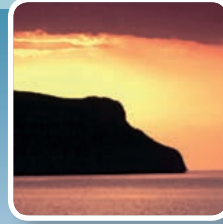




# Discovering THE GREAT ORME

- Wildlife
- History
- Geology



## GENERAL INFORMATION

Most of the Great Orme is a Special Area of Conservation (SAC) because it contains habitats and species that are rare or threatened in Europe. It is a 'Site of Special Scientific Interest' (SSSI) illustrating the national importance of the site especially in terms of its geology and wildflowers. The Great Orme is also designated as a Heritage Coast illustrating its importance in the landscape and serving to protect this coastline of special scenic and environmental value from undesirable development. There are also hundreds of historical sites and eight archaeological sites of national importance (Scheduled Ancient Monuments).

### For further information about the Great Orme, please visit the:

Great Orme Visitor Centre next to the summit tram station, (open every day between March and November), or contact the Country Park Office on 01492 874151.

### For more information about the area, please visit the:

Tourist Information Centre,  
Library, Mostyn Street,  
Llandudno, LL30 2RP  
Phone: 01492 577577

- 🔍 Please follow The Countryside Code  
Respect • Protect • Enjoy

## The Great Orme - an introduction

The Great Orme is a spectacular headland of limestone lying to the north-west of Llandudno. It is 3km long and 2 km wide, and rises to 207m at the summit. For many years the Great Orme has been a very popular place for people to visit - today the Great Orme receives over half a million visitors each year. The Great Orme consists of mainly limestone grassland, with heathland, limestone pavement, scrub, woodland and sea cliffs. It is of importance for its landscape, wildlife, geology and its history. It is for these reasons that it is now managed as a Country Park and Local Nature Reserve by Conwy County Borough Council. This publication is designed to give an introduction to this fascinating place.

## HOW TO GET HERE

**By bus:** Buses to the summit of the Great Orme vary depending on the season. For information on services, please phone Traveline Cymru on 0870 608 2 608 or visit [www.traveline-cymru.org.uk](http://www.traveline-cymru.org.uk)

You can also phone the Public Transport Enquiry Line on 01492 575412.

**By tram:** The Great Orme Victorian Tram Way runs from the foot of the Great Orme to the summit between March and November. For information, phone 01492 879306 or visit [www.greatormetramway.co.uk](http://www.greatormetramway.co.uk).

**By car:** Follow the A470 into the centre of Llandudno. Go up the main street, turn right at the roundabout and follow the road past the entrance to the pier and The Grand Hotel onto the Marine Drive toll road. Follow the signs to the summit, where there is a pay-and-display car park and Visitor Centre.

This is one in a series of leaflets produced by Conwy Countryside Service. For more information on walks in the County Borough of Conwy visit: [www.conwy.gov.uk/countryside](http://www.conwy.gov.uk/countryside) or phone: 01492 575290 / 01492 575200

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Thanks to Great Orme Copper Mines for the illustrations on page 11.

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↑ Looking down Monk's Path in early summer, the yellow flowers are rockrose.



↑ St. Tudno's Buttress illustrating the layers of limestone on the headland.



↑ Fossils on the Great Orme.

## Geology

### of the Great Orme

The Great Orme is made of limestone rock which was formed between 300 and 350 million years ago when most of North Wales lay beneath a shallow tropical sea. The rock has been formed from the remains of sea creatures that lived during this time, a period known by geologists as the Carboniferous. Skeletons and shells from these creatures accumulated on the seabed for millions of years and most were broken up by the action of waves and sea currents. Gradually, these fragments were squeezed together to form solid limestone rocks.

Changes in sea level have at times both raised and submerged the limestone rock causing weathering and erosion (wearing away of rock). As the rock eroded many fossils were uncovered. Today, the fossilised remains of many of the sea creatures, typical of the Carboniferous Period may be seen. The most common fossils that can be found are brachiopods (similar to present-day cockle shells), crinoids (sea lilies, stalked animals related to starfish) and reef forming corals.

After the carboniferous period there were extensive earth movements associated with volcanic activity, crumpling the earth's crust, forming mountain ranges such as the Alps. This movement was felt on the Great Orme causing the limestone layers to fold.

If you look at the layers of limestone on the headland you will notice they are no longer horizontal, but lie at angles. This warping or folding was produced by huge pressure, created by the earth's movements at this time, causing the rocks to fracture, or break and move apart both horizontally and vertically (a process known as 'faulting'). This was often associated with volcanic activity, as the earth's crust weakened to allow molten rock (hot, liquid rock) and gases to escape. As the material cooled down various minerals were left in the faults (valleys left by the earth moving), forming 'mineral veins'. On the Great Orme, the most frequently found minerals are compounds of copper. Humans used this copper from prehistoric times until the middle of the 19th century.

Over the past two million years, Britain has experienced several ice ages when the climate became cooler and the Arctic ice sheet moved south.

On the higher ground in the mountains of Snowdonia, glaciers (moving ice sheets formed by compacted snow) developed and much of North Wales was covered by huge ice sheets. The Great Orme was covered by a glacier during the most recent ice age, which lasted from 60,000 to 12,000 BC.

As the ice sheet moved across the headland it scraped away overlying soil and some of the rock, uncovering flat limestone rock which has been subjected to weathering (worn away) over the past 14,000 years. Rainwater has entered cracks within the rock and dissolved the softer limestone forming deep vertical channels known as "grykes". The hard limestone rocks around the "grykes" have not weathered so quickly; these are called 'clints'. These geological or rock formations are known as 'limestone pavements'.

As the glaciers melted at the end of the ice age, soil and rock which had been removed from elsewhere was dropped in places on the Great Orme. This soil and rock is known as 'glacial drift' or 'boulder clay'. You can see most of this boulder clay on the West Shore, but you can still find boulder clay all over the headland which may be easily recognised by the heathland vegetation which is able to grow on the deeper soils.

Evidence of glaciers melting can be seen in the form of large boulders, or erratics, left scattered over the headland.



↑ Glacial erratic.





↑ View from a cave on the Great Orme.

## Archaeology and History of the Great Orme

### The Stone Ages (100,000 BC to 2,500 BC)

At the beginning of the Stone Age (the Palaeolithic period, 100,000 to 10,000 BC) Conwy Bay was probably dry land. During warmer periods it would have been covered with a dense forest. The remains of trees can still be seen at low tide from several places offshore at Conwy, Llandudno and Penmaenmawr. The discovery of flint scrapers, stone axes and decorated animal bones has shown that Stone Age people lived in various caves around the Great Orme.

Kendrick's Cave, a small cavern on the south side of the Great Orme (on private land) has been extensively excavated since 1886 and the results have revealed very early habitation reaching possibly Palaeolithic Stone Age times and later Neolithic times.

Also on the Great Orme is 'Ogof Tudno' (Tudno's Cave), which although not firmly dated contained many limpet and mussel shells similar to those found in occupied caves. Neolithic people of the later Stone Ages arrived in southern England in about 4,000 BC to 2,500 BC, introducing the practices of farming and pottery. At Penmaenmawr they developed an axe factory and established a number of settlements. Neolithic people buried their dead in impressive burial chambers. The remains of a chamber or 'cromlech' as it is called in Welsh (meaning 'crooked stone') may be seen on the Great Orme, in a field below the half way tram station.



↑ St. Tudno's Church.



↑ Life in a Bronze Age Village.  
(Illustrations taken from a display at the Great Orme Copper mine).

### The Bronze Age (2,500 BC to 500 BC)

Around 2,500 BC, people who knew how to make metal tools arrived in Britain. Bronze, the metal used, is a mixture of copper, tin and other materials. It was in the Bronze Age that the Great Orme and its rich copper ores would have taken on a new significance in the eyes of those who recognised this potential wealth. Investigations over the last 15 years, with the benefits of scientific back up, have shown that the Great Orme Copper Mines were first worked over 3,500 years ago during the Bronze Age. They are currently recognised as being the largest Bronze Age mine workings in Western Europe, and maybe in the world. The basic tools of prehistoric miners were stone hammers, animal bones and antler picks. You can explore some of the workings, and find out more about life in the Bronze Age on the Great Orme by visiting the Great Orme Mines, which opened to the public in 1991.

Besides mining, Bronze Age people farmed, hunted and fished, and lived in circular huts. Evidence of circular huts can still be found on the Great Orme today.



↑ Pen Dinas.

### The Iron Age (500 BC to 43 AD)

Iron Age people arrived in Britain from the Hallstatt (Austria) region of the Alps around 550 BC. They spread inland from the east coast of England, building farms and small villages. During unsettled times Iron Age people built hill forts, or protected villages. One such hill fort can be found on the Great Orme, on the hill known as Pen Dinas (Welsh for Hill or Summit of the Castle) which overlooks Llandudno. People used the steep cliffs as a natural defence.



**Allwedd Key**

- |  |                              |  |                        |  |                                      |
|--|------------------------------|--|------------------------|--|--------------------------------------|
|  | Parc Gwledig<br>Country Park |  | Adelidau<br>Buildings  |  | Canolfan Ymwelwyr<br>Visitor Centre  |
|  | Mer<br>Sea                   |  | Ffordd<br>Roads        |  | Tollfodau<br>Toilets                 |
|  | Tywod<br>Sand                |  | Trae<br>Track          |  | Safleoedd Picnic<br>Picnic Sites     |
|  | Coed<br>Trees                |  | Tramffordd<br>Tramway  |  | Llunithau<br>Refreshments            |
|  | Caeau<br>Fields              |  | Car Cebli<br>Cable Car |  | Ffôn Argyfwng<br>Emergency Telephone |
|  | Parc<br>Park                 |  | Parcio<br>Parking      |  |                                      |



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**LLANDUDNO**



Abbey Road  
 Church Walks  
 Gloddlaeth Street  
 Victoria  
 Gorsaf Tramffordd  
 Tram Station  
 Mostyn Street

Ogof Llech  
 Slate Cave  
 Rest & Be  
 Thankful  
 Café  
 Yr Hen Oleudry  
 The Old Lighthouse  
 Fferm  
 Parc  
 Farm  
 Ffynnon  
 Llety Ffadoc  
 Well  
 Eglwys Sant Tudno  
 St Tudno's Church  
 Pen-y-Gwylfryn  
 Summit  
 Ffynnon  
 Powell  
 Well  
 Ffynnon  
 Gogarth  
 Well  
 Chwarel yr Esgob  
 Bishop's Quarry  
 Mwngloddiau Copr  
 Copper Mines  
 Cronlech  
 Gorsaf Hammerfordd  
 Halfway Station  
 Shaft  
 Shaft  
 Chwarel  
 Quarry  
 168  
 Sgïo Llandudno  
 Ski Llandudno  
 Happy Valley  
 Y Fach  
 Gorsaf Car Cebli  
 Cable Car Station  
 Tollbarth  
 Toll Gate  
 Pier  
 Ffynnon y  
 Galchog  
 Well  
 Ogof Colomennod  
 Pigeons Cave  
 Gerddi Haufrife  
 Hafrife Gardens  
 Gorsaf Tramffordd  
 Victoria  
 Tram Station

## Roman times (43 AD to 410 AD)

Though the Romans controlled lowland Britain shortly after the Claudian invasion of 43 AD, it took some time for the Romans to penetrate upland Wales. There is little evidence for direct Roman interaction with the inhabitants of the Great Orme and no remains of a Roman settlement have been found.

However, two Roman coin hoards were found at the beginning of the 20th century. The first collection of Roman coins was discovered during the construction of Mostyn Broadway, Llandudno in 1907. Most of the coins were made in Britain.



The second coin hoard was found on the Little Orme near the same road, about half a mile east from the first find.

Although there is no direct evidence for the Roman exploitation of the Great Orme Copper Mines, the fact that the mineral wealth of Britain was one of the reasons behind the invasion may certainly make it possible. The Romans left Britain around 410 AD, and for several centuries the historical records are very sparse.



↑ The ruins are all that remain of the Bishop's Palace.

## Recent times (410 AD to 1850 AD) Historical buildings

Around the 6th century, Tudno, a Welsh Christian missionary, came to the Great Orme. He built the first church in the area, probably from wood, and this was later replaced by a stone building in the 12th century. The church was named after Tudno, who was made a saint in recognition of his good work. St. Tudno's Church was enlarged in the 15th century but then fell into disrepair in the 19th century, ending with the roof being blown off in a severe gale. The church was restored in 1855 and has been used ever since.

Another building of historical interest on the Great Orme is Gogarth Abbey or, more correctly, the old Bishop's Palace. Its remains stand on the edge of the cliffs overlooking Conwy Bay on the West Shore. The building was probably built by Bishop Anian towards the end of the 13th century. The palace may have been a present from Edward I after Anian christened the first Prince of Wales. The building was burned by Owain Glyndwr (he led a Welsh rebellion against the English) at the beginning of the 15th century. Only ruins can be seen today. Gogarth Abbey is currently on private land.

## Farming

During this time, (13th century) farmers on the Great Orme ploughed the land around the summit. Reminders of this medieval farming are still visible today with the ridge and furrow markings and evidence of long-huts. These are especially evident in the area above St. Tudno's Church.

## The Vikings

The Viking influence is also evident on the Great Orme. This is especially so in the place name "Orme" which is thought to have come from the Norse "horma heva" meaning "dragon" or "sea monster". Coins from near St. Tudno's Church, which contained coinage of King Cnut (a Viking king), confirm this connection.



↑ Looking towards Bishop's Quarry from the summit.

## Mining

Mining on the Great Orme slowed after the Bronze Age, and it was not until the end of the 17th century that mining on a large scale was restarted. In 1692 the mining industry initially involved random prospecting and limited mining for surface deposits of copper. As surface deposits were exhausted gradually deeper mines developed. The main mining area was near the halfway tram station, where shafts and spoil tips (waste discarded from the mine) can still be seen. The mine shafts are very dangerous and should not be entered. There are several 'adits' (horizontal tunnels) excavated to provide drainage and ventilation. Most are now flooded and again are very dangerous. The settlement at Cwllach and Maes Y Facrell, housed the miners and was one of the original settlements in the Llandudno area. After the growth of Llandudno as a holiday resort, the mining area became less important.

## Quarrying

Two stone quarries were formerly worked on the Great Orme, Rofft Quarry and Bishop's Quarry. Stone from Bishop's Quarry is said to have been used to construct the Conwy Cob and Telford's Suspension Bridge at Conwy in 1826. The stone was carried by sea around the Great Orme via a shallow bay that forms part of Pigeons' Cave, known as Porth yr Helyg ('Harbour of the willow trees').



↑ The Lighthouse.

## From 1850 to 1950

In 1862 the lighthouse came into operation perched high on the limestone cliffs. In 1878 the Marine Drive road was completed around the headland and in 1902 the tramway was opened.

During the Second World War, the West Shore of the Great Orme played host to the Royal Artillery's Coast Artillery School relocated from the south of England. The land required little alteration. There was suitable anchorage for target vessels and good conditions for radio direction finding. In addition to the gunnery, wireless and searchlight wings were also established in 1940. At the end of the war, the armament and equipment were removed and the land returned to Mostyn Estates. The buildings became derelict and most were demolished in the mid-1950s under a reclamation scheme. However, the remains of observation sites, pill boxes and gun emplacements can still be seen today with the land now forming part of the Great Orme Country Park.

If you wish to explore the history of the Great Orme on foot, pick up a copy of the 'Great Orme Historical Trails' booklet from the Great Orme Visitor Centre or the Tourist Information Centre in Llandudno.





↑ Limestone Heath.

## Wildlife

### of the Great Orme

The wildlife found on the Great Orme is extremely rich and diverse due to the variety of habitats which occur here. These range from sea cliffs and limestone grassland to heathland and woodland. There are no large areas of fresh water, though there is a disused and now silted up reservoir east of St. Tudno's church.

#### The Wild Flowers of the Great Orme

An enormous variety of wild flowers thrive on the Great Orme in habitats ranging from sheltered woodlands to exposed, virtually soil-less, sea cliffs. So please enjoy their beauty without picking them.

The limestone rock on the Great Orme has given rise to a very shallow, limerich soil over most of the headland and this supports a grassland community of international importance, dominated by short grasses such as sheep's fescue.

Growing among the grasses are a large number of wild flowers including wild thyme, dropwort, salad burnet, harebell, common rockrose and a rare flower, hoary rockrose. Where trampling occurs these wild flowers are replaced by coarser grasses such as Yorkshire fog and white clover. Walking through these areas during spring and early summer can be a delight.



↑ Common Rock rose.

The limestone pavements support interesting plants because the grykes (deep channels) provide shade and moisture in a very dry and exposed place. This allows shade tolerant plants more commonly found in woodlands such as dog's mercury and several varieties of ferns, including wall rue and black spleenwort to flourish. The bare areas of limestone rock are frequently covered with lichens and mosses, with the surrounding grassland supporting hoary rockrose.



↑ Spiked Speedwell, a nationally scarce plant found in limestone grassland.

Ungrazed cliff ledges provide a refuge for plants such as wild cabbage and dark red helleborine. Other flowers such as sea campion, thrift, spring squill and common scurvy grass thrive because of the coastal influence on the headland. Scurvy grass is rich in vitamin C and was used by sailors in the past to combat scurvy, a common disease at the time resulting from a lack of fresh fruit and vegetables.

On some parts of the headland, pockets of deeper soil of glacial origin support heathland plants such as bell heather, ling, gorse, tormentil, heath bedstraw and heath speedwell.

Meanwhile, the small areas of woodland on the sheltered south-eastern slopes of the Great Orme contain a variety of trees including ash, sycamore, wych-elm, whitebeam, lime and yew, with a variable shrub layer of hazel, hawthorn, elder and holly.

In total, 431 species of plants, many of which are rare or unusual, have been recorded on the Great Orme. One particular plant, the wild cotoneaster or 'Great Orme berry', is unique to the Great Orme. It is endangered because this is the only place in the world where it can be found. Another important plant is the spiked speedwell. You can find this nationally scarce plant in limestone grassland. However only 360 species of those identified are native to Britain, with others being introductions.

Non-native plants (plants that have been introduced) present an enormous threat to our native wildlife, second only to habitat loss.



↑ Razorbills.

#### The Birdlife on the Great Orme

A large number of different types of birds may be seen on or around the Great Orme throughout the year. Some use the headland only during the spring and summer as a place to breed, while others stay just for a day or two when they are migrating, and a few birds spend only the winter months here. There are about thirty species which are truly resident, only very rarely, if ever leaving the Great Orme.

The birds that breed on the Great Orme are dependent upon the various habitats found here. For example, the sea cliffs support breeding colonies of seabirds such as guillemots, razorbills, kittiwakes, cormorants and fulmars.



↑ Chough, a rare member of the crow family, often found in remote cliff areas.

Wheatears, which arrive from North Africa in the spring, nest among the rocks and walls and feed on insects in the short grassland. Linnets and skylarks can also be found in the limestone grassland, and the resident stonechats and meadow pipits find shelter for nesting in the heathland. Other residents are ravens, chough, little owls and peregrine falcons which inhabit the more remote cliff areas.

During the spring, many types of birds migrate, making a northward journey frequently of many hundreds or even thousands of miles to reach their breeding grounds. This they repeat in a southerly direction each autumn. Some of these migrant birds spend short periods of time on the Great Orme, regaining their strength to continue their journey. Birds such as golden plovers, dotterels, ring ouzels, yellow wagtails and whinchats are seen at such times.

Winter sees the arrival of birds from northern Europe and the Arctic, such as the attractive snow bunting which searches for seeds on the generally frost-free ground.

Turnstones and redshanks, two types of wading bird, are frequently seen feeding along the rocky shorelines, and just offshore, red-throated divers, red-breasted mergansers and great-crested grebes dive for fish.

The most common birds on the Great Orme are herring gulls and jackdaws which have adapted to feeding on our waste. For this reason, they have been able to move into Llandudno where they survive equally well.

## Insects and Mammals

The enormous variety of flowering plants on the Great Orme provides food for many types of insects; in particular, numerous butterflies and moths may be seen during spring and summer.

This diversity of flowering plants results in the limestone grassland supporting an enormous variety of insects. There are six rare species of butterflies and moths including the silky-wave moth and the horehound plume moth, and sub-species of the grayling and silver-studded blue butterflies which are only found on the Great Orme.

Butterflies are not very strong fliers and tend to be most active in sheltered places or during calm, sunny weather. Moths generally fly at dusk and through the night and may be seen wherever there are lights.



↑ This rare silver-studded blue butterfly is only found on the Great Orme.

The following butterflies have been seen regularly on the Great Orme.

|                     |                       |
|---------------------|-----------------------|
| Large skipper       | Peacock               |
| Large white         | Comma                 |
| Small white         | Dark-green fritillary |
| Silver-studded blue | Speckled wood         |
| Brown argus         | Wall brown            |
| Common blue         | Grayling              |
| Red admiral         | Gatekeeper            |
| Painted lady        | Meadow brown          |
| Small tortoiseshell | Small heath           |

In total 24 species of butterfly have been recorded on the Great Orme.



↑ Kashmir Goats.

The most commonly seen mammal on the Great Orme is the domestic sheep, whose association with people has helped to create the present Great Orme landscape. Other mammals include rabbits, lesser horseshoe bats, foxes, mice, voles, moles, hedgehogs and grey squirrels.

The feral or wild goats with their white, shaggy coats and impressive horns are arguably the most spectacular mammals on the Great Orme. They are Kashmir goats. The herd descended from a pair of goats from the Windsor Royal Herd, acquired by Major General Sir Savage Mostyn around 1880. The herd was released on the Great Orme 20 years later and the goats have been roaming wild over the Great Orme ever since. They feed mostly on scrub such as gorse, brambles and hawthorn. By grazing on these dominant plant species this enables the less competitive wild flowers on the Great Orme to flourish, and because of their climbing ability, goats can graze in areas that sheep cannot reach.

A large increase in the goat population on the Great Orme has resulted in the need for management. This includes the relocation of small herds to similar habitats in other parts of the UK for conservation grazing. During the spring and summer, you may be lucky enough to spot grey seals and sometimes dolphins and porpoises swimming offshore.

If you wish to explore the wildlife of the Great Orme, pick up a copy of the 'Great Orme Nature Trail' booklet from the Great Orme Visitor Centre or the Tourist Information Centre in Llandudno.