conclusion drawn by Watterson (*Nature*, **235**, 521; 1975), that large scale ductile simple shear belts in which deformation is usually accompanied by a reduction in grain size, may produce a permanent weakness in the crust. Watterson suggested, following work in West Greenland, that diffusion at grain boundaries plays an important role in ductile deformation, and the reduction in grain size with the consequent increase in such boundaries permanently reduces the strength of rock so deformed. The South Australia belt discussed by Coward might have been weakened in this way (also see Dunnet, *Phil. Trans. R. Soc., Lond.*, **A280**, 641; 1976). Coward suggested that the transform fault which offsets the Antarctic ridge south of Adelaide formed where the zone of ductile deformation was crossed in early Tertiary times by the spreading axis from which Australia and Antarctica were to separate. Cleary and Simpson suggested that the pattern of seismicity within Australia—essentially a belt in the south-west, another passing through Adelaide to the centre of the continent and on to the western coast and a third and more diffuse zone running parallel to the Pacific coast from Victoria to southern Queensland—could be accounted for by contrasts between the ancient shield to the west and a relatively "soft" layer beneath south-eastern Australia. They noted evidence suggesting a strongly developed low velocity layer and probably, therefore, a substantial zone of low strength in the upper mantle below south-eastern Australia. The observations of Coward and Watterson indicate that belts of ductile shear which probably extended down to the base of the crust could introduce a further weakness into the lithosphere which would be reflected in the distribution of earthquakes, and which might have influenced the many Tertiary volcanic centres of eastern Australia. □

Spectrin-like proteins

from Dennis Bray

A RESEARCH worker at the Pacific Research Center, Honolulu, tries to prepare tubulin from sea urchin eggs by a standard method and obtains an unexpected result. The extract obtained with glycerol and a chelating agent forms a gel on warming as usual, but this is made of filamentous actin instead of microtubules. The actin is combined with two other proteins, one of which has a molecular weight of 220,000 (Kane, *J. Cell Biol.*, **66**, 305; 1975). A second investigator, by a different ocean, isolates the acrosome of an echinoderm sperm. This is composed of unpolymerised actin and a high molecular weight protein with a similar behaviour on SDS–acrylamide to spectrin—the major structural component of mammalian erythrocyte membranes. The author suggests that the two might be related and, in collaboration, shows that human spectrin and rabbit muscle actin can interact (Tilney, *J. Cell Biol.*, **63**, 349a; 1974; Tilney and Detmers, *J. Cell Biol.*, **66**, 508; 1975).

Within a year two other laboratories find that they too can obtain clear watery extracts which set when warmed. One is from *Acanthamoeba*, the other from rabbit lung macrophages. In both of these the gelled material comprises actin together with one or two other proteins. The purified high molecular weight protein from macrophages binds directly to F-actin and is compared with spectrin (Pollard, *Biophys. J.*, **15**, 124a; 1975; Hartwig and Stossel, *J. biol. Chem.*, **250**, 5659; 1975). A new high molecular weight protein is isolated from smooth muscle. It is a major component and present in kidney, lung, liver and brain, but not skeletal muscle. On immunological evidence it is associated with the fibrillar arrays within cultured cells. It is not myosin and the authors compare it to spectrin and the recently described actin-binding protein of rabbit macrophages (Wang *et al., Proc. natn. Acad. Sci. U.S.A.*, **72**, 4483; 1975).

The casual reader of these papers, trying to keep up with the breathless pace of developments in cell motility, will find them intriguing in content and captivating in style. He will also, unless he is careful, come away with the wrong conclusion. For, although each is distinct and in essential details quite different, there is a strong underlying similarity in approach and interpretation (which has been emphasised in the gloss above). Although it is not explicitly said, there are broad hints from the *dramatis personnae* that there is a moral. The audience is led to make its own conclusions, one version of which is that a high molecular weight protein, similar to spectrin, is present in many kinds of cell and influences the polymerisation of actin. But is this justified? Let us examine the evidence.

To begin with the new proteins are not necessarily the same. They are grouped together under the generic description of 'high molecular weight' but in a way this is misleading. It implies that there is some structure or function that always goes with a polypeptide of more than 200,000 daltons, and we do not know this to be true. There is no reason why the molecular weights of these proteins should not be as precisely compared as any other—but so far this has not been done. At present they could vary by as much as 30,000 daltons: which as evidence of identity is not compelling. Other properties, such as solubility and actin-binding are not quantitative in the present context and, moreover, show differences as well as similarities. Second, these proteins are not spectrin. Of those that have been compared directly on SDS–acrylamide gels, two are clearly heavier and one overlaps in only one of its components. The other obvious test—that of immunological cross-reaction—has so far not been reported, although at least one of the laboratories involved must have all the necessary ingredients. In fact, less than a year ago they used an antibody to spectrin to demonstrate that this protein is absent from most tissues (Painter *et al., Proc. natn. Acad. Sci. U.S.A.*, **72**, 1359; 1975). As to whether the proteins are 'spectrin-like'—the question is as insubstantial as it sounds. Criteria which have been advanced in support of this aetherial quality are high molecular weight (see above), solubility in low ionic strength solutions and 80% ethanol, absence of ATPase activity and failure to form filaments in isotonic buffers. Finally, they are not necessarily involved in actin polymerisation, although it would be of great interest if they were. The possibility arises because all but one of the proteins is extracted together with actin which later polymerises, but the direct evidence, which can only come from tests with purified components, is so far lacking. Therefore, although these new and noteworthy phenomena are clearly related, it is too early to say in what way. In particular, a simple explanation of the kind given above is at present untenable. □

A hundred years ago

THE *Morgenblad* of Christiania states that a singular phenomenon was observed there after a recent violent storm. A number of worms were found crawling on the snow, and it was impossible to find the places from which they had issued, everything being frozen in the vicinity. Similar circumstances were reported from several places of Norway.

MANY of our readers, we are sure, will rejoice to hear that a movement is on foot in Germany to abolish the crabbed printed German alphabet and adopt Roman type. We sincerely wish the movement may lead to the desired result, and that it will extend to the still more vexatious written alphabet. from *Nature*, **13** (March 2), 357; 1876.

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