Aurorae

The observation of aurorae is quite extensively covered by amateur astronomers and needs very little in the way of equipment in its simpler forms. As aurorae occur along the auroral ovals surrounding the north and south magnetic poles, observers tend to be concentrated at fairly high latitudes. However, it is useful for astronomers at low latitudes to be aware of the fact that they may be able to see aurorae – even if only on rare occasions – and that they may sometimes be more favourably placed than people at high latitudes. They should take every opportunity to check for the presence of aurorae, and record their form. A very valuable contribution to auroral studies is made by officers of ships at sea, who submit reports of sightings, and who thus provide help to fill the otherwise very considerable gaps in coverage which would result from relying upon land observers alone.

The restricted population (and land areas) in the Southern Hemisphere means that many southern auroral displays are poorly covered, Antarctic observers being sometimes *too* far south. It is therefore difficult to make correlations between activity seen in the two hemispheres, although this can occasionally be tried. Auroral activity does, of course, vary with the sunspot cycle, reaching a maximum one or two years after sunspot maximum, when in general the auroral ovals expand and move down to lower latitudes.

Auroral observations are reasonably straightforward and consist of recording which of the main types are present: arcs (arches with smooth lower borders), bands (irregular lower borders or folds), patches (resembling isolated clouds), veils (widely spread, evenly illuminated areas) and rays (streaks of light extending upwards into the sky). The basic forms may be described as homogeneous, striated (with bands roughly parallel to the lower border) or rayed (appearing to be formed of many individual rays). Further information to record includes details of behaviour (e.g. quiescent or active), brightness, colour and form (e.g. multiple or, if seen at the zenith, coronal). When arcs or bands are seen it is most important to record the elevation above the horizon of the highest point of the lower border. If several observers report this information it is then possible to derive the altitude and position of the display.

Although most people are fascinated by the constantly changing forms in an auroral display, and will watch continuously, efforts should be made to note full details at the standard times: every hour, and at 15, 30 and 45 minutes past each hour. This same procedure should be followed with photography as well, although naturally one might wish to take other photographs at intermediate times in addition.

Photography is of course of very great value. Exposures will usually be fairly short – perhaps of the order of half a minute, although this depends upon the speed of the film. Photographs which record the stellar background are particularly valuable, as they enable easy determination of the extent and precise position of a display. There is a lack of

Opposite page, top: *The frequency with which aurorae can be seen varies very greatly with the observer's location on the Earth.*

Opposite, centre right: *Measurements of the angle from the horizon to the bottom of auroral arcs are most important.*

Multiple rayed bands (below) *and a homogenous single band covering the V of the Hyades* (facing page, below). *Both auroral displays were photographed in Canada by W. Cobley.* Opposite: *an aurora photographed from Fort Augustus, Scotland, by D. Gavine.*