

**THE SCIENCES: A READING BOOK FOR
CHILDREN: ASTRONOMY, PHYSICS-
HEAT, LIGHT, SOUND, ELECTRICITY,
MAGNETISM-CHEMISTRY,
PHYSIOGRAPHY, METEOROLOGY**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649698998

The Sciences: A Reading Book for Children: Astronomy, Physics-Heat, Light, Sound, Electricity, Magnetism-Chemistry, Physiography, Meteorology by Edward S. Holden

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

EDWARD S. HOLDEN

**THE SCIENCES: A READING BOOK FOR
CHILDREN: ASTRONOMY, PHYSICS-
HEAT, LIGHT, SOUND, ELECTRICITY,
MAGNETISM-CHEMISTRY,
PHYSIOGRAPHY, METEOROLOGY**

THE SCIENCES

A READING BOOK FOR CHILDREN

ASTRONOMY, PHYSICS—HEAT, LIGHT, SOUND,
ELECTRICITY, MAGNETISM—CHEMISTRY,
PHYSIOGRAPHY, METEOROLOGY

BY

EDWARD S. HOLDEN



GINN & COMPANY

BOSTON · NEW YORK · CHICAGO · LONDON

Q163
H56

GENERAL

ENTERED AT STATIONERS' HALL

COPYRIGHT, 1902, BY

EDWARD S. HOLDEN

ALL RIGHTS RESERVED

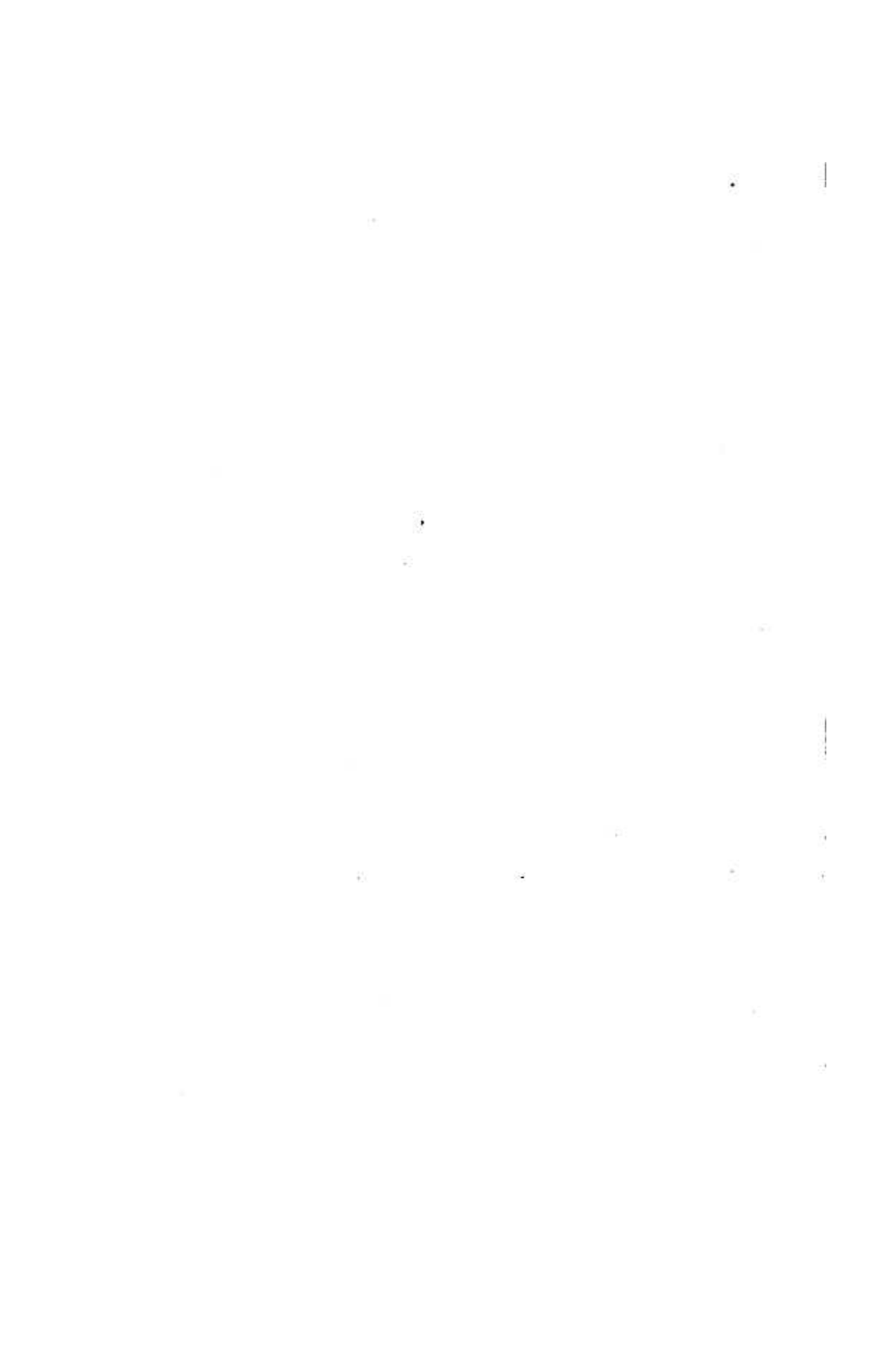
68.10

The Athenaeum Press
GINN & COMPANY • PROPRIETORS • BOSTON • U.S.A.

TO
MY YOUNG FRIEND

Mildred Steble

190795



PREFACE

THE object of the present volume is to present chapters to be read in school or at home that shall materially widen the outlook of American school children in the domain of science, and of the applications of science to the arts and to daily life. It is in no sense a text-book, although the fundamental principles underlying the sciences treated are here laid down. Its main object is to help the child to understand the material world about him.

All natural phenomena are orderly; they are governed by law; they are not magical. They are comprehended by some one; why not by the child himself? It is not possible to explain every detail of a locomotive to a young pupil, but it is perfectly practicable to explain its principles so that this machine, like others, becomes a mere special case of certain well-understood general laws.

The general plan of the book is to waken the imagination; to convey useful knowledge; to open the doors towards wisdom. Its special aim is to stimulate observation and to excite a living and lasting interest in the world that lies about us. The sciences of astronomy, physics, chemistry, meteorology, and physiography are treated as fully and as deeply as the conditions permit; and the lessons that they teach are enforced by examples taken from familiar and important things. In astronomy, for example, emphasis is laid upon phenomena that the child himself can observe, and he is instructed how to go about it. The rising and setting of the stars, the phases of the moon, the uses of the telescope, are explained in simple words. The mystery of these and other matters is not magical,

as the child at first supposes. It is to deeper mysteries that his attention is here directed. Mere phenomena are treated as special cases of very general laws. The same process is followed in the exposition of the other sciences.

Familiar phenomena, like those of steam, of shadows, of reflected light, of musical instruments, of echoes, etc., are referred to their fundamental causes. Whenever it is desirable, simple experiments are described and fully illustrated,¹ and all such experiments can very well be repeated in the schoolroom.

Finally, the book has been thrown into the form of a conversation between children. It is hoped that this has been accomplished without the pedantry of *Sandford and Merton* (although it must be frankly confessed that the principal interlocutor has his knowledge very well in hand for an undergraduate in vacation time) or the sentimentality of other more modern books which need not be named here. The volume is the result of a sincere belief that much can be done to aid young children to comprehend the material world in which they live and of a desire to have a part in a work so very well worth doing.

EDWARD S. HOLDEN.

THE CENTURY CLUB,
NEW YORK CITY, January, 1903.

¹ Illustrations have been reproduced from many well-known books, especially from the reading books of Finch and Stickney, Frye's geographies, Davis' physical geography and meteorology, Gage's text-books of physics, Young's text-books of astronomy, etc. To the authors of these works the writer begs to express his sincere thanks.

CONTENTS

	PAGE		PAGE
PREFACE	v	Distances of the Stars	32
INTRODUCTORY CHAPTER	1	What is a Planet?	33
BOOK I. ASTRONOMY,—The Science of the Sun, Moon, and Stars	9	Phases of the Moon (New Moon, Full Moon, etc.)	34
The Earth as a Planet	9	Number of the Stars	38
Distance of the Moon from the Earth	11	Clusters of Stars	39
Distance of the Sun from the Earth	11	The Pleiades	39
The Diameter of the Earth	12	The Milky Way	41
Distance of the Sun from the Earth	14	Do the Stars have Planets as the Sun does?	42
The Planets Mercury and Venus	16	Shooting Stars; Meteors; Fireballs	44
The Planets Mars, Jupiter, Saturn, Uranus, and Neptune	16	The Zodiacal Light	46
Distances of the Planets from the Sun	17	Nebulæ	47
How to make a Map that shows the Sun and Planets	17	Rising and Setting of the Sun	48
Scale of the Map	18	How the Sun appears to move from Rising to Setting	49
Sizes of the Planets compared to the Sun	19	The Celestial Sphere	49
The Solar System; the Sun and Planets	25	The Northern Stars	51
Relative Sizes of the Planets	28	The Great Bear (the Dipper)	53
The Moons of the Planets	30	The Southern Stars	54
The Minor Planets; the Asteroids	32	Time and Timekeeping	56
Comets	32	Telescopes	56
The Stars	32	A Meridian Circle	57
		The Lick Telescope	61
		The Moon	62
		Mountains on the Moon	62
		Life on the Planets	64
		The Planet Mars	64
		The Planet Jupiter	64
		Appendix (Statistics of the Solar System)	66-70