

**A LABORATORY
MANUAL IN
ASTRONOMY**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649042814

A Laboratory Manual in Astronomy by Mary E. Byrd

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

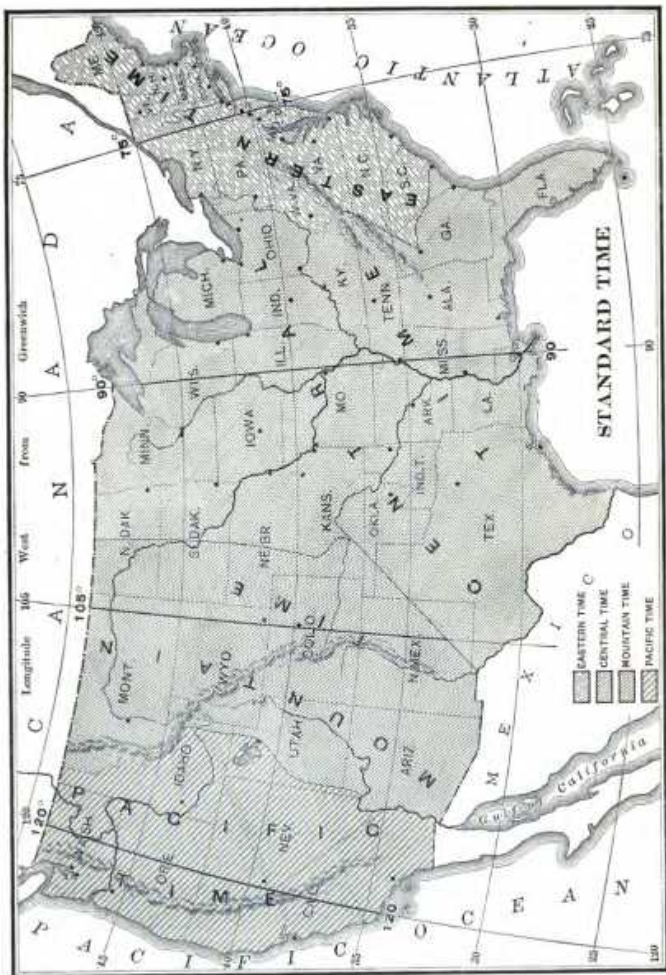
Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

www.triestepublishing.com

MARY E. BYRD

**A LABORATORY
MANUAL IN
ASTRONOMY**



A

81382

LABORATORY MANUAL

IN

ASTRONOMY

BY

MARY E. BYRD, A.B.

DIRECTOR OF THE OBSERVATORY, SMITH COLLEGE

BOSTON, U.S.A.

GINN & COMPANY, PUBLISHERS

The Athenæum Press

1899

COPYRIGHT, 1899
BY MARY E. BYRD
ALL RIGHTS RESERVED

Letron & Co.

PREFACE.

THE laboratory method of instruction is growing in favor so rapidly with astronomical teachers that there is little occasion for any plea in its behalf. It is a recognized fact that the direct investigation of celestial phenomena gives a vividness and reality to the subject and arouses interest and enthusiasm difficult to obtain by any other means. Indeed, to require the study of the heavenly bodies and provide no means for observing them is somewhat like restricting the student of botany to text-books and to pictures of plants.

It cannot be urged as a valid objection to this method that large mathematical attainments and expensive equipment are prerequisites. Laborious investigations necessitating telescopes and observatories are not the ones which should engage the attention of our students at the beginning; but rather the simple observations which teach them how to see and enable them to gather at first hand a store of pleasant astronomical information.

Whether the study of astronomy is taken up first in secondary schools or colleges, years of experience have convinced me that it is best to devote at least one term to general astronomy and naked-eye observation. An unobstructed place for watching the heavens, a few home-made instruments, and evening hours of laboratory instruction will, I believe, do more to foster a genuine interest in astronomy or prepare for the use of instruments of precision than any amount of text-book study which is supplemented only by desultory star-gazing.

1133
- 8-33
(

The present laboratory manual has grown out of the needs of my own students during the past fifteen years. It is based upon a primer called "Questions on the Sky," which was printed in 1898, especially for the use of students at Smith College. Teachers who have expressed their approval of the primer may be interested to know that the questions given there are republished here with some modifications and additions. After the introductory chapters on almanacs, maps, and globes, all the questions proposed are designed to be answered directly from observation or by data obtained from observation. The one aim and object of the book is to lead to direct study of the heavens.

For the convenience of teachers and students the number of observations suggested is large. Few of them, comparatively, should be undertaken by any one student. But it needs only a modicum of experience to show that astronomy more than other sciences demands large room for choice and adaptation. The factors which condition the work of young observers are so many and varied that teachers within a few miles of each other may require different sets of topics, and students in the same class often work to the best advantage along different lines.

The manual is designed to be used in connection with one of the standard works on general astronomy, like those of Young and Newcomb; and while it has seemed necessary to include a few definitions and explanations, no inroad has been made into the province of the regular text-book, and it has invariably been left to the teacher to call attention to inferences and conclusions which depend jointly upon reading and observing.

The references made to "Young" throughout the book refer to the revised edition of "Young's General Astronomy," and "Elements of Astronomy." The letter E. before the number of the article indicates that the reference is to the "Elements."

All appliances mentioned in the text, except opera-glasses, are home-made, and whatever mechanical excellence they pos-

ness is due largely to Mr. F. King, the Smith College carpenter, and Mr. R. Gellis, the engineer.

To all who have contributed in any way to make the manual complete and serviceable — whether mentioned by name or not — it is a pleasure to accord hearty recognition.

Most of the observations for illustration have been taken by my students and are marked with their initials. Miss Abby E. Tucker, a graduate student, deserves special thanks for making some of the more difficult observations and computing numerical checks. In these as well as in many other directions the help given by my assistant, Miss Harriet W. Bigelow, has been invaluable. I am indebted to her for the index.

Acknowledgment is due Professor Wm. W. Payne, Director of Goodsell Observatory, for permission to use as seemed best several articles of mine which have appeared in *Popular Astronomy*. Through the courtesy of the publishers of *Popular Science Monthly*, an article in that magazine on a "Home-Made Telescope," by Dr. Pyburn, is reprinted as Appendix A of this book.

Appendix B, on "Zodiacal Light," has kindly been prepared by Professor Arthur Searle of Harvard College, and Appendix C, on "Moonrise," by Professor Edgar Frisby of the U. S. Naval Observatory.

I am under special obligation to Professor Edward C. Pickering, Director of Harvard College Observatory, and to Professor Charles A. Young of Princeton University for their kindness in examining the book in manuscript. Their help is gratefully acknowledged.

Suggestions and criticisms from those who use the manual will be gladly received.

NORTHAMPTON, MASS.,
December, 1898.

