GEOLOGY REPORT Wednesday 27 September 2006
Oceans on the roof-top of the world. Travelling through Tibet.
Speakers: Liz Weldon and Dr Monica Campi from Deakin University

Our original speaker, Professor Guang Shi, was unable to attend so we are very grateful to Liz and Monica for stepping in at quite short notice and preparing and delivering this excellent powerpoint presentation. Our speakers are both studying Permian brachiopods and attended the 2nd International Palaeontological Congress in Beijing in June this year. They then went on the post-congress excursion: *Upper Palaeozoic to Triassic successions of the Tibetan Himalayas and significant geological occurrences along the road leading to the Himalayas*. It was this excursion that formed the basis of their talk.

Liz introduced the presentation with photos of the rather barren scenery, the architecture, the people and their customs. At an average height of 4000 metres, altitude sickness is a problem and hotel rooms have oxygen machines and participants on the excursion had to carry oxygen with them wherever they went.

Monica explained the plate tectonics background to the area they visited. The geological map reproduced with this report shows two broad belts running across southern Tibet, the one to the north being the Lhasa Block and to its south, the Himalayan Block. The geological history of this part of Asia is more complicated than simply India hitting Asia and the Himalayas being pushed up. The two blocks of continental crust mentioned above detached from Gondwana and collided with the North and South China Blocks long before India made its move. The Lhasa Block drifted north first and was in tropical latitudes during the Permian which is reflected in its warm-water brachiopod fauna. The Permian of the Himalayan Block which Liz and Monica saw between Nyalam and Tingri consists of diamictites (glacial sediments) and contains a cold-water fauna somewhat similar to that in Western Australia. This fauna positions this block much further south in Permian times. It too collided - with the Lhasa Block. Between them is sandwiched a sliver of oceanic crust consisting of pillow basalts and cherts. Chert is a form of silica and in this case would have originated from the skeletons of siliceous radiolarian protozoans falling to the ocean floor. From about 50 million years ago India began colliding with these two blocks which were now part of Asia, thrusting them up as mountains.

Liz took us through the excursion in the order of the age of rocks observed which spanned the Ordovician to the Triassic, so from about 450 Ma to 200 Ma ago. Our speakers had brought in a collection of fossils from the trip so the audience could see the specimens first-hand. They included Devonian tentaculitids which are small cone-like shells believed to be related to the molluscs. On the hand specimen they looked like a mass of small spines, each one just a few millimetres long. They lived from the Lower Ordovician to the Upper Devonian before becoming extinct. Another specimen from the Carboniferous was *Chondrites*, a trace fossil consisting of irregular markings which are probably worm burrows. Not all the rocks were sedimentary; there were also granites dated at around 80 Ma and 17-28 Ma.

We had already seen the stark landscape in a number of slides and Monica went on to explain the geomorphic processes at work on the Tibetan Plateau. It is very dry with little vegetation and active sand dunes. Pollen analysis shows that in the past there was abundant juniper forest but 4000 years ago the record changes to cereal pollen. The authorities are trying to reverse this man-made change through reafforestation. When it does rain (in summer) the exposed surface material is readily removed and we were shown examples of rill erosion and alluvial fans. The sediment fills the rivers which have braided channels. Tibet is still rising so river terraces are left as rivers cut down.

Monica finished the presentation with a look over the border into Nepal where the 8000-metre mountains catch the rain and rhododendrons grow in the cloud forest. The higher rainfall accentuates erosion and deep gorges contrast with the gentler slopes we had seen on the Tibetan Plateau.

Our thanks to our two speakers who gave us such an interesting insight into the geology, geomorphology and geography of Tibet.

Rob Hamson