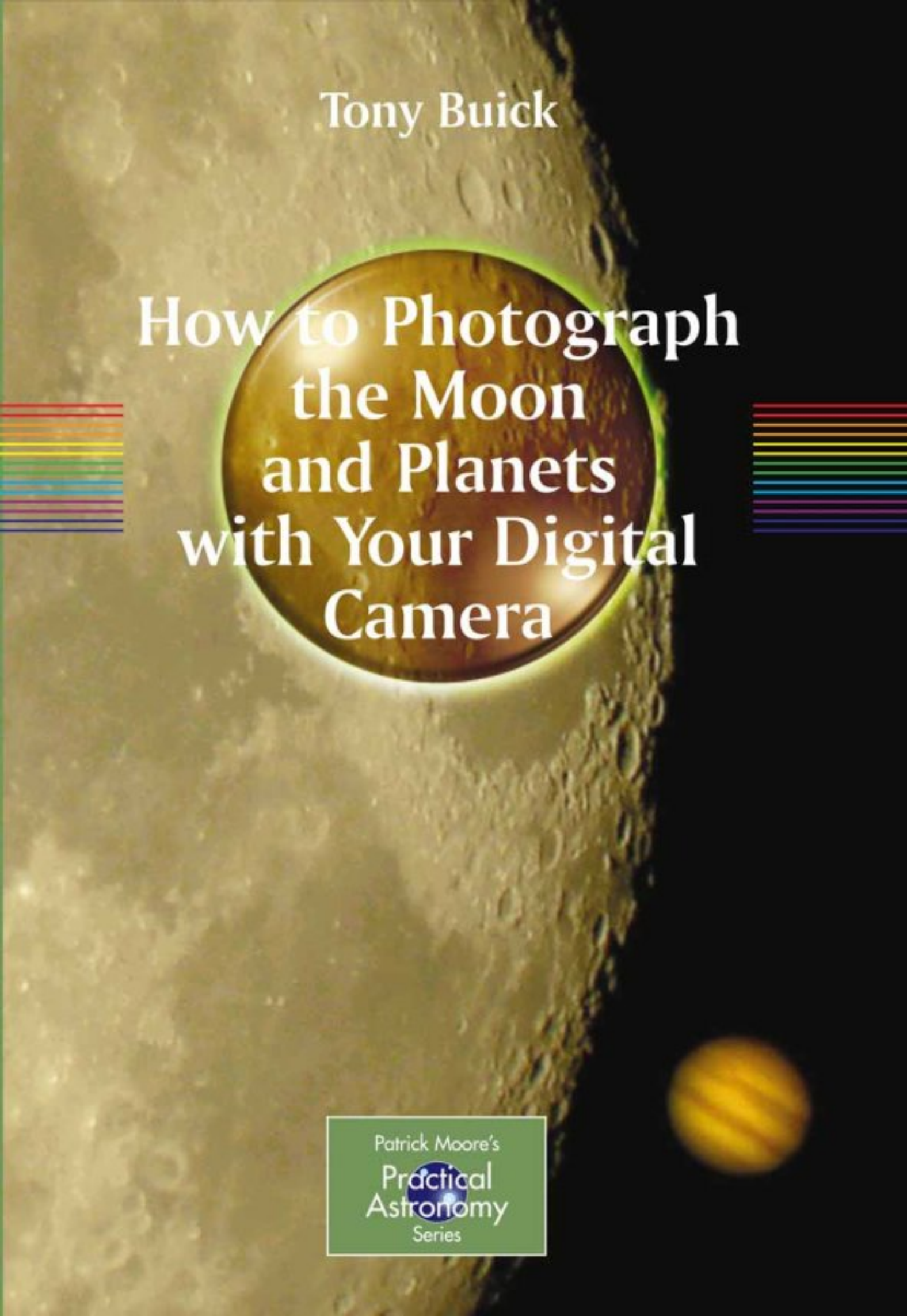
Tony Buick

How to Photograph the Moon and Planets with Your Digital Camera



Patrick Moore's Practical Astronomy Series

Patrick Moore's Practical Astronomy Series

Other titles in this series

Telescopes and Techniques (2nd Edn.)
Chris Kitchin

The Art and Science of CCD Astronomy
David Ratledge (Ed.)

The Observer's Year
Patrick Moore

Seeing Stars
Chris Kitchin and Robert W. Forrest

Photo-guide to the Constellations
Chris Kitchin

The Sun in Eclipse
Michael Maunder and Patrick Moore

Software and Data for Practical Astronomers
David Ratledge

Amateur Telescope Making
Stephen F. Tonkin (Ed.)

Observing Meteors, Comets, Supernovae and other Transient Phenomena
Neil Bone

Astronomical Equipment for Amateurs
Martin Mobberley

Transit: When Planets Cross the Sun
Michael Maunder and Patrick Moore

Practical Astrophotography
Jeffrey R. Charles

Observing the Moon
Peter T. Wlasuk

Deep-Sky Observing
Steven R. Coe

AstroFAQs
Stephen F. Tonkin

The Deep-Sky Observer's Year
Grant Privett and Paul Parsons

Field Guide to the Deep Sky Objects
Mike Inglis

Choosing and Using a Schmidt-Cassegrain Telescope
Rod Mollise

Astronomy with Small Telescopes
Stephen F. Tonkin (Ed.)

Solar Observing Techniques
Chris Kitchin

Observing the Planets
Peter T. Wlasuk

Light Pollution
Bob Mizon

Using the Meade ETX
Mike Weasner

Practical Amateur Spectroscopy
Stephen F. Tonkin (Ed.)

More Small Astronomical Observatories
Patrick Moore (Ed.)

Observer's Guide to Stellar Evolution
Mike Inglis

How to Observe the Sun Safely
Lee Macdonald

Astronomer's Eyepiece Companion
Jess K. Gilmour

Observing Comets
Nick James and Gerald North

Observing Variable Stars
Gerry A. Good

Visual Astronomy in the Suburbs
Antony Cooke

Astronomy of the Milky Way: The Observer's Guide to the Northern and Southern Milky Way (2 volumes)
Mike Inglis

The NexStar User Guide
Michael W. Swanson

Observing Binary and Double Stars
Bob Argyle (Ed.)

Navigating the Night Sky
Guilherme de Almeida

The New Amateur Astronomer
Martin Mobberley

Care of Astronomical Telescopes and Accessories
M. Barlow Pepin

Astronomy with a Home Computer
Neale Monks

Digital Astrophotography: The State of the Art
David Ratledge (Ed.)

How to Photograph the Moon and Planets with Your Digital Camera

Tony Buick

With 312 Figures

Tony Buick
Orpington, Kent, UK

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

Library of Congress Control Number: 2005927381

Patrick Moore's Practical Astronomy Series ISSN 1617-7185
eISBN: 1-84628-046-X
ISBN-10: 1-85233-990-X
ISBN-13: 978-1-85233-990-6

Printed on acid-free paper

Printed in Singapore/KYO

9 8 7 6 5 4 3 2 1

Springer Science+Business Media
springer.com

To my two dear sons Chris and Tim for their support in everything always

Foreword

This is a remarkable book, unlike any other known to me. Tony Buick is not a professional astronomer; he is concerned with medical science. He does not aspire to own wildly expensive astronomical equipment – and yet with an ordinary digital camera and a very modest telescope he has produced lunar and solar photographs, which are fully equal to the best professional photographs available only a few decades ago.

His methods are straightforward enough, and what he has achieved here can be emulated by others, even allowing for the fact that Tony Buick has more than the average amount of practical skill. Follow his instructions, and you too will be able to produce stunning images which will not only give you pleasure, but may well turn out to be useful for research purposes.

This book concentrates upon photographs of the Moon, and to a lesser extent the Sun and planets, but the methods can well be extended to "deep space" objects such as nebulae and galaxies. There is a tremendous amount of scope. Tony Buick has shown the way, and what he has achieved will inspire many others to follow suit.

Sir Patrick Moore, CBE, FRS

Preface

This book is intended for the great number of amateur astronomers who wish to pursue the hobby of astrophotography but find it a daunting prospect to plough through books and/or otherwise gain information to translate such desires into the production of quality pictures.

Astronomy generates awe in us all. We watch the news showing spacecraft blasting off from their launch pads, amazing pictures from Mars and other planets, as well as eclipses of the Sun and Moon. Participation in such events seems too remote a possibility for many. And yet there is a way, that is so exciting, to capture astronomical images with only a small amount of effort and an even smaller amount of knowledge. Never mind the light pollution and tiny patch of sky available to you. You don't need a huge budget either.

In the following chapters a step-by-step guide is given to enable acquisition and construction of inexpensive equipment with which to facilitate the taking of beautiful photographs of space objects. No astronomical or optical physics knowledge is assumed or required save the small amount given where necessary.

Amateurs at all levels may find the speed and rapid accumulation of quality sky images useful for education and presentation purposes in addition to displaying those images as part of an absorbing interest.

In places, short astronomical introductions to the target objects are provided for beginners to peek into the vastness of space and time, to imagine the processes that formed them and to wonder at the strange cosmic bodies that exist.

It is hoped that enjoyment of the images obtained will lead to enthusiasm and continued development of this fascinating hobby.

Tony Buick
Orpington, Kent, UK

Acknowledgments

I am most grateful to Sir Patrick Moore for his kind encouragement and help to make possible production of this book. Also to my son Chris, without whom the task would have been so much more difficult – his computing, proofreading skills and ideas throughout have been invaluable – and my son Tim for computer enhancement of Jupiter and Saturn images and constant support for my project. I am indebted to the Orpington Astronomical Society members for their friendship, advice and enthusiasm. Thank you Jenny, Roy and Wendy for much support and constantly listening to my Moon ramblings and Gilbert Satterthwaite for his generous advice and encouragement.

Tony Buick
Orpington, Kent, UK

Contents

CHAPTER ONE

Introduction

You have a digital camera but do you have a telescope? Can you borrow one? Are you visiting someone who has one? Focus the telescope on something. Anything! The Moon, a distant telegraph pole, a boat on the horizon … Hold your digital camera very steadily over the eyepiece and take a picture. Your first telescopic image (figure 1.1) – and you didn't need any technical knowledge at all. You only required a digital camera, a cheap or borrowed telescope and a computer to store and print your images. Your hobby has already started or, for existing amateur astronomers, taken on a new dimension. This picture was taken with a very cheap camera and a small telescope. Some features of the Moon are clearly visible, such

Figure 1.1.

as the dark areas called maria ("seas") and the splendid bright rays from the crater Tycho.

I very much like the principle of "do first and learn later". It can be terminally off-putting to have to endure hours, weeks or many months of instruction or reading before producing your first image of the sky. Of course many mistakes will be made and many pictures will have to be erased but since you are transferring images onto a computer from your camera the expense of those mistakes will be as close as you can get to zero. (Purists please do not pick up on this illustrative statement.) Your pictures will be seen as soon as you can get to a computer – no waiting around for days to view disappointing results on film by which time your image opportunity has changed or even vanished.

Almost certainly your reaction to your first astronomical image will be *Wow*! Look at that detail! Did I do that? Then you are hooked. You will want to do more and know more and show your friends and colleagues with pride the sky images you have captured on camera. You will produce pictures ever more stunning even with your inexpensive starting equipment. It is extremely satisfying to produce the best possible pictures with the instruments you start with. Investigate all parameters on the telescope and the camera. Use your imagination, creativity and DIY (Do It Yourself) talents as a substitute for shelling out tons of money, which you can do later if desired to match your astronomical ambitions.

The following pages describe a journey for you to follow from never having produced a single astronomical image to the production of images that some experts will describe as stunning.

I recall one memorable conversation when showing off some early efforts.

Me: "Look at these pictures that I took last night."
Him: "Wow! They are stunning. I suppose you are in a low light-pollution area."
Me: "No! I have a street light right outside my patio viewing area."
Him: "I suppose you have good all-round vision of horizons."
Me: "No! I live on the side of a hill (east-blocked), with houses on each side of my patio and a streetlight at patio height and 7 metres to the west. I can only see a patch of zenith (overhead) sky."
Him: "I suppose you have expensive equipment."
Me: "No. I used my standard family digital camera and a broken second-hand telescope."

And so it went on. The message is to use whatever you have, can borrow or buy cheaply to begin with and use wherever you are.

It must be emphasized that *your* camera and telescope may well be a different make and model from those used as examples in this work but the principles are the same for you to transfer to *your* instruments.

A glossary is given in the appendix of technical or astronomical terms used in the text.