

STEPPING OUT • STARGAZING



HOW TO USE YOUR STAR CHART

Hold the starchart up in front of you when facing the appropriate direction and look at the sky.

LOOKING NORTH (ABOVE)
The Plough is the most easily recognised group of stars in the northern sky. It is always above the horizon and looks a bit like a saucepan. The two stars furthest from the end of the 'handle' point towards the North Star, so you can always find north wherever you are on earth.

LOOKING SOUTH (BELOW)
These stars change throughout the year, but in winter you should see Orion (The Hunter), the Pleiades (or Seven Sisters), Pegasus and more.

BLESSED WITH SOME OF THE DARKEST SKIES IN WESTERN EUROPE, SCOTLAND OFFERS FANTASTIC OPPORTUNITIES FOR STARGAZING. DAN HILLIER FROM THE ROYAL OBSERVATORY EDINBURGH ENCOURAGES YOU TO DISCOVER SOME OF THESE STELLAR DELIGHTS FOR YOURSELF

IT'S A CRYSTAL CLEAR NIGHT. You pop your head outside, look up and the stars – far too many to count – fill the sky. Your eye is drawn to a bright cluster of young blue stars, created after the extinction of the dinosaurs. To their left is a bright, reddish star – an old Red Giant (a stage that many stars go through at the end of their lives). Down a little and there is a small smudge, a nebula – a distant cloud of gas and dust where new stars are being born.

It's incredibly beautiful and can be a bit overwhelming, particularly if you know relatively little about the night

sky. Many people can spot one or two constellations, but they are often all that ever seem to make any sense. If that's the case, take heart, read on and prepare to find your way around a starry sky.

All you will need are warm clothes, a location well away from tall buildings, trees and the glare of bright lights and, of course, a clear sky. Use the two winter starcharts (*opposite*) to help you along the way. Each chart covers half the sky – one for the northern sky and one for the south – and includes only the really key stars, or 'skymarks'.

LOOKING NORTH

The first thing to know about the northern sky is that the same stars are present all year round. And with its strong pattern of seven stars, The Plough is a great place to start your exploration. If you follow an imaginary line – we call this star-hopping – from the two stars at the end of The Plough, you will reach a star that is all on its own. This is the North Star (or Polaris), the most famous star in the sky. It's not that the North Star is particularly bright; it's just that by an accident of the Universe it sits right above

the North Pole. This means that, wherever you are on Earth, if you are looking at the North Star, you are facing north.

At night, sitting above one end of the Earth's axis, the North Star stays perfectly still while the rest of the sky slowly rotates around it in a clockwise direction. Although this happens too slowly for us to notice in real time, you may have spotted that The Plough and Cassiopeia (a northern constellation named after a legendary queen of Ethiopia) often appear upside down or on their side as they move around the North Star during the night.

If you can find the North Star and recognise that clockwise movement of the Plough and Cassiopeia around it, you have one half of the night sky in the palm of your hand. You will spot these constellations and that same movement each and every night of the year.

LOOKING SOUTH

But what is happening behind us in the southern part of the sky? Here, it is a story of change. However, with just a couple of simple tips, you will gain the kind of

familiarity with this part of the night sky that was probably common among our ancient ancestors.

The first thing to remember is that stars in the southern sky rise and set during the night. This means that as the night sky rotates you will see stars in the south rise over the eastern horizon, move round the southern sky and then set in the west. You see the Sun doing exactly the same in the southern sky during the day and for the very same reason: the Earth is spinning. This process of rising and setting means that the stars you see in the southern sky are continually changing through the night.

Another point to remember is that stars in the southern sky change during the seasons – a second crucial part of the southern story. What this means is that if you go out at exactly 8pm two nights running, the stars in the south are not quite in the same position. They have shifted in a clockwise direction ever so slightly. This movement is too little for us to detect over a few days or even a week, but over the course of the year we see entirely different constellations in the south, depending on the season. **D**

Star spotting: use the starcharts above as your guide to the winter night sky; stargazing near Dunnet, Caithness (left)



“AS WELL AS STARS, YOU CAN SEE PLANETS, METEORS, SATELLITES AND THE MOON”



SCOTLAND IS A FANTASTIC country in which to follow the stars and we have a superb pedigree in exploring the night sky. The Royal Observatory Edinburgh ran the world's first mountaintop observatories and continues to build some of the world's best astronomical cameras and unveil breathtaking discoveries.

While you can enjoy the stars shown in the starcharts from a garden or park in the middle of Glasgow or Edinburgh, anyone who has stepped out under a clear sky in a rural location knows what an inspirational sight it is: you can see 100 times more stars than in the cities.

Our weather means we might never be a major destination for astro-tourism, but niche providers are growing in areas such as Galloway (see Dark matters, page 8) and elsewhere. What's more, our dark skies provide a very special experience for anyone who lives in or visits rural and remote communities.

The Dark Sky Scotland programme is helping everyone make the most of our dark skies – not least during the 2009 International Year of Astronomy. In March, the programme launched the world's first two Dark Sky Discovery sites: at Glen Nevis in the Highlands and Newbattle Abbey in Dalkeith. These two places – hopefully the first of many – have been recognised as great places in the local community to see the stars.

So, what are you waiting for? Wrap up warm this winter and get out there and explore.

FURTHER INFORMATION

Dan Hillier is Visitor Centre Manager at the Royal Observatory Edinburgh and leads the Dark Sky Scotland partnership. For details on family events, plus Dark Sky Discovery Sites, light pollution surveys and other school and community projects, visit www.darkskyscotland.org.uk

The Sun is expected to become more active in the coming years, creating more occurrences of the Northern Lights. Look out for forecasts at www.spaceweather.com

For more on planets and satellites, see: www.heavens-above.com, while for excellent (and free) night sky software, visit www.stellarium.org



Winter warmer, stargazing can be a good excuse for stepping outside this winter (above); the Orion Nebula can be seen with the naked eye as a tiny smudge in the constellation Orion. It is imaged here using a two-metre telescope in Chile (above right)

☞ The winter starchart shows that Orion (the Hunter) is easy to see at this time of year. To his right is Pleiades, a cluster of seven relatively young stars that never saw any of the dinosaurs. However, by the second half of the winter, you will need to be up in the small hours to see Orion. And during summer nights you won't see him at all. It's not because of Scotland's long summer days; he's just not there to be seen – emphasising how the southern sky is the place to look for changing constellations through the seasons.

And this is just the start. The starcharts show the stars and how they make up a fixed but rotating pattern in the sky, but on many nights this winter you will also see planets, meteors, satellites and the Moon – which looks fantastic through binoculars.

There's rarer stuff, too, including galaxies, nebulae and the Northern Lights, or aurora borealis – one of the most stunning sights in the night sky. They are caused by material blown off from the Sun interacting with the atmosphere above the magnetic north pole, although are not a common sight in Scotland.

You can discover a lot more about the night sky from specialist websites and literature, but the stars of the northern and southern sky are always your starting point. ■

PHOTOGRAPHY: DUNCAN STEWART SMITH; ANAGACH COMMUNITY WOODS; EUROPEAN SOUTHERN OBSERVATORY