Field trip on 28th June 2009 to examine the Burniston dinosaur footprint beds
Leader: Dr Martin Whyte

On a rather damp, humid morning eight members of NEGS clambered down Burniston steps to get our first view of the Scalby Formation of the mid-Jurassic in the low cliffs behind Burniston Bay. Dr Whyte said that we would spend most of our time looking at the Long Nab Member, a mainly non-marine sequence of sandstones, siltstones and mudstones cut through by spectacular cross-bedded river channels, often with slumped margins. Below this lies the wave-cut platform of the Moor Grit Member, comprising a complex series of anastomosing channel sandstones known as the meander belt. About a metre above the beach the meander belt passes into thin beds of clays and silty sandstones, referred to as the level beds. Near the base of these deposits is a dark carbonaceous band, probably an ancient inter-tidal swamp, containing plant material with long rootlets. A second dark band could be seen 2-3 metres higher up: both proved to be useful marker horizons, remaining level right across the bay.

About 4 metres above the beach, just above the higher of the two dark bands, a fairly persistent bed of sandstone jutted out from the cliff. Dr. Whyte informed us that this was the well-known Burniston Footprint Bed. Blocks of it had fallen on to the beach, some in an upturned position, and before long, with a bit of persuasion from Dr Whyte, we were able to spot a preserved tridactyl dinosaur footprint on what would have been the base of the bed, standing out in relief as a trace fossil – a silty infill cast of a dinosaur footprint as it had walked over the soft mud. We rapidly became expert at seeking out these blocks, each of us discovering footprints for ourselves, sometimes being lucky enough to spot a track and the direction in which the animal had walked.

We proceeded south along the beach to Cromer Point, examining several localised channels with strong cross-bedded sandstones which had cut into the laminated level beds of sheet sandstones and silts. More than one channel displayed a muddy infill directly in contact with the sandy channel, indicating a powerful eroding current. These channels mostly occurred beneath the Footprint Bed, and in some cases were deep enough to cut into the meander beds.

As we approached Cromer Point the ebbing tide revealed dipping arcuate rock bands on the foreshore, representing the inner point bar deposits of a southward-migrating channel. Dr Whyte pointed out an interesting depression and rim feature in one of these bands, more than 50 cm across, which is attributed to a large sauropod footprint as it stood on the soft sediments of the river bank and distorted the mud.

We retraced our steps northward along Burniston Bay, discovering numerous examples of disturbed beds and casts of dinosaur tracks, on both upturned rocks in the bay and as casts on the under surface of the Footprint Bed as it wedged out from the cliff, still in situ. We also came across smooth, sinuous gutter marks on some channel surfaces, up to a metre long and several centimetres wide, sometimes appearing as deep grooves cut into the side of the channel,

indicating erosion from strong current action, possibly from a tidal surge during a brief marine incursion.

We spent some time examining roots and other carbonaceous deposits in a finely laminated sequence, some reaching down to the meander beds beneath. Erosion surfaces could also be seen within the laminae. Nearby, a surface rock displayed tri-radial syneresis cracks, the result of chemical reaction in the mud due to salinity changes Worm burrows were also present, another sign of brackish conditions and tidal influence.

Other interesting features such as shrinkage polygons were seen on the surfaces of fallen rocks, where sand had infilled cracks following ephemeral dry episodes, probably seasonal. Dr Whyte showed us an example of other, smoother polygons, the origin of which is under debate, but which may be attributed to hummocky cross-stratification on channel beds following storm action. Mudflake conglomerate were also seen, and there was an interesting sequence of migrating ripples displayed in one of the boulders.

We rounded off the trip with a quick excursion to Long Nab, once again coming across many features seen earlier in the day. The presence of large ironstone concretions in the upper meander belt and clay were noted, the result of oxygen-poor water accumulating beneath peaty soil horizons. Attractive dark red nodules of sphaerosiderite were also found. The field trip ended on a splendid note at Long Nab, when Dr Whyte presented us with his *pièce de rėsistance* - a perfectly recognisable cast of a pillar-like sauropod foot which had eroded out of the cliff about 4 metres above beach level, presumably formed as the creature trod on a soft, clay bed leaving a depression which subsequently became infilled with sand or silt. We had some fun working out which direction the sauropod had been heading – probably into the cliff!

Mavis Gill

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