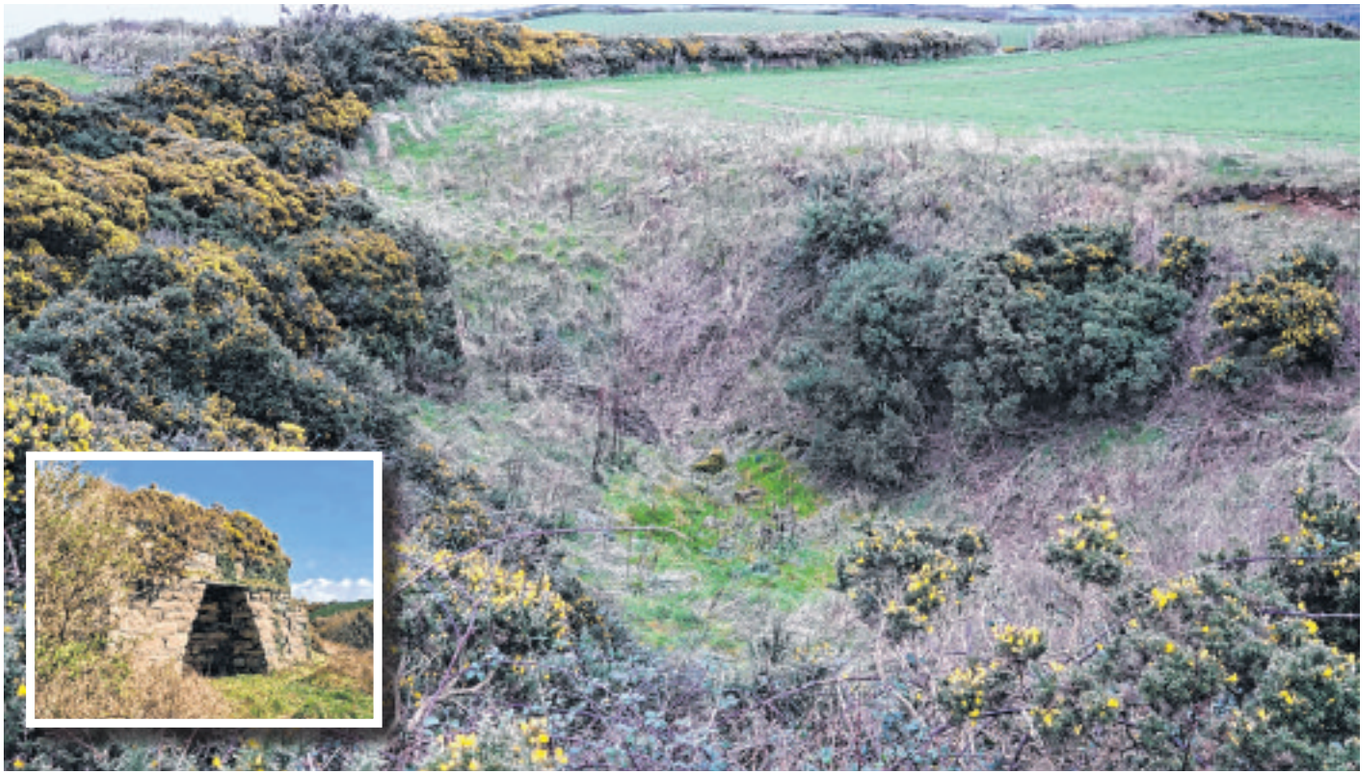
BUILDINGS AT RISK

Clay and lime – binding our land and buildings

Buildings at Risk looks at our built heritage – buildings and structures, how they have evolved, and their place and role in the landscape. In this instalment, **Dave Martin** of the Isle of Man Natural History and Antiquarian Society looks at how our use of clay and lime has changed - how they were extracted, processed and used; and how they interacted with our land and buildings.



A typical marl pit (opencast clay mine) in Andreas, nearly 30 feet deep. Inset, Glen Trunk, Orrisdale lime kiln (Photo: Sam Hudson)

Across the world, use of natural materials for both shelter and food production has often evolved in parallel.

This article looks at how two materials – clay and lime – have been extracted and used in the Isle of Man for both building and agricultural purposes, and the evidence and impact of these uses.

The material from which buildings are constructed, until at least the last century or two, usually reflected the materials available in the neighbourhood – wherever that might be in the world.

If stone was available, it was often the preferred material for its structural strength and weather resistance – but stone was not always available or suitable.

From time immemorial, mankind has appreciated mud – from making mud-pies as children, to filling-in gaps in a stone wall or as the 'daub' in wattle and daub to keep the wind out.

Actually using mud as a building material goes back millennia. In warmer climates - especially those with low rainfall - mud bricks, often known by their Spanish name of adobe, can be dried in the sun.

In more northern latitudes, 'rammed earth', sometimes known as 'cob', can be used to make whole walls – but earth on its own it lacks structural strength and benefits from fibrous matter such as roots, gorse, straw, or bracken. Earthen walls though suffer from erosion by rain, especially if wind-driven.

Those who lived from, and worked, the land would be very aware of the existence impact of differing soil types – some would be more fertile than others; some would drain freely whilst some would stay moist for longer, and some would even hold water.

SOIL

Most 'soil' is ground-up rock - ground up by being rolled-around in rivers, by glaciers, or on the seabed, or occasionally eroded from standing rock faces by the weather or waves

Many rock types are relatively homogeneous, but as they are ground-up, especially in for example the sea bed environment, they become mixed – different types of rock particles and also other sea-bed material.

What happens after it is ground-up can also affect the end result. In some cases it can take-on minerals, for example organic iron being captured to make 'iron pan' – which was the source of much of the Vikings' iron, rather than the iron ore used more recently.

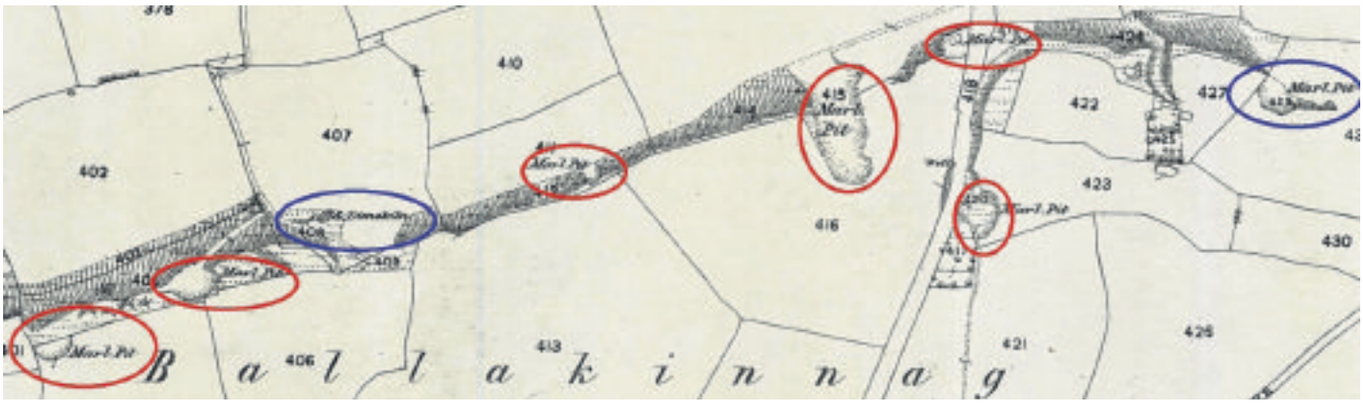
With wind-eroded rocks, it is easy to envisage finer particles being blown away. The same happens underwater too.

The bigger, heavier, particles - pebbles, gravel and sand - drop out of the flow; and the fine particles are carried away by tidal streams or river current.

If those particles end up in a pool or lake or other area of slow-moving or even static water, they eventually settle out as what we would recognise as silt. If enough silt builds up, for long enough, that is how we get clay. The beds of those ponds or lakes become the beds of clay we find at varying depths in the surface (non-bedrock) material in the island.

North of the line of the TT course from Kirk Michael to Ramsey, everything is 'the gift of the glaciers'.

It is layers of sand and gravel brought by the gla-



Extract from the First Edition Ordnance survey map c.1869 – within just over half a mile, there were seven marl pits and a lime kiln

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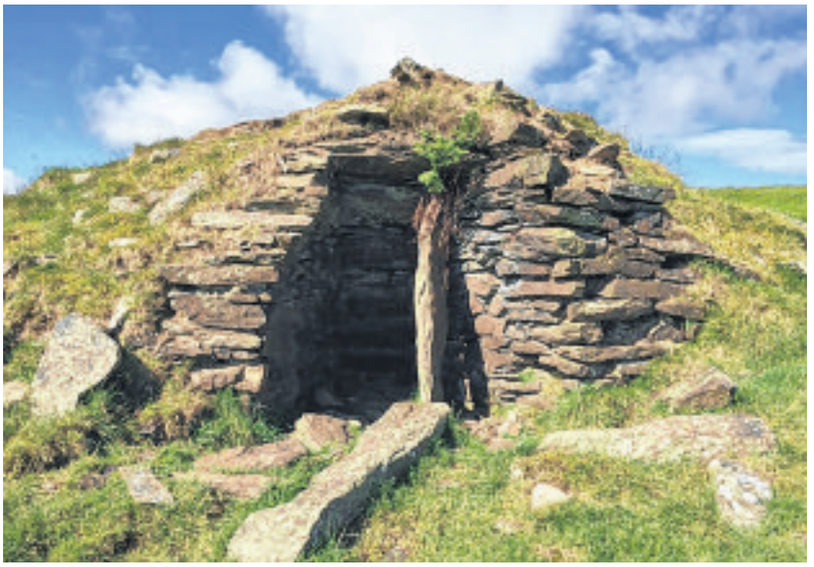
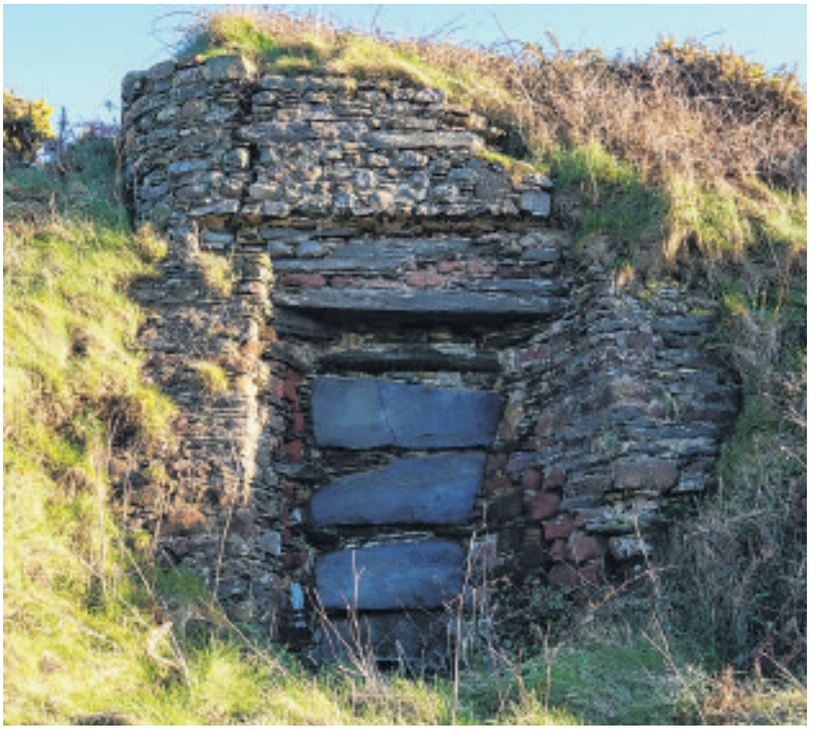
An early limekiln on the Ayres below Ballagarrett, Bride – note that the stonework has only been bonded with clay, although it has later had a coat of lime render



Druidale lime kiln – possibly peat-fired



A later limekiln built against the side of the brooghs

ciers, and beds of clay formed as water drained from hills, from periods of higher sea level, and from melting glaciers. This sequence of layers can be seen when, for example, there are landslips which remove the vegetation from the face of brooghs at the inland edge of the Ayres – you can see layers of sand and gravel with occasional layers of clay – the clay may be less than a foot thick but it serves to trap rainfall.

Another good example some readers may have seen was when the 'Prehistoric forest' was revealed at Cranstal a few years ago – a bed of clay which had formed at the bottom of a lake had set around, and preserved, the roots of trees dating back towards the end of the last ice age.

Whilst there are patches of 'perfect' soil for farming, much of the coastal belt is predominantly sand, at least on the surface (the Ayres are the extreme example); whereas some areas further inland are distinctly wet (the Curraghs). The Curraghs are wet because underlying layers or beds of clay keep the water from draining away.

Excessively-well-drained sandy soil reduces agricultural yields, so farmers tried to improve its moisture retention. One method was to spread wrack (seaweed) from the shore. That helped somewhat, and they were – possibly unwittingly – adding minerals etc. as well.

MARL

More moisture-retention was needed though, and whilst fields couldn't be given a complete under-soil 'damp proof course', all along the northern coast one of the first systematic extractions was clay to 'marl' the fields. Marling was an established practice on the Island by the time William Sacheverell, who was Governor 1693-94, published his 'Account of the Isle of Man'.

Although the edges of the clay beds could sometimes be seen in the brooghs, the risk of hundreds or thousands of tons of unstable glacial debris tumbling down meant extraction by working in from the face of the brooghs was infrequent and very small scale.

John Christian Curwen MP MHK, agricultural pioneer

Photo: Manx Museum Art Collection

Instead, clay (or marl) was extracted by what we might now describe as opencast surface mining – effectively digging a big hole.

This is why, on the detailed older maps, you will see a proliferation of marl pits (more locally known as clay dubs) along that coast. Marling is the term used to describe spreading clay over a field and mixing it with the existing soil to increase water retention.

These clay dubs were all dug by hand, with horsepower to pull laden sleds of clay or spoil up to field level. Examination of a number of the still-remaining clay dubs reveals that there may only have been one, two or three feet of clay in a hole 30 or more feet deep, so there was a vast amount of over-burden or spoil and relatively little clay, which would be very hard won.

Basil Quayle's 'General View of the Agriculture of the Isle of Man', published in 1794, describes applying ideally 'three to four hundred loads, each of 10 cwt, to the acre' i.e. 150-200 tons of marl per acre. That rate implies that even the biggest clay dubs may only have marled a couple of acres, once, if that ideal rate was used.

There was though another benefit – probably unrecognised at the time - to marling with that clay found under the coastal belt. As some of the silt that had formed this clay was ground up under the sea and incorporated shells, it was calcareous – so as well as helping retain water, this marl also improved the soil's pH.

This marling explains the proliferation of now largely unrecognised 'opencast clay mining' structures on farms around the north of the island.

In the second half of the 18th century, agricultural knowledge increased – both organically by farmers cooishing, and from the influence of agricultural improvers such as John Christian Curwen MP MHK, of Milntown and Ewanrigg, who was awarded a medal by the RSA (the Royal Society for the advancement of the Arts, Manufactures and Commerce) for promoting improvements to farming practices.

By the time of Basil Quayle's 1794 survey, farmers across the island were increasingly spreading lime to improve their fields' pH.

Whilst mining clay to marl fields really only took labour, limestone had to be bought and brought to the area, kilns built, and fuel bought – so significantly expensive, but far less was required – perhaps only a tenth of the tonnage of marl, or even less.

LIME

Much of the lime burnt in the island came from the – now flooded – quarry at Scarlett. It was generally believed that lime should be applied to fields as soon as possible after being burned.

Farmers in the south of the island could purchase their lime from commercially-operated kilns at, for example, Scarlett, Derbyhaven and Port St Mary; but farmers further north tended to buy 'raw' limestone and burn it themselves – either in their own on-farm kiln or in what may have been a community kiln, so the lime was produced close to the fields it would be used to dress. Those farmers may also have believed they could, by building their own kilns, sourcing their own fuel, and using their own labour, reduce their actual cash outlay. Coal fuel often still had to be bought, but some tried using, for example, gorse bornes; it is also believed that some of the upland kilns were peat fired.

Limestone was sometimes carted over-land – for example to the limekiln at Druidale - but more usually carried by sea, and landed on the coast near to where it would be burned and used.

Limekilns, of which more detail next time, are vertical kilns so are tall structures (unlike, say, brick ovens). Furthermore, limekilns are top-loaded, so access is needed to kick cartloads of limestone and fuel into the top of the kiln, so limekilns were often built against the faces of banks or brooghs which provided access; if that wasn't available, ramps would have to be built sufficiently strong to bear the weight of horse(s) and a laden cart.

● Future articles will continue the story, not only of limekilns but also how products were manufactured including how clay was used for bricks and dams, and limestone was transformed to lime mortar; and we'll look at how the island's geology gave rise to distinctive – and now fast eroding – regional building materials and hence building styles.