more justified than seeing the summer in a single swallow. The fact is that although the McEvilly–Johnson results are consistent with the absence of the dilatancy effect, there seems to be at least one explanation which does not preclude dilatancy. On balance the evidence is still somewhat in favour of the existence of premonitory seismic velocity changes.

MATERIALS

Fatigue in Composites

from a Correspondent

THE subject matter of the twelve contributions presented at a symposium on fatigue in composites organised by the Institute of Physics at Imperial College, London, on November 15, ranged widely. The fields covered included the behaviour of metal matrix composites reinforced with metal fibres and with whiskers; fatigue resistance of a variety of carbon fibre and glass fibre reinforced plastics, laminates and joints under different forms of loading; the setting up of safe-life design criteria for the use of composites in realistic conditions; and non-destructive testing techniques for studying damage sustained during testing and in service. Both in prepared papers and in discussion it was clear that three principal topics claimed the attention of the participants, both investigators and users: not surprisingly, these three are fundamentally interrelated.

The first topic concerns the question of variability of fibre and composite properties, and defects in manufactured materials. J. Sturgeon (Royal Aircraft Establishment, Farnborough) discussed the importance of using failure probability analysis in order to obtain usable stress/life curves for fatigue of carbon fibre reinforced plastics (CFRP). From discussion following his remarks and also those of A. K. Green (Imperial College, London), it became clear that it is not generally possible to extrapolate results from one batch of material to another, or from one laboratory to another. This fact considerably impedes the procedures of developing and using

Sinistral Movement Along the Great Glen Fault

WHAT movement has taken place along the Great Glen fault? This is a question which has received a variety of answers, most of which conflict with each other. When Kennedy (*Quart. J. Geol. Soc.*, **102**, 41; 1946) first recognised the fault as transcurrent, for example, he assumed that the Caledonian Strontian and Foyers granitic complexes had once been part of the same intrusion and concluded from this that a sinistral displacement of 100 km had occurred. A year later he found further support for the same conclusion from the matching of the metamorphic zonation in the Moinian assemblage rocks. But during the past few years, not only have differences in the Strontian and Foyers intrusions been found, thus throwing doubt on the identity between the two, but the grades of metamorphism in the Moinian rocks surrounding the two intrusions have also been found to differ.

Going to the other extreme, Holgate (*Scott. J. Geol.*, **5**, 97; 1969) has adduced evidence for a Mesozoic dextral displacement of 30 km along the Great Glen fault, and Garson and Plant (*Nature*, **240**, 31; 1972) have even more recently claimed that the Caledonian movement was dextral. Clearly someone is wrong somewhere; but one of the difficulties in identifying who it is, or who they are, is that data are so often so incomplete that they may be taken to support directly opposing views simultaneously. Nor has geophysical evidence been of much direct help apparently. On the other hand, geophysical data have had something to say about which other faults are, or are not, continuations of the Great Glen fault. This is particularly relevant to the Leannan fault in Ireland whose well-established sinistral displacement of 40 km circumstantially supports a sinistral movement along its Scottish counterpart.

This is part of the background against which J. A. Winchester, in *Nature Physical Science* next Monday (December 10), adduces evidence to support a sinistral displacement of 160 km along the Great Glen fault. What Winchester has done is to investigate the variations in metamorphic grade in the Moinian assemblage on each side of the fault and thus produce a metamorphic zonal map—a feat made possible by the widespread distribution of calc-silicate gneisses in the assemblage. In other words, he has been able to map the regional variations of metamorphic grade on each side of the fault in terms of the mineralogical variations in the calc-silicate gneiss bands and the distribution of gneissose injections.

The characteristics of the zonal map are too complicated to be summarised here; but what can be said in general terms is that the variations in metamorphic grade, and in particular the maxima and minima, can be adequately matched across the Great Glen fault only if a sinistral movement of 160 km is assumed to have taken place. The features of the match are numerous; but the most dominant example is that the high grade rocks of the Western Highlands complex and the Monadhliaths injection complex, both of which are truncated diagonally by the fault and both of which have about the same width at the fault line, are brought into juxtaposition when the pre-displacement pattern is reconstructed.