

## Buried Wealth

Cornwall's rich mineral resources have been exploited on a large scale since medieval times. Large reserves of tin coupled with local innovations in mining practice meant Cornwall dominated the world market until the 1870s. Likewise by the early nineteenth century Cornwall was the pre-eminent copper producer in the world. During the last decades of the nineteenth century the production of arsenic as a by-product of tin and copper mining was pioneered in the county.

Tin was in demand for use in pewter, bronze and to make tin plate on which the canning industry was built. Copper was needed for shipbuilding, in the brewing and distilling industries and for the telegraph cables which criss-crossed the world. The English brass industry was based on Cornish tin and copper. Arsenic was used in the dyes of the Lancashire cotton industry and demand grew when it became a popular insecticide in the late nineteenth century.

China clay is used in the making of porcelain and more recently as an ingredient in paper, cosmetics, plastics, paints and pharmaceuticals and Cornish china clay production remains a major industry. Cornish granite was exported all over the world; some of London's bridges are made from it.

Tapping into Cornwall's mineral wealth led to the creation of thriving and prosperous settlements throughout the county. It also created burgeoning ancillary industries such as foundries and engineering, and the development of a transport network including tramways, railways and industrial ports.

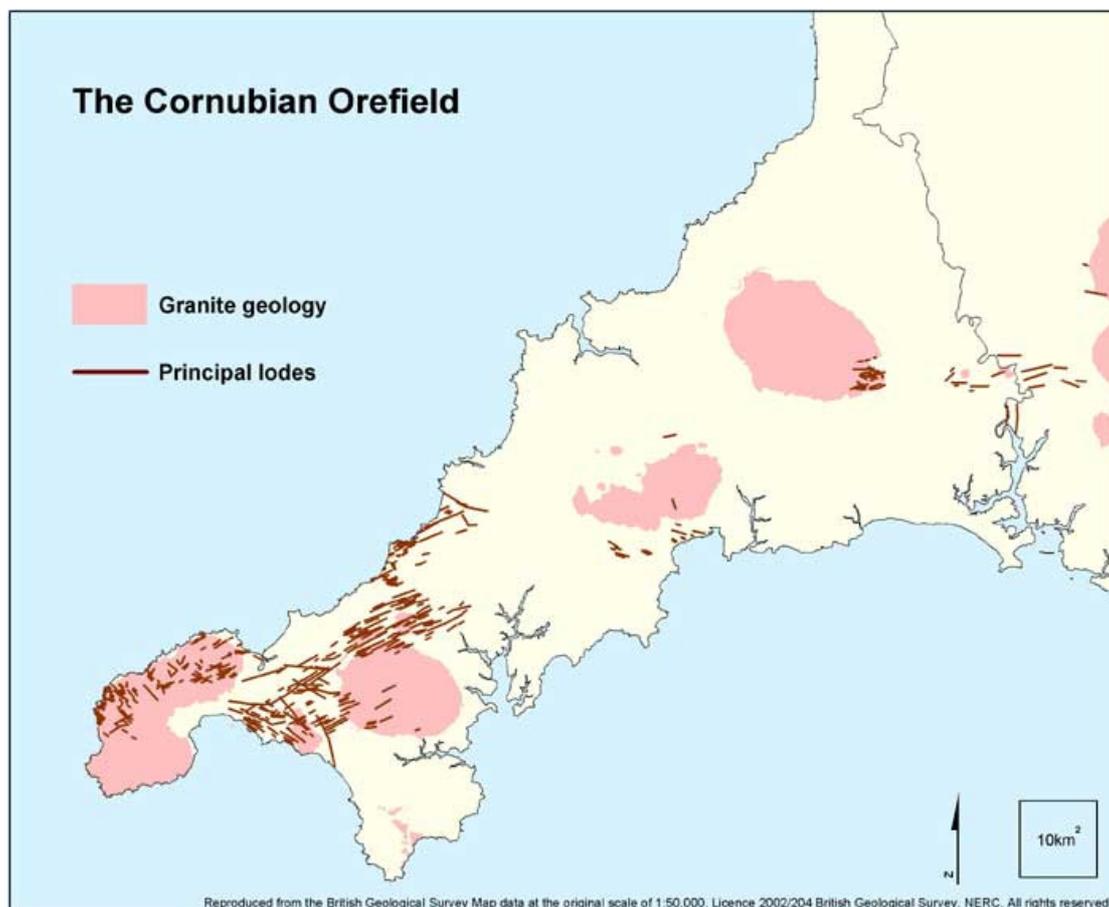


*Charlestown. One of the best examples of late eighteenth and early nineteenth century industrial harbours in Britain. Photo © Cornwall County Council Historic Environment Service*

## Metal & Stone

Cornwall's naturally occurring metal ore deposits were produced nearly 400 million years ago when molten rock formed submarine lavas and intrusions on the bed of a Devonian sea. Episodes of major earth movement caused by continents colliding subjected these rock formations to folding and faulting, and mudstones became slates. Between 300 and 270 million years ago continental collision generated enormous heat and pressure which melted the crust and formed granite, a coarse crystalline rock, deep in the earth.

Pressure forced granite masses upwards and they intruded into the rocks above them. The economically important mineral veins – known as lodes in Cornwall – were formed shortly after the intrusion of granite. The intense heat from the granite caused water to circulate in fractures in the rock, dissolving metal salts present there. As the water cooled it deposited metallic ore minerals along fissures and faults. Fifteen different metals and a great variety of minerals were produced; the most important being tin, copper and arsenic.



*Map showing granite outcrops in Cornwall and the location of the principal mineral lodes (seams).*

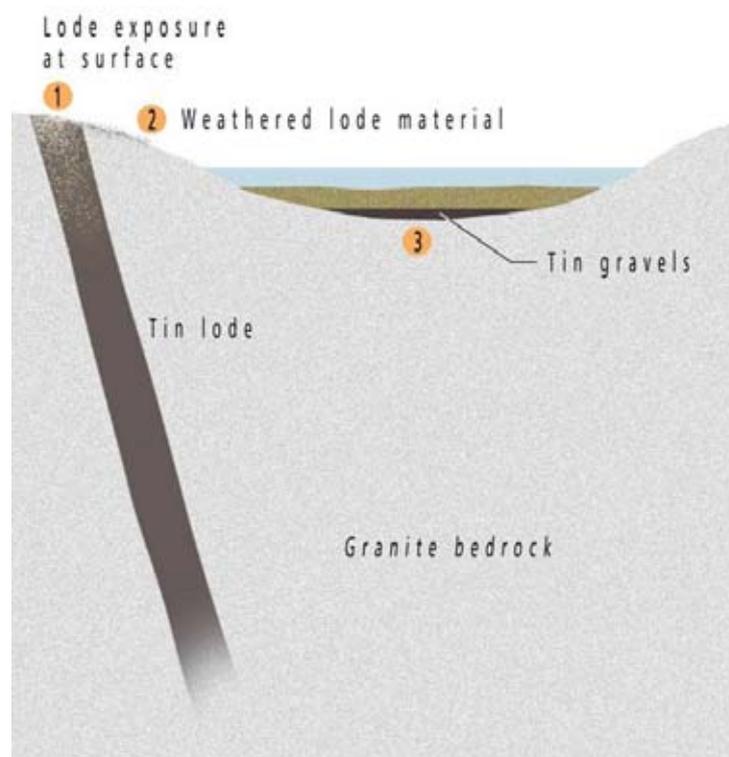
A similar process of water circulation affected some parts of the granite, breaking down feldspar crystals in the granite to produce kaolin or china clay. Kaolinised granite is found mainly in the Hensbarrow area to the north of St Austell. It is often weak and decayed in character.

Some rocks found on the Lizard Peninsula are even older than the granites, dating from the Cambrian era 600 million years ago. Most have been altered by subsequent pressure or heat. Among the economically important rocks on the Lizard are greenstone and serpentine. Greenstone is a term used to describe a number of igneous rocks (rocks formed molten volcanic magma) and is found in places in West Penwith and in North Cornwall as well as on the Lizard. Serpentine is a mineral produced when a volcanic rock, peridotite, became altered. It is a highly decorative stone when polished.

### Early Exploitation

Cornish stone has been an important resource since the earliest times. Six thousand years ago during the Neolithic period axes were being made from high quality greenstone dug from Cornish quarries. These axes were exported from Cornwall and have been found as far away as East Anglia. Prehistoric stone circles and megalithic chambered tombs were built from massive granite stones found lying on the moors. Bronze Age farmers in the Cornish uplands used moorstone taken from the surface to build their homes and to divide up the land into fields.

Tin and copper reserves were certainly exploited in prehistory. The upper part of a copper vein or 'lode', above the water table, is subject to oxidisation. This process produces colourful copper-rich minerals, such as red oxide (cuprite) and blue and green carbonates (azurite and malachite, among others). These are very obvious, for instance as bright green staining in the cliffs around St Agnes, and would have been easily recognised.



*Where lodes of tin were exposed at surface (1) tin-rich rocks were weathered and washed downslope where it lay as eluvial tin (2). Some accumulated as concentrated deposits of alluvial tin in river valleys (3).*

Similarly the unusually heavy, dark-coloured pebbles from deposits of tin ore (cassiterite) would not have escaped notice. Where tin lodes were exposed,

geological erosion caused cassiterite to break away and to lie on the surface as coarse, tin-rich gravel. These tin gravels were then washed downslope. They either settled a short distance downslope from the parent lode as *eluvial* deposits, or accumulated in the bottom of river valleys to form *alluvial* deposits. In both cases the deposits formed layers of varying lengths known as tin streams. These streams of tin are often several metres deep and wide.

Although any early tin mining will have become obscured by peat growth or by later workings there is a wealth of evidence pointing to the quarrying or mining of metals in Cornwall from the earliest times. The classical author and historian Diodorus Siculus, describing the inhabitants of the pre-Roman South West, wrote that

*The natives work the tin, treating the bed which bears it in an ingenious manner. The bed, being like rock, contains earthy seams, and in them the workers quarry the ore, which they melt down and cleanse of its impurities.*

Diodorus also recounts how the finished tin was taken for export to northern Europe.

The archaeological record presents a picture of extensive use of the tin resources at this time. A number of tin ingots dated to the late Iron Age and Romano-British periods have been identified in Cornwall; pebbles of stream tin and evidence of metalworking are commonly found at Romano-British settlement sites.

During the early medieval period there is evidence for export of Cornish tin to the Mediterranean and northern Europe. A wooden shovel used by tinnerns working in Boscarne tin stream is dated to this period. Clearly the extraction of tin was becoming a large scale enterprise: church bells, whose bronze depended on Cornish tin, were widespread by the time of the Norman Conquest.