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sequence. Above the pillow lavas is tuffaceous limestone which shows some evidence of cross-bedding. Oolitic textures are also developed in the limestone, indicating shallow water tropical marine conditions. Vertical fissures can be seen cutting the massive limestone above and these are filled with reddened well lithified sandstone material (non-carbonate) which are Neptunian dykes infilled with Triassic sediment when there were arid continental conditions and sediment filled joints in the limestone.

**Further information on the volcanic rocks of the area can be found in:**

**T. J. Faulkner:** The early Carboniferous (Courseyan) Middle Hope volcanics of Weston-super-Mare: development and demise of an offshore volcanic high. *Proc. Geol. Assoc.* Vol. 100, pt 1, pp. 93-106.

**R.J.G Savage** (editor): *Geological Excursions in the Bristol District*. University of Bristol. 1977. ISBN 0 901239 22 4. Volcanic Rocks in the Bristol Region. pp.49-54.

**W. A. Macfadyen:** Geological highlights of the West Country. Butterworth .1970. ISBN 0 408 70002 5. pp. 250-252.

*Photographs by Alan Holiday*

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## “THARS OIL IN THEM THAR HILLS!”

*Charles Hiscock*

Some years ago, we flew to New Zealand via the United States, landing at Los Angeles for a 24 hour stopover. After a good night's rest, we had many hours to kill before our onward flight to New Zealand and so decided to go on a morning excursion around LA. We boarded the small tourist bus and, while waiting for others to join us, I asked the driver if we drove anywhere near the Brea Tar Pits in the centre of the city. He was rather surprised that we had heard of them – most tourists were only interested in Hollywood and the high spots such as the Kodak building. He knew where they were but said that the tour did not go past the pits and anyway, it was not possible to stop. We set off and after a short while, the driver pulled up on a busy street and told us that, if we looked over the road, we would be able to just see the Tar Pits. Indeed, we could see fossil skeletons and other ‘exhibits’ beside a pond of black tar. We thanked him for he had clearly made a detour so that I could see them, albeit at only a distance.

Maybe, we will go back one day and visit the Brea Tar Pits and Museum properly.

Last year, we were on holiday in Shropshire and paid a visit to The Ironbridge Complex and Gorge. The fascinating history and geology of the Gorge could be seen as we walked along the banks of the River Severn and it was with some surprise that I read a sign directing us to the Tar Tunnel on the north bank of the river. It was a lovely warm day and we decided that it was time for a coffee in a little café beside the canal and found that alongside was the entrance to the Tunnel – I had to go and look!

On paying my entrance fee, a leaflet explained that a local ironmaster, William Reynolds, started digging a tunnel from close to the river into the hill towards the mineshafts at Blists Hill so that coal from the mines could be moved to a canal. After about 300 yards, the men digging the tunnel came upon a spring of black tar. The thick black exudate that oozed through the bricks was natural bitumen, which, like coal and oil, is made from the organic remains of plants and animals that have been preserved in the rocks, particularly in the Coal Measures. Reynolds immediately realised the potential of this discovery and set about exploiting the supply. He set up large cauldrons near the Tunnel and boiled the bitumen to convert it into pitch, used to preserve the timbers of ships. Some was turned into varnish while he also produced ‘British Oil’ for the treatment of rheumatic and skin diseases. Initially, the Tunnel produced about 4500 gallons a week but this reduced to about 1000 gallons a week for many years. By the 1820's, only 10 barrels a year were being collected and by the 1840's the sales had stopped.



*Natural bitumen oozes through the bricks in the tunnel*

The Tunnel continued to be used to transport coal and to ventilate the mines until the 1930's and was used as an air raid shelter in the Second

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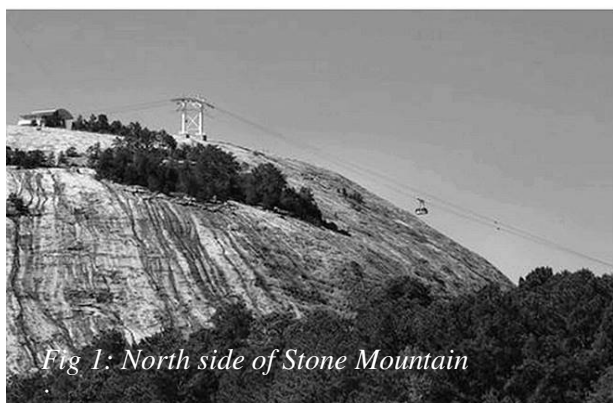
World War. After this time, the Tunnel was forgotten until 1965 when it was explored by the Shropshire Mining Club. Now, visitors can enter the first 100 yards where the bitumen can be seen oozing through the joints between the bricks. On the right hand side, two tar wells can be seen and a channel runs along the same side to drain the tar away. The rest of the Tunnel is not accessible to visitors but, beyond the iron gate at the inner end, the Tunnel opens out to allow wagons to pass. Beyond there, the Tunnel has collapsed and, a little further on, becomes no more than a culvert but it had been wider and longer in its operational

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## **JOURNAL of an AMATEUR GEOLOGIST: STONE MOUNTAIN, GEORGIA, USA**

*Roger Southgate*

In a park to the east of Atlanta stands Stone Mountain, (Fig 1) a rounded mass of “granite” about 2.5 km long rising 250 metres above the surrounding plain. The park, which is a Confederate Memorial site, is easily accessible from the interstate road network around Atlanta.



*Fig 1: North side of Stone Mountain*

The State of Georgia is located in the south-eastern region of the USA. The sketch map at fig. 3 shows the location of Stone Mountain and the provinces of the northern half of the state. The Valley and Ridge, Blue Ridge and Piedmont provinces form part of the Appalachians which extend from Newfoundland to Alabama.

The main visitor attraction is a memorial carving about half-way up the side of the mountain (Fig 2). It is almost 60 metres long and 30 metres high

days, having been reported to be 1100 yards in the 1790's.

Brea Tar Pits, famous for the huge number of preserved fossil animals from mice up to large mammals that had fallen into the bitumen ponds over thousands of years, is the largest of its kind. So, it was a pleasure to find that we had a similar phenomenon in this country, albeit on a very small scale. The Tar Tunnel of Ironbridge has no fossilised creatures although the odd spider and woodlouse seem to have been lured into the bitumen but it was a very interesting visit and recommended if you are in the Ironbridge Gorge.

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and depicts three figures on horseback associated with the succession of the Confederate States and subsequent American Civil War (1861-1865). The



*Fig 2: Memorial carving on Stone Mountain*

carving was started in the 1920s and, after a long interruption, finally finished at the beginning of the 1970s.

My first visit to Stone Mountain in 1974 was to view this carving and, despite other visits since, I have only recently been able to walk up to the top and look at the geology.

The lower half of the state is part of the Coastal Plain province that stretches around the edge of the eastern part of the USA from Cape Cod in Massachusetts to Texas. The Coastal Plain province is a region of unfolded sedimentary rock and in Georgia it comprises Cretaceous, Tertiary and Quaternary deposits.

The Fall Line is the dividing line between the Piedmont and Coastal Plain provinces. It is significant as it represents a change from the harder rocks of the Piedmont to the softer rocks of the Cretaceous. A number of rapids and waterfalls on the rivers along the Fall Line form a barrier to navigation. As a result, a number of cities and