

The Aurora Borealis

By Ian Ridpath

As is appropriate for a talk about the Northern Lights Ian Ridpath treated members of the Cirencester Science and Technology Society to a profusely illustrated lecture showing the many faceted aspects of the Northern Lights in terms of shapes, forms and not least the amazing shades of colour for which the Northern Lights are best known.

Covering, first, a little history, Ian explained the Latin origins of Aurora, the Roman goddess of dawn, whose name was first invoked in relation to the Northern Lights by Galileo some 400 years ago. Explaining that aurorae are caused by the stream of solar wind particles emanating from the sun some 93 million miles from the earth the lecturer then demonstrated the various forms and shapes that aurorae often exhibit. These include; a diffuse glow, an arc, a band, vertically inclined rays and a corona. Examples were shown as still photos as well as film clips speeded up to illustrate the variation in both form and colours. The usual colours are green and red caused by electrons from the sun's solar wind hitting oxygen and nitrogen gases in the upper atmosphere. The top of the aurora is usually red due to the excitation of oxygen atoms at high altitudes while greater concentrations of nitrogen at low levels can induce purple tinges. However the predominant colour usually seen by viewers at earth level is green as this is most easily visible to the naked eye.

Aurorae generally occur in the ionosphere at heights of between 100 and 250km above the surface of the earth and form an auroral oval generally of some ten degrees in width that has as its centre the geomagnetic North Pole in the northern hemisphere and similarly with the South Pole in the southern hemisphere. Although the auroral oval is usually located too far north for viewers in Southern England the occasional occurrence of major coronal mass ejections from the sun causes a massive disturbance to the Earth's magnetic field as measured by the Kp index. During periods of very violent coronal mass ejections, with a maximum Kp index value of 9, the Northern Lights can be viewed as far south as the Mediterranean in Europe and Florida in the USA.

More information on the subject is available at <http://www.ianridpath.com/aurorae.pdf>