Bus over the Andes

A public bus service is not always ideal for a travelling geologist who wants to stop off to appreciate views or examine outcrops. But it can be very worthwhile where a rented car is not an easy option, and either local buses or trains can allow greater appreciation of local culture than is obtained by isolation within your own metal box-on-wheels.

Certainly one of the greatest bus rides has to be from Kashgar to Gilgit over the Karakoram Highway, across truly spectacular terrain, though it can no longer be done on a single ride, and now requires three separate day-long buses. Any bus route across a great mountain range can be enthralling; the writer has enjoyed some memorable rides across the Canadian Rockies, the Himalayas and the Iranian Zagros, and also on postal buses within the Swiss Alps. On Madeira, an unsung winner for anyone off a cruise-ship for a day in Funchal, is the Number 81 bus into the Curral das Freiras and back; for a small island the mountain scenery is amazing.

There are extraordinary numbers of bus routes available to those who seek them out, and some of the best in terms of efficiency, comfort and cheapness are in South America. We (that's Jan and myself) recently left a cruise ship in Valparaiso and wanted to take in the Iguacu Falls on our way home. The simple option is to fly direct, but a bus over the Andes to Mendoza is easily followed by flights eastwards over the flatlands. The bus ride turned out to be spectacular.

Soon after leaving Valparaiso, the bus climbs through the Coastal Cordillera (formed of poorly exposed Jurassic basement), then crosses the Central Valley where Cretaceous volcanic and sedimentary sequences are largely obscured by extensive vineyards. The scenery then steadily improves as the bus climbs an excellent highway along a valley with a narrow floor of farmed land below very barren flanks cut into the foothills of the Andes. These are formed of Pliocene and younger volcanics, in which structures can occasionally be recognized in passing. Altitude is gained as the road winds up numerous hairpin bends and then passes through long open-sided avalanche shelters with glimpses of small glaciers and towering snow-peaks in the distance.

Part of the set of 17 hairpin bends on the Chilean side of the Andean pass

Known as the Paso de Los Libertadores, the road's summit lies at an altitude of 3200 metres, because it is within a tunnel opened in 1980 that crosses the Chile/Argentina border and takes more than 600 metres off the total climb. From there, the road follows down the valley of the River Mendoza, with a more gentle descent passing some fine geological features. A highlight is the great rock landslide that is clearly seen from the bus windows on the northern side. Just away

The great rockslide from the shoulder of Cerro Tolosa

Some of the superb alluvial fans beside the River Mendoza.

from the young volcanics along the Andean crest, Cerro Tolosa is a peak formed of steeply dipping Mesozoic sedimentary rocks, where a thick bed of sandstone forms a shoulder that has been undercut by a tributary stream. A single huge slab came away over a bedding plane weakness. No date has yet been ascribed to the failure event, but the massive ramp of fallen sandstone blocks, reaching out onto the main valley floor and still devoid of vegetation, constitutes a textbook rockslide.

After the excitement of the landslide, the scheduled bus offers only fleeting glimpses of Aconcagua and the Puente del Inca, which are both worth a more leisurely return visit (see below). Then the valley continues in dramatic style with the road clinging to the slopes cut into Palaeozoic sequences. Most of these are difficult to interpret from a passing glance, but there are some sections with contrasting rock colours and features that rise from beneath huge thicknesses of outwash and alluvial fill. And the southern slopes are adorned with a magnificent succession of steep alluvial fans that also benefit from the total lack of vegetation in these harsh dry mountains.

The valley opens out gently as it finally leaves the mountains for the plains, and the bus journey ends at Mendoza. Capital of Argentina's wine industry, this is a delightful town with tree-lined boulevards and an almost permanent holiday atmosphere. Fortunately it also has lots of local companies that offer mini-bus day-trips into the mountains; and one popular itinerary includes visits to the best sites seen from the bus window along the road from Chile.

Lunch-stop on these tours is at Las Cuevas, which has no visible caves but is right beside the great Cerro Tolosa landslide, so ideal for some better photos. Before lunch, the mini-bus turns off the road to the summit tunnel, and takes the original road (now just a dirt track) that zig-zags up to the crest of the Uspallata Pass at an altitude of 3831 metres. Also known as the Paso Cristo Redentor de los Andes after the huge statue right on the col, this is almost directly above the new road tunnel. Splendid panoramas over both sides of the Andes are worth braving the incessant cold wind that blows across the col.

Only a short way down the valley from Las Cuevas, tours make a stop at the Aconcagua viewpoint. The great snow-covered mountain makes a fine sight at the head of a long tributary valley. Reaching to 6962 metres,

Dikes exposed by differential erosion at the top of the Uspallata Pass.

it is the highest point in the Americas. Unlike many Andean summits that are active andesitic volcanoes, Aconcagua consists of older volcanic rocks, with the youngest dating from 8 Ma, and owes part of its height to subsequent tectonic uplift. The short walk from road to viewpoint is across lumpy terrain that appears at first glance to be a moraine from a glacier of the Last Glacial that reached just into the River Mendoza valley. However, there are soundly based claims that the mounds are the toe of debris flows from the mountain faces half way to Aconcagua.

Ten kilometres farther down the valley, and close to the road, the Puenta del Inca is a natural bridge of travertine that spans the River Mendoza (also known locally as the Rio Cuevas). Water from warm springs spread a thick sheet of travertine on top of alluvial sediments that form the valley floor. At some stage deposition obstructed the river channel enough for water to escape sideways through unconsolidated alluvium beneath the travertine, and headward piping erosion created the bridge that is now around 25 metres wide and long. Some of the travertine has been dated to 9700 years BP, and the later phases of deposition lie below the upstream side of the bridge. Like so many of the world's large travertine deposits, these have been formed by geothermally warmed water, which is not boiling hot, that has circulated through limestone at depth. A walk round the Punta del Incas viewpoints does justify the return trip from Mendoza.

The Argentinean side of the Uspallata Pass.

Multiple companies run buses from Valparaiso (or Santiago) to Mendoza, and seats are easily booked on-line. At $25 each for the nine-hour ride, these are complete bargains, and the bus station is less than five minutes walking from the cruise dock in Valparaiso. Tours to the Uspallata Pass are easily found in Mendoza, and they pick up from any hotel. Both are great days out.

Tony Waltham

The travertine bridge of Puente del Inca, with disused bath houses sited over the active warm springs.