HOLIDAY GEOLOGY

Mitchell Caverns, California

From Barstow towards Phoenix, interstate I-40 takes a roller coaster ride eastward through Basin and Range country of the Mohave Desert. It is thought that this journey has doubled in length over the past 17 million years due to the stretching of the region westward. This created north-south faults that are nearly vertical at the surface but are thought to curve to near horizontal at depth. These accommodate both the westerly movement and the fall and rise of the basins and ranges respectively. Near to Barstow, in the western part of the province, most of the vertical movement is on the western sides of the ranges. As a result many of them tilt. The Providence Mountains, 70 miles from Barstow in the Eastern Mojave Desert, are one such range. Although the western side is the higher, the eastern face is still quite dramatic, and in the 2000 feet high cliffs, lie the Mitchell Caverns, just 12 miles north of I-40.

The small Natural Preserve has a surface nature trail around the desert flora, and there are extensive views east over the basin floor of Precambrian crystalline rocks partially covered with eroded Tertiary lavas. West above the visitor centre, the cliffs are formed of a craggy Upper Carboniferous limestone that contains caves in its lowest 200 feet. However, a little to the north the cliffs change abruptly to a reddish Tertiary rhyolite capped with dark lava flows. Further north still, several mesas each have a dark lava cap. To the south, the cliffs are a smooth white syenite, contrasting the craggy limestone.

The caves can be visited only in groups accompanied by a ranger. Once inside, visitors must not touch or even brush against anything, and coughing and sneezing are definitely not allowed. There is a well-made cement path with low-level guide lighting and railings where needed. Stops are made, and at each a choreographed lighting display reveals a spectacular scene that draws the usual sounds of approval from the American members of the group. The chambers are not particularly large but there is a profusion of stalactites, stalagmites, pillars, and calcite shields. Much of the walls are coated with flowstone. A coral is exposed at one point, but most fossils are covered by the flowstone. We were impressed.

Various questions were addressed by our guide, but geology was not mentioned, and the age of the calcite formations is said to be unknown. The profusion and complexity of the calcite deposits suggests a long and interrupted history, probably related to climatic variations in the Pleistocene. The caves were totally dry during our visit, but are said to drip after rain.

Interpretative panels in the visitor centre suggest that the caves initially formed beneath the water table, and were subsequently drained to allow the dripstones to form in free air. The drainage was ascribed to erosion of the Tertiary lavas in the adjacent basin, but this was not related to the scope for rejuvenation instigated by relative uplift of the fault block.

The Mohave Desert is a classic drive-through for an itinerant geologist. Well worth drop-in visits are both the Mitchell Caverns and the nearby Hole in the Wall, with its spectacular rhyolite cliffs full of holes.

Alan Filmer

A ceiling packed with calcite stalactites in Mitchell Caverns.