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The Observer's Guide to Astronomy
Volume 2

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The Observer's Guide to Astronomy Volume 2

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Preface

Amateur astronomers

Active amateur astronomers engage in their favourite activity as a hobby, in their spare time. They are able to devote a limited amount of time to it, being restricted by their jobs, whose hours are rarely arranged to suit people who want to spend the night looking through a telescope!

Amateurs are limited financially, because they either have to provide the money themselves or obtain it from an astronomical group, most of which do not generally have large amounts of funds.

Many instruments bought commercially by amateurs are small refractors or reflectors, and the majority of these are probably gathering dust in attics, either because their owners were disappointed in their performance, or because they were purchased in a burst of short-lived enthusiasm or, finally, because their owners became bored with looking at the Moon or M31 for hours on end, did not know what else to do, and abandoned astronomy for some other pursuit. It was thinking about the latter group of observers that the germ of the idea for this book was sown: such amateurs need to be shown the vast range of useful observations that are possible, even with modest equipment, and how they should proceed.

Amateur astronomy

Just as professional astronomers may be divided into two broad groups, observers and theorists, the same applies to amateurs. Some are purely observers, and others are happier in a library than in an observing dome. Apart from these two classes of amateur, however, there are two more categories. There are the 'Telescope Nuts' (as they are often termed in North America), who spend their lives building bigger and better telescopes, but who often have no time to use their latest equipment before they start on something new, and there are the society members, who are the backbone of all the local and national astronomical groups and keep them in existence, but who have no time to look at the sky in between organising meetings, exhibitions, or conferences.

Let us concentrate on the observers. There are three types of observations made by amateurs:

Sight-seeing This consists of looking at objects in the sky purely for their beauty, and this is where most people begin. This is often the initial reason – and for some people the only reason – for taking up astronomy. Some amateurs never progress beyond this stage, but many others feel an urge, after a certain time, which may be months or years, to take things further, and frequently they are unable to find

any guidance either in their circle of acquaintances or in the literature. Even if 'sight-seeing' is, by definition, unproductive, apart from the pleasure that it brings, it should not be neglected, because it enables amateurs to gain experience and become accustomed to observing; both qualities that are of considerable value when they turn to more 'serious' work.

Educational Here, the astronomer carries out an experiment, which may require special equipment or measurements, or else a greater or lesser degree of sophistication in analysing the results. There are many different examples, but unfortunately the results are foregone conclusions, with the outcome having been known for decades – even for centuries – and to a degree of accuracy that is far beyond amateurs' reach.

True observation This often forms part of a specific programme of observation, and the results contribute – albeit sometimes in a very modest fashion – to our overall knowledge of the universe. People frequently have little idea of the range of observations within the capabilities of amateurs, who are thus able to make really useful observations.

In fact, amateur and professional astronomy truly complement one another. Although professionals have powerful methods at their disposal, amateurs are able to cover those fields that require little equipment or small instruments (such as binoculars, small, wide-field telescopes, etc.), mobile resources (such as the observation of grazing occultations), or a large number of observations (examples are variable stars, double stars, sky patrols, etc.). The result has been an increase in the collaboration between professionals and amateurs, with the latter having greater access to large telescopes such as the 600-mm reflector at the Pic du Midi Observatory, or participating in meetings such as the one organised by the Société Astronomique de France in Paris in 1987, which was supported by the International Astronomical Union (IAU Colloquium 98).

If we consider the fields for which amateurs are noted, we find that France is among the first rank on an international level when it comes to the study of planetary surfaces, double stars and variable stars. It is also relatively well placed as regards the Sun, comets and meteors.

Occultations appear to be a Belgian speciality, but in many other fields such as astrometry, deep-sky work or the discovery of new objects (comets, novae, supernovae, and minor planets), the United Kingdom, United States, Australia or Japan set an example. It is time that French astronomers woke up to these particular fields, where their forebears were extremely prominent. One gets the impression that nowadays, apart from a handful of top-notch observers, whose names appear from time to time in the International Astronomical Union's telegrams and circulars, or in specialized international journals, that French astronomy has lapsed into somnolence, and has left it to other countries to make all the discoveries. (The balance-sheet when it comes to comets is particularly eloquent.)

The observer's guide

Somehow we need to convey to amateurs who have grown bored with seeing the same few notable objects that they look at every night, that there are fascinating observational programmes, in which they can also achieve extremely useful results.

It became obvious that it would be of great value if descriptions of the useful work that may be carried out could be brought together in one publication. This is what gave birth to the idea of this '*Observer's Guide*'. To avoid overawing beginners, it does include some 'sight-seeing' and 'educational' projects, but because it aims to guide observers into making useful 'scientific' work, it does concentrate on the latter.

Any such project is highly ambitious and could not be realized by a single person. In fact, each subject needs to be described by a specialist, and as no one can hope to be expert in every field, this naturally led to the idea of a collaborative work.

This book examines all the different types of object available to amateur astronomers, and for each one it describes the types of observation that are possible (paying particular attention to their scientific value), the equipment required, the methods to be employed, where appropriate information may be found, and the organisations to which the results should be reported. Each chapter has been written by a French or Belgian expert (or experts) in the subject concerned; the authors include both professional and amateur astronomers.

The first fifteen chapters describe observational programmes, divided into individual classes of astronomical object. The last five chapters discuss techniques that relate to several of the subject-areas previously described. This arrangement avoids unnecessary repetition.

An effort has been made to standardize the text provided by the various authors, and to limit the amount of editing required; some subjects that are considered to be particularly important, however, are deliberately included in more than one place in the book.

Despite its size, the '*Observer's Guide*' cannot include every aspect of amateur astronomy. It has been assumed that the reader is familiar with all the basic techniques, such as setting up a telescope, finding objects, etc. If not, details may be found in any one of a number of books intended for beginners, so it would be pointless to repeat them here.

For similar reasons, there is no chapter devoted to astrophotography as such. The basic techniques that are required are described in a number of books, which are given in the bibliography. It therefore seemed pointless to include information about this general area in this book, and to do so would have required 100 to 200 additional pages. On the other hand specific photographic techniques required by particular types of observation are discussed in considerable detail in some of the individual chapters.

Advice to the reader

The '*Observer's Guide*' is not meant to be read straight through from cover to cover. It has been designed so that the individual chapters are relatively independent, so that the reader may concentrate on the subjects of interest, and in any desirable

order. Relevant cross-references are included to other chapters and sections as required.

This book should be regarded as a catalogue, where amateurs may find out what types of observation are possible given the facilities that they have available, and from which they may choose those fields that seem most attractive to them. The text describes all the steps and equipment necessary to take the first step. If this serves to confirm the initial attraction for any particular field of interest, addresses of various organisations are given that may be contacted for further information and guidance.

So now ... good reading, and good observing!

Translator's preface

In a multi-author work, there are always problems in ensuring consistency in presentation, style, and usage. Not surprisingly, there were some disparities in the original French text. In translating this work, I have tried to ensure that the whole text is consistent. In accordance with recommended practice, for example, all wavelengths in the visible and adjacent spectral ranges are now given in nanometres (nm) rather than the older, perhaps more familiar, ångström units – 1 nm (10^{-9}m) = 10 Å (10^{-10}m). At longer wavelengths, the unit used is the micrometre μm (10^{-6}m). Similarly, the dimensions of telescopes, etc. are consistently given in millimetres or metres (not in centimetres or decimetres).

The symbols for physical variables and constants have been altered to those most commonly used in English-language works and, whenever possible, agree with the recommendations of the IAU or the various IAU Commissions. Annotations and captions to the figures have also been changed to forms more readily related to the English-language terms for the terms and items designated.

Dates and times have been expressed consistently in the accepted international scientific format: Year, month, day, hour, minute, and second, with decimal forms where appropriate. In accordance with this standard format, the name of the month is given in full or as a three-letter abbreviation, not in numerical form.

One major alteration from the layout of the original volumes concerns the positioning of notes, references, glossaries and bibliographies. The original chapters were inconsistent, some giving this material within the text, some in footnotes, and some in 'appendices' at the ends of the chapters concerned. The majority of notes, glossaries, and appendices have now been incorporated in the text. Where it has been thought advisable to insert a translator's note, this is enclosed in square brackets. Section numbering and cross-referencing have also been simplified, and do not correspond precisely with the arrangement of the original edition. A few items (including some Figures) have been moved to more appropriate positions. Two general appendices on 'Time-scales' and the interesting 'T60 Association' may be found at the end of Volume 2.

Discussion of the merit (or demerit) of specific charts, atlases, etc. for a particular branch of practical work has been retained in the text, usually within a special sub-section. References to papers, articles, etc. – i.e., items with no accompanying discussion or comments – may be found with a more general bibliography (and a few notes) for each chapter in sections at the back of each volume. Please note that where books are cited as specific references, they are not repeated in the general bibliography.

The original work contained many references to French-language material, in particular to papers and articles in French journals. Obviously, many English-speaking readers will be unable to understand the original language. It was felt, however,

that some items were not adequately treated in English, so some references to major French-language publications, particularly books and the journal *l'Astronomie*, have been retained. Most references to publications issued by local groups have been removed, because the majority of readers will find the material impossible to obtain or consult. Various references to easily available English-language books and journals have been added, including some material not published when the original text was written.

There are known to be inconsistencies in the details given for some of the references, many of which were missing volume, issue, or page numbers – and even in some cases date, author or title! Regrettably, it was not possible for me to spend the extremely large amount of time that would be required to check and correct every individual reference. (Many dozens of corrections have been incorporated, and I would particularly like to thank Mr Peter Hingley, the Royal Astronomical Society's Librarian, for all the work that he carried out in this respect.) It is believed that the information given will enable the appropriate papers to be located without too much trouble, even though the information may be incomplete.

All necessary amendments to the French edition have been incorporated, and in addition, I have corrected many minor, previously undetected errors, and included the latest data wherever possible – such as revised totals for numbered minor planets, and the number of supernovae discovered by Bob Evans – without reference to the authors. Many major discrepancies and errors have been referred back to the original editor, Patrick Martinez, and the authors, and appropriately corrected.

In a few cases, the precise methods used by observational groups in Francophone countries differ from those employed by the major, English-speaking organisations. No attempt has been made to 'correct' these points, not only because the various methods may be equally valid, but also because the differences may be instructive. However, attention is sometimes drawn to any disparity in a translator's note.

It is impossible for me to mention individually the many amateur and professional astronomers in all parts of the world who have so unstintingly helped me with details of methods and organisations, or with more general advice. There is not a single chapter that has not benefited from their assistance, which is greatly appreciated. If I may single out one person in particular, whose advice has extended far beyond the field of just minor planets and comets, it is Dr Brian Marsden, of the IAU Central Bureau for Astronomical Telegrams in Cambridge, Massachusetts. His advice, often received almost instantaneously, thanks to the wizardry of modern computer networks, has been invaluable.

Storm Dunlop