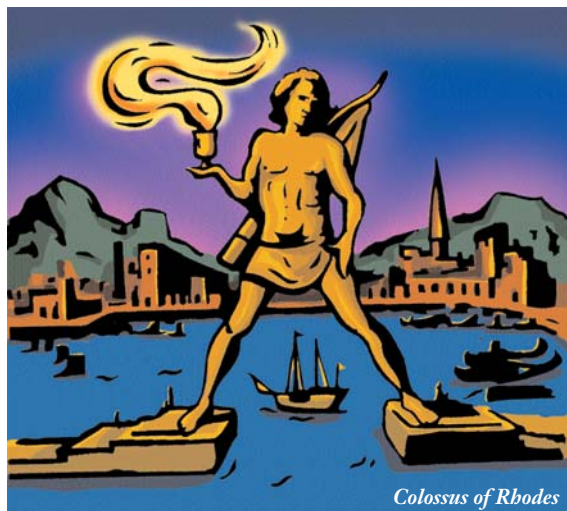


## Lighthouse lore

There is something fascinating in lighthouses. In the form of beacons lit on promontories they have been with us since antiquity. The famous Colossus of Rhodes, built about 280BC, was



Colossus of Rhodes

a statue of Apollo holding a flaming torch. The statue was destroyed by an earthquake 80 years later. The equally celebrated Pharos of Alexandria was a 100m tower on the island of that name, built in 261BC by Ptolemy Philadelphus and reputedly visible for 68km. It was partly blown down in AD793 and shattered by earthquakes in 1375. Both structures were ranked among the seven wonders of the world. Moreover, the volcano Stromboli in the Lipari Islands, was known as “the lighthouse of the Mediterranean”.

In our own islands the first century Roman lighthouse at Dover has enjoyed its own fame. Since then we have seen the multiplication of lighthouses round our coasts. These were the work of the Corporation of Trinity House, developed by a guild of mariners concerned with navigational safety, which received its charter of incorporation from Henry VIII in 1514 and was awarded the right to control coastal buoys and beacons in 1594.

What prompted my recent interest in the lighthouse phenomenon was the news that on 22 August festivities were held at the Lizard lighthouse in Cornwall to celebrate the completion of 250 years since its light first shone out. A concert and firework display were held at the site.

The Lizard Light was unusual in having two separate light towers joined by residential buildings for the guardians. Although both towers remain, one single flashing light in the eastern one was established in 1903, visible for 40km. The philanthropic Sir John Killigrew in the early 17th century was responsible for raising a lighthouse at his own expense, but was thwarted by the unwillingness of passing ships to pay a toll to keep the venture alive. In 1748 Trinity House came to the rescue of another constructor, Thomas Fonnereau, and the light was built in 1751 and showed

its first gleams the following year. Eventually a flashing white light was organised, with a period of three seconds.

If you venture after dark along the cliffs of the Lizard you will experience the great sweep of white light sending its message to skippers entering the Channel from the south-west. It is memorable. There is

another impressive feature to experience. That coastal area is subject to many sea fogs, some of them alarmingly dense and sudden in onset. The Lizard Light has also a powerful foghorn, uttering two blasts, long and short, every minute.

Since the coastal footpath alongside the lighthouse is narrow and precarious, a notice warns walkers to beware of unheralded blasts, which might easily upset their balance and even propel them in the direction of the great chasm known as the Lion's Den. I was once overtaken by a fog in that

critical situation, and was shaken to the core for a few seconds by the warning signal bursting from the darkness.

I prefer to meditate in the atmosphere of Tennyson's *Ulysses* (1842): “The lights begin to twinkle from the rocks; / The long day wanes; the slow moon climbs; the deep / Moans round with many voices.” And, of course, the Lizard Light sweeps its magnificent beams across the rugged cliffs.

## In the limelight

Two centuries ago, in 1802, Robert Hare, a chemist holding a professor's chair at the University of Pennsylvania, devised the oxyhydrogen blowpipe for making metal alloys, analysing minerals and carrying out reactions at high temperature. It was found that when the flame of the blowpipe was directed at refractory substances such as quicklime a high intensity light was emitted. An engineer from Edinburgh, Thomas Drummond, turned this light emission to practical effect a few years later. Drummond studied chemistry and mathematics under Michael Faraday at the Royal Institution in London, and joined the Royal Engineers in 1815. From here he moved to working with the Ordnance Survey in 1820.

Drummond found surveying and communicating difficult in bad weather, but adopted the limelight generator, which greatly improved visibility for the surveyors. Another inventor, Sir Goldsworthy Gurney in Cornwall, made some improvements to the original design, but gave full credit to Drummond by naming it the “Drummond light”, a designation widely adopted thereafter. Drummond adapted his light for use in

coastal lighthouses, the first limelight being installed in the South Foreland lighthouse in 1861.

The Drummond light became a popular source of illumination for public works carried on at night, and in theatres for special effects and for picking out actors on the set. The film industry would have found it hard to progress without this aid. The expressions “seeking the limelight” and “avoiding the limelight” passed into everyday language, especially among politicians and other doubtful characters.

Drummond himself took great interest in social and political problems, particularly in Ireland, where he took an administrative position in Dublin. He did not spare himself in this work, and was so indefatigable that he ruined his health in the process, dying at the early age of 42 in 1840.

## Old iron

Within the Qutub Minar complex in Delhi stands an iron column some 7m high and weighing 6 tons. The extraordinary thing about it is that, despite exposure to the weather since the fifth century it has not rusted in the manner we expect an iron object to do, nor has it shown any sign of corrosion. It has long been an object of interest to archaeologists, having been erected by King Chandragupta to celebrate one of his conquests about AD400. The column was originally set up in Udayagiri in central India but was moved to its present site during the 13th century.

The amazing preservation of an iron structure has prompted research at the Institute of Technology in Kanpur by the materials engineer Ramamurthy Balasubramaniam. *New Scientist* for 3 August reports that Dr Balasubramaniam has analysed material from the pillar's surface and found that it is composed of a hydrated iron hydrogen phosphate. The reaction of iron containing an unusually high concentration of phosphorus with atmospheric oxygen and moisture has formed a highly resistant surface film, which has effectively prevented rusting of the metal beneath.

The history of iron smelting in India is not clear, but it is believed that the process was introduced there from the West, possibly as early as 1000BC. Several celebrated iron pillars in the continent are believed to date from the first century AD or later, when the smelting industry of India was flourishing. There is a long tradition that they embodied a secret composition, since they resisted decay. However, when specimens were transported into Europe, it was reported that they rapidly underwent corrosive rusting and deteriorated into dust. Indian metallurgists differed from smelters elsewhere in failing to employ limestone to remove phosphorus from iron. It seems probable that here lies the root of the phenomenon.