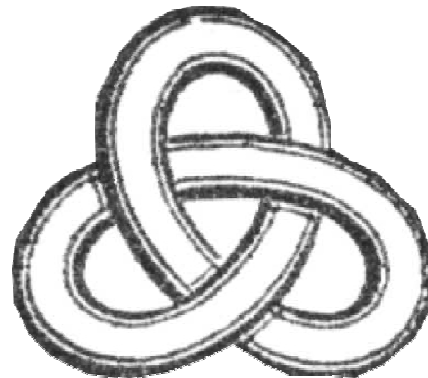


# The Unseen Universe; Or, Physical Speculations on a Future State

P. G. Tait & Balfour Stewart (1875)



## Uniting C19th physical science with the established doctrines of Christianity

- Possibility of immortality
- Existence of an unseen universe
- Relationship between science and religion
- Position of the man of science

*scientific basis*

## Principle of Continuity

# The anonymity game

- 1<sup>st</sup> edition - April 1875
- 3 editions published anonymously
- Authorship revealed April 1876

**The Athenaeum's revelation:**  
' Dr. Balfour Stewart, of Manchester, and Mr. P.G. Tait, Professor of Natural Philosophy at the University of Edinburgh ' [1]

## **Tait's Scrap-Book**

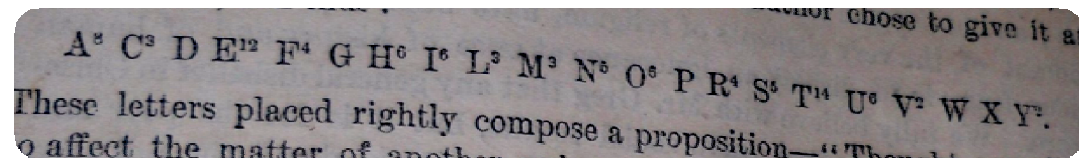
The James Clerk Maxwell Foundation, Edinburgh

<http://www.clerkmaxwellfoundation.org>

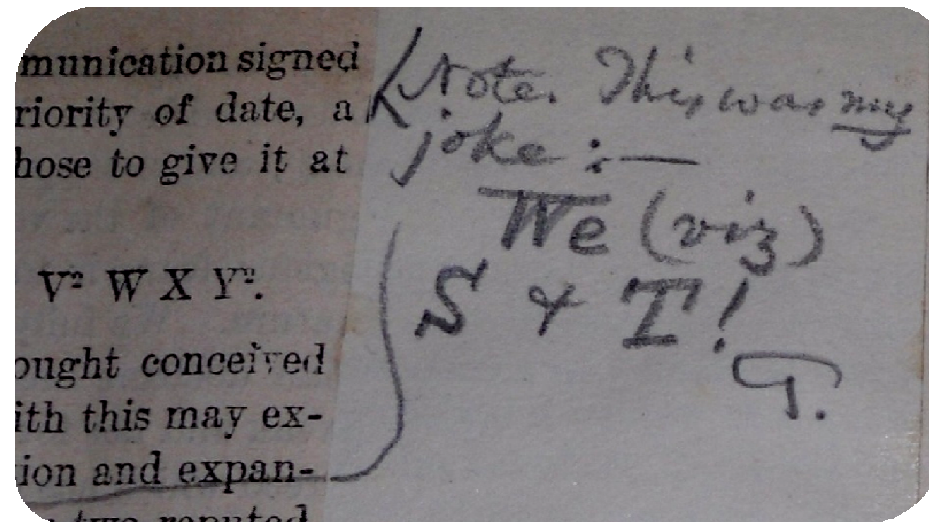
# The anonymity game – cryptic revelation

‘ Thought conceived to affect the matter of another universe simultaneously with this may explain future state ’ [2]

*Nature*  
October  
1874



A<sup>3</sup> C<sup>3</sup> D E<sup>12</sup> F<sup>4</sup> G H<sup>6</sup> I<sup>6</sup> L<sup>3</sup> M<sup>3</sup> N<sup>5</sup> O<sup>6</sup> P R<sup>4</sup> S<sup>5</sup> T<sup>14</sup> U<sup>6</sup> V<sup>2</sup> W X Y<sup>2</sup>.  
These letters placed rightly compose a proposition—“Thought  
to affect the matter of another universe simultaneously with this may explain future state”



Communication signed  
priority of date, a  
hose to give it at  
V<sup>2</sup> W X Y<sup>2</sup>.  
Thought conceived  
with this may ex-  
pansion and expan-  
ture reported

Note. This was my  
joke:—  
We (viz)  
S & T!  
G.

The Nation, May 27, 1875 [2]

# The authors

**Peter Guthrie Tait (1831 - 1901)**



**The Unseen Universe  
Paradoxical Philosophy  
3 papers: 'On the heating of a  
disk by rapid rotation in vacuo'**

**1847: Univ. of Ed.  
1848: Peterhouse, Cambridge  
1854: Prof. mathematics, Queen's, Belfast  
1860-1901: Chair Natural philosophy , Ed.  
1861: elected FRSE**

**Balfour Stewart (1828 - 1887)**



**1845: Univ. of Ed.  
---training in mercantile profession---  
1856: Univ. Of Ed., Forbes' assistant  
1859: Director of Kew Observatory  
1862: elected FRS  
1870-1887: Prof. physics, Owen's College,  
Manchester**

# The Christian man of science

## Nature and Scripture – the Two Books of Revelation

### Open to criticism

‘Some call us infidels, while others represent us as very much too orthodoxly credulous; some call us pantheists, some materialists, others spiritualists.’ [3(i)]

### Their challenge

Welcoming ‘with sincere pleasure any remarks or criticism on these speculations ... whether by the leaders of scientific thought, or by those of religious inquiry’ [3(ii)]

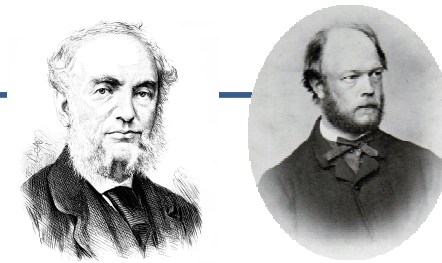
## Venturing outside the boundaries of distinct areas of knowledge

# The Christian man of science

## Service through science

**Created in His image:**  
encourages an honest inquiry  
into questions demanding both a  
theological and scientific approach

**Scientific inquiry:**  
an inlet to Revelation



**Intimate knowledge of  
Christian doctrine through  
Personal faith**

**Profound understanding of  
contemporary science**

Thinking this way, the purpose of science  
might be all at once: the glory of God, the search for truth  
and the ‘ennoblement of human beings’. [4]

# The Christian man of science

## Science and religion - the nature of the relationship

**‘Foundational’ and ‘interactive’ [5]**

**Not ‘independent’ [5]**

**‘The truth is, that science and religion neither are nor can be two fields of knowledge with no possible communication between them. Such a hypothesis is simply absurd.’ [3(ii)]**

***The Unseen Universe* – a model of how to engage in the science v religion debate**

**Contribution – identify the real antagonists**



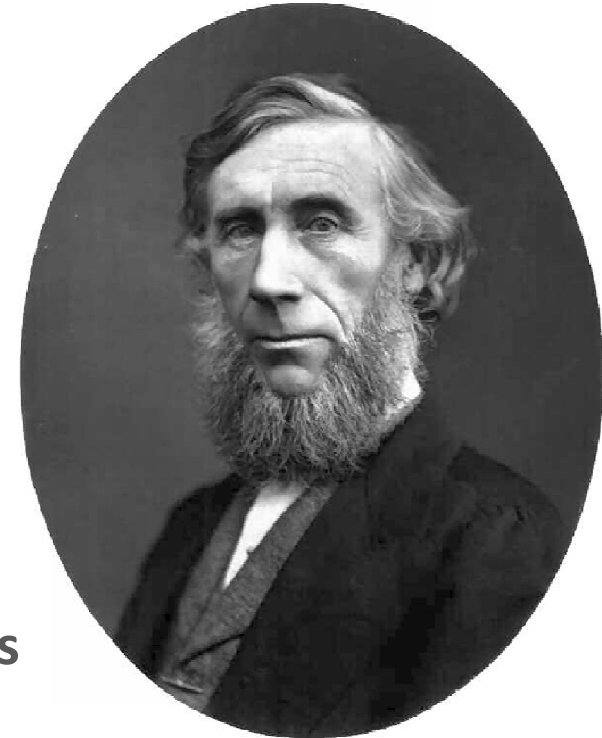
# Motivation – Tyndall's Belfast address

**Presidential address**

**British Association  
for the Advancement of Science  
August 1874**

- ‘superior authority of science over religious and non-rationalistic explanations’ [6];
- the freedom of scientific inquiry from religious authority;
- and an end to religious intrusion into the domain of science.

**--MATERIALISM--**



**John Tyndall  
(1820-1893)**

# Motivation – Tyndall's Belfast address

- A source of irritation
- Correspondences regarding themes

## Knott (Tait's biographer):

'In the winter of 1874, a few months after the delivery by Tyndall of his famous presidential address before the British Association at Belfast, it began to be whispered among the students of Edinburgh University that Tait was engaged on a book which was to overthrow materialism by a purely scientific argument. When, in the succeeding spring, *The Unseen Universe* appeared it was at once accepted as the fulfilment of this rumour.' [7]

*Unseen Universe* anticipated in Tait and Stewart's earlier work

# The Principle of Continuity

## Appeal to the critics – a dual definition

### Spirit of science – uniformity of law

‘The government of the universe has proceeded on a certain path, ruled by certain fixed laws, we may therefore infer that it will continue to be so’ [8]

### Spirit of religion – expression of trust

‘God has endowed us with certain capacities which enable us to dwell safely in the world and serve Him according to His laws. He will not distress or alarm His children by capriciously suspending or setting aside the laws which guide His universe.’ [8]

### Uniting the two

the uniformity of natural law as the ‘steady expression of the unchanging Will of the Creator’ [9]

# The Principle of Continuity

## An intellectual process

**‘the Principle of Continuity ... has solely reference to the intellectual faculties’ [10]**

**‘a foregoing condition of things capable of producing that which is’ [11]**

**‘continuous chain of cause and effect, of antecedent and consequent’ [9]**

# The Principle of Continuity

## A breach of continuity

**‘Continuity, in fine, does not preclude the occurrence of strange, abrupt, unforeseen events in the history of the universe, but only of such events as must finally and for ever put to confusion the intelligent beings who regard them.’ [3(iii)]**

# The authors' hypotheses

## The Great First Cause and the origin of life

- **The Great First Cause** 'absolutely self evident the existence of a Deity, who is the Creator of all things' [3(iv)]
- **Intelligent design**  
(i) sporadic/abrupt beginning (ii) atoms as manufactured articles
- **Life development**  
Evolutionary creationist, accommodating Christianity and Darwinism  
Darwin's primordial germ – living antecedent required  
3<sup>rd</sup> person of the Trinity – the Lord and Giver of Life  
(2<sup>nd</sup> person of the Trinity – developer of energy of the universe)
- **Duty of the man of science**  
'to put back the direct interference of the Great First Cause' [3(v)]

***Abiogenesis*: the hypothesis that living matter may be produced from non-living matter. The term was first used by Huxley in 1870.**

# The authors' hypotheses

## The end of the visible universe

Scripture and science both point to the same catastrophe—the end of the visible universe—‘the one in language a child can understand, the other in the wordless eloquence of Nature’s changeless laws’[8], therefore, the present visible universe is no home for the immortal soul.

- **Aggregation of masses, degradation and dissipation of energy**
- **Heat death**

**Finite size of observable masses - > Universe had its origins in time**

# The authors' hypotheses

## The existence of an unseen universe

If only the visible universe exists - it's beginning and end are breaks of continuity



### Conclusion

'visible is not the whole universe, but only, it may be, a very small part of it' [3(vi)]

## Interaction between universes

- Visible evolved in matter and energy from the unseen and will retire into it
- Independent but intimately connected
- Exchanges of energy with the ether as a bridge



# The authors' hypotheses

## Thomson's vortex atom theory The latest speculation on the theory of matter



**William Thomson**  
(1824 - 1907)

### Universe's primordial atoms

Vortices developed from a pre-existing fluid filling all space

**Perfect fluid** -> creative act in time  
(breach of continuity)

**Less than perfect fluid** -> non-permanence of the visible order of things

A unique form of vortex ring for each of the elements?

# The authors' hypotheses

## The Great Whole – an infinite number of universes

### Led by the Principle of Continuity

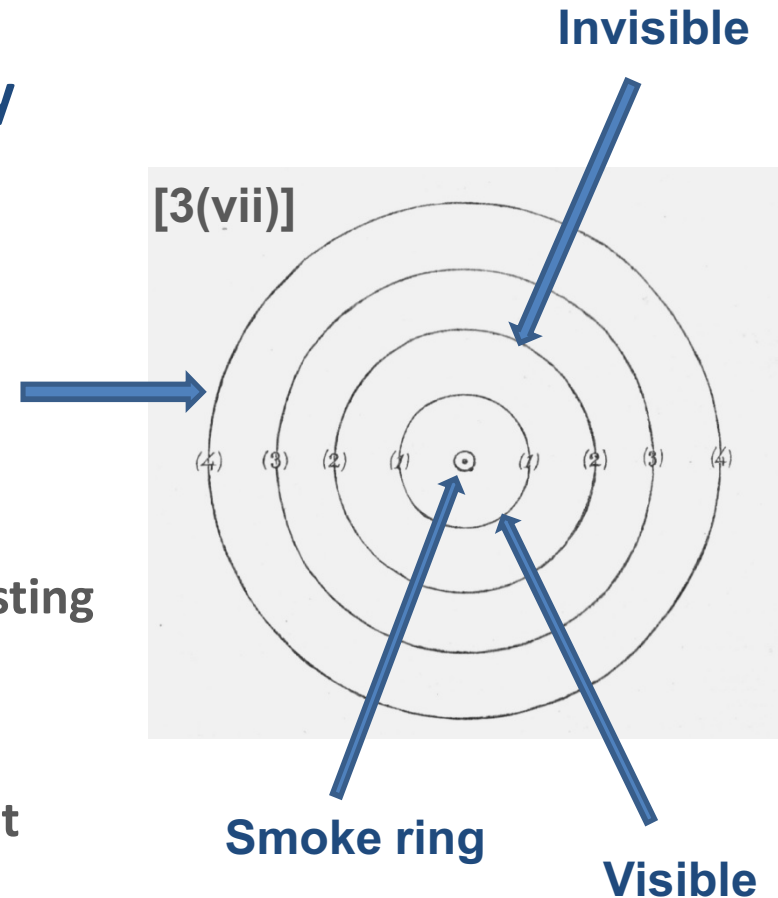
#### Mother Universe

One universe of infinite energy with an intelligent developing agent of infinite energy

Great whole – infinite in energy, everlasting

#### Appreciation of fine-tuning

(i) development of complexity from that which is simple (ii) delicate balance of unstable forces



# The authors' hypotheses

## Immortality and a spiritual body

### Sources in favour of immortality

(i) Statements about Christ (ii) man's intense longing for immortality

### Nature of a future state

View grounded in Scriptural revelation

### Immortality as a transference

'From the visible universe to some other order of things intimately connected with it' [3(viii)]

Conditions of  
intelligent existence

-----

Organ of memory

Varied movement

### Spiritual body

Frame for each individual receiving molecular displacements of the brain

# The authors' hypotheses - summary

## Reason to believe in...

- a Creator;
- the creation of the visible universe in time;
- the end of the visible universe in time;
- the existence of an unseen universe;
- an infinite series of invisible universes
- one invisible universe of infinite energy in which an intelligent agency (of infinite energy) resides;
- the Great Whole—infinite in energy and eternal;
- a spiritual body connecting us with the unseen;
- personal immortality;
- and roles for the 2nd and 3rd persons of the Trinity as developers of energy and life in the universe.

## Close scrutiny

### Appeal

Authors' 'real and intimate' knowledge of the latest scientific theories [9]

### Sequel

*Paradoxical Philosophy* (1878)

## Reasoning

- Discipline of philosophy
- Legitimate scientific inference
- Communication
- Religious licence

## Robust counter-attack

## Praise

An honest search for the truth

‘Deep intuitions of the spirit as well as ... the logical faculties of the brain’ [12]

‘Clear expositions of scientific truth’ [13]

Applications of sound scientific reasoning

Hope for truth in major propositions

# Truth in their propositions

## String theory and M-theory anticipated

A theory of everything

Thomson's vortex atom -> string theory

Conception of the multiverse -> M[embrane] theory

## A Trinity of mysteries

**'... the position of the scientific man is to clear a space before him from which all mystery shall be driven away, and in which there shall be nothing but matter and certain laws which he can comprehend. There are however three great mysteries (a trinity of mysteries) which elude, and will for ever elude his grasp ... they are the mystery of matter and energy; the mystery of life; and the mystery of God,— and these three are one.'** [3(ix)]



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- [1] *The Spiritualist Newspaper*, May 28, 1875 \*
- [2] *The Nation*, May 27, 1875 \*
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- [7] Knott, C G, *Life and Scientific Work of Peter Guthrie Tait*, Cambridge University Press, 1911, pg. 236

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- [8] *The Monthly Packet*, no date \*
- [9] *The Guardian*, June 23, 1875 \*
- [10] Preface to the 4<sup>th</sup> Edition, no date, pg. vi \*
- [11] *Science Sermons for Young People*, no date, pg. 110 \*
- [12] *The Truthseeker*, Jan, 1876 \*
- [13] *The Globe*, April 30, no year \*

\* Sourced from Tait's Scrap-book in Edinburgh (preserved by the Maxwell Foundation).