

Book Review

ALAN STERN and
JACQUELINE MITTON

Pluto and Charon: ice worlds on the ragged edge of the solar system

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This is the second edition of this title, originally published in 1997, but it has been thoroughly revised and updated to take into account recent remarkable discoveries in this exciting area of astronomy. The appearance of this new version is timely. In January 2006, NASA launched the New Horizons mission that is due to encounter Pluto in 2015 (author Alan Stern is the Principal Investigator for the project). This will be the first occasion on which a probe from Earth will visit Pluto, and it should do much to enhance our knowledge about this dark, icy mysterious body.

Go back thirty years and ask astronomers about the outer reaches of our solar system and you would be told that the boundary of our solar system was marked by a small planet called Pluto about which very little was known. This book tells the story of the discovery of Pluto and how, over the past 30 years, planetary scientists have had to revise their ideas about the outer solar system.

The first chapter sets the scene with the discovery of the main character, Pluto, by ex-farm boy, Clyde Tombaugh in 1930. His boyhood passion had been astronomy, but his parents were too poor to send him to college. Undeterred, he took a job at the Lowell Observatory in Arizona that had long been associated with the search for a trans-Neptunian body, Planet X, and this is well documented in this chapter. Tombaugh undertook a systematic but laborious photographic survey of the sky that culminated in the discovery of Pluto. Clyde Tombaugh lived until 1997 and he met with the authors whilst the first edition was in preparation. How Pluto came by its name is discussed and it may surprise many to learn that it was a young English girl, Venetia Burney, who proposed 'Pluto'. Following on from their account of the discovery of Pluto, Stern and Mitton give an overview of the solar system and where Pluto fits into the picture, which general readers will find useful. They go on to relate how it became apparent, fairly quickly after its

discovery, that there was something different about Pluto. The orbit was far more eccentric than that of any other planet and it had a much greater angle of inclination. In fact, its path is so strange that on occasions it is closer to the Sun than Neptune. The discovery of the long sought after Planet X was posing more questions than it had answered.

Alan Stern and Jacqueline Mitton are at great pains to emphasize the slow rate at which information was first obtained about Pluto due to its vast distance. I particularly liked the way they illustrated this point by stating that 'to image Pluto's surface requires resolving something as tiny as a walnut 30 miles (50 km) away'. Well, this walnut certainly took a long time to crack. So, if so little progress was made, why was interest maintained when there were far more important problems in astronomy? The authors attribute this to 'the challenge and attraction of exploring a truly frontier world'. In other words, Pluto is one of our neighbours and we need to know about it! The book goes into some detail about the hard fought but frustrating battles between 1930 and the 1970s to extract Pluto's secrets. Many researchers will empathize with the astronomers concerned! The mid-late 1970s marked the dawn of our modern ideas about Pluto and much of the book is quite rightly devoted to this. The discovery of Pluto's moon, Charon, in 1978 is the subject of much attention. (At the time this book was written, Charon was the only official moon of Pluto. However late in 2005, two new possible moons were announced. Further work in 2006 should confirm that these faint objects are indeed new satellites of Pluto, but these discoveries came too late for this book.)

Charon was found by accident, but Lady Luck must have been smiling on astronomers: once its orbit around Pluto had been established, it was realized that, as seen from Earth, Pluto and Charon would soon begin a series of mutual occultations and these only happen twice every 248-year orbit. How's that for timing? Chapter 3 concentrates on these events and their importance in allowing us to measure the true size of Pluto, its density and to propose possible models of its internal structure.

The following chapters describe recent advances that have resulted from improvements in instrumentation (e.g. the Hubble Space Telescope) and coincided

with Pluto reaching the closest point in its orbit around the Sun (perihelion).

Chapter 6 investigates the discovery of icy bodies, similar to Pluto, that orbit the sun beyond the orbit of Neptune. These are referred to variously as trans-Neptunian objects, Kuiper belt objects or Kuiper–Edgeworth belt objects. Since the 1980s quite a few have been found and the number is increasing. They move around the Sun at even greater distances than Pluto and consequently even less is known about them. The sub-title of this book is 'Icy worlds at the ragged edge of the solar system' and that adequately sums them up.

Space probes have taught us much about all other planets in the solar system and astronomers have long desired a mission to Pluto. Chapter 7 usefully summarizes what a fly-by or orbiting mission can tell us about a planet. Pluto missions have been proposed in the past but none has got through the planning stages until New Horizons, the subject of the last chapter.

NASA's New Horizons will be the first spacecraft to explore Pluto, Charon and some Kuiper belt objects, although we will have a long wait for its findings since it will not reach Pluto until 2015. Going on the spectacular success of previous NASA planetary missions, it is likely that our ideas about Pluto and its icy friends will have to be completely revised.

The last sentence of the book possibly says it all: 'So guard your secrets while you can, Pluto. We are coming to wrest them from you for all humankind'.

So we are and I cannot wait! In the meantime, this well-written, amply illustrated book serves as a useful, informative guide and I know I shall refer to it often over the coming years (at least until 2015!). Many of the studies reported here are fairly recent and the book benefits from the authors having personal knowledge of the researchers involved, and 'Pluto and Charon' is peppered with interesting biographical information and anecdotes about those involved. This is a 'state of the art' collection of our knowledge about the outer solar system and will appeal to the specialist and non-specialist alike.

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