Iceland 2010

A retrospective guide to the locations and features visited on the 31st Anniversary Liverpool ‘ICEX’ Tour

Section 5
Despite its large size (more than 36km²) Mývatn has a maximum depth of just 4.5m and is warmed by hot springs. As a consequence, the lake is rich in microscopic life, including hard-shelled algae known as diatoms, on which the midge larvae feed. The midges support abundant populations of fish and attract a wide range of wildfowl and other bird species as part of a complex wetland ecosystem. More species of duck are said to live here than in any other place on Earth.

Dredging for diatomite (a chalky white rock made of diatom shells and used for filtration and other industrial purposes) began at Mývatn in 1967 and was the largest employer in the area for over three decades. However, the dredging was later found to have a damaging effect on the populations of midge larvae, fish and wild birds, and was closed in 2004. Since then, the lake has been slowly recovering - protected by Icelandic Law under the international Ramsar Convention.

At Skútustadir (53), on the south western shores of Mývatn, there is a spectacular group of ‘pseudocraters’, formed when the Younger Laxárdalur lavas flowed over the shallow margins of the original lake, giving rise to explosions of superheated steam.

Following our first overnight stay at the Vogar Farmhouse cabins on the eastern shore of Mývatn, we headed out eastwards from the small town of Reykjahlíð, past the group of sub-glacial palagonite volcanoes, including Búrfell (54), to the south of the main road.
Our first destination on Day 8 was Dettifoss (55), on the Jökulsá á Fjöllum river which drains northward from the Vatnajökull icecap. With a height of 44m, it is not as high as some of the waterfalls on the south coast, but it has a discharge as much as 1,500m³s⁻¹ in periods of heavy rain and maximum snow melt, making it the most powerful waterfall in Europe.

In immediate post-glacial times the peak discharge may have been as high as 500,000m³s⁻¹. It has been estimated that, on average, it carries around 120,000 tonnes of sediment per day. Approaching the falls from the car park on the western side, a number of abandoned channels can be seen cut into the columnar jointed basalt - testimony to the evolution of the river during Postglacial times.
Hverir (56) and the Námafjall ridge behind it, is a high temperature geothermal area with hot springs, boiling mud pools and sulphurous fumaroles. It is located within the same north-south trending active rift zone as Krafla, to the north, and Hverfjall and Ludent to the south. Not all of the features at Hverir are natural, however: exploration wells that were drilled here (in 1974) for the Krafla power station are now steam vents, such as the one pictured below. Sulphur was also once mined here, for use in gunpowder, and was exported via Húsavík.
The central volcano of Krafla forms a broad shield some 25km in diameter, with a caldera in its centre. In Postglacial times at least 18 eruptions have occurred in the caldera and the associated fissure swarm, which is some 80km long and 4 to 10km wide, with over 1,000 fractures. In historical times there have been two main periods of activity, the “Mývatn fires” in the 18th Century and the “Krafla fires” of 1975-84.

The Mývatn fires began on 17th May 1724 when a row of explosion craters formed, the most spectacular of which (named after the Icelandic word for ‘Hell’), was Viti (57, pictured below). This eruption lasted no more than a day or two, ejecting both silicic pumice and basaltic scoria, but mostly mud and other debris from the near surface rocks. Subsequently, periodic fissure eruptions continued to produce basaltic lava flows until September 1729. By then the lava had covered an area of about 34km² and reached the north shore of Lake Mývatn. It had overflowed two farms and the farmhouses of the parsonage at Reykjahlíð, but left the church intact, surrounded by lava. The events that took place during the Krafla Fires of 1975-84 were a striking repetition of what happened during the 1720s.

During each period of activity, it is thought that magma rises within the central volcano and is stored within shallow magma chambers at 3km depth. In the 1975-84 events, the maximum inflow rate of magma was estimated to be 5m³s⁻¹, based on the rate of inflation of the surface. During the short episodes of deflation and rifting, magma is intruded from the shallow magma chambers into the fissure swarm creating linear intrusions known as dykes. As a result of this activity, the tensional stress is gradually released and the magmatism changes from primarily dyke injection in the early stage of the rifting episode to lava outflow at a later stage.
The **Krafla geothermal power station** (58) was originally built in 1975-7 but has since been expanded and improved following early setbacks. A series of nine volcanic eruptions and associated seismic events took place near the station between 1975 and 1984. The ground movements deformed some of the original well casings and caused corrosive magma vapours to enter the geothermal system, destroying the borehole linings and affecting many of the processes within the power plant.

Since 1984 these effects have greatly diminished. In 1996 a decision was made to install a second turbine and drilling began to increase the capacity for steam generation. Improved technology, including oblique directional drilling, proved to be highly successful, both for developing new boreholes and for upgrading existing ones. 33 boreholes have now been drilled and the extension is complete. On average, 15 to17 boreholes are used at any given time and the station has been operating at its full installed capacity of 60MW since 1999.

**Dimmuborgir** (59), which translates as the ‘Black Castles’ or ‘City of Darkness’, lies to the south of Krafla, and to the east of Lake Mývatn. It forms a partially collapsed ‘blister’ within the Younger Laxárdalur lava flow, which originated some 2,300 years ago from the Lúdentsborgir crater to the south east.

It is the remains of a lava pool which formed when the lava was dammed as it flowed into Mývatn. After the surface of the lava had cooled, the central part of the blister collapsed as magma escaped through a labyrinth of lava tubes to the west, leaving a remarkable depression surrounded by vertical walls of lava. Within the depression a number of lava pillars (formed as steam vents within the original lava lake) stand as rugged peaks some 10-20m high, their tops being level with the surrounding lava surface.

Some of them contain natural arches, representing the roofs of former lava tubes. The sides of the pillars are marked by slickensides, formed when the consolidated surface of the lava subsided and scraped the sides of the pillars as the liquid below was drained away.
Directly to the north are the lavas associated with the Jarðbaðshólar fissure, which erupted during the latter stages of activity at Hverfell, but long before the Younger Laxárdalur flows seen at Dimmuborgir (see page 40).

The Jarðbaðshólar lava surface has been fractured in subsequent rifting episodes, as seen at the Grótagjá fissure (61) (pictured right).

It used to be possible to bathe in the geothermally-heated subterranean pools within this fissure but, after the 1984 eruptions, the water here became too hot.

At the eastern edge of the Jarðbaðshólar lava flow is Jarðböðin (62) (pictured left) - Iceland’s newest geothermal, open-air swimming pool.
Day 9: Mývatn to Gullfoss

Day 9 involved crossing the interior of Iceland once again, this time using the Kjölur route between Akureyri and Gullfoss. Kjölur is the high plateau (650m) between the icecaps of Hofsjökull and Langjökull. The route is described below in three sections.

Part 1: Eyjafjörður – Akureyri – Öxnadalur

After leaving Mývatn, the first part of our journey took us into the northern highlands, the deep fjord of Eyjafjörður (63) and the town of Akureyri (64) – the ‘capital’ of northern Iceland, on the western shore of Eyjafjörður, with a population of around 15,000 people.
In contrast to the much younger landscapes seen closer to the active rift zones in central and southern Iceland, this northern part of the country has been sculptured by many episodes of Late Pliocene and Quaternary (Pleistocene) glaciations, carving deeply into rocks of the Tertiary Basalt Formation, ranging from about 12 to 3.3 million years old.

Dominated by extensive, plateau basalt lava flows, the Tertiary succession also contains important thin red interbeds. These are sedimentary layers, formed during periodic breaks in volcanic activity at fairly regular (c.1 million year) intervals. Fossil plants within these layers demonstrate a progressive change in climatic conditions, from being much warmer than those of today in the oldest sediments, to much cooler conditions and the onset of glaciation.

The glaciers and icecaps which formed during the late Pliocene continued to wax and wane throughout the subsequent Pleistocene period, leaving a clear imprint of glacial erosion throughout the northern highlands in the form of deep U-shaped valleys and fjords, cirque basins and rugged mountain peaks.

During the last Ice Age of the Quaternary era (the Younger Dryas period), Eyjafjörður was occupied by a very large outlet glacier from the main ‘South Icelandic’ icecap to the south (this spanned the present day icecaps of Vatnajökull, Hofsjökull and Langjökull in the central and south-eastern parts of the country). At this time the local cirque glaciers within the highlands of the Tröllaskagi peninsula were also larger than they are today, but did not reach the coast (Stötter et al, 2000). This fascinating contrast reflects the fact that southern Iceland receives far more precipitation than the north, and that accumulation rates on the icecap must therefore have been much greater than on the northern cirques. As the climate warmed at the end of the Pleistocene, the Eyjafjörður glacier retreated rapidly to the south.

Our route from Akureyri followed the glacial valley of Öxnadalur (65), with occasional glimpses of some of the residual cirque glaciers of the Tröllaskagi mountains. Closer at hand, on the valley sides, are massive Postglacial landslips and glacial moraines.
Day 9, Part 2: Öxnadalsheiði to Hveravellir

From the head of Öxnadalur, our route continued over the glacial breach of Öxnadalsheiði, flanked by numerous deeply incised headwater steams and alluvial fans, before dropping down into the west-facing Norðurádalur, a tributary of Héraðsvötn, the broad valley which leads to the northern fjord of Skagafjörður.

Following lunch at the small town of Varmahlíð, with its interesting rural sculpture (above), our route continued via Blöndudalur to the man-made lake of Blöndulón (66), created in the late 1980s as part of another of Iceland’s many hydroelectric power schemes.

Continuing south we paused briefly at the mountain refuge of Arnarbaeli (67), affording distant views of the interior highlands and the western side of the Hofsjökull icecap (41).
Hveravellir (68), literally translated as ‘hot spring fields’, is a relatively low temperature geothermal area at the northern edge of the Kjalhraun lava field, situated within a shallow valley on the high plateau surface between the Hofsjökull and Langjökull icecaps.

It is accessible via a short detour from the Kjölur route and, during the summer, is a stopping point on a scheduled bus service between Reykjavik and Akureyri.

The natural features of the area include a variety of hot springs, fumarole steam vents and mini terraces of geyserite (a form of opal), which have formed around some of the springs when dissolved silica comes out of solution as the water cools.

There are also natural oases of lush vegetation around the springs – in marked contrast to the surrounding desert landscape.

An artificial pool has been created where very hot water from the hot springs is mixed with cold water to achieve a comfortable temperature for bathing – the most fantastic experience after a day’s hiking in the interior … and not bad after just half a day on the bus!

Looking out over the icecaps from the pool is a stunning experience. ……looking up from there at the Northern Lights during the winter is said to be even better!

According to legend, Hveravellir was for some time the hideout of the famed outlaw Eyvindur of the Mountains. Eyvindur was a condemned man who went into hiding in the wilderness with his wife and children back in 1760, when travel to the interior was almost unknown. The remains of the shelter he is said to have lived in for 20 years are still evident.