The Art of Astrophotography

In *The Art of Astrophotography*, astronomer and *Popular Astronomy* contributor Ian Morison provides the essential foundations of how to produce beautiful astronomical images. Every type of astroimaging is covered, from images of the Moon and planets, to the constellations, star clusters and nebulae within our Milky Way Galaxy and the faint light of distant galaxies. He achieves this through a series of worked examples and short project walk-throughs, detailing the equipment needed – starting with just a DSLR (digital single lens reflex) camera and tripod, and increasing in complexity as the book progresses – followed by the way to best capture the images and then how, step by step, these may be processed and enhanced to provide results that can rival those seen in astronomical magazines and books. Whether you are just getting into astrophotography or are already deeply involved, Morison’s advice will help you capture and create enticing astronomical images.

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The Art of Astrophotography

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This book is dedicated to my many friends at the Macclesfield Astronomical Society, which has been a most rewarding part of my life for over 25 years. Their encouragement has helped lead to this book.
## Contents

_Preface_  
_Acknowledgements_  
1. Imaging Star Trails  
2. Imaging a Constellation with a DSLR and Tripod  
3. Imaging the Milky Way with a DSLR and Tracking Mount  
4. Imaging the Moon with a Compact Camera or Smartphone  
5. Imaging the Moon with a DSLR  
6. Imaging the Pleiades Cluster with a DSLR and Small Refractor  
7. Imaging the Orion Nebula, M42, with a Modified Canon DSLR  
8. Telescopes and Their Accessories for Use in Astroimaging  
9. Towards Stellar Excellence  
10. Cooling a DSLR Camera to Reduce Sensor Noise  
11. Imaging the North America and Pelican Nebulae  
12. Combating Light Pollution – the Bane of Astrophotographers  
13. Imaging Planets with an Astronomical Video Camera or Canon DSLR  
14. Video Imaging of the Moon with a Webcam or DSLR  
15. Imaging the Sun in White Light  
16. Imaging the Sun in the Light of its H-alpha Emission  
17. Imaging Meteors  
18. Imaging Comets  
19. Using a Cooled ‘One Shot Colour’ Camera  
20. Cooled Monochrome CCD Cameras  
21. LRGB Colour Imaging  
22. Narrowband Colour Imaging  

_Appendix A: Telescopes for Imaging_  
_Appendix B: Telescope Mounts_  
_Appendix C: The Effects of the Atmosphere_  
_Appendix D: Autoguiding_  
_Appendix E: Image Calibration_  

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Contents

Appendix F: Practical Aspects of Astroimaging .............................................. 256
Appendix G: A Survey of Astronomical Websites and Instructional DVDs ..... 260
Index .............................................................................................................. 263
Preface

The first point to address is why the title ‘The Art of Astrophotography’ was chosen for this book. As one finds when setting out to produce beautiful astronomical images, as much, or even more, time is spent processing the data as acquiring the raw data. There are many image processing tools available, some of which will be applicable to a particular image, and the appropriate ones need to be chosen and applied to give the desired result. Different images will require a different sequence of processes and rarely will these be the same, so there are no rigid rules as to how to go about it. There is thus some ‘art’ required to choose the appropriate tools to produce a particular image. But then, having produced an image, artistry is often required to make it aesthetically pleasing, so this is perhaps a further and more common use of the word ‘art’ as applied to astrophotography. Two examples of, hopefully, applying artistry in the production of an image are seen in the ‘Star Trails’ and ‘Composite Meteor Trails’ images in Chapters 1 and 17 respectively.

Software is extensively used not just for image acquisition but for processing the captured images. Happily, many of the required software tools are free, such as Deep Sky Stacker (DSS) and Registax, but specialist programs that are used to process astronomical data such as Pixinsight need to be purchased. One often finds that, having done the major part of the image processing in a specialist program, Adobe Photoshop is used to carry out the final editing of the image. The important point about Photoshop is that it can handle 16-bit data which less expensive programs such as Photoshop Elements cannot do. At the time of writing, the free program GIMP can also only handle 8-bit data, but it is said that the next version will be able to do so and thus this may then become an alternative to the use of Photoshop.

In this book all the image processing is handled in Photoshop. Adobe no longer sell the CS6 version (or any previous versions) of the program and it is leased on a month to month basis, so, at least, there is no large upfront cost. All of the capabilities required for the image processing techniques used in this book are found in the versions from CS2 onwards (I use an ‘academic’ version of CS4). It is sometimes possible to buy new copies of these older versions by searching on the Internet and,
Preface

should you not have a copy of Photoshop, I would encourage you to search for ‘Adobe Photoshop CS2’ to see what might be available.

The structure of the book is very simple. Relatively short chapters are used to illustrate virtually all aspects of astrophotography and are used essentially as ‘worked examples’, first describing the hardware that would be needed to capture a particular image and then describing, step by step, how the image is processed to produce the final result. As the chapters progress, the equipment required will become more complex, but they start with two chapters whose images require only the use of a DSLR (digital single lens reflex camera) and a tripod.

A few chapters introduce techniques that can aid all aspects of astroimaging, such as Chapter 10, which describes how DSLRs can be cooled to enhance their performance in summer, and Chapter 12, which shows how filters can be used to combat light pollution.

Gradually, all of the processing steps needed to create images are covered – in detail when first applied in the early chapters, and then with a summary of their use in later chapters. So even if one only wishes to use, for example, a telescope, equatorial mount and cooled CCD (charge-coupled device) camera, the earlier chapters should at least be read lightly.

The book’s chapters are supplemented with a set of appendices to cover in more depth aspects of astroimaging that are briefly summarised within some of the chapters. Examples of appendices where introductory chapters are included in the main text are Appendices A and D relating to telescopes and autoguiding. A further appendix, Appendix B, discusses in some depth the mounts, alt/az or equatorial, that are such an important part of an imaging system.

The world’s top astrophotographers tend to concentrate on one aspect of the hobby – and do it supremely well. Damian Peach’s planetary images come to mind. Over the past few years I have been writing books and articles – most recently a series entitled ‘Imaging for Beginners’ for the UK magazine Astronomy Now – which have had to cover all aspects of astroimaging, so in one sense I am a ‘jack of all trades’ but master of none. (But, having said that, one of my lunar images has been awarded a trophy and a variety of others have been used in books and magazines to illustrate articles other than those of my own.)

I can only offer one piece of evidence that the advice given in this book can be useful to others. A friend of mine who is a superb natural history photographer asked me for advice as to how begin to take astroimages. I explained to him how I thought one could best image the Orion nebula region (which, as Chapter 7 explains, is not that trivial) and then process the set of images taken to produce a good final result. He submitted his image to the ‘Insight Astronomy Photographer of the Year’ competition organised by the Royal Observatory Greenwich and won the 2015 Sir Patrick Moore Prize for Best Newcomer award!

With a little application, anyone could easily achieve images similar to those shown in this book, and my sincere hope is that many of you who use it to learn about astroimaging will, in time, achieve images far better than any of those that I have made.
Acknowledgements

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I would like to thank Vince Higgs, Lucy Edwards and the team at Cambridge University Press who have steered this book through to publication and to Linda Paulus at OOH Publishing who prepared this complex book for publication. Particular thanks go to Peter Gill, who copy-edits my articles for the magazine Astronomy Now and who has greatly helped me to improve my writing skills, and to Chris Cartwright, who has carried out a superb task in copy-editing what is a challenging and technical text.

Finally, but not least, I must thank my wife for supporting me through too many hours spent at the computer, and for graciously accepting the fact that, far too often, mounts and telescopes have been spread over the lounge and dining room ready for use and that one bedroom has been taken over for their storage.