news and views

Antarctic jigsaws

from J. Sutton

MANY countries bordering the Pacific contain rocks older than any preserved in the floor of that ocean where little material exceeds 200 million years in age and most is much younger. Yet the Pacific Ocean appears to have formed much further back in time and may have existed in the Precambrian, as long as 1,000 million years ago. Valuable clues to the early history of the Pacific can occasionally be picked up through study of old rocks preserved on land around its margin. Recent work by two members of the British Antarctic Survey on islands of the Scotia Arc has brought particularly interesting evidence to light. In this issue of *Nature* Smellie and Clarkson (page 701) describe new clues to possible conditions in Palaeozoic times along part of the south-east edge of the Pacific.

From studies around Scotia Arc, the 4,000 kilometre long ridge (in part submerged, in part exposed as groups of islands) which joins South America and Antarctica, they conclude that in Upper Palaeozoic times Pacific Ocean floor was being subducted and destroyed in that region.

They base their conclusions on their recent discoveries of the mineral glaucophane, a mineral found in metamorphic rocks which have been subjected to unusually high pressures and one which characterises many of the well-established subduction zones formed more recently in the history of the Pacific. Smellie and Clarkson found Palaeozoic glaucophane schists in the South Shetlands not far from the Antarctic Peninsula. Coupled with earlier discoveries of similar rocks among material dredged from the vicinity of the northern arm of the Scotia Arc, the new finds suggest the presence of a Palaeozoic glaucophane schist belt along which Pacific floor may have been subducted. Offset from part of this belt and roughly parallel to it a belt of rather different metamorphic rocks and intrusions has been identified on the Antarctic Peninsula through the work of many members of the British Antartcic Survey. The nature of these rocks suggests a Palaeozoic belt formed by rather higher heat flow than that indicated by the glaucophane schist belt. Smellie and Clarkson suggest that the two belts could be compared with the paired metamorphic belts which are a familiar feature of many younger terraines around the Pacific.

As a rule each pair comprises a metamorphic belt whose mineral make-up indicates a rather low heat flow parallel to a second belt further from the Pacific, formed by higher flux of heat. The newly identified Antarctic belts follow this pattern and suggest there was an active Palaeozoic plate boundary between the south-east Pacific and the land masses of what is now Western Antarctica and southernmost South America.

That belt of subduction may well have preceded the opening of the South Atlantic and may have been active at a time when South America and Africa still formed a single block. Whether that block had separated from Antarctica at the period is uncertain. The Palaeozoic rocks may have formed along the Pacific coast of Gondwanaland or have been part of an early island arc—a proto-Scotia Arc linking Antarctica with the South American–African continent.

Solving such problems entails careful examination of the older rocks preserved at intervals along the Scotia Arc. Recently, I. W. D. Dalziel has reviewed progress made between 1969 and 1975 on the Scotia Arc tectonics project mounted by Lamont (*Antarctic Journal of the United States*, 1975). There Dalziel summarises recent developments in the model for the evolution of the Scotia Arc earlier proposed by himself and Elliott, (*Nature*, **233**, 246–252; 1971). Dalziel and his colleague suggest that the Scotia Arc region was deformed in a Gondwanian orogeny in the early Mesozoic. From studies of Mesozoic sediment within the arc, notably on South Georgia and from within the South American continent they are able to suggest the Gondwanian orogeny resulted either from a collision of an island arc with the main part of Gondwanaland or from subduction beneath the margin of that super continent. Bit by bit the early history of the continental crust now widely dispensed along the Scotia Arc is emerging and the jigsaw of the present day fragments can be more confidently put back into place. □

Membrane-bound tubulin: fact or artefact?

from Mike Jacobs

THE role of microtubules in the strategy of the cell is a very important one. The question of what functions they are actually involved in, is more difficult to answer and very much a subject of speculation. The main evidence for the participation of microtubules in such cellular activities as transport and secretion of cell constituents rests on inhibitor studies (for a recent review see Roberts *et al.*, *Prog. Biophys. molec. Biol.*, **28**, 371; 1974). These drugs can disaggregate microtubules by binding to tubulin, both in the cell and *in vitro*, and this is assumed to be their mode of action in inhibiting cellular processes. To prove this conclusively, however, is no easy matter. Colchicine, for example, inhibits the secretion of plasma proteins from the liver at the levels predicted by its binding constant to tubulin. Inhibition is accompanied by a dramatic accumulation of protein in the Golgi-derived secretory vesicles (Redman *et al.*, *J. Cell Biol.*, **66**, 42; 1975; Le Marchand *et al.*, *J. biol. Chem.*, **248**, 6862; 1973). Other obvious metabolic parameters are unaltered and colchicine analogues and drugs that do not bind to tubulin are ineffective.

The morphological evidence is not so good. Reports differ as to whether microtubules are depolymerised when secretion is inhibited. There are few microtubules in liver cells, and their orientation suggests no obvious role in secretion. Other studies of secretory cells often tell the same story; there is sparse anatomical evidence to support a mechanism by which microtubules transport 'packaged' molecules.

The finding of tubulin and colchicine