

# Isaac Newton's General Scholium to the *Principia*: science, religion and metaphysics

## *A tercentenary symposium*

*University of King's College, Halifax, 24–26 October 2013*

### **Symposium overview**

This international, interdisciplinary symposium will bring together a contingent of leading historians and philosophers of science for a systematic examination of the ideas and legacies of the General Scholium to the *Principia*—arguably the most famous portion of Newton's writings. At once humanistic and natural philosophical, the General Scholium includes Newton's reflections on what he saw as some of the most important natural philosophical, theological, methodological and metaphysical corollaries to the mathematical physics and cosmology of his *magnum opus*. In the General Scholium Newton powerfully rejects Cartesian vortices, discusses planetary and cometary dynamics, champions the inductive method, articulates the design argument, considers the nature and attributes of God, ventures into biblical interpretation, declares that discoursing about God is a part of natural philosophy, touches on philosophical and metaphysical issues concerning space, matter and causation, presents a descriptivist view of gravity, speaks out against the reckless use of hypotheses and speculates about an electric spirit. And this does not exhaust the themes treated in the General Scholium. Under the surface are links with Newton's late alchemical work, hints at heretical theology and responses to his natural philosophical critics. This symposium coincides with the three-hundredth anniversary of the second (1713) edition of the *Principia*, in which the General Scholium first appeared in print.

Well-known and crucial to comprehending the wider goals of Newton's thought, the General Scholium is nevertheless comparatively under-researched and still imperfectly understood. This symposium aims to bring greater clarity to our understanding of the General Scholium, along with the many ways it intersects with Newton's scientific, philosophical and religious thought, and to produce the first book-length study of this text and related themes. The symposium and published book will have a strongly interdisciplinary element, bringing together the Humanities and the Sciences, including the fields of history of science, philosophy of science, history, philosophy, theology, biblical studies, Classical studies, philology, physics, astronomy, cosmology and mathematics. Delegates participating in the symposium are based at institutions in eight countries: Canada, the United States, England, Belgium, Germany, Switzerland, Italy and Israel. Steffen Ducheyne (Free University of Brussels), Scott Mandelbrote (Cambridge University) and Stephen Snobelen (King's College, Halifax) are serving as the symposium organisers and will also edit the proceedings.

The symposium will be held at the University of King's College in Halifax, Nova Scotia. King's College is a small liberal arts college known for its Great Books Programme, School of Journalism and interdisciplinary upper-year honours programmes in Contemporary Studies, Early Modern Studies and History of Science and Technology. It is affiliated with Dalhousie University, a research institution and comprehensive university with programmes in the Arts, Social Sciences, Sciences, Medicine, Law, Engineering and Agriculture.

The symposium programme will commence formally on the evening of Thursday 24 October with an advertised public lecture in Alumni Hall by Andrew Janiak (Duke University) entitled "Isaac Newton, philosopher". This lecture will be followed by a reception. A video of the lecture and discussion will be digitally archived and made available freely online. There will also be a public seminar led by Niccolò Guicciardini (University of Bergamo) on the second edition of the *Principia* presented in the later afternoon of Friday 25 October. The second day will conclude with a planning session for the publication of the proceedings. Videos of all the presentations will be made available freely online shortly after the symposium concludes. In addition to the two advertised public events, the symposium talks will be open to interested undergraduates, graduate students and faculty from the Arts, Social Sciences and Sciences, as well as the general public.

Each delegate's paper will examine its particular theme in terms of 1) the internal content of the 1713 and 1726 versions of the General Scholium, 2) the relationship of the General Scholium to the rest of Newton's

published and unpublished writings as well (including “De gravitatione”, the Classical Scholia, the *Opticks* and *Optice*, the first three published editions of the *Principia*, drafts for the various editions of the *Principia*, the *System of the World* and the theological papers) and 3) both contemporary debate, such as the Leibniz-Clarke correspondence of 1715-1716, and the wider context of Newton’s thought in seventeenth- and eighteenth-century science, religion and metaphysics. Each paper will engage with the historiography and scholarly opinion relevant to its topic as well. Where relevant, the papers will also discuss links between the General Scholium and new features of the second edition of the *Principia*, including editor Roger Cotes’ powerful and polemical preface. Each session will allow time for feedback, questions and discussion.

Unprecedented access to Newton’s unpublished writings allows delegates to go far beyond Newton’s public texts. The Cambridge Digital Library, for example, includes Newton’s annotated copy of the first edition of the *Principia*, along with some of his notebooks. The year 2013 also coincides with the completion of the Newton Project’s transcription of Newton’s theological papers, virtually all of which, along with a growing number of scientific and biographical documents, are available online for consultation and research.

A new English translation and critical edition of the General Scholium and its five manuscript drafts will be produced for the symposium. This new translation, along with the symposium papers and a general introduction, will be published through an academic press by 2015. This published work will act as an introduction and guide to the General Scholium that will serve scholars of Newton, early modern science, early modern philosophy and the history of science and religion. It will also benefit physicists, other scientists and, more broadly, members of the public who are interested in the scientific, religious and metaphysical themes presented in Newton’s General Scholium.

### **Newton and Newtoniana book exhibition**

An exhibition entitled, “Newton and Newtoniana: the collections of the Dalhousie University and King’s College Libraries: A book exhibit to commemorate the tercentenary of the General Scholium and the second edition of the *Principia* (1713)”, will be open to the public at the King’s College and Dalhousie Libraries during the symposium and afterwards. This small exhibit includes all the early Latin editions of the *Principia*, notable eighteenth-century Newtoniana and other related books from the history of ideas and the history of science. Highlights include not only the first and second (anniversary) editions of the *Principia*, but also Cambridge Platonist Ralph Cudworth’s *The true intellectual system of the universe* (1678), the first edition of philosopher (and friend of Newton) John Locke’s *Essay concerning human understanding* (1689) and the famous first edition of Galileo’s *Dialogue concerning the two chief systems of the world* (1632).

### **Symposium sponsors and support**

The symposium has received help from several sponsors, partners and supporters, including a major Connection Grant from the Social Sciences and Humanities Research Council of Canada (SSHRC). Additional grants and support have come from Situating Science Atlantic Node, the University of King’s College Centre for Interdisciplinary Research, the Newton Project, the Newton Project Canada, the Student Assistant Programme (King’s College), the History of Science and Technology Programme (King’s College), the Early Modern Studies Programme (King’s College), the Rotman Institute of Philosophy (University of Western Ontario), the Department of Philosophy (Dalhousie University), the Department of History (Dalhousie University) and the Department of Classics and Religious Studies (Dalhousie University).

The symposium organisers are grateful to the administrators of these bodies for their support and vision. The symposium organisers are also grateful to the University of King’s College for providing rooms, AV, advertising, guidance and other support in kind. Additionally, grateful acknowledgements are due to the librarians and archivists at the Dalhousie University and King’s College Libraries for their help and expertise in preparing the book exhibition. Finally, special thanks are due to Emily Tector, administrative manager of Situating Science, along with students at King’s College who have provided logistical and other kinds of assistance.



## Symposium schedule

Thursday 24 October 2013

*Public Lecture: 7:30–9:00 (Alumni Hall):*

### **Isaac Newton, philosopher**

*Andrew Janiak, Department of Philosophy, Duke University*

*Chair: Ian Stewart, History of Science and Technology Programme, University of King's College*

- Isaac Newton as a philosopher
- Isaac Newton's engagement with philosophy
- Isaac Newton's contributions to philosophy

*Reception: 9:00–9:30 (Wilson Common Room)*

Friday 25 October 2013

*All symposium presentations in the KTS Room*

*Session 1 (including opening remarks): 9:00–9:45:*

### **The genesis of Newton's General Scholium: an editorial history**

*Steffen Ducheyne, Centre for Logic and Philosophy of Science, Free University of Brussels*

*Chair: Niccolò Guicciardini, Dipartimento di Lettere e Filosofia, University of Bergamo*

- the editorial history of the text
- drafts A-E and what they tell us about Newton's aims for the General Scholium
- Newton's correspondence with Roger Cotes
- Newton's theological motivations for the General Scholium
- the General Scholium as published in the second edition of the *Principia* (1713)
- revisions to the first published version and its final form in the *Principia* (1726)

*Session 2: 10:00–10:45:*

### **Cosmology and astronomical physics in Newton's General Scholium**

*Chris Smeenk, Department of Philosophy, University of Western Ontario*

*Chair: Mélanie Frappier, History of Science and Technology Programme, University of King's College*

- Newton's rejection of Cartesian vortical theory
- Newtonian cosmology in the *Principia* and as epitomised in the General Scholium
- planetary dynamics, cometography and the law of gravity

*Session 3: 11:00–11:45:*

### **Science and religion in Newton's General Scholium**

*Stephen Snobelen, History of Science and Technology Programme, University of King's College*

*Chair: Larry Stewart, Department of History, University of Saskatchewan*

- Newton's design argument: from the Bentley letters (1692-93) to the British Newtonians
- natural theology in the General Scholium and the Queries to the *Opticks*
- the Programmatic Statement: discoursing about God does certainly belong to natural philosophy
- God and natural philosophy: the relationship between science and religion in Newton's thought

Lunch: 12:00–1:00 (Board Room)

Session 4: 1:00–1:45:

### **Classical theism in Newton's General Scholium**

*Paul Greenham, Institute for the History and Philosophy of Science and Technology, University of Toronto*

*Chair: Neil Robertson, Early Modern Studies Programme, University of King's College*

- engagement with classical theism in Medieval and early modern Christian theology and comparative theological analysis (e.g., Augustine, Aquinas and Calvin)
- justification for natural theology
- God's nature and attributes (sovereign, eternal, infinite)

Session 5: 2:00–2:20:

### **Heterodoxy, church history and biblical exegesis in Newton's General Scholium**

*Irena Backus, Institut d'histoire de la Réformation, University of Geneva (moderated discussion)*

*Chair: Stephen Snobelen, History of Science and Technology Programme, University of King's College*

- anti-Trinitarianism and the ante-Nicene Fathers: influences on Newton
- biblical interpretation and biblical criticism in the General Scholium
- Newton's concept of God and the status of the Son in the General Scholium and in his notes on the word *homoousios*
- Newton as theologian in the General Scholium compared to Clarke and Leibniz

Session 6: 2:30–3:15:

### **Scholarly and Scholastic contexts for Newton's General Scholium**

*Dmitri Levitin, University of Edinburgh and Trinity College, Cambridge*

*Chair: Scott Mandelbrote, Perne Librarian, Peterhouse and Lecturer, Faculty of History, Cambridge University*

- Newton's agnosticism about how an omnipresent God interacts with the world, and thus about the cause of gravity and the nature of action at a distance
- Newton's history of theology and philosophy in the Classical Scholia and Yahuda manuscripts
- metaphysics in the seventeenth century and Newton's discomfort with the tradition
- Newton: metaphysician or exponent of English experimental philosophy and physico-theology?

Session 7: 3:30–4:15:

### **Newton's General Scholium in seventeenth- and eighteenth-century religion**

*Scott Mandelbrote, Perne Librarian, Peterhouse and Lecturer, Faculty of History, Cambridge University*

*Chair: Dmitri Levitin, University of Edinburgh and Trinity College, Cambridge*

- the relationship of the theology of the General Scholium to mainstream religion in Britain and Europe in Newton's lifetime
- the General Scholium and religion in the Enlightenment
- religion and secularism *vis-à-vis* Newton's natural philosophy, from Newton's perspective and that of his observers

Session 8: 4:30–6:00 (public seminar):

### **The second edition of Newton's *Principia mathematica* (1713)**

*Niccolò Guicciardini, Dipartimento di Lettere e Filosofia, University of Bergamo*

*Chair: Peter Rowlands, Department of Physics, University of Liverpool*

- two tercentenaries: the second edition of the *Principia* and the *Commercium epistolicum*
- Newton's abortive plans for a revision of the *Principia* in the 1690s

- David Gregory's notes on the *Principia* and his correspondence with Newton, 1687–1708
- John Keill's 1708 paper on central forces; the priority dispute is triggered
- the cooperation of Cotes with Newton and the variants between first and the second editions
- the mathematical disputes surrounding the *Principia* and the General Scholium

*Delegate Banquet:* 7:00–10:00 (Halifax waterfront district)

## Saturday 26 October 2013

*Session 9:* 9:00–9:45:

### **Classical thought in Newton's General Scholium**

*Karin Verelst, FUND-CLEA, Free University of Brussels*

*Chair: Ian Stewart, History of Science and Technology Programme, University of King's College*

- Platonic and Aristotelian themes
- Philo Judaeus, Pythagoreanism, Stoicism
- the General Scholium and the Classical Scholia
- the question of the classical 'façade' of the *Principia*

*Session 10:* 10:00–10:45:

### **Philosophy and metaphysics in Newton's General Scholium**

*Andrew Janiak, Department of Philosophy, Duke University*

*Chair: Gordon McOuat, History of Science and Technology Programme, University of King's College*

- the General Scholium as a philosophical document
- nominalism, epistemology and nescience of substance
- time, space, force, motion, matter, phenomena, laws of nature, causation

*Session 11:* 11:00–11:45:

### **Philosophy of science in Newton's General Scholium**

*Mary Domski, Department of Philosophy, University of New Mexico*

*Chair: Michael Hymers, Department of Philosophy, Dalhousie University*

- induction, empiricism, experimental philosophy, *hypotheses non fingo*
- the General Scholium, the Rules of Reasoning and scientific method in the *Principia*
- the universalisation of the laws of nature

*Lunch:* 12:00–1:30 (Board Room)

*Session 12:* 1:30–2:15:

### **Polemics in Newton's General Scholium**

*Eric Schliesser, Department of Philosophy and Moral Sciences, Ghent University*

*Chair: Karin Verelst, FUND-CLEA, Free University of Brussels*

- the ideological contexts of the General Scholium (natural philosophical, philosophical and theological)
- polemics against and engagement with Descartes, Spinoza, Leibniz and Toland
- the Newton-Bentley correspondence (1692–93)
- Clarke's *A demonstration of the being and attributes of God* (1704–5)

Session 13: 2:30–3:15:

### **Newton's General Scholium and the mechanical philosophy**

*Hylarie Kochiras, The Cohn Institute of Tel Aviv University*

*Chair: Mary Domski, Department of Philosophy, University of New Mexico*

- the question of Newton's commitment to seventeenth-century mechanical philosophy
- matter theory and "the most subtle spirit"
- the General Scholium and "De gravitatione"
- Newton and the Cambridge Platonists on matter and spirit (e.g., Henry More)

Session 14: 3:30–4:15:

### **Alchemy and the electric spirit in Newton's General Scholium**

*Cesare Pastorino, Berlin Center for the History of Knowledge (Zentrum für Wissensgeschichte, Berlin)*

*Chair: Eric Schliesser, Department of Philosophy and Moral Sciences, Ghent University*

- a study of the General Scholium's final paragraph, in which Newton speculates about an electric spirit operating as an attractive and repulsive force in and between bodies
- the role of the electric spirit in chemical phenomena and animal and human physiology
- the twelve propositions on the electric spirit and their final form in the General Scholium
- experimental electricity in the early eighteenth century (e.g., Francis Hauksbee, Sr.)

Session 15: 4:30–5:15:

### **The legacies of Newton's General Scholium**

*Mordechai Feingold, History and Philosophy of Science, California Institute of Technology*

*Chair: Hylarie Kochiras, The Cohn Institute of Tel Aviv University*

- the immediate impact of the General Scholium in the early eighteenth century
- English translations of the General Scholium
- the use of the General Scholium by the Newtonians
- the role of the General Scholium in helping to shape scientific projects and scientific method in the eighteenth century and beyond
- the General Scholium in Enlightenment and Romantic apologetics

Session 16: 5:15–6:00 (Frazee Room):

### **Delegate final discussion and planning session**

- reflections and discussion about the symposium themes
- planning for the publication of the proceedings

*Discussants:*

J. E. McGuire, Department of History and Philosophy of Science, University of Pittsburgh

Peter Rowlands, Department of Physics, University of Liverpool

Larry Stewart, Department of History, University of Saskatchewan

