

**THE ROMANCE OF
SCIENCE.
COLOUR MEASUREMENT
AND MIXTURE**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649552320

The Romance of Science. Colour Measurement and Mixture by William de Wiveleslie Abney

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.

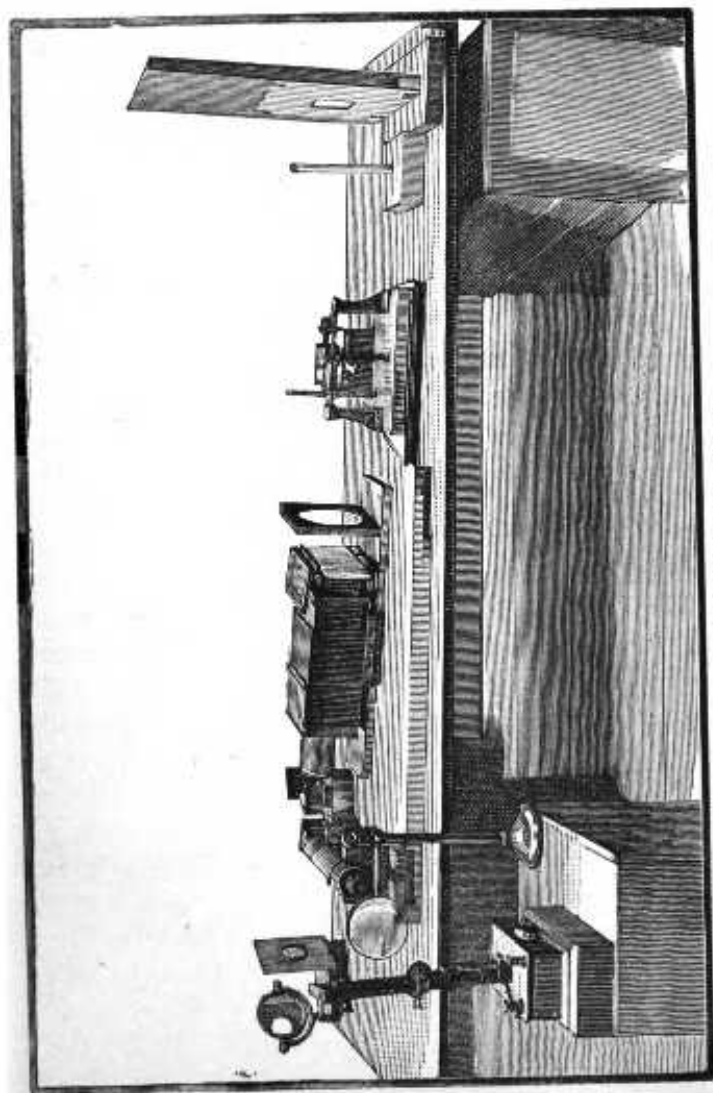
Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

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

WILLIAM DE WIVELESIE ABNEY

**THE ROMANCE OF
SCIENCE.
COLOUR MEASUREMENT
AND MIXTURE**



COLOUR-PATCH APPARATUS.

THE ROMANCE OF SCIENCE.

COLOUR MEASUREMENT
AND
MIXTURE.

With Numerous Illustrations.

BY
CAPTAIN W. DE W. ABNEY, C.B., R.E., D.C.L., F.R.S.

PUBLISHED UNDER THE DIRECTION OF THE COMMITTEE
OF GENERAL LITERATURE AND EDUCATION APPOINTED BY THE
SOCIETY FOR PROMOTING CHRISTIAN KNOWLEDGE.

^{KC} SOCIETY FOR PROMOTING CHRISTIAN KNOWLEDGE.

LONDON: NORTHUMBERLAND AVENUE, W.C.;

43 QUEEN VICTORIA STREET, E.C.

BRIGHTON: 135, NORTH STREET.

NEW YORK: E. & J. B. YOUNG & CO.

1891.

P R E F A C E.

SOME ten years ago there were three measurements of the spectrum which I set myself to carry out; the last two, at all events, involving new methods of experimenting. The three measurements were: (1st) The heating effect; (2nd) the luminosity; and (3rd) the chemical effect on various salts, of the different rays of the spectrum. The task is now completed, and it was in carrying out the second part of it that General Festing, who joined me in the research, and myself were led into a wider study of colour than at first intended, as the apparatus we devised enabled us to carry out experiments which, whilst difficult under ordinary circumstances, became easy to make. On two occasions, at the invitation of the Society of

Arts, I have delivered a short course of lectures on the subject of Colour, and naturally I chose to treat it from the point of view of our own methods of experimenting; and these lectures, expanded and modified, form the basis of the present volume.

As a treatise it must necessarily be incomplete, as it scarcely touches on the history of the subject—a part which must always be of deep interest. The solely physiological aspect of colour has also been scarcely dealt with; that part which the physicist can submit to measurement being that which alone was practicable under the circumstances.

W. DE W. ABNEY.

*South Kensington,
1st May, 1891.*

CONTENTS.

CHAPTER I.

Sources of Light—Reflected Light—Reflection from Roughened Surfaces—Colour Constants p. 11

CHAPTER II.

A Standard of Light—Formation of the Spectrum by Prisms and by the Diffraction Grating—Wave-lengths of the principal Fraunhofer Line—Position of Colours in the Spectrum p. 17

CHAPTER III.

The Visible and Invisible Parts of the Spectrum—Methods for showing the Existence of the Invisible Portions—Phosphorescence—Photography of the Dark Rays—Thermo-Electric Currents p. 30

CHAPTER IV.

Description of Colour Patch Apparatus—Rotating Sectors—Method of making a Scale for the Spectrum p. 41

CHAPTER V.

Absorption of the Spectrum—Analysis of Colour—Vibrations of Rays—Absorption by Pigments—Phosphorescence—Interference p. 51

CHAPTER VI.

Scattered Light—Sunset Colours—Law of the Scattering by Fine Particles—Sunset Clouds—Luminosities of Sunlight at different Altitudes of the Sun p. 62

CHAPTER VII.

Luminosity of the Spectrum to Normal-eyed and Colour-blind Persons—Method of determining the Luminosity of Pigments—Addition of one Luminosity to another p. 76

CHAPTER VIII.

Methods of Measuring the Intensity of the Different Colours of the Spectrum, reflected from Pigmented Surfaces—Templates for the Spectrum p. 88

CHAPTER IX.

Colour Mixtures—Yellow Spot in the Eye—Comparison of Different Lights—Simple Colours by Mixing Simple Colours—Yellow and Blue from White p. 112

CHAPTER X.

Extinction of Colour by White Light—Extinction of White Light by Colour p. 126

CHAPTER XI.

Primary Colours—Molecular Swings—Colour Sensations—Sensations absent in the Colour-blind p. 133

CHAPTER XII.

Formation of Colour Equations—Koenig's Curves—Maxwell's Apparatus and Curves p. 147

CHAPTER XIII.

Match of Compound Colours with Simple Colours—All Colours reduced to Numbers—Method of Matching a Colour with a Spectrum Colour and White Light p. 156

CHAPTER XIV.

Complementary Colours—Complementary Pigment Colours—Measurement of Complementary Colours p. 167

CHAPTER XV.

Persistence of Images on the Retina—The Use of Coloured Discs p. 179

CHAPTER XVI.

Contrast Colours—Measurement of Contrast Colours—Fatigue of the Eye—After-Images p. 196

LIST OF ILLUSTRATIONS.

FIG.	PAGE
Colour-patch apparatus	<i>Frontispiece</i>
1. Spectrum of sunlight	18
2. Carbon poles of an electric light	20
3. Curve for converting prismatic spectrum into wave-lengths	28
4. The thermopile	36
5. Heating effect of different sources of radiation	38
6. Colour-patch apparatus	42
7. Rotating sectors	46
8. Spectrum of Carbon Sodium and Lithium	48
9. Interference bands	60
10. Absorption of rays by the atmosphere	68
11. Luminosity curve of spectrum of the positive pole of the electric light	78
12. Rectangles of white and vermillion	82
13. Arrangement for measuring the luminosities of pigments	83
14. Measurement of the intensity of rays reflected from white and coloured surfaces	89
15. Intensity of rays reflected from vermillion, emerald green, and French ultramarine	92