



## Asteroids and dwarf planets and how to observe them

by Roger Dymock

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Books devoted to a comprehensive description and appraisal of asteroids are thin on the ground. One has to go back more than a decade to find Charles T. Kowal's slim 1996 monograph concerning their 'nature and utilization', and to 1988 to find Clifford J. Cunningham's ground-breaking *Introduction to Asteroids*. Does that mean that asteroid science is moribund or just not worth talking about? Not at all, as Roger

Dymock's substantial contribution demonstrates. Indeed, asteroids are being discovered at ever-increasing rates, and studied intensively by both amateur and professional astronomers, often working collaboratively.

The first third of Dymock's book comprises a description of asteroids and dwarf planets, both as individuals and as groups. A chapter on definitions, numbering, naming, and orbits is followed by a tour of the solar system, from hypothetical Vulcanoids within the orbit of Mercury to so-called detached objects, icy bodies that orbit far beyond the planets. Then, the heterogeneity of asteroid types is brought to the fore in a chapter dealing with the techniques used to observe and classify asteroids and what those techniques tell us about asteroid body shapes, surface structure and composition. The five known dwarf planets are given their due here, and each is described individually. How the various components of the asteroid population, such as the main belt, Jupiter Trojans, and transneptunian objects, came to be is set in the broader context of the solar system's formation. Because of their occasional propensity for striking and damaging our planet, near-Earth asteroids are accorded a chapter of their own.

The bulk of Dymock's text concerns asteroid observing. An extensive section on observatories and their equipment, both amateur and professional, groundbased and in space, leads into a series of chapters on observing techniques. A step-by-step guide to visual observing shows how to find and follow asteroid images. A chapter on imaging,

using webcams and digital single-lens reflex cameras, introduces a number of active asteroid observers, and highlights a remarkable resolved image of Ceres (angular diameter 0.83 arcsec) by John Sussenbach. Astrometry is given two chapters: one on tools and techniques, such as how CCD images are processed; the other on possible projects, including asteroid discovery.

Asteroids usually change in apparent brightness as they rotate. Two chapters are concerned with photometric techniques, including lightcurve reduction and interpretation in terms of asteroid body shape and spin-axis modelling. There follows the concept and parameterisation of an asteroid's absolute magnitude and how and why an asteroid's brightness changes with observing geometry.

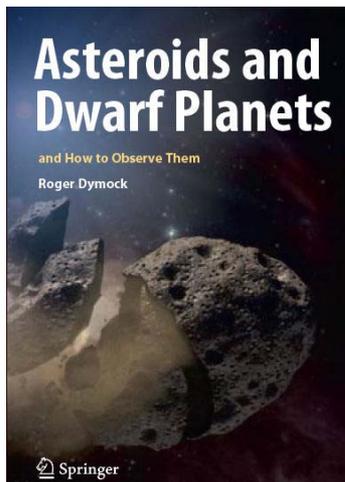
Next, Dymock shows how occultations of stars by asteroids give useful information about an asteroid's shape and size. The book's

penultimate chapter shows how even arm-chair astronomers can get involved with asteroid science – by examining and analysing frames taken during the course of the Near Earth Asteroid Tracking (NEAT) observing programme. In a 'final word', Dymock makes the point that amateur astronomers will continue to play an important role in the advance of asteroid science, even in the face of impending deep and wide professional surveys.

Dymock's book is full of good illustrations, many in colour. Because the book is a broad overview of current asteroid science, it cannot contain a large number of how-to recipes. Nevertheless, it will give interested amateurs some good ideas about how they could contribute, and will point them to sources of more detailed information. Heartily recommended.

### Edward Bowell

*Edward ("Ted") Bowell has been an astronomer at Lowell Observatory since 1973. He specialises in asteroid science, including asteroid discovery, orbit computation, and photometry. He has been President of the International Astronomical Union's Division III (Planetary Systems Sciences). In 1990 one of Ted Bowell's asteroid discoveries was named 'Britastra' to commemorate the centenary of the founding of the BAA.*



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