

# Across Tibet

**Michael Ward**

*Plates 31–32*

The Royal Society/Chinese Academy of Science Tibet Geotraverse, which crossed from Lhasa to Golmud in June and July 1985,<sup>1</sup> was the first large-scale, co-operative, scientific programme to be carried out in the central and northern part of the Tibetan plateau. Its purpose was to establish the geological events that are occurring as a result of the Indian plate moving northward and converging with the Asian plate forming the Himalaya and elevating the plateau of Tibet.

According to the very recently (1966-67) accepted Theory of Plate Tectonics, about 200 million years ago India, together with Australia, Antarctica and part of Madagascar were clustered around the South Pole. The combined European and Asian land mass was separated from this grouping by a sea — named Tethys after the greatest of the sea-deities and wife of Oceanus.

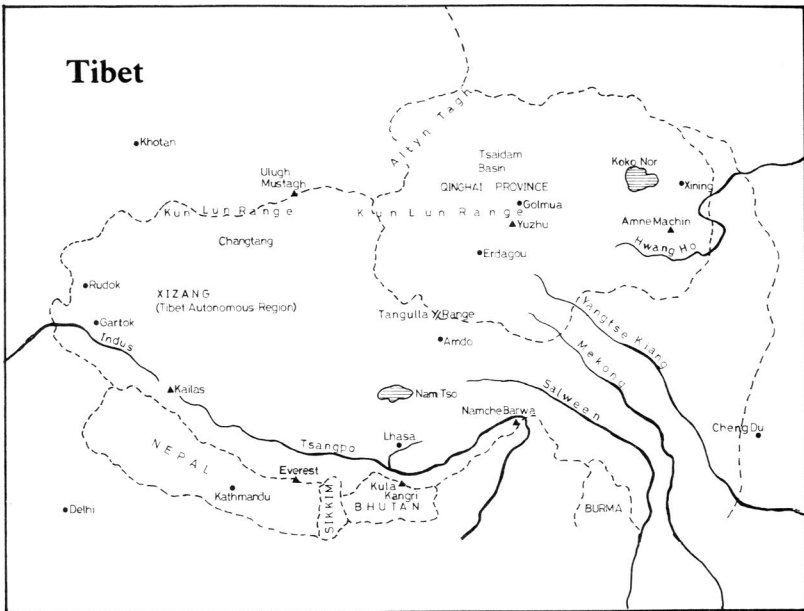
As the Indian plate moved north, the Tethys Sea contracted until finally a collision occurred about 40 to 50 million years ago between India and the southern part of the Eurasian land mass. As a result, it is thought that the earth's crust crumpled, throwing up the mountain ranges of the Himalaya and central Asia, the Tibetan plateau being formed by north-south shortening and vertical thickening. As the irresistible force of India's movement northward acts against the immovable mass of Asia (for the process is continuing at about between 2 to 3cm each year), earthquakes occur in the vicinity of the converging plates.

At present it is considered that the Kun Lun range is definitely part of the Eurasian plate whilst the Indian plate extends as far north as the suture line in which the Tsangpo and the Indus run.

The origin of the plateau in between is controversial, and by crossing from south to north it would be possible more fully to understand and date the geological events that have occurred. This is of fundamental importance in understanding how the earth works, particularly as the Tibetan plateau is the only part of the world where convergence is occurring between continental masses as opposed to an ocean and land mass as is the case on the W coast of North America.

In the last 20 years Chinese earth scientists have carried out a great deal of work in Tibet including the production of both a geological map and a topographical map (scale 1:100,000) in the course of multidisciplinary expeditions. Some of these have included mountaineering parties and Everest, Xixapangma and other peaks have been climbed. Each province and region of China has a Geological Survey Department — in the case of Xizang (Tibet) in Lhasa and for Qinghai in Xining.

For some years, Chinese co-operation with French geologists has been taking place in the southern part of the Tibetan plateau as far north as Amdo which is



south of the Tanggulla range — the boundary between the Autonomous Region of Tibet and the Chinese Province of Qinghai. So far Chinese geologists only have worked in Qinghai — the central and northern part of the Tibetan plateau and it was in this region that the main contribution of the combined Royal Society/Chinese Academy of Science party would take place. The Royal Society party consisted of geologists from Switzerland, America and Great Britain, and their specialities were matched in the Chinese group.

As far as the life sciences were concerned, by visiting and lecturing at the newly opened (Dec 1984) High Altitude Medical Research Institute at Xining, and by visiting the appropriate centres in Lhasa and Golmud, I would be able to fill in, at least partially, a very large gap — namely Chinese work carried out on the population that lived on the plateau.

### Lhasa (c. 3650m)

The city is situated on a plain draining into the Kyi Chu, a tributary of the Tsangpo. It now has about 100,000 inhabitants and is dominated by the Potala, a unique building spreading over and seemingly growing out of a hill 120m high and 275m in length. It is the focus of the temporal and spiritual power of the Dalai Lama and externally was saved from the depredations of the Cultural Revolution. Many of the treasures inside were removed by the Chinese prior to this. The official residence of the Dalai Lama, at present in exile, it is, without him, a lifeless monument.

The main Buddhist temple in Lhasa is the Jokhang which is situated in the old town and is the centre of the purely religious life of Tibet. This also was looted and partially destroyed by the Chinese.

In the valleys of the surrounding hills (which rise to 4500-5000m) there are a



31 *The N side of Yuzhu (c. 6400m) in the E Kun Lun.*

*Photo: Mike Ward*



32 *Yuzhu seen from the south.*

*Photo: Mike Ward*

number of villages and the great monasteries of Sera, Drepung, and Ganden, which were founded between AD 1409 and 1419. Partially destroyed by the Chinese, these are now being rebuilt using Tibetan labour, and open examination of novice monks has restarted.

### **Route Across the Plateau**

The Jesuit Fathers Johannes Grüber and Albert d'Orville were the first Europeans to bring back authentic records of Tibet to Europe. Their journey from Peking to Lhasa took place between AD 1661 and 1662 and was undertaken not through missionary zeal but because of the necessity of finding a new route from China via Lhasa to Europe, as the sea journey by Macao was not possible.

They followed, from Xining to Lhasa, a very old pilgrim route which we used in reverse. From Xining this runs along the south side of the Koko Nor, crosses the numerous parallel ranges of the eastern Kun Lun and then traverses the Tibetan plateau to the Tangulla range where the route rises to 5000m and then gradually descends to Lhasa. After a short stay in Lhasa they continued south to Nepal crossing the Himalaya by the Thung La, and may have been the first Europeans to see Mount Everest. Eleven months after leaving Peking the party entered India.

It is an interesting fact that at this time China, Tibet, Nepal and India were open not only to European travellers but also to Christian missionaries. Their journey emphasised the connection between Peking and Lhasa rather than between Lhasa and India.

### **Nyenchen Tangla Range**

This range runs between the Nam Tso or Tengri Nor and a wide flat valley north west of Lhasa. It forms one boundary of the Changtang — the very high, arid and sparsely populated plateau that occupies NW Tibet.

The two highest peaks are between 6700m and 7000m, and one appears to be at the NE part of the range. The other, a fine glaciated peak is in the SW section. Most of the other peaks were snow-covered in the bad weather of June and July which forbade good views being obtained. A number of the deeply incised valleys on the S side of the range were visited, as was the N side.

At Jangbajan, the wide valley on the SE side, there is a thermal station which supplies heat to Lhasa. A dirt road runs southwards crossing outlying spurs and then a pass, to descend to the Tsangpo valley and reach Shigatse.

The Tengri Nor on the NW side of the range is reached by a pass crossing the N part of the range. This is a beautiful salt lake ringed by vast pasture lands with immense herds of yak, sheep and goats. Small Tibetan encampments, usually tented, but some with mud buildings, are dotted about the green plain. The lake contains edible fish, and yellow poppies were found on the pass at about 4500m.

### **Tangulla Range**

This forms the boundary between Qinghai, the province in which the N part of the Tibetan plateau lies, and Xizang (Tibet) to the south. The range runs east and west and contains numerous peaks around 5700-5800m. The highest peaks

appear to be west of the Tangulla pass (c.5000m) with groups up to 6400m, whilst to the east a number of peaks about 6000m are found. The peaks are rounded with extensive snowfields and glaciers. The road across the pass climbs without zig-zags for many miles, and at its highest point is still a dirt road, though tarmac is being laid.

This pass is the highest point on the route between Xining and Lhasa and was probably that most used by travellers through the centuries, though there are a number of alternative routes crossing this range to east and west.

Some years ago a survey was carried out to pinpoint problems facing the construction of a railway between Golmud and Lhasa. The main one appears to have been permafrost.

In the course of this investigation it was pointed out to me by Dr Lu Tsung Chih of the Tibetan hospital in Golmud that in the Tangulla range Tibetans had worked continuously at altitudes of around 6000m for three to four months in summer for several years in succession, whilst living in tents at that height. They were probably mining high grade quartz crystals. They had not had to descend due to altitude sickness. By contrast South American miners working at Avconquilcha had found that working in the mine at 5800m brought on symptoms of mountain sickness. As a result a permanent village had been constructed at 5300m and not at the mine itself. Until now 5300m has always been considered the upper limit for permanent habitation even for those born and bred at altitude, but this figure will now have to be revised.<sup>2</sup>

On the northern side of the range hot springs are found.

### **East Kun Lun Range (Burhan Buddai)**

The Kun Lun range runs for over 1600km delineating the N side of the Tibetan plateau in the same manner as the Himalaya delineates the S margin. The Kun Lun separates the plateau from the desert areas of the Tarim Basin (Takla Makan Desert) to the west and the Tsaidam to the east.

At its W extremity the Kun Lun abuts on to Pamir and is part of the melange of peaks through which the Karakoram Highway runs from Kashgar to the Indian sub-continent. The Kongur group of peaks are the highest in this region.

In the central Kun Lun, Ulugh Mustagh has been attempted unsuccessfully by a Chinese party. In the autumn of 1985 a Chinese-American party made the first ascent, with a team including Peter Molnar, Tom Hornbein and Bob Bates.

The E Kun Lun (Burhan Buddhai) has a striking feature. Part of it appears to be separated from the main Kun Lun by a gap several kilometres wide through which the Kun Lun Pass runs carrying the main road between Golmud and Lhasa. On the N side of this fragment is a flat valley, the Xidatan, 3-5km wide running east and west. In the floor of this valley runs a fault similar to the San Andreas fault in California which indicates that the Burhan Buddai range is moving eastwards at about 2 to 3cms each year, separating this part of the Kun Lun from the N part. In effect the N part of the plateau is being squeezed to the east, possibly due to the pressure exerted by India moving north.

Movements in the region of plate boundaries cause earthquakes. When two

plates scrape along one another in opposite directions, as occurs in this instance, the rocks slowly bend and stress within, then builds up. Breaking point is reached and suddenly the rocks break and snap back to their new position. The focus of an earthquake is deep in the earth and movements occur in a series of jerks which produce waves going in all directions. The intensity of the shock depends on the size of the earthquake and is related to the total energy released. Measured on the Richter scale a reading of 8.6 is equivalent to 60,000 H-bombs.

The main peak of the Burhan Buddai, called Yu Zhu, is situated to the east of the Kun Lun Pass and is about 6400m.

Glaciers on the southern flank run on to the main plateau forming few if any glacial valleys, whilst those on the northern side carve out valleys, and the mountains themselves are much steeper. The peaks are not particularly steep, with rounded elevations, and having reached the main ridge it might be possible to ski along the rounded, broad crest.

On the N side of the valley, the mountains change dramatically — the peaks are jagged, but not glaciated, whilst the land becomes more arid. In some places rivers have sliced through both the surface sedimentary layer and the underlying rock, making narrow canyons 30m deep.

Further north the peaks become lower with snow lying only in the winter until finally they peter out altogether in the Tsaidam.

The road through the Kun Lun follows a series of east–west and north–south valleys; the gradient is always easy with no zig-zags, and it seems likely that this was the main centuries-old caravan route. An alternative more circuitous route through the mountains exists about 20km to the east of the main road and was followed from the plateau to the Tsaidam. This runs through a series of valleys to the north and south of the main east–west fault valley and is used by herdsmen with yak, camel, sheep, horses and goats. Small settlements of these semi-nomadic people are scattered up side valleys and, though narrower than the main route, lorries can follow this ‘drovers’ road. Skeletons of yaks and mountain sheep lying in the valleys have been picked clean by crows and give a surreal feel to the country. The herdsmen all carry rifles — however indiscriminate shooting is forbidden and numbers of kyang, antelope and gazelle were seen.

Towards the Tsaidam the mountains become very arid with vegetation only in the beds of dried river courses. The peaks which rise to 5000m consist of rock and there are no glaciers — it is extremely hot during the day whilst temperatures fall precipitately at night.

The majority of the valleys on either side of the main highway were visited in the course of our stay in the Kun Lun, and the main ‘fault’ valley, the Xidatan, was traversed for much of its length. An attempt to distinguish a fossil series up the face of one rock peak failed after about 600m because of climbing difficulty. Artificial aids would have been necessary on a face that even here was remarkable for its friability and instability.

### **Koko Nor (3000m)**

The Koko Nor, Tsinghai or Blue Lake is the largest expanse of fresh water in

China. The S side has grass-covered hills, with numerous herds of yak and sheep. By the lakeside are fields of corn and beehives. In summer, parties bathe though in the winter the lake is frozen over. At several points there are jetties with fishing vessels tied up — fish from the lake is a particular delicacy in the capital Xining. The N side has sand dunes extending to the water's edge. Several small islands serve as bird sanctuaries.

Xining, the capital of Qinghai, is a bustling town with a strong Moslem influence. The newly opened High-Altitude Medical Research Institute is situated in one of the two main hospitals and, with easy access to the Tibetan plateau, it is ideally placed. There is also a large hospital for traditional Tibetan medicine.

Kun Bun (Taer) monastery is south and west of Xining and was preserved during the Cultural Revolution by a direct order from the Federal Government. The present Dalai Lama's father worked in this monastery, which is an important centre of traditional Tibetan medicine.

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1. Members of the Royal Society Party were: Prof R M Shackleton FRS, Leader, Prof J F Dewey FRS, Deputy Leader, Prof A Gansser, Prof P Molnar, Prof W Kidd, Prof M Coward, Dr A Smith, Dr J Pearce, Dr M Leeder, Dr N Harris, Dr D Watts, Dr M Ward.
2. A recent letter from Prof John West, leader of the American Medical Research expedition to Everest in 1981, tells of a Mr Copa who lives at almost 6000m (barometric pressure 373mm Hg). He has been there for two years and is one of the four caretakers of the mine at Avconquilcha. He spends six days of the week at the camp but comes down to a slightly lower altitude on Sundays to play football. Apparently there are no suitable pitches at 6000m.