What to see

This trail takes you through some of the areas familiar to Charles Darwin who lived and worked at Down House for 40 years. His careful observations of plants and animals living in the countryside around his home provided him with evidence which supported his theories, much of which is still here for everyone to see. Some of the species he studied are indicated as you follow the trail, others are more difficult to spot and are shown in the pictures opposite. Tick the circles and see how many you can find. ✔

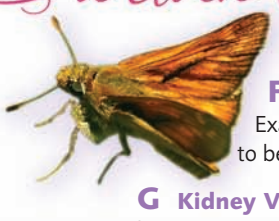
Places you'll pass

Much of the trail is along the Downe Valley, the charm of which, according to Francis Darwin, helped his father to settle here.'The Big Woods' where Darwin often walked with his sons and was an important area for observations and experiments where, *'Sometimes in order to observe birds or beasts. he would walk very slowly, just quietly putting down his foot and then waiting before the next step- a habit, he said, which he had practised in the tropical forests of Brazil.'* Another of Darwin's favourite places you'll see was called by his family, 'The Terrace' (see map). It was described by his daughter, Henrietta, as a bank bright *'with flowers that love a chalk soil....sheltered by a rough shaw of beeches and an undergrowth of sloes, traveller's joy, service trees and hawthorn. My father would pace.. and my mother would sometimes sit on the dry chalky bank waiting for him, and be pulled by him up the steep little pitch on the way home.'* Great House and Great Pucklands Meadows were important for observations and experiments and in 1856, Cudham School Pond was the site of the first of a series of experiments about seed viability in pond mud.

How to get around

The complete trail (shown on the map inside in black) is 5 miles (8km) long, but the walk can be shortened to a route 3¼ miles (5.5kms) long or 1¾ miles (2.5kms) long. There is a pub in Jail Lane near the end of the trail and 2 pubs and a café in Downe where you can get refreshments. The paths may be muddy and slippery at times with some gradients of 25% as you walk into and out of the Downe Valley, and stiles and steps as shown on the map. Please follow the Country Code, keep to the footpaths and remove your dog waste.

Look for Species Darwin Saw or Studied



Spring

A Lesser Celandine: Darwin experimented on how light affected growth of leaf stalks and observed how lesser celandine leaf-stalks that break through the ground in spring are arched at first while those which arise near the soil surface are straight.

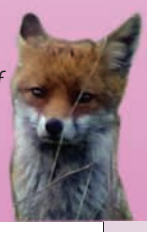
B Bumble bee: With the help of his children, and some flour to dust (and mark) them, Darwin mapped the flight of male bumble bees. He found they stopped at certain 'buzzing places' since found to be areas where they scent mark to attract queen bees.

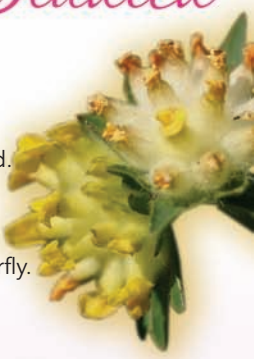
C Rabbits: In the 1850s Darwin compared local rabbits with other wild and domesticated varieties *(see The Origin of Species)*

Summer

D Common Spotted Orchid with Empid Fly: Helped by his son, George, Darwin studied this orchid and explained how the adaptations of the flowers ensure cross-pollination by these and other flies.

E Sainfoin: In 1844, Darwin wrote, *'The sainfoin fields now of the most beautiful pink, and from the number of hive bees frequenting them the humming noise is quite extraordinary.'*





F Large Skipper Butterfly Examined by Darwin and found to be a pollinator of pyramidal orchid.

G Kidney Vetch, called 'Ladies Fingers' by Henrietta Darwin still grows in the chalk grassland, supporting the rare small blue butterfly.

Autumn

H Spindle: Darwin found this plant had 3 forms of flowers, H (i) female (small stamens) H (ii), male and hermaphrodite (appear similar but males produce little or no fruit, hermaphrodite produce some fruit with less seeds than the females). In spring look for the different flowers, in autumn for the different amounts of fruit on different bushes (H iii).

I Black-headed Worm: locally the most important species for moving soil to the surface. The subject of years of experiment and observation around Downe led Darwin to remark,

'Worms have played a more important part in the history of the world than most persons would at first suppose..... In many parts of England a weight of more than ten tons (10,516 kilogrammes) of dry earth annually passes through their bodies and is brought to the surface on each acre of land'

Winter

J Ivy: Darwin observed how young ivy stems bent away from the light in summer, but later in the year, the shoot tips appeared to spiral, which helped them to find a support.

K Fox: Walking very quietly Darwin reported several close encounters with foxes, once coming across one asleep in the day.

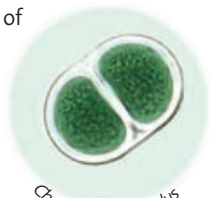
Turn R into field (see map) and cross Downe Valley.
In the valley bottom wooden sheds were used for packing fruit grown in the orchard which once grew here. When you reach top of western side of the valley, cross field to a path between hedges.
Turn R.

The pond with its surrounding semi-natural ancient woodland belongs to Cudham School and in 1856 was the site of the first of a series of experiments carried out by Darwin on pond mud, when he germinated 53 plants from seeds in 2 samples weighing in total 3¾ ozs. He went on to show how seeds in pond mud were carried on birds' feet and could be distributed to other ponds, so explaining the similarity between species found in different ponds far away from each other.

Kirchneriella obesa green alga

Scenedesmus communis green alga

As you continue, look in the trough in the field on your R. In summer algae make the water turn green. Their tiny spores originally carried here by the wind or animals, develop into plants often made up of only 1 cell. Sometimes even more simple organisms called blue-green algae develop. Closely related to bacteria, these are some of the earliest organisms found in the fossil record.



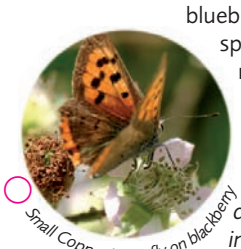
Chroococcus turgidus blue-green alga

When you reach Jail Lane, turn L.
Please cross to face the oncoming traffic and take great care along the road.
Turn R just before Cudham School.

The school was founded by Earl Stanhope in 1851. Darwin contributed towards the building fund and paid an annual subscription towards running costs. In his time 100 children from labouring families attended here.
Turn R when you reach the stile.

Greenfinch

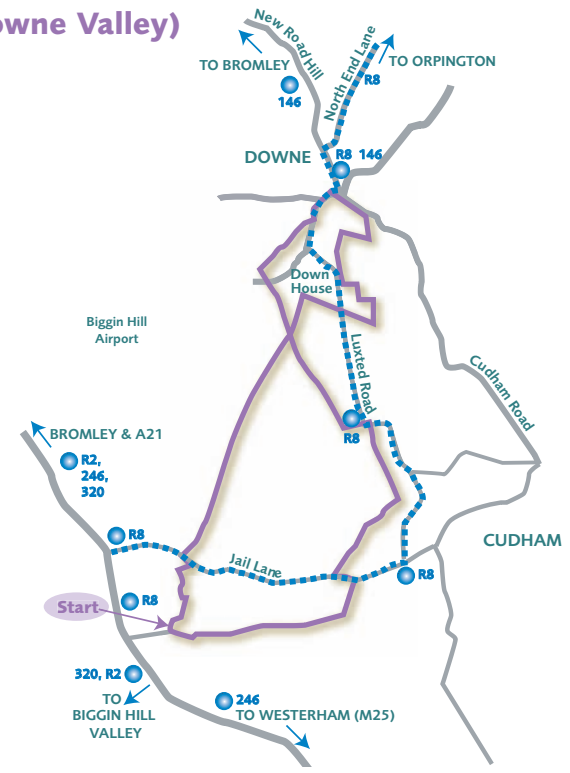
The hedgerows as you continue are remnants of old woodland, look for bluebells at their bases in spring. Thick and rich in numbers of different plants, they provide shelter, food and singing posts for many birds. In summer look for butterflies drinking nectar from flowers such as bramble. Darwin observed how *'bramble in hedges do depend to earth, & the leading shoot is buried in grass-becomes white & succulent, swells, leaflets not developed become covered with knobs, each knob ultimately producing a root'.*



Small Copper butterfly on blackberry

When you reach the road, cross, and walk up Church Road. The car park is on your right.

How to Reach Darwin Trail 1 (Downe Valley)



The trail starts at Biggin Hill Recreation Ground, but can be begun and ended at different points. Access to the trail is via the following bus routes:-

R2 (Mon –Sat) Petts Wood to Biggin Hill Valley via Orpington
R8 (Mon-Sat) Orpington to Biggin Hill via Green St. Green, Shire Lane, Downe, Luxted Road & Jail Lane (Hail & Ride ■■■)
146 (Mon-Sat) Bromley to Downe via Hayes and Keston
246 (daily) Bromley to Westerham via Hayes & Biggin Hill
320 (daily) Bromley to Biggin Hill Valley via Keston & Leaves Green
Trains: Nearest Station: Orpington.

Correct at time of going to press. For up-to-date information about train and bus times phone Traveline on 020 7222 1234 or see http://journeyplanner.tfl.gov.uk

For more information about Darwin's life and work around Downe, including walks and events in the area and how you can become involved, see www.darwinswildlife.co.uk or www.darwinatdowne.co.uk.
To read Darwin's publications on line see, 'The Writings of Charles Darwin on the Web' at http://pages.britishlibrary.net/charles.darwin or http://darwinlibrary.amah.org. More information can also be found in the World Heritage Site Nomination Document (2006) at your local library.

EMERGENCY PHONE: 020 8464 4848

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Start at the Car park as shown and turn right (R) into Biggin Hill Recreation Ground; keep R following hedge for 200m.


Toothwort

Continue through to the woodland with its big oak trees, beech and hazel: a remnant of the semi-natural ancient woodland which the Darwins called *'The Big Woods'*. In spring look for toothwort, parasitic on the roots of hazel, as you turn right onto the tarmac path. Darwin explained how as the sap rises in the tree, the toothwort takes in water from its host which it secretes from its underground, scale-like leaves, moistening the soil so its arched shoot can more easily push through the ground.


Hazel catkins in spring


Chalk Milkwort

In May and June notice patches of yellow crosswort on the western side of the fairway, and as you walk up the eastern slope, bright blue patches of chalk milkwort which Darwin described as, *'almost equal to an alpine gentian'*. He observed how milkwort flowers were often not visited by bees when they first opened, but many bees visited together as soon as the weather warmed. He suggested that this was because secretion of milkwort nectar depended on temperature and the bees were attracted by its smell.


Crosswort

At Jail Lane, turn left (L), take footpath opposite


Greater Stitchwort

You have reached 'The Terrace'. In summer look for rock-rose here.

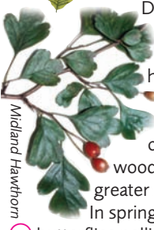

Rock-rose

Turn L to continue. To take a short cut, turn R (south), and go to trail note 14.

On your right is a strip of woodland left when trees were cleared long ago and known in Kent as a shaw. Many shaws, like this one, include a woodbank with great old trees growing along the top, and marked boundaries. When you reach the road, the woodbank along it is marked by an ancient beech tree.


Beech flowers

You are walking into the Downe Valley. The hedgerow on your right with its midland hawthorn, yellow archangel and greater stitchwort, is another remnant of semi-natural ancient woodland. Darwin recorded how greater stitchwort was pollinated by flies. In spring look for brimstone butterflies pollinating other early flowers whilst searching for nectar.


Midland Hawthorn


Yellow Archangel

Brimstone butterfly

As you reach the wood look for bluebells in spring, later in the year look for foxgloves whose flower structure, wrote Darwin, *'made insects almost indispensable for their fertilisation'*.

Bluebells

'Please follow Public Footpath closely through Golf Course and beware golf balls'

The rough on the right supports some good chalk grassland. Look for greater knapweed and hedge bedstraw in summer. In the autumn look for male goldfinches on teasel in the weedier areas. Darwin noted how the slightly longer beaks of the males enable them to reach teasel seeds, *'whilst the females more commonly feed on the seeds of the betony or Scrophularia.'*


Hedge Bedstraw


Goldfinch


Teasel

Cross road, take footpath opposite. Turn R at junction of paths

Look right to see the 'Arts and Crafts' design house built in 1931 on land bought by George Buckston Browne. He also bought Down House for use as a museum in 1927. As you walk through the fields look for red clover in summer. Darwin observed how its flowers only set seed when pollinated by bumble bees who are able to transfer pollen between flowers, because they have a proboscis (tongue) long enough to reach the nectar.


Meadow Brown butterfly on Greater Knapweed


Bumble bee on red clover

When you reach the road turn L, walk into Downe Village and turn R passing the 13th Century Church on your left, and on your right the old Village School (now the Village Hall) built in 1855 by Sir John Lubbock of High Elms.

KEY

Grassland
Woodland
Trail
Public footpath
Stile
Gate/Kissing Gate

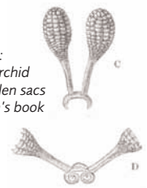
After Christmas Tree Farm turn R onto footpath

Ancient oak trees mark an old wood boundary.

Bulbous buttercup

Cross the field looking for bulbous buttercups with their turned back sepals in spring. In summer, look for burnet moths emerging from cocoons on grass stalks. Darwin recorded them pollinating pyramidal orchids.


Burnet Moth on Pyramidal Orchid



▶ *Drawings: Pyramidal Orchid showing pollen sacs from Darwin's book on orchids*

Pass through a gap in the hedge where holly grows. Darwin demonstrated how pollen from flowers on male holly trees was moved by bees to flowers on female trees, so that bad weather in spring was responsible for a lack of berries the following Christmas. On your right you can see Down House through the hedge. When Darwin moved to Downe he wrote, *'larks abound here & their songs sound most agreeably on all sides'*. You can still hear them in nearby fields during summer.


Holly: male flowers


Skylark

Follow the footpath as shown.

Cross the road to Great House Meadow, so-called because it belonged to the 'Great House' built on the site of Down House by Thomas Know in the 1650s. The meadow was part of the estate sold to Darwin so he could graze a few cows, 2 horses and make hay for winter. In 1842 Darwin spread a layer of chalk and cinders over part of the field; 29 years later he dug trenches to discover that this layer was now buried 7 inches (18cm) below the surface, due to the action of earthworms.

Go through the gate and over the stile into Great Pucklands Meadow


Sweet Vernal Grass

This was the site of the first count of plant diversity, when in 1855 Darwin and his childrens' governess, Miss Thorley, counted how many different species of plants grew here. At first Darwin found grasses very hard to identify and asked Joseph Hooker, the Director of Kew and a good friend, to check his identifications. He wrote to Hooker , *'I have just made out my first grass....it was the easy Anthoxanthum odoratum [sweet vernal grass] ...I never expected to make out a grass in all my life'*. Look for this, and at the bottom of the field, where nutrients draining downhill have made the soil more fertile, for species such as hogweed.


Hogweed

Look back to the Sandwalk hedge which Darwin planted with hawthorn in the 1840s. In 1880 he observed an extra 19 plant species growing here including cherry, yew and hornbeam, *'presumably the seeds having been bought by birds (which) alighting on clipped hedge will cause more seed in dung to be dropped than those in the open field.'* He also noted how the thorn trees escaped being browsed by cattle and protected other young plants which eventually outgrew and out-competed them.


Cherry


Yew


Hornbeam

Cross the stile, descend 8 steps, turn L

Spindle: Look for all 3 flower types here. The nectar they produce attracts many small flies and beetles.


Soldier Beetle on Spindle flower lying in wait to catch small flies

As you continue, look R

The thin, dry soil and warm, sunny slope means that plants have to be well adapted to take in water and not lose it too fast in dry weather. The difficult conditions encourage a great variety of plants with different ways of surviving. For example, some have deep roots, others have leaves close to the ground, are covered in fine hairs or flower and fruit before the driest months. They demonstrate the truth of Darwin's statement in *'The Origin of Species'*, that *'the greatest amount of life can be supported by great diversification of structure'*. The plants in turn provide food for many different plant eaters and the minibeasts and bigger animals that eat them, including lizards by day and slow-worms at night.


Salad Burnet leaves & flowers


Common Lizard


Slow worms

'When you reach road, turn L. At the T-junction turn R past Luxted Farm Cottages, then R again. Cross stile.

Follow the hedge on your left for 500m. It was once woodland. Look for wild plum, field maple and old oak trees.


Wild Plum


Field Maple


English Oak