



JAMES CLERK MAXWELL

BOTOND GAÁL

**THE FAITH OF A SCIENTIST**

**JAMES CLERK MAXWELL**

**THE ISTVÁN HATVANI THEOLOGICAL RESEARCH CENTRE  
DEBRECEN UNIVERSITY OF REFORMED THEOLOGY  
DEBRECEN  
2003**

Author:  
Bótond Gaál

Reviewed by  
Jock Stein

Copyright © Botond Gaál, 2002  
All right reserved.  
Kálvin tér 16.  
4044 Debrecen/Hungary

Jacket photograph:  
István Vencsellei  
Front and back page: Reformed College of Debrecen

**ISBN 963 8429 39 9**

Published by  
The István Hatvani Theological Research Centre  
Debrecen University of Reformed Theology  
Printed in Debrecen/Hungary by Fábíán Nyomdaipari Bt.

To my teacher,  
Professor Thomas Forsyth Torrance  
in  
gratitude and affection

The author of this monograph established  
**The István Hatvani Theological Research Centre**  
in 1993.

The aim of this Centre is to help all of the professors and students  
at the Debrecen University  
in examining and better understanding the relationship between  
natural sciences and Christian theology  
in order to promote progress in all fields of the human culture.  
István Hatvani (1718-1786) was an outstanding  
physicist, mathematician,  
chemist, physician, philosopher and Calvinist theologian  
who,  
as a professor of the Reformed College of Debrecen,  
embodied a European standard in teaching science and theology.

\* \* \* \* \*

This publication was supported by the  
**Regional Center of the Hungarian Academy of Sciences**  
**in Debrecen**

and

A grant from the  
Science and Religion Course Program in Europe of the  
*Center for Theology and Natural Sciences (CTNS)*  
in Berkeley, California,  
funded by the  
**John Templeton Foundation**

## Contents

<b>INTRODUCTION</b> .....	8
<b>ABBREVIATIONS</b> .....	11
<b>1. JAMES CLERK MAXWELL IN THE VICTORIAN AGE</b> .....	12
The Impact of the Scottish School of Common Sense.....	13
Christian Heritage and Theological Background.....	19
<b>2. FROM THE WHOLE TO THE PARTS</b> .....	26
The Effectiveness of that Principle in his Life.....	34
The Effectiveness of that Principle in the Area of Human Knowledge.....	37
Christ as the Wholeness and His Universe as the Part.....	39
<b>3. THEOLOGY OF JAMES CLERK MAXWELL</b> .....	48
In Relation to his Fellowmen and Women.....	49
In Relation to the Church.....	51
In Relation to the Universe .....	54
In Relation to Christ.....	58
Christ in Relation to God, the Universe, the Church and Man .....	60
<b>4. MESSAGE FOR TODAY LEFT BY JAMES CLERK MAXWELL</b> ....	64
Creation out of Nothing and Incarnation of Christ .....	66
Maxwell's Unitary Vision and Contingency of the World .....	66
Pre-eminent Tri-unity of God and the Unitary Vision of the Created World.....	67
<b>APPENDIX – James Clerk Maxwell and the Bible</b> .....	70
<b>BIBLIOGRAPHY</b> .....	88

## Abbreviations

- C&G            **Campbell, Lewis and Garnett, William.** *The Life of James Clerk Maxwell: With a Selection from his Correspondence and Occasional Writings and a Sketch of his Contributions to Science.* London: Macmillan and Co., 1882.
- Harman        **Harman, P. M. ed.** *The Scientific Letters and Papers of James Clerk Maxwell.* Cambridge: University Press, Vol. 1., 1991 and Vol. 2., 1995.
- Papers        **Niven, W. D. ed.** *The Scientific Papers of James Clerk Maxwell.* New York: Dover Publications, 1890.
- Treatise      **Maxwell, James Clerk.** *A Treatise on Electricity and Magnetism.* Oxford: Clarendon Press, 1881.

## Notes on Style

Most Bible references follow the version used by Clerk Maxwell himself, which was of course the King James Version. Some other references, used in commentary, are in the New International Version.

Capital letters are often used for pronouns referring to Deity, as Maxwell tended to use them.

Maxwell used the term „man” in a generic sense, meaning human beings.

## INTRODUCTION

When the volumes of the *Mecanique Celeste* (Celestial Mechanics) were published in the beginning of the 19<sup>th</sup> century, Napoleon noticed that Pierre Simon Laplace discussed the problem of the celestial bodies at great length without saying a word about the role of God in it. Laplace's answer was solid and concise: „Je n'ai pas eu besoin de cette hypothèse, Sire.” – „Your Majesty, I did not need that hypothesis.”

As we know, this was not only his private opinion, but the general conviction of many scientists and philosophers of his age. They thought that science and theology were forever „divorced”. That kind of attitude more and more dominated the relation of science and theology in the 19<sup>th</sup> century and resulted in a critical atmosphere also in the 20<sup>th</sup> century, especially in the countries which were under the influence of Marxist philosophy. We also know that there was always a residual core of great scientists who could not agree with this idea. They worked independently of this view and did not let themselves be disturbed by the separation of science and theology. It may be a very surprising thing that in the midst of that separation, acceptance of the Christian way of thinking played an important role in leaving mechanistic thought and taking a step forward in the development of science. It took place in the late fifties and early sixties of the 19<sup>th</sup> century with the work of James Clerk Maxwell, the brilliant thinker and genuine Christian.

He was born in Edinburgh on June 13, 1831 and grew up at Glenlair, South Scotland, where his father built a family home. He studied at the University of Edinburgh, and at Peterhouse and Trinity Colleges in Cambridge.

In November 1856 he began to work in Aberdeen as professor of natural philosophy at Marischal College. Between 1860-1865 he was professor of natural philosophy and astronomy at King's College in London. This period of his life is distinguished by the production of his most important papers on Colours, the Kinetic Theory of Gases, and Physical Lines of Force: A



Dynamical Theory of the Electromagnetic Field, which was written in 1864 and published in 1873. This latter essay contains his famous equations which predict the wave nature of electromagnetic phenomena resulting in the research efforts which culminated in his great masterpiece.

Between 1865-1871 Clerk Maxwell lived in his father's house in Scotland. From 1871 he was elected to be the first professor of the famous Cavendish Laboratory established by the University of Cambridge. Maxwell died in 1879.

Looking back to the history of science his name undoubtedly is among the greatest physicists of the world ever mentioned by the historians of science. His theory on the electromagnetic field is an important step forward between the time of Newton and Einstein. It is really true that Clerk Maxwell's life and work, and his significance in science, is deeply appreciated by great physicists, mathematicians, philosophers and historians of science in the context of their respective disciplines. But we should also evaluate him from the theological point of view, examining his Christian way of thinking in which he devoted his whole existence to Jesus Christ. This is an ardent wish of many theologians and scientists, following the emphasis of Thomas F. Torrance.

James Clerk Maxwell was not only a great scientist but also a brilliant thinker. He lived in the Victorian age and was probably influenced by the contemporary culture which had a very real vision of reality as a unitary whole. In the *first chapter* we can see how he was or was not influenced by the Victorians and how great a role his biblically based faith played in his way of thinking. In the case of Maxwell it is very important to judge whether it was the philosophical impact or theological effect which impressed him in a deeper way. The *next chapter* demonstrates how his Christian way of thinking provides a heuristic clue for his scientific and theological understanding. Regarding the unity of the world Maxwell referred to the role of Christ from whom we respond and through whom we participate in the loving character of the Triune God in whose creation we take delight as we discover its intricate, subtle intelligibility. This discovery is the vision of physical reality, which is grounded, mediated and motivated by theological insight with respect to the Triune God. Theology, in other words, functions as a lens through which reality is understood to be unitary and functions in this way to further scientific discovery, for James Clerk Maxwell at least. In the *third chapter* we point out how his theological

perceptions actually can be discerned as a regulating guide in his scientific creativity. After these, of course, the question has to be raised: if Maxwell's theological insights functioned as a heuristic clue for him, what really is the contemporary relevance of his particular view of the relation between theology and science as he lived it out personally in his own life? The answer can be found in the *fourth section* of this monograph. The *last part* of this writing is an *appendix* in which the reader can find all the recorded biblical passages that were referred to by such a genius. Forty passages have been found so far, but it may be possible to find more in the archives of Great Britain where his unpublished papers and manuscripts are collected and preserved. The appendix presents these passages, describing their context and, at the same time, evaluating theologically Maxwell's Bible interpretation. These findings convince one of the importance and reality of his biblical knowledge in his life and thought.

In consideration of this particular theme finally we have to say that the investigation of the life and work of James Clerk Maxwell from the theological viewpoint started with the examination of his biblical insight. It was necessary, of course, to begin with the disclosure of his biblical understanding; then could come the theological evaluation of his thought. It is the natural way to do theology. Now, in logical sequence, the reader can see the result of this endeavor. – I am grateful for the Center of Theological Inquiry at Princeton, NJ, USA, where I completed this research.

Botond Gaál  
Debrecen/Hungary  
September, 2002

## BIBLIOGRAPHY

**Barrow, John D.** *Theories of Everything. The Quest for Ultimate Explanation.* Oxford: Clarendon Press, 1991.

**Barth, Karl.** *Protestant Theology in the Nineteenth Century.* London: SCM Press, 1972.

**Broadie, Alexander.** *The Tradition of Scottish Philosophy: A New Perspective on the Enlightenment.* Edinburgh: Polygon, 1990.

**Campbell, Lewis and Garnett, William.** *The Life of James Clerk Maxwell: With a Selection from his Correspondence and Occasional Writings and a Sketch of his Contributions to Science.* London: Macmillan and Co., 1882.

**Carse, James.** *Jonathan Edwards and the Visibility of God.* New York: Charles Scribner's Sons, 1967.

**Cunliffe-Jones, Hubert.** ed. *A History of Christian Doctrine,* Edinburgh: T&T. Clark, 1978.

**Davidson, Stibbs and Kevan.** ed. *The New Bible Commentary.* Grand Rapids: Eerdmans, 1953.

**Davies, Paul.** *The Mind of God. The Scientific Basis for a Rational World.* New York: Simon & Schuster, 1992.

**Domb, C.,** ed. *Clerk Maxwell and Modern Science. Six Commemorative Lectures.* London: The Athlone Press, 1963.

**Einstein, Albert.** „Maxwell's Influence on the Development of the Conception of Physical Reality.” In *James Clerk Maxwell: A Commemoration Volume 1831-1931.* Essays. Cambridge: University Press, 1931.

\_\_\_\_\_. „Geometry and Experience”, *Ideas and Opinions.* New York: Crown Publishing, 1954.

**Fine, Arthur.** „Einstein's Realism.” In *Science and Reality, Essays in Honor of Ernan McMullin.* Notre Dame, Indiana: University of Notre Dame Press, 1984.

**Gaal, Botond.** *A Universe Fine-Tuned for Intelligent Life.* Perspectives, A Journal of Reformed Thought, Grand Rapids, Vol. 10., No. 10. December 1995.

\_\_\_\_\_. *Egy nagy természettudós hite. James Clerk Maxwell gondolatainak haszná a teológiában. (The Faith of a Great Scientist. The Benefit of James Clerk*

Maxwell's thoughts in Theology.) Written in Hungarian. *Theológiai Szemle*, 1992/12.

**Garnett**, William. „Maxwell's Laboratory.” In *James Clerk Maxwell: A Commemoration Volume 1831-1931*. Essays. Cambridge: University Press, 1931.

**Giere**, Ronald N. „Toward a Unified Theory of Science.” In *Science and Reality*. Essays in Honor of Ernan McMullin. Notre Dame, Indiana: University of Notre Dame Press, 1984.

**Harman**, P.M. ed. *The Scientific Letters and Papers of James Clerk Maxwell*. Cambridge: University Press, Vol. 1., 1991 and Vol. 2. 1995.

**Jeans**, Sir James. „James Clerk Maxwell's Method.” In *James Clerk Maxwell: A Commemoration Volume 1831-1931*. Essays. Cambridge: University Press, 1931.

**Kaiser**, Christopher B. *Quantum Complementarity and Christological Dialectic*. Religion & Science, History, Method and Science. ed. W. Mark Richardson and Wesley J. Wildman, New York: Routledge, 1996.

**Larmor**, Sir Joseph. „The Scientific Environment of Clerk Maxwell.” In *James Clerk Maxwell: A Commemoration Volume 1831-1931*. Essays. Cambridge: University Press, 1931.

**Lightfoot**, J.B. *St. Paul's Epistles to the Colossians and to Philemon*. London: Macmillan and Co., 1875.

**Loder**, James E. and **Neidhardt**, W. Jim. *The Knight's Move*. The Relational Logic of the Spirit in Theology and Science. Colorado Springs: Helmers & Howard, 1992.

**Lodge**, Sir Oliver. „Clerk Maxwell and Wireless Telegraphy.” In *James Clerk Maxwell: A Commemoration Volume 1831-1931*. Essays. Cambridge: University Press, 1931.

**Maxwell**, James Clerk. *A Dynamical Theory of the Electromagnetic Field*. ed. and int. Thomas F. Torrance. Edinburgh: Scottish Academic Press, 1982.

\_\_\_\_\_. *A Treatise on Electricity and Magnetism*. Oxford: Clarendon Press, 1881.

**McNeill**, John T., ed. *John Calvin: Institutes of the Christian Religion*. Philadelphia: Westminster, 1960.

**Miller**, Perry. *Jonathan Edwards*. Toronto: George J. McLoed, 1949.

**Neidhardt**, W. Jim. *Biblical Humanism: The Tacit Grounding of James Clerk Maxwell's Creativity*. Perspectives on Science and Christian Faith, Vol. 41., Number 3, September 1989.

- Niven, W.D.**, ed. *The Scientific Papers of James Clerk Maxwell*. New York: Dover Publications, 1890.
- Olson, Richard.** *Scottish Philosophy and British Physics 1750-1880: A Study in the Foundations of the Victorian Scientific Style*. Princeton: University Press, 1975.
- Pannenberg, Wolfhart.** *Toward a Theology of Nature*. Essays on Science and Faith. Ed. Ted Peters. Louisville, Kentucky: Westminster/John Knox Press, 1994.
- Peierls, R.E.** „Field Theory since Maxwell.” In *Clerk Maxwell and Modern Science*. Six Commemorative Lectures. Ed. C. Domb. London: The Athlone Press, 1963.
- Planck, Max.** „Maxwell’s Influence on Theoretical Physics in Germany.” In *James Clerk Maxwell: A Commemoration Volume 1831-1931*. Assays. Cambridge: University Press, 1931.
- Polkinghorne, John C.** *Belief in God in an Age of Science*. New Haven: Yale University Press, 1998.
- \_\_\_\_\_. *Reason and Reality*. The Relationship between Science and Theology. London: SPCK, 1991.
- Randall, Sir John.** „Aspects of the Life and Work of James Clerk Maxwell.” In *Clerk Maxwell and Modern Science*. Six Commemorative Lectures. Ed. C. Domb. London: The Athlone Press, 1963.
- Simonyi, Karoly.** *A fizika kulturtörténete (A History of Physics in the Context of Culture)*, Written in Hungarian. Budapest: Gondolat, 1986.
- Templeton, John Marks and Herrmann, Robert L.** *Is God the Only Reality?* New York: Continuum, 1994.
- Thomson, Sir J. J.**, „James Clerk Maxwell.” In *James Clerk Maxwell: A Commemoration Volume 1831-1931*. Essays. Cambridge: University Press, 1931.
- Tolstoy, Ivan.** *James Clerk Maxwell*. A Biography. Chicago: University Press, 1981.
- Torrance, Thomas F.** *Scottish Theology*. From John Knox to John McLeod Campbell. Edinburgh: T&T. Clark, 1996.
- \_\_\_\_\_. *Reality and Scientific Theology*. Edinburgh: Scottish Academic Press, 1985.
- \_\_\_\_\_. *Divine and Contingent Order*. Oxford: University Press, 1981.
- \_\_\_\_\_. *The Christian Doctrine of God, One being Three Persons*. Edinburgh: T&T. Clark, 1996.

*Dictionary of Scottish Church History & Theology*, gen. ed. David Wright.  
Edinburgh: T&T Clark, 1993.

*Encyclopaedia Britannica*, A New Survey of Universal Knowledge, Fourteenth  
Edition. London: The Encyclopaedia Britannica Company, 1940.