

THE
OPTICAL PAPERS OF
ISAAC NEWTON

THE
OPTICAL PAPERS OF
ISAAC NEWTON

VOLUME II
THE *OPTICKS* (1704) AND
RELATED PAPERS
ca. 1688–1717

EDITED BY
ALAN E. SHAPIRO



CAMBRIDGE
UNIVERSITY PRESS

CAMBRIDGE
UNIVERSITY PRESS

University Printing House, Cambridge CB2 8BS, United Kingdom
One Liberty Plaza, 20th Floor, New York, NY 10006, USA
477 Williamstown Road, Port Melbourne, VIC 3207, Australia
314–321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre, New Delhi – 110025, India
79 Anson Road, #06–04/06, Singapore 079906

Cambridge University Press is part of the University of Cambridge.
It furthers the University's mission by disseminating knowledge in the pursuit of
education, learning, and research at the highest international levels of excellence.

www.cambridge.org
Information on this title: www.cambridge.org/9780521302180
DOI: 10.1017/9781139043526

© Cambridge University Press 2021

This publication is in copyright. Subject to statutory exception
and to the provisions of relevant collective licensing agreements,
no reproduction of any part may take place without the written
permission of Cambridge University Press.

First published 2021

Printed in the United Kingdom by TJ Books Limited, Padstow Cornwall
A catalogue record for this publication is available from the British Library.

Library of Congress Cataloguing in Publication Data
Newton, Isaac, Sir, 1642-1727.

The optical papers of Isaac Newton.

Bibliography: v. i, p.

Includes index.

Contents: v. i. The optical lectures, 1670-1672.

I. Optics- Early works to 1800. 2. Optics-History-

Sources. Shapiro, Alan E. (Alan Elihu), 1942-

II. Title.

QC353.N555 1983 535 82-14751

ISBN – 2 Volume Set 978-1-108-95422-8 Hardback

ISBN – Volume I 978-1-108-84475-8 Hardback

ISBN – Volume II 978-0-521-30218-0 Hardback

Cambridge University Press has no responsibility for the persistence or
accuracy of URLs for external or third-party internet websites referred to in
this publication and does not guarantee that any content on such websites is,
or will remain, accurate or appropriate.

To the memory of D. T. “Tom” Whiteside
Newton Scholar Extraordinaire

Contents

List of Plates	page viii
List of Tables	ix
Preface	xi
Editorial Note	xiv
Abbreviated References	xix
1 Introduction	1
1.1 The Conception of the <i>Opticks</i>	1
1.2 The Composition of the <i>Opticks</i>	5
1.2.1 Further Observations on Book II of the <i>Opticks</i>	13
1.2.2 The Last Book on Diffraction and the Publication of the <i>Opticks</i>	16
1.3 The Latin Translation, New Queries, and Newton's Annotated Copy of the <i>Opticks</i>	20
1.4 A Projected Book III, Part II and the Second Edition of the <i>Opticks</i>	25
Appendix. Propositions of the <i>Opticks</i>	28
2 First Edition of the <i>Opticks</i>	32
2.1 The Manuscript of the First Edition of the <i>Opticks</i>	32
2.2 Newton's Annotated Copy of the <i>Opticks</i> (1704) in the Cambridge University Library	231
3 <i>Fundamentum opticae</i> (<i>The Foundation of Optics</i>)	240
4 Additions to <i>Optice</i>	338
4.1 Draft Advertisement for <i>Optice</i> (1706)	338
4.2 Newton's English Version of Queries 17–23 for the Latin Translation, <i>Optice</i> (1706)	338
4.3 Additions to <i>Optice</i> , Qu. 23, Paragraphs 1 and 22, ca. 1709–10	380
5 Queries 17–31 for the Second English Edition of the <i>Opticks</i> (1717)	384
Bibliography	414
Index	420

Plates

- | | |
|---|---------|
| 1. The opening of the <i>Opticks</i> , Bk. I, Pt. I, CUL, MS Add 3970, f. 17r | page 35 |
| 2. The first folio of Bk. I, Pt. II of the <i>Opticks</i> , CUL, MS Add 3970,
f. 131r | 141 |
| 3. The opening folio of the <i>Fundamentum Opticae</i> , CUL, MS Add 3970,
f. 409r | 241 |
| 4. The first folio of the English manuscript of the queries added to the
Latin translation, <i>Optice</i> , CUL, MS Add. 3970, f. 296r | 339 |

Tables

1.1	The Principal Stages of the Composition of the <i>Opticks</i>	<i>page</i> 7
1.2	Major Differences in Queries between Editions	23
3.1	<i>Fundamentum opticae</i> Correspondence with <i>Opticks</i>	334
3.2	<i>Opticks</i> Correspondence with <i>Fundamentum opticae</i>	336

Preface

This volume is decades late, and its appearance now is due to the (ultimately welcome) badgering and cajoling from David Tranah, senior mathematics editor at Cambridge University Press, who first contacted me in 2005. It was delayed and publication effectively set aside not for a lack of interest in Newton's optics, but because of the new digital world of scholarship and publication that arose in the 1980s and 1990s. The typewriter was replaced by the personal computer and the printed book was coming to be replaced by digital editions, especially scholarly editions. Volume I of this edition, which was published in 1984, was firmly in the world of the printed editions of Newton's *Correspondence* (1959–77) and *Mathematical Papers* (1967–81), all published by Cambridge University Press. By the turn of the century, printed editions were being replaced by such online editions as the “Newton Project” (www.newtonproject.ox.ac.uk) and “The Chymistry of Isaac Newton” (webapp1.dlib.indiana.edu/newton). Cambridge University Press is now digitizing these three editions and will put them online in a collaborative project tentatively called The Newton Lab. Volume I of *The Correspondence* will be the first to go online at about the same time as this volume appears.

All the texts for the edition were typed by a secretary from my transcriptions on a central departmental computer. The typed texts were checked against photocopies of the manuscripts multiple times by research assistants, and against the manuscript at least once by me, so they were very reliable transcriptions. Software was not yet standardized, and when central computers were being abandoned and I got my first personal computer, it turned out that for technical reasons the texts could not be fully converted to Word. Only ASCII characters were converted, and all formatting, marginalia, super- and sub-scripts, diacritical marks, and special characters were lost. These were restored by comparing the ASCII text with the typescript twice. Some texts, including the manuscript of the *Opticks*, were converted by scanning the typescript. The scan was compared with the typescript two times. In preparing this volume for publication I no longer had a research assistant, so the annotations are liable to be less accurate than the texts. Throughout this period of rescuing and restoring the texts, I continued working on and studying Newton's papers, which I found, at least for the short term, to be more rewarding.

This second and final volume of the *Optical Papers* contains the manuscript of the first edition of the *Opticks* (1704) and papers related to it and to later editions, primarily the queries added in 1706 and 1717, but also subsequent additions and corrections. Throughout, drafts are indicated and variants with respect to the latest draft are given in the footnotes. The manuscript of the *Opticks* is followed by Newton's annotations in his copy of the first edition that is now in the Cambridge University Library, and which served as the basis through Query 16 for the Latin translation and, much later, as the copy text for the second English edition. This annotated copy—there are others—is of special interest because it gathers so many of the changes in the two editions in one place. This volume also contains the

“*Fundamentum opticae*,” the first draft of the *Opticks*, which Newton composed in Latin before switching to English. The “*Fundamentum*” is published with a facing-page English translation. In the translation I have tried to follow closely Newton’s “translation” and phrasing in the English version of the *Opticks* even if sometimes this is a bit awkward. This is followed by the two manuscripts for the new and revised queries. The first is the English manuscript of the queries added to the Latin translation. This manuscript or a copy of it was given to Samuel Clarke to translate into Latin. His Latin translation follows this English manuscript very closely. This same manuscript later served as the basis for the further revision of the queries for the second English edition in 1717. I have also included some draft additions to Qu. 23/31 dealing with the electric spirit. The manuscript of the queries for the 1717 edition is the second manuscript of the queries included in the volume. The queries for the *Optice* are preceded by a brief draft Advertisement, or preface, for that edition concerned with double refraction.

At this point, after following all the drafts, additions and corrections, the text will be close to the final version, the fourth edition, that we all know through the widely used Dover edition. This volume thus documents how Newton arrived at the book that for over a century was taken as a model of experimental science, was the leading treatise on optics and a fecund source of natural philosophical speculations, and is now considered a classic of science. My aim in this volume differs from that of the Newton Project, and, alas, I began it before that Project. The initial aim of the Newton Project was to publish online meticulous diplomatic transcriptions—without commentary or notes—of Newton’s “non-scientific” papers. It later expanded to a far more ambitious project, namely, to include a broad selection of Newton’s manuscripts (as well as a number of his published works) encompassing all of his endeavors—scientific as well as non-scientific. It has done an admirable job in carrying this out, and it largely leaves to others the task of expanding on their work. I publish many optical manuscripts that they have omitted, such as the “*Fundamentum opticae*,” provide commentary and translation when necessary, and indicate and cite the numerous drafts that Newton utilized in composing the *Opticks*. When I omit a text that the Newton Project has published, I refer the reader to it. In short, the two efforts complement each other.

In order to fit all the manuscripts related to the *Opticks* into one volume, I had to engage in triage and eliminate almost all drafts except for the “*Fundamentum opticae*.” The number of folios devoted to drafts of the *Opticks* and the queries is larger than the *Opticks* itself. Since so much of the footnotes is devoted to textual matters, I have limited my commentary largely to shorter remarks and to citing the historical literature, much of which, I admit, is my own. I have particularly limited my commentary on Book I, the theory of the compound nature of white light, since this was treated extensively in Volume I, and readers can turn to its notes. My aim is to guide the serious reader to further resources.

I have worked so long on this edition—indeed, much of my career—that I have accumulated many debts and will no doubt have trouble remembering all of them. Those that I fail to explicitly cite and thank, please accept both my gratitude and my apology. Tom Whiteside coaxed me into starting this edition, and he supported and encouraged me throughout. When I visited him in Cambridge late in his life, we had a very pleasant meeting and he only very gently reminded me that I had something to complete. Among the many Newton scholars who helped,

assisted, and befriended me over the years, I especially thank Jed Buchwald, I. B. Cohen, Johannes Lohne, Bill Newman, George Smith, and Sam Westfall. Bernard Cohen generously gave me a number of documents related to the *Opticks*. Particularly useful to me was a bound photocopy of Newton's annotated first edition of the *Opticks* in the Cambridge University Library (*O_{1a}* in the notation of this edition). At various periods I have received support from the National Science Foundation, the Graduate School of the University of Minnesota, the Institute for Advanced Study, Princeton, the John Simon Guggenheim Foundation, and the Rowland Foundation, and I am grateful to all of them. The staff of Cambridge University Library were extremely helpful, and special thanks must go to David McKitterick and Godfrey Waller of the Manuscripts Room. St. Edmund's College was a welcome home to me during the periods when I was residing in Cambridge to work on Newton's manuscripts. I was much more than ably served by four research assistants, Fred Fellows and the three Pauls—Paul Morf, Paolo Palladino, and Paul Steig. Madeline Henry, my fifth research assistant and a classics major, did an admirable job in undertaking the initial translation of the "*Fundamentum*" from seventeenth-century Latin. Being without a research assistant for about two decades, I appreciate their efforts all the more.

A.E.S.

Minneapolis, Minnesota
December 2018

Editorial Note

In general, I have followed the editorial conventions of the first volume. The exceptions, to be noted, are a consequence of the different nature of the texts in this volume and the options provided by modern computing. The published texts faithfully follow the manuscripts, in particular, in reproducing spelling, punctuation, and capitalization. Other than for the figure numbers, as explained below, and the expansion of contractions (such as the enclitic *que*) and ligatures, all editorial emendations are enclosed within square brackets.¹

Words that Newton underlined have been rendered in italics. To make navigating through the texts easier I have also put in italics his various subsection headings, such as Definition, Experiment, Observation, Proposition, as well as the statements of the Propositions, and their abbreviations. One exception is that the italics in the Axioms and Definitions that Newton inserted at the beginning of the *Opticks* are his. Not every change in the various manuscripts and every variant between related texts, such as drafts and different editions, is indicated in the textual notes, and for the most part word order, tense, mood, spelling, and the like have been ignored. Even by thus limiting the notes to changes and variants that affect the meaning, the reader will more likely than not find that I have erred on the side of comprehensiveness. Significant variants of the manuscripts of the *Opticks* and queries with the published Latin and English editions and with Newton's annotations in the published editions are also noted. Since I am not publishing a variorum of the *Opticks*, I have not scrupulously collated the different editions. All the texts included in this volume are accessible online at Cambridge University Library, so that my readings of the manuscripts may be checked, and it is also easy to assess my editorial conventions by comparing a few pages to those published here.²

All manuscripts published and cited here, unless otherwise indicated, are from Add. MS 3970 in the Portsmouth Collection in the Cambridge University Library (CUL), and the manuscript location and number will not subsequently be indicated. The 653 folios in MS 3970 are almost all optical, and most of them are bifolios, that is, large sheets $25\frac{1}{2} \times 15$ inches, which are folded in half, or $12\frac{1}{2} \times 15$ inches for a single folio. Bifolios are indicated by a slash (/), e.g., 339/40.

(1) One exception to this rule is that Newton's seventeenth-century orthography for Greek characters, which was not always consistent, has been silently modernized, as in Volume I.

(2) High-quality images of the entirety of Add. MS 3970, which contains almost all the manuscripts cited and published in this volume, are accessible in the Cambridge University Digital Library (<http://cudl.lib.cam.ac.uk/view/MS-ADD-03970/1>). The Newton Project (www.newtonproject.ox.ac.uk) has transcriptions of many of the texts in Add. MS 3970.

Marginal Page and Folio Divisions, and Figure and Query Numbers

Divisions in pagination of the manuscripts are indicated in the text by a slash mark (/)³, and the corresponding folio numbers are printed in the inner margin. For the manuscripts of the *Opticks* and the queries for the second English edition, the pagination of the appropriate edition—that is, the first and second English editions of the *Opticks*—is indicated in the text by a double slash mark (//), and the corresponding page numbers are printed in roman typeface in the inner margin. The page and folio numbers can be readily distinguished from one another, since the folio numbers have a superscript r or v (recto and verso). I have not indicated page numbers for the Latin Queries, since I am publishing the English text from which the translation was made. Because the 1952 Dover edition of the *Opticks*, which is based on the text of the fourth, posthumous edition (1730), has become ubiquitous, I have also indicated those pages by a double slash mark in the text, but the corresponding page numbers are printed in boldface in the inner margin. The subscript 2 preceding the page numbers in Books II and III of the *Opticks* (1704), as in ₂41, indicates, as is customary, the second sequence of page numbers in the first printed edition (the pagination of the *Opticks* first edition starts over from 1 at the beginning of Book II).

When Newton added eight new queries to the second English edition, he inserted them after the initial 16 queries and changed the numbers of the seven queries, 17 to 23, added in the Latin translation to 25 to 31. To indicate the alternative numbering of those seven queries, I use the notation 17/25, 18/26 . . . 23/31, where the first number is that of the Latin translation and the second that of the second English edition. Table 1.2 in the Introduction gives the corresponding number of each query in each edition.

The figures in the first edition were on folded plates inserted among the pages of text, e.g., following pp. 6, 16, 40, and so on. In the Latin edition, all the plates are gathered at the end of the volume. From the second English edition onwards, the figures are inserted in the text in the appropriate place as in a modern book. I have inserted the figures in the text and have prefaced Newton's figure numbers with Roman numerals indicating the Book and Part of the *Opticks*; for example, the first figure in Book I, Part I is I.I.1, the second figure in Book II, Part II is II.II.2, and so on. I have not put the Roman numerals in square brackets. The "*Fundamentum opticae*" lacks figure numbers, and I have inserted numbers in the text in square brackets.

Textual Notes and Special Symbols

The format adopted for the textual notes is, I trust, clear and simple, but a few conventions require elaboration. It is important to recognize that the annotations indicate not only changes in the text but also comparisons to earlier texts, such as a draft or earlier edition, or to later ones. In footnotes I refer to drafts by the notation *Dxxx* where *xxx* is the first folio number of the manuscript. For example, *D79* represents ff. 79–90, and *D339* represents ff. 339/40 and 363/4, which join to

(3) Newton himself numbered only the first folio of each bifolio—that is, only the odd-numbered folios—of his manuscript, but his numbers are omitted here.

form a continuous text or draft. The lemma, that is, the word or phrase that is the subject of such a note, is specified at the beginning of the note before a single bracket (]); the lemma is omitted when the addition or deletion consists of one word. The lemma is followed by the annotation in italics, which, when necessary, is followed by another reading. The words represented by an ellipsis (. . .) in the lemma are identical to the words of the ellipsis in the change, i.e., following the colon, if a second ellipsis is present at all. Some examples follow:

- *Deleted*: light & rays. The deleted passage immediately follows the footnoted word.
- & red] *added*. The words in the lemma were added.
- one uniform. . . Red] *originally*: that colour. This indicates the original state of the words within the lemma.
- the fume] *added*; O_1 : the fumes. This indicates that the words in the lemma were added in the manuscript of *Opticks* (*MSO*); and the passage after the semicolon indicates that in the printed text, O_1 , “the fume” was changed to the plural.

The following terms describe changes in the text and its relation to drafts and other versions:

- [*illeg*]. Illegible, one or more words that could not be deciphered. This almost always indicates that the passage is heavily crossed out or overwritten.
- *in different ink*. Indicates a text written in a noticeably different ink from the surrounding text and made at a later date.
- *in margin*. A note, directions, or an addition written in the margin.
- *originally*. This is most commonly a deletion and then an addition, but on occasion it is more complex. For example, it may involve the addition of text both before and after a passage.
- *read*. This corrects the text, usually following another edition, annotated volume, or draft, as in the following example: *Read (as O_1):* blew
- [*space*]. Denotes a space left in the text.
- *written over*. Word(s) written over other word(s).

When comparing a text to earlier drafts and editions or later versions, additional terms have been adopted:

- *continues*. This indicates that the other text goes on, and acts as if it were an addition.
- *omits*. This means that the text is lacking in the earlier or later version.

Editorial interventions in the text are all in square brackets. Newton too used square brackets, but heavy ones that I represent in boldface **[]**, to indicate passages that he intended to delete or those that he was only contemplating deleting.

Extending a notation used in Volume I, a single rule in the margin indicates a major deletion and a double rule an addition.

When different lemmas fall on the same word, the two lemmas are separated by a bold vertical bar (|).

- I measured] *added* | & the distance. . . I measured] *D79*: the lines *Ci*, *Ck*, *Cl* were [*space*] inches respectively & if y^e line *Cm* or *Cn* was $\frac{1}{2}$ an inch
 Note that this problem of different lemmas falling on the same word is different from different variants on the same lemma. The latter are separated by semicolons.

Additional Terminology for *Opticks*, Book II, Parts I–III

The text of *Opticks*, Book II is based directly on the “Discourse of Observations,” or, more simply, the “Observations,” that Newton sent to the Royal Society in 1675.⁴ Indeed, for the text of the *Opticks* through Part III, Prop. 8 he simply revised the copy of the “Observations” that he had retained in 1675 (ff. 501–17, cited as *DO2*). Significant differences between the “Observations” of 1675 (or *DO2*) and *Opticks*, Book II are indicated in the notes. Since Newton first marked up *DO2* for publication for an aborted plan for publication in 1676, it was necessary to restore its text to the state of 1675. This was done by comparing it with the copy of the “Observations” in the hand of John Wickins (cited as *DO3*) that was submitted to the Royal Society and then returned to Newton after it was entered in the Society’s Record Book. I have restored those deletions that are not in *DO3* and deleted those additions not in it. When they diverged, I have followed *DO2*. After Newton revised and marked up the manuscript from 1675 for the *Opticks*, he gave it to an amanuensis to copy for the *Opticks*.

The terms adopted for notes referring to the “Discourse of Observations” in the *Opticks* are the following:

- *DO2 originally*. This refers to the restored 1675 state before changes for the *Opticks* were made.
- *DO2 added*. This means that it was added after 1675, when it was submitted to the Royal Society.
- *DO2 omits*. This means the 1675 version lacks a passage in the manuscript of the *Opticks*.

Strikethrough and Angle Brackets in Footnotes

One significant change in footnotes from the first volume is that strikethrough type is used for deletions, and angle brackets < > for additions. When there is a deletion within a deletion, a double strikethrough is used for the initial deletion; and when there is an addition within an addition, large angle brackets are used for the outer pair. Both are infrequent. Some examples follow:

- In rays] *originally*: If rays <emerging> perpendicularly ~~to out~~ pass.
 This means that “If rays emerging perpendicularly pass” was deleted and “In rays” then added. Before that, “emerging” was added and “to out” deleted.
- Deleted: <at y^e chart>
 Here “at y^e chart” was added and then deleted.
- Deleted: as in y^e sixt & following experiments all the rays of one sort be one sort being refracted more
 Here Newton made a succession of deletions without additions above the line. That is, he wrote “as in y^e sixt & following experiments” and deleted it. He then started again with “all the rays of one sort be” and deleted this too. Finally, he started yet again with “one sort being refracted more” and deleted this too.
- In like manner. . . rays] *D341 originally*: And if the force of y^e refracting surface <plane> by w^{ch} y^e refraction is done begin <begin to act upon the rays>

(4) On the “Observations” see the Introduction §1.1, especially note 9.

<Let also the motions of y^e emerging rays *CE Ce* be represented distinguished into two *EN & NE*>

In this case “surface” was deleted and “plane” added, and also “begin” was deleted for the larger addition “begin to act upon the rays.” Then everything written thus far—“And if the force of. . .upon the rays”—was deleted for an addition, “Let also the. . .*NE*.” Hence “surface” and “begin” have a double strikethrough. Finally, the last addition was struck out and the new text, “In like manner. . .rays,” was added.

- *D324 deleted*: totally red (without any blew, <or violet> &) in the <deep> blew they were totally blew wthout y^e mixture of any other colours <manifest to sense>
 Newton inserted “or violet” in an existing insertion, whence “without any. . .&” is placed in larger angle brackets. The two other additions are in simple angle brackets.

Abbreviated References

Full bibliographic references are given in the bibliography at the end of the volume.

- Correspondence* Newton, *The Correspondence of Isaac Newton*. Edited by H. W. Turnbull, J. F. Scott, A. Rupert Hall, and Laura Tilling. 7 vols. Cambridge, 1959–77.
- FPP* Shapiro, *Fits, Passions, and Paroxysms: Physics, Method, and Chemistry and Newton's Theories of Colored Bodies and Fits of Easy Reflection*. Cambridge, 1993.
- Lectiones opticae* The earlier version of Newton's *Optical Lectures*, in Newton, *Optical Papers*, Vol. I: 46–279.
- Math Papers* Newton, *The Mathematical Papers of Isaac Newton*. Edited by D. T. Whiteside. 8 vols. Cambridge, 1967–81.
- Optica* The revised and expanded version of Newton's *Optical Lectures*, in Newton, *Optical Papers*, Vol. I: 280–603.
- Optical Papers* Newton, *The Optical Papers of Isaac Newton*, Vol. I. *The Optical Lectures, 1670–1672*. Edited by Alan E. Shapiro. Cambridge, 1984.
- Opticks*, Dover ed. Newton, *Opticks: Or, a Treatise of the Reflections, Refractions, Inflexions and Colours of Light*. Reprinted from the 4th Edition. London, 1931. Reprint: New York, Dover Publications, 1952.
- Principia*, trans. Cohen Newton, *The Principia: Mathematical Principles of Natural Philosophy*. Translated by I. Bernard Cohen, Anne Whitman and Julia Budenz. Berkeley, 1999.
- USP* Newton, *Unpublished Scientific Papers of Isaac Newton. A Selection from the Portsmouth Collection in the University Library, Cambridge*. Edited by A. Rupert Hall and Marie Boas Hall. Cambridge, 1962.

Abbreviations for Texts

- DO2* “Discourse of Observations,” Autograph, 1675. CUL, Add. MS 3970, ff. 501–18
- DO3* Wickins copy of “Discourse of Observations,” submitted to the Royal Society and returned to Newton, CUL, Add. MS 3970, ff. 549–67
- FO* *Fundamentum opticae*, CUL, Add. MS 3970, ff. 409/10, 415/16, 394/5, 396, 397/8, 583/4, 425/6, 647/8, 407/8, 405/6, 403/4, 401/2, 399/400, 419/22, 420/1, 411/12, 413/14, 423/4, 417/18
- MSO* Manuscript of *Opticks* (1704) CUL, Add. MS 3970, ff. 17–78, 91–233, 359

O_1	First edition of <i>Opticks</i> , 1704
O_1e	Errata in O_1
O_1a	Newton's annotated copy of O_1 . Lacks title page and plates, CUL, MS Adv.b.39.3
O_1A	Newton's annotated copy of O_1 . McGill University Library Rare Books, QC353 N57 1704. Also known as MS 46
$O_1\alpha$	Newton's annotated copy of O_1 . Missing pp. 1–16. Trinity College Library, Cambridge, NQ.16.198
L_1	Latin Translation, <i>Optice</i> , 1706
L_1eca	Errata, Corrigenda, & Addenda in L_1
L_1a	Newton's annotated copy of L_1 . CUL, Adv.b.39.
QL_1	English MS of new queries 17–23/25–31 for L_1 , CUL, Add. 3970, ff. 246–7, 296/7, 298/9, 300/1, 257–60, 249 <i>bis</i> , 248–56, 285/6
O_2	Second edition of <i>Opticks</i> , 1717 and reissue in 1718
O_2a	Newton's annotated copy of O_2 , Babson Collection, Huntington Library, 700873
QO_2	MS of queries 17–31 for O_2 , CUL, Add. 3970, ff. 263–84
L_2	Second edition, enlarged, of <i>Optice</i> , 1719
O_3	Third edition, corrected, of <i>Opticks</i> , 1721
O_4	Fourth edition, corrected, of <i>Opticks</i> , 1730