

MEMBERS' EVENING 2010

The fourth Members' Evening was held on 13th March 2010. Once again, the instructions to the presenters were simple: *show us your interests and infect us with your enthusiasm*. It is hoped that other members, especially those who are amateur, will offer short presentations to continue the Members' Evenings into future years.

Spotlight on Shetland

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When geologists mention Shetland they are normally talking about oil; but since this lies in rocks deep beneath some of the world's stormiest ocean, and is difficult to photograph, the onshore geology forms the basis of this presentation.

Because of its outstanding geological heritage, Geopark Shetland became a full member of the European Geoparks Network on 15 September 2009. This gave it the triple aims of: 1) conserving the geological heritage and demonstrating links with the natural and cultural heritage of the islands, 2) raising awareness and increasing the understanding of this geological heritage, and 3) enhancing the image of Shetland, while promoting sustainable development linked to its geological heritage and geo-tourism.

The Shetland Isles consist of over 100 islands that lie between 60° and 61° north, in the same latitude as Southern Alaska, and they are closer to Norway than to



Folded and sheared schist formed as a part of the Caledonian mountain building when granite and other rocks were intruded in northern Unst.

England. Blessed by the warm North Atlantic Drift that springs from the Gulf Stream, they enjoy a relatively mild climate, while the surrounding seas are rich in life that for many centuries has provided food both for the local people and also for massive colonies of sea birds.

The bedrock of the Shetlands accumulated when quite different terrains came together over long periods of geological time, along continuations of the Moine and Great Glen Faults of the Scottish Mainland. In Shetland, the oldest rocks occur in the Hebridean terrain west of the Walls Boundary Fault, where an inlier of Lewisian Gneisses, of >2900 Ma, is surrounded by garnet mica schists.



Devonian flagstones used to build an Iron Age broch on the isle of Moussa, off the east coast of southern Mainland.



Frost sorted, patterned-ground mainly in serpentinite at Keen of Hamar, on Unst. Note the purple-blotch colouring of healthy leaves, due to high chromium content in the soil.



Post-Caledonian granites forming reddened cliffs, arches and stacks along the west coast of northern Mainland, as seen looking southeast from the Eshaness peninsula.

Much of the remainder of Shetland's southern Mainland, including the Walls peninsula, consists of Devonian conglomerates and breccias overlain by sandstones and flagstones. These were deposited in alluvial fans and along braided rivers that derived from an active volcanic highland area towards the end of the Devonian and ended in the northern margin of the Orcadian Basin. In western Eshaness, the Devonian volcanic suite, including rhyolite and andesite lavas, vent agglomerates and ignimbrites dates from around 365 Ma. The distinctive pink granites that form Shetland's highest hill (Ronas Hill, at just 450 m), and extend through the eastern part of the Eshaness peninsula, are dated later, at 350 Ma.

Dalradian rocks forming the central part of Mainland east of the Walls Boundary Fault, consist of steeply dipping metamorphic rocks. These include the quartzite and schistose grit extracted at the Scord Quarry near Scalloway for roadstone. Four thick beds of marble have now been linked to 'Cap Carbonates' that formed during the melting phase of a Snowball Earth around 635 Ma. Close to Whiteness these beds have provided a source of lime, while the soil on them has a distinctive flora and fauna and also a higher value for agricultural development.

A north-south fault zone separates these Dalradian rocks from Grampian rocks that form eastern Mainland, where they are partly overlain by Devonian sediments dipping gently east. Carboniferous faulting then controlled mineral veins containing copper that was being worked more than 2000 years ago (on

the evidence of excavations of an Iron Age broch at Scatness). Dalradian rocks continue northwards beyond the faulting around Yell, into the northern isles of Fetlar and Unst. Here they include a serpentinised slice of ocean floor and mantle material that was worked near Keen of Hamar for metallic ores, notably its chromite. Until the middle of last century these were exported for pigments from the end of Chrome Lane in Lerwick. This ophiolite sequence also provided soapstone (a form of talc schist) that was carved by the Vikings settlers into lamps and cooking vessels; small quantities of talc are still extracted in the area for industrial use.

Shetland's Quaternary history includes the formation of an ice-cap on Ronas Hill and an invasion by Scandinavian ice-sheets that brought distinctive Norwegian erratics. Stone stripes and polygons, turf-banked terraces and block-fields form patterned ground features that are still active on the most exposed uplands. During glaciations, global sea levels were around 100 metres lower than at the present day, when the Shetland Isles therefore had a very different geography. The subsequent progressive rise in sea-level formed the deep sheltered inlets known locally as 'voes', and has given the islands a spectacular assemblage of coastal erosion and depositional features including massive cliffs, stacks, arches, blow-holes, bay-head bars and single and double tombolos.

The whole suite of Shetland's geological delights is good reason for any 'sooth-mooth' geologist to make the trip north, especially during the 'Simmer Dim' when the sun hardly dips below the horizon.



St Ninian's tombolo, a single sand ridge joining St. Ninian's Isle to the west coast of southern Mainland. Sand extraction for local building material at the mainland end has now ceased.