

camera can be used alone on a suitable driven mount, but it is more commonly mounted on a full-sized telescope which may then be used for guiding; or the camera may itself be provided with a guide telescope.

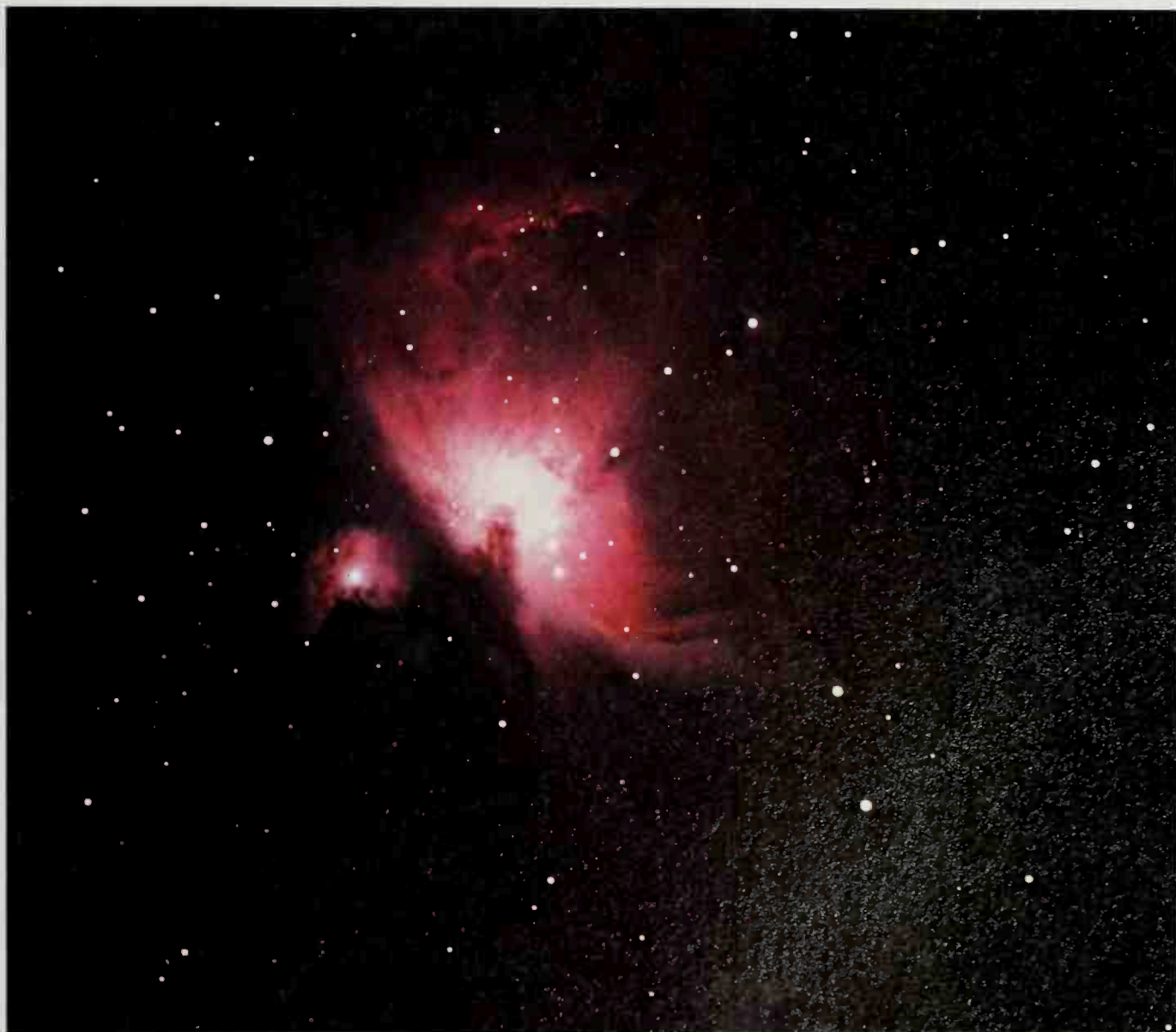
Photography through a telescope is rather different, and also takes a number of forms. It is quite possible to use any camera, set to infinity and held to the telescope eyepiece, for short exposures. However, the only suitable subject is the Moon, which with its easy availability, abundance of light – allowing very short exposures with no image motion – and large size can be photographed with acceptable results.

For most subjects it is necessary for the camera body, without its lens, to be properly and rigidly coupled to the telescope. The exact way in which the combination is used depends upon the object being photographed and the image scale required. At prime focus the focal length of the mirror determines the scale at the film plane and this is the principle usually adopted for photography of comets, star fields and galactic and extragalactic objects. For lunar and planetary work some form of magnification is normal unless the focal length of the telescope is very long, with a large image scale, as in some Cassegrain and Maksutov forms. Projection of an enlarged image on to the film plane through a high-quality eyepiece is a method frequently adopted, and a Barlow lens is also very suitable if properly employed. In most cases some experimentation is required to determine the best method for the particular object being photographed, and usually some form of compromise

is necessary. A large image scale will minimize grain problems (allowing for substantial print enlargement), but will require a longer exposure, with all the consequent problems of atmospheric conditions and the necessity for accurate drives and guiding.

The most important factor in astronomical photography is probably the maximum aperture available. This will govern the faintest stars that can be photographed in a given time, and in most applications is more important than the 'speed' of the equipment. This applies specifically to point sources such as stars, which remain as points on the film whatever the focal ratio. Extended objects such as nebulae are theoretically better being photographed with faster telescopes or lenses, ideally like the Schmidt types, but here again there is usually an important gain from the greater light-gathering power and increased resolution of a larger instrument.

Astronomical photography may become highly specialized. Many advanced amateurs have built special cameras – sometimes to take plates or sheet film – for mounting on to their telescopes. These can provide better coverage of the field provided by their telescope than the standard 24 × 36mm rectangle available on 35mm film. Others use specialized techniques of film treatment and exposure, such as those discussed elsewhere, particularly hypersensitization and the cooled-emulsion method (pages 176–177). Even the most advanced astronomical photographers occasionally find themselves making use of conventional cameras and lenses, although they do mount them on highly sophisticated telescopes and driven mounts.



*The great Orion nebula (M42), NGC 1976. A 22-minute exposure on Kodak Ektachrome EL (ASA 400), taken on 1978 November 26, by Ron Arbour, using a 215mm f/6.3 reflector.*