Science and the Scottish evangelical movement in early nineteenth century Scotland: a study in the interactions of science and theology in the work of the Rev. Dr. Thomas Chalmers D.D., LL.D., 1780-1847

John E. Webster
University of Wollongong
NOTE

This online version of the thesis may have different page formatting and pagination from the paper copy held in the University of Wollongong Library.

UNIVERSITY OF WOLLONGONG

COPYRIGHT WARNING

You may print or download ONE copy of this document for the purpose of your own research or study. The University does not authorise you to copy, communicate or otherwise make available electronically to any other person any copyright material contained on this site. You are reminded of the following:

Copyright owners are entitled to take legal action against persons who infringe their copyright. A reproduction of material that is protected by copyright may be a copyright infringement. A court may impose penalties and award damages in relation to offences and infringements relating to copyright material. Higher penalties may apply, and higher damages may be awarded, for offences and infringements involving the conversion of material into digital or electronic form.
SCIENCE AND THE SCOTTISH EVANGELICAL MOVEMENT IN EARLY NINETEENTH CENTURY SCOTLAND

A study in the interactions of science and theology in the work of the Rev. Dr. Thomas Chalmers D.D., LL.D., 1780-1847

A thesis submitted in partial fulfilment of the requirements for the award of the degree of

MASTER OF ARTS (HONS.)

from

University of Wollongong

by

John E. Webster, B.A. (Wollongong)

DEPARTMENT OF SCIENCE AND TECHNOLOGY STUDIES
1989
STATEMENT

I hereby certify that the work contained in this thesis has not been submitted for a degree to any other university or institution.

J.E. Webster
## TABLE OF CONTENTS

**INTRODUCTION** .......................................................... 1

**CHAPTER**
1. The Scientific Interests of Chalmers' early years ... 15
2. Ordination and Call to Kilmany ......................... 67
3. Ministry at Glasgow .............................................. 81
4. The Discourses in the Context of a Growing Scepticism 117
5. The Infidels Answered ....................................... 131
6. Thomas Chalmers - His legacy to Science and Theology 146

**CONCLUSION** .......................................................... 190

**APPENDIX**
1. ................................................................. 196
2. ................................................................. 199
3. ................................................................. 201

**BIBLIOGRAPHY** ..................................................... 211
PREFACE

The preparation of this thesis has been with great difficulty, due to the lack of primary resource material in this country. Nevertheless, I trust that it will be a useful contribution to the literature on Thomas Chalmers, as there is very little written on his love for the sciences. I wish to express my appreciation to those who assisted me:

The Bendigo College of Advanced Education, especially Mrs. Jill Stokes who arranged inter-library loans.

The staff of the Bailleu Library, University of Melbourne.

The assistance of Dr. Lawrence McIntosh of Ormond Theological Hall Library, was most gracious.

The practical guidance and helpfulness of Dr. John Panter, my supervisor within the University of Wollongong, and Dr. Stewart Gill, lecturer in history at the Presbyterian Theological College, Box Hill, Victoria, whose knowledge of Scottish history was of immense value.

All the typing associated with a thesis such as this was provided by Mrs. Carolyn Senter. Without her diligence I don't know what would have become of this work. Finally, many thanks to Mr. Robert Cox, of the Bendigo College of Advanced Education, who finalised the format and actual production of the thesis on a word-processor.

J.E. Webster
Bendigo, Victoria
February, 1989.
ABSTRACT

The Church of Scotland experienced the great "Disruption" in 1843, which led to the formation of the Free Church of Scotland and its theological College, known as the "New College". Thomas Chalmers was not only the principal leader of the Disruption, but also the first Principal of the New College. It was through his influence that a chair in Natural Science was created, with the appointment of the famous Scottish geologist, John Fleming. Only a person who was committed to the teaching of the sciences could insist that such a chair be created in a theological institution.

This thesis seeks to collocate Chalmers' scientific interests and to show that he was the first of the great evangelical preachers of nineteenth century Scotland to introduce scientific issues into the Scottish pulpit.

Although he attended St. Andrew's University and graduated in arts and theology with a view of entering the ministry of the Church of Scotland, his real interest was not in theology, but in mathematics. He pursued his study in mathematics and natural philosophy at a post graduate level at Edinburgh under the famous Professors John Playfair and John Robison. It was during his stay at Edinburgh that he was introduced to Chemistry by Charles Hope.

Whilst a minister of the Church at Kilmany, he continued his interest in the sciences by lecturing five days a week at St. Andrews in Mathematics and Chemistry.

In 1809 he was converted to Evangelical Christianity, but he continued his interest in the sciences, but only at a secondary level of importance.

The preaching and the publication of the "Astronomical Discourses" in 1816 had an enormous appeal as he argued ruthlessly against the "unscientific premises of the sceptics", who forced an unnecessary wedge between science and religion. It was Chalmers' assertion that science and Christianity were in perfect harmony.

He took an active interest in the British Association for the Advancement of Science throughout his life and developed the natural philosophy of John Robison and formulated what has become known as the "Gap theory".

His approach to systematic theology was a major departure from accepted orthodoxy, due principally to his acceptance of a Baconian philosophy.
SCIENCE AND THE SCOTTISH EVANGELICAL MOVEMENT IN EARLY NINETEENTH CENTURY SCOTLAND

A study in the interactions of science and theology in the work of Rev. Dr. Thomas Chalmers, D.D., LL.D. 1780-1847

INTRODUCTION

The Oxford Dictionary of the Christian Church describes Thomas Chalmers as follows:

"theologian, preacher, and philanthropist. In 1823 he became Professor of Moral Philosophy at St. Andrews and in 1828 of Theology at Edinburgh. He was known in his early days as an able evangelical preacher, a formidable intellectual defender of Christianity, a brilliant mathematician and a pioneer of popular education and modern methods of poor relief..." (1)

No serious student would question the enormous influence that Thomas Chalmers had in Scotland, especially in the establishment of the Free Church in 1843. His reputation as a scholar was well recognized in Scotland and England and both the Universities of Glasgow and Oxford admitted him to the degrees of D.D. and LL.D. honoris causa respectively.

Since the publication of his memoirs in 1851, by his son-in-law, the Rev'd Dr. William Hanna, there have been a number of articles which have appeared on various aspects of his work, such as political economy, social justice, the influence of Scottish Common Sense Philosophy and his "Natural Theology". Hanna's Memoirs have until recently been the one standard reference work. (2.) One hundred and thirty years passed before another authoritative work was published. Dr. S.J. Brown's major work on Thomas Chalmers (3.) is a welcomed and well-researched work which will
service the scholarly community for many years ahead. This new major work is illuminating as the author has had the privilege of being one of few scholars who has had at his disposal the complete and catalogued letters and articles (700 personal and 14,000 from correspondents) of Chalmers; something which William Hanna did not possess. It could be also said that Stewart Brown's work has the advantage of being somewhat more objective and critical, as William Hanna was Chalmers' son-in-law and was understandably prejudiced on many important issues which confronted Chalmers within the Church of Scotland.

Chalmers produced the first of the Bridgewater Treatises, entitled *The Adaptation of External Nature to the Moral and Intellectual Constitution of Man*. He also published two volumes entitled *Natural Theology*. With these publications it is understandable why he was dubbed a 'natural theologian' D. Cairns states that until recent times, Thomas Chalmers was regarded as one of Scotland's great intellects who was a part of a "great, indeed a predominant, tradition in the Christian Church which accepted natural theology". (4.) He raises serious doubts, however, about whether Chalmers was a 'natural theologian' in the classical sense of the term.

Whatever scholars may think about this issue, Thomas Chalmers will undoubtedly be remembered chiefly as a theologian and leader of the Free Church movement in
Scotland. By 1830, Chalmers' name had become well known as a leading theologian. It has been claimed, by A.C. Cheyne, and not without good reason, that Thomas Chalmers was in all probability Scotland's greatest religious leader between the Reformation and our own time.

For the purpose of this thesis, Chalmers' life falls into two fundamental periods, each period dominated by what Hanna calls "devoteeism", by which he means Chalmers was completely devoted to and possessed painstaking diligence and perseverance with the subject matter that interested him.

His early formative years (1780-1809) was the first period in which his intellectual powers matured and began to assert themselves. It is during this period that Chalmers became obsessed with mathematics and the sciences. It was his ambition to be elected to the Chair of Mathematics at Edinburgh University. During these years, he was ordained a minister of the Church of Scotland; but although minister in the Parish of Kilmany, he was all but an absentee cleric who spent five days of the week lecturing in Mathematics and Chemistry in the University of St. Andrews.

The second period dates from 1809 until his death in 1847. This is the period when Chalmers became known for his preaching and teaching quality and his "devoteeism" to theology. It was during this period in which Chalmers' name
was indelibly engraved upon the soul of Scotland.

The writings of Chalmers, remarks J. Dodds, had a universal reputation which portrayed him as a man of genius and eloquence. He was:

"the stuff of which the Pyms and the Colberths were made, the Franklins and Cavours, the Knoxes, the Wesleys, the St. Vincent de Paul's -- the men who have the gift to meet emergencies with the proper remedies; who bridle revolution by the restraining influences of a new order; to make of benevolence a work, not a sentiment; to consolidate and perpetuate the forces of enthusiasm in the moulds of powerful organisation." (6.)

More recently A.C. Cheyne notes in the introduction of his book *The Practical and the Pious* (7) that John Cairns of Berwick claimed that Chalmers' stature and influence is to be compared to Plato, Descartes, Pascal, Leibnitz and Kant, as combining an "intellect essentially and characteristically scientific".

Cheyne also notes the comment of Thomas Carlyle: - "It is not often that the world has seen men like Thomas Chalmers, nor can the world afford to forget him." (8.)

This transition from the first period to the second was due to conversion from "moderatism" to "evangelicalism" wherein his secular interests in the sciences became of secondary importance to what was to become his life's chief work, that of ministering the gospel of Jesus Christ within the Church in Scotland.
This conversion took place in 1809. J. Cumming claims that it was the great doctrine of justification by faith which Martin Luther had "dug from the rubbish and debris of medieval superstition" (9.) that made all the difference to his life and source of vocation. Hanna, quoting Chalmer's reaction to the discovery of Luther's monumental thesis, says:–

"I feel it myself as the greatest enlightenment and enlargement I ever had experienced, when made to understand both the indispensable need of morality and the securities that we have for its being realized in the character of Christians, notwithstanding the doctrine that by faith and faith alone we are justified - a doctrine which I at one time regarded as Antinomian in its tendencies, and as adverse to the interests of virtue and practical righteousness in the world." (10).

Soon after his 'conversion', he became minister of the Tron Kirk in Glasgow. In 1815, he preached his Astronomical Sermons or Discourses. It was these sermons which threw Chalmers into the public arena. The sermons were delivered on Thursday afternoons and led to shops and business houses being closed in order to give employer and employees alike a chance to listen to them, which suggests something of the power and influence Chalmers possessed in the pulpit.

J. Cumming notes that it was through these sermons that foundations were laid for a fame wider than that of any other Scottish clergyman. These sermons were "demonstrations that, as far as astronomy is concerned,
Christianity has every reason to hail an ally and not one to dread as an enemy." (11.)

Although there have been many articles written on various aspects of Chalmers' work, there has been very little written on his scientific background and the philosophy of science which he tenaciously clung to, not only during the first period of his life, but also, as it will be shown, throughout the second period of his life and work.

Hence, the aim of this thesis is to show that Chalmers was the first of the great evangelical preachers of the early nineteenth century to use science in the Scottish pulpit. His knowledge and interest in the sciences began almost immediately upon entering St. Andrew's University. His interest in the sciences constituted an important role in his development as a formidable intellectual defender of evangelical Christianity.

It is volume seven (12.) of his published works which contains the Astronomical Discourses and other scientific related topics and it is in this volume that we observe an interaction between science and Christianity. The materialists of his day, represented by Godwin, Voltaire, Mirabaud and others were challenging the validity of the Christian Gospel and its compatibility with the new discoveries in the sciences. Chalmers whilst at St. Andrews studied Mirabaud's work on the System of Nature, or the
Laws of the Moral and Physical Worlds. Mirabaud argued for an eternal universe of mere matter and motion in which all the good processes of nature were but the necessary evolutions of the powers and properties in which all parts of nature had been so endowed from eternity. What appeared as beneficent design and contrivance were only harmonies which naturally occurred, upon matter's original properties developing themselves according to motion's immutable laws. (13)

These "infidel" philosophies were shown by Chalmers to be anti-Christian as well as unscientific. Chalmers' involvement in the sciences, including a philosophy of science, particularly that of Francis Bacon and Isaac Newton, enabled him to speak out on atheistic philosophies which were promulgated in the name of science and modern enlightenment.

It should be noted that the term "infidel", used constantly by Chalmers, is to be defined as a person who sees no place for the God of the Bible in the universe or a person who holds to the Deistical school of thought.

The structure of this thesis is as follows:

Chapter 1 seeks to show that whilst belonging to the "moderate" section of the Church of Scotland, his interest in the sciences was cultivated,
especially under the influence of James Brown at St. Andrews and Professor John Robison and John Playfair of Edinburgh University. The extensive detail of this chapter serves to show the extent to which the sciences captivated his time and energy. Although he was a candidate for the ministry of the Church of Scotland, his divinity studies were of secondary importance. This was in keeping with the "moderate" school of thought which was in the ascendancy in Scotland during the second half of the eighteenth century to about 1843. The moderates were moderate in their conception of doctrine and discipline than were their evangelical counterparts. They sought to be friends of learning, culture and order, and emphasized morality rather than dogma. (14). It is this first chapter of this thesis which provides the basis of Chalmers' scientific enterprise.

Chapter 2 shows how his moderate theological position was challenged by a series of personal events in his life. His conversion to the Evangelical party of the Church of Scotland meant a reordering of his priorities. The events at Kilmany set the stage upon which he was to emerge as the foremost evangelical preacher of his day.
Chapter 3 Up to the point of his conversion to evangelicalism, the fields of science had been well ploughed and cultivated. It is therefore not surprising that his expertise in the sciences should emerge in the pulpit. The Astronomical Discourses brought his knowledge of Astronomy and Mathematics into a harmonious relationship with the Biblical doctrine of Creation. From the preaching of these discourses Chalmers became known as an evangelical preacher of considerable public status and as one who harmonized science and religion.

Chapters 4 & 5 argue that Chalmers interest and expertise in the sciences meant that he became a formidable evangelical apologist. The scepticism of that age was met with ruthless scrutiny and the arguments of the infidels were analyzed and then dismantled to show that the arguments had no scientific credence.

Chapter 6 argues that Chalmers scientific interests permeated his whole outlook towards his work in the Church. This chapter looks at three basic areas in which the scientific disciplines had an impact.
i) his theology is greatly influenced by his acceptance of Baconianism.

ii) as an apologist, seeking the harmony of the Biblical doctrine of Creation with the created order, he became the father of the modern "Gap Theory", to explain the apparent difference between the days of creation in Genesis chapter one and the vast periods of time which geologists claimed to be necessary to explain the present condition of the earth.

iii) Chalmers saw the necessity to create a Chair of Natural Science in the New College which he set up in Edinburgh after the disruption in 1843. This chair was filled by some of the greatest names in Science, such as John Fleming and J.Y. Simpson. The chair fell vacant in 1934 and in the General Assembly's wisdom it carried the recommendation that no appointment to the chair be made.

The content of this thesis has been drawn from the various Works of Chalmers and two secondary sources, viz. the work of W. Hanna and S.J. Brown. The works of Hanna and Brown are essentially biographies. Hanna's work was published in a number of editions and was the standard biography until
Stuart Brown published his updated biography in 1982. Hanna's work, in the 1852 edition, has the advantage of containing a number of important appendices and entries from Chalmer's diary. This thesis goes beyond that of a biography; it seeks to piece together as a whole unit the development of his scientific interests and its impact upon his work in the Church. To my knowledge, no one has attempted to do this. Indeed the collected papers and other documents have been catalogued only recently. According to Margot Butt, Manuscripts Assistant at New College Library, Edinburgh, Stuart Brown's biography contains the most extensive of the material currently available. (15). Consequently, I have had to rely heavily on these two volumes for basic biographical detail, such as sequence of events and dates.

In 1969 Robert M. Young published a monograph in which he argues that Chalmers, together with Malthus, Paley, Darwin, Lyell, Spencer and Wallace were part of a single debate. Young sees that Malthus was an important figure in the history of political, economic and welfare theory and was at the same time an important influence in the evolutionary debate.

Hence Young seeks to "marry the history of socio-economic theory and the history of biology" (16). Young was quite correct in assuming that Chalmers was a disciple of Malthus. Chalmer's argument in his Bridgewater Treatise is
of interest, says Young, because Chalmers puts forward the view that nature was adapted to man, not the other way round, as Chalmers was "besotted with the Malthusian Law." (17).

Young's argument has been an important contribution in the area of sociology and political economy especially as it relates to the English poor laws and the development of the evolutionary debate. I have deliberately omitted reference to this material as I believe that it was outside the scope of this thesis and he does not cover the same ground as I do.
ACKNOWLEDGEMENTS - INTRODUCTION


(8) Cheyne, *ibid*.


(11) T. Chalmers, *op cit.*., p. XXII.


(13) This reference is found in W. Hanna, *Memoirs*, vol. 1, (Thomas Constable, Edin., 1854), p. 29f.

The footnote to p.29 observes *The Systeme de la Nature*, published under the assumed name of "M. Mirabaud, Secretaire Perpetual et des quarante de l'Academie Francaise", is sufficiently ascertained to have been the production of Baron d'Holbach.


13
(17) *Op. cit.*, p. 120.
CHAPTER 1

THE SCIENTIFIC INTERESTS OF CHALMERS' EARLY YEARS

Thomas Chalmers was instrumental in introducing science into the Scottish pulpit. At the time he preached his famous Astronomical series of sermons in the Tron Church, Glasgow, he had become an evangelical i.e. a person who was committed to a particular view of Christianity. Evangelical Christianity was defined by Josiah Pratt in the notes of discussions of the Eclectic Society, London, in 1808 as a ministry of "essential truth" -

"the Scripture character of Jehovah; the guilt, pollution, and impotence of man; his acceptance only through the merits of Christ; renewal and sanctification by the Holy Spirit; the obligation of universal holiness.

Some chief points of essential truth are defined in the Christian Observer, vol. i. p. 10.

Salvation originates wholly in grace, applied through the instrumentality of that faith which is the gift of the Holy Ghost, and which brings the believer into a state of acceptance with God, by making him partaker of the merits of Christ, and prepares him for heaven by maturing him in love and obedience." (A)

Chalmers was not always an evangelical. He was a convinced moderate (see Introduction) right up until 1809. It is important to understand something of his intellectual development as it relates directly to the sciences rather than
divinity. The early years of his life from 1791 to 1802 i.e. from the time he became a student at St. Andrews to the time of his ordination and induction as the minister of Kilmany, was characterized not only by moderatism but also his "devoteeism" to the sciences.

This chapter seeks to outline the development of his thought under five sub-headings viz.

1. Student days at St. Andrews University
2. Time at Edinburgh
3. Influence of Playfair and Robison
   - No evidence that Chalmers shared Playfair's algebraic mathematics
   - His adoption of Robison's distinction between Natural History and Natural Philosophy
4. His "proofs" of Divinity
5. Admirations of Bacon and Newton

1) Student Days at St. Andrews University

In 1791, Thomas Chalmers matriculated (at the age of eleven) to St. Andrews University. The courses of study at the United College which Chalmers entered were in the humanities but his biographer, Hanna, notes that the first two years were spent in 'boyish' pursuits, such as football, golf, etc., while much of the academic time was
spent in correcting and enhancing his poor preparation in Latin and the art of writing. (1)

It was during the second year of his arts studies that Thomas Chalmers and a friend, James Miller, began a serious study in mathematics under the supervision of Dr. James Brown, who was the assistant to Professor Vilant. Hanna records that the two young students were invited almost every night into Dr. Brown's room for the purpose of correcting class notes and tuition. (2.)

Stewart Brown's work on Thomas Chalmers states that James Brown not only recognised Chalmers' gifted mind, but endeavoured to inspire him further with a love of mathematics and scientific enquiry. (3.) This was Thomas Chalmers' intellectual birth, says Hanna. "The strong force of will and ardour of impulse which had shown themselves from infancy, now took a new direction urging him on and upholding him in his mathematical studies." (4.)

The intellectual development of Thomas Chalmers took place within two universities, namely St. Andrews and Edinburgh. Both universities had taught the philosophies of Newtonianism some years before Chalmers had become a student and both institutions had become famous centres for mathematical studies and the teaching of natural philosophy.
Christine Sheperd interprets the comments on the lecture notes of Charles Erskine, developed in 1703, under the title "Annotations of John Leclere's Physics", as convincing evidence that Newtonianism was well established in the teaching of natural philosophy in Edinburgh. There were direct links between Edinburgh and St. Andrew's Universities, as members of the Gregory family who held to Newtonian ideas, were professors of mathematics at Edinburgh as well as at St. Andrew's. It has been generally thought that the Gregory family were the first to support Newtonian ideas in Scotland. Christine Sheperd notes that this belief is based on Gregory's most prodigious commendation on Newton's discoveries in the *Principia* quoted in Whiston's Memoirs (4A Footnote). But, as Sheperd notes, the Gregory mentioned in Whiston's statement is usually considered to be David Gregory, who became Professor of Mathematics at Edinburgh in 1683. In fact, says Sheperd, it is more likely to have been James Gregory, David's brother, who came to Edinburgh as Professor of Mathematics in 1692, having previously taught at St. Andrew's. The Uncle of James and David, another James Gregory, had preceded both of them in the mathematics chair at Edinburgh and like his nephew James, he too first taught at St. Andrew's. (5)
It is not surprising that the brilliant mind of Chalmers would sooner or later see a link between the conclusions of Bacon's work and its importance to the thought of Isaac Newton.

Chalmers' interest in the sciences was enhanced by James Brown of St. Andrews and three others from Edinburgh, namely Charles Hope, John Playfair and John Robison. The two most important names among these four, particularly in mathematics and natural philosophy, were James Brown and John Robison, both of whom became Chalmers' intellectual mentors.

It was James Brown who instilled a love and an enthusiasm for mathematics in the young Chalmers. The relationship between teacher and student soon developed into a deep personal friendship. The influence of John Playfair cannot be underestimated as it was he who provided Chalmers with the postgraduate level of mathematics and an awareness of the life and work of James Hutton, the famous geologist.

James Brown was a most able mathematician who nurtured the young brilliant mind of Chalmers. Dugald Stewart, the famous Scottish "Commonsense Philosopher", said of Brown that "he never met with anyone who expressed himself with greater elegance and at the same time greater precision on
mathematical and metaphysical subjects". (6). James Brown was to become not only a close personal friend, but one of the most important instructors of his life.

It was under the influence of James Brown that he read with great interest William Godwin's *Political Injustice*. Godwin's work was the English version of the atheistic philosophy of Baron d'Holbach. To assist Chalmers to understand the French philosophes, Brown encouraged him to learn French, which he did. But this also had other advantages such as the study of higher branches of mathematics in the French language.

Chalmers' own estimate of James Brown's influence is summed up in one sentence thus --

"of all the professors and instructors with whom I have ever had to do, he is the one, who most powerfully impressed me to the ascendency of whose mind over me, I owe more in the formation of my tastes and habits and in the guidance and government of my literary life, than to that of all other academic men whose class I ever attended". (7)

It would seem that Chalmers possessed a natural bent of mind towards mathematics, so it is perfectly understandable that mathematics became the science which drew Chalmers' intellect to maturity. Under James Brown he developed an insatiable interest in mathematics which could not be satisfied. It was pure geometry which excited him most and
he was to conclude, in later years, that "geometry furnished one of the very best instruments of intellectual training". (8)

The impact of mathematics on the young mind of Thomas Chalmers was such that while studying Divinity at St. Andrew's not even the "powerful spell of one of the ablest theological lecturers, Professor George Hill, could win him away from his mathematical devoteeism". (9) In Hanna's opinion, the brilliant lecturing of George Hill fell on deaf ears as "the mere intellectual power without heart seemed to have no power to suspend his favourite study". (10)

Despite his lack of interest in theological subjects, he completed the Divinity course and graduated in 1799. He immediately went south to Edinburgh to pursue his study of Mathematics under Professor John Playfair.

Prior to his departure to Edinburgh, he was licensed by the Presbytery of St. Andrew's as a preacher of the Gospel. There was no conflict nor was there any reservation about being licensed as a preacher in the Church's ministry. At that time a ministry of the Church of Scotland was a profession in which mathematics and scientific interests could be pursued.
Arriving in Edinburgh with the view to becoming a tutor to young Lord Rosehill, whose family possessed influence to 'promote his future views', Chalmers arrived too late for the tutoring position, but was determined to stay the Winter. It was his purpose to pursue his mathematical studies under Playfair and, by tutoring pupils, he hoped to ease the financial burden on his father. In January of 1800, he wrote to his father and once again his devotion to mathematics is greater than to the work of the Church's ministry --

"I have never preached since I came to Edinburgh except once at Penicuick. As to my class, I find my time so profitably employed that I would be sorry at any interruption for the Winter..." (11)

Hanna notes that the phrase 'interruption for the Winter' means "a call to ministerial employment". (12)

In a letter addressed to Dr. James Wood, M.D., dated 1801, (see acknowledgement in note 16) Chalmers reveals his real intention in life. He thanks Dr. Wood for his interest and enquiry about a ministerial settlement, and then gives his reasons for not accepting such a settlement:
"I would not without the greatest reluctance interrupt the course of my present studies, which for the Winter have been chiefly directed to that most interesting of subjects - Chemistry". Secondly, "I have some engagements in the way of teaching, which, though they may be got over, yet cannot well be relinquished without a degree of indelicacy." and "Thirdly and chiefly, I cherish some point yet I hope well-founded prospects of preferment in this country in a line I prefer above all others - the teaching of mathematics" and lastly, "Independently of such preferment, I think the interval betwixt leaving the college and entering into the office of a clergyman cannot be more profitably employed than in extending my acquaintance with science."

Chalmers stayed two winters in Edinburgh in order to satisfy his quest for knowledge in the sciences.

Chalmers had an insatiable desire to stay in Edinburgh as long as possible. Not only was there the quest for scientific knowledge, for Chalmers, but, as J.B. Morrell records, Edinburgh University was pre-eminent in its teaching, research and publication in scientific fields during the years 1789 - 1815 when France was convulsed by the Revolution and its aftermath. It was in science the outstanding University in Europe and the English-speaking world. Its two outstanding professors were John Robison, Professor of Natural Philosophy, 1774-1805, and John Playfair, Professor of Mathematics, 1785-1805 and Professor of Natural Philosophy 1805-1819. (13)
Chalmers had only been in Edinburgh a matter of weeks when the famous Edinburgh chemist, Professor Black, died very suddenly. Chalmers became interested in the study of Chemistry. He began chemistry studies with enthusiasm under Black's successor, Dr. Thomas Charles Hope.

Thomas Charles Hope was the Professor of Chemistry from 1799. J.R. Partington asserts that his lectures taught Lavoisier's theories and his lectures and experiments were excellent. (14) The Chemistry course became popular and was well patronised in 1823 (as in that year he lectured to 575 students).

Chalmers wrote in a letter dated 1801 to James Wood, M.D. in which he said that he was a little disgusted at first by the 'foppery of manner and language' of Dr. Hope, but asserts that he was 'upon the whole a good professor'. He further notes that Dr. Hope's class "went very well as long as he confines himself to the particular doctrines of Chemistry, but is miserably poor, I think, in his general discussions upon the nature and objects of the science." (15)

Thomas Chalmers' interest in Chemistry was such that he was prepared to use his initiative and suggest that Professor Hope may have been wrong in the reasons for heat radiation
in a class experiment. Presenting a paper to the Professor on the theory of heat radiation, Thomas Chalmers was not very pleased when it was not received with delight. (Chalmers' argument is located in the acknowledgements section at the end of this chapter. 15A.)

The presentation of the experiment to Dr. Hope must have angered him, as Chalmers is found lamenting to his friend at St. Andrews, Dr. James Brown, in a letter, complaining about the attitude of Dr. Hope. He complains that Dr. Hope's objections to the presentation of the experiment and its conclusions were "trifling and absurd, and I am ashamed to think they came from the mouth of a Professor". (16) However, Chalmers does admit that he could have been somewhat to blame for the difficulty in which teacher and student found themselves, but he says, "upon the whole, I cannot blame myself with having expressed myself throughout in a forward or disrespectful manner".

In a further letter to James Brown, Chalmers was pleased to relate that Hope had since looked over his paper and "found it correct". However Chalmers was still at a loss, to understand what was meant by this admission:--

"I am not sure what to understand by this- if he admits the justness of its hypothetical reasonings, or if he has performed the experiment and obtained any new or original result." (17)
Although there was this altercation with the Chemistry Professor, there was no dampening of his spirit for the sciences.

Charles Hope argued that the spirit of modern philosophy is a spirit of patient and an industrious enquiry. It rejects, he says, the speculations of "an ardent and unbridled fancy; it denounces every system that is not founded on the basis of experience... it is an enemy to all rash and perceptible conclusions... it acknowledges no master; she will yield to nothing but the stubborn and incontrovertible evidence of facts. With her the result of a single experiment is sufficient to overthrow a whole system, though supported by the testimony of ages and enthroned in all the pride of antiquity." (18)

He further argues that modern experimental philosophy has justified itself by the revelations of other secrets which have been awaiting discovery. Such modern discussions would never have come to light had the philosophy of Aristotle continued to hold sway over the mind of man. In a scathing denigration of scholastic philosophy, he says, "Could such modern scientific discoveries, eg, chemistry, have issued from the schools of Aristotle? No; the logicians of old might have wrangled for ages and they might have heaped syllogism upon syllogism - they might have constructed system after system, and attempted to demonstrate the constitution of the universe by their categories of logic: they could never have restored science from that sink of degradation to which the ignorance and barbarity of
the schools had condensed it." (19)

Charles Hope also expressed the view that chemistry had important industrial and political consequences. "Chemistry teems with the happiest applications to art and manufacture and it will therefore contribute in a most essential degree to the progressive amelioration of society..." Therefore, a chemistry class is not for mere amusement, rather it is a "class in which ought to be delivered the connected and systematic view of science -- a science distinguished by the importance of its doctrines and the copious fertility of its applications to the various departments of business and industry." (20)

With the French Revolution very fresh in every Briton's mind, Chemistry as with any other science, must have strong relations to national pride and social application. Hope notes that the success of Bonaparte was due largely to military science which overthrew all the politics of Europe. But to oppose Bonaparte with his own weapons, is not enough... "We must oppose to him the armour of the mind - the skill and science of the country. The strength of Britain does not lie in her money or in her commodities. It lies in the heart and understanding of her people - in their affectionate patriotism." (21)
Whilst the study of Chemistry was prosecuted with enthusiasm, it must not be forgotten that Chalmers came to Edinburgh for the specific purpose of studying Mathematics under Playfair.

3) **INFLUENCE OF JOHN PLAYFAIR AND JOHN ROBISON**

Chalmers' pursuit of mathematics in Edinburgh was prosecuted under the famous mathematician and natural philosopher, John Playfair. Richard Olsen shows that Playfair's mathematics reveal an attitude towards the foundations of mathematics which is identical with that of Reid and Stewart, the exponents of Scottish 'Common Sense Philosophy'. (22)

It has been argued by D.F. Rice that Chalmers' work was influenced by Common Sense Philosophy. It would not be unreasonable to suggest that Chalmers was first exposed to this philosophy whilst studying under Playfair. (See acknowledgement 80)

Olsen argues that Playfair's paper *On the Arithmetic of Impossible Quantities*, is an attempt "to justify the usefulness of operations with imaginary or 'impossible' quantities in spite of their philosophical
unintelligibility". (23) Playfair is quoted by Olsen to support the claim:

"In geometry every magnitude is represented by a line and angles by an angle. The genus is always signified by the individual, and a general idea by one of the particulars which fall under it. By this means, all contradiction is avoided, and the geometer is never permitted to reason about the relation of things which do not exist, or cannot be exhibited. In algebra again every magnitude being denoted by an artificial symbol, to which it has no resemblance, is liable, on some occasions, to be neglected while the symbol may become the sole object of attention. It is not perhaps observed where the convection between them ceases to exist, and the analyst continues to reason about the characters after nothing is left which they can possible (sic) express: if, then, in the end, the conclusions which hold only of the characters be transferred to the quantities themselves, obscurity and paradox must necessarily ensue." (24)

Olsen notes that Playfair went on to show that this potential for abuse in Algebra is actualized in many instances, although the predictions about real physical phenomena which arise out of utilizing what are literally impossible quantities do invariably hold true. Playfair refused to accept that the notion that imaginary terms compensate or destroy each other was unsatisfactory because he could not conceive one impossibility destroying another. "Is not this to bring impossibility under the predicament of quality, and to make it a subject for arithmetical computation? And are we not thus brought back to the very difficulty to be removed?" (25)
Although Chalmers studied under Playfair, there seems to be no evidence that Chalmers used or shared Playfair's views on algebraic mathematics. It would be difficult to believe that Chalmers was not aware of Playfair's views. Every indication is given that geometry was still the foremost form of mathematics used by Chalmers. Chalmers says to a class of mathematics students:

"Gentlemen, these Elements of Euclid, have raised for their author a deathless monument of fame. For two thousand years they have maintained their superiority in the schools, and been received as the most appropriate introduction to geometry. It is one of the few books which elevate our respect for the genius of antiquity. It has survived the wreck of ages... It has been destined to reappear in all its ancient splendour." (26)

In the context of this passage, Chalmers shows that geometry is his field of expertise and Euclid's principles form the basis of this discipline. Chalmers argues that just because the elements of Euclid are old it does not alter the truth and validity of the Elements.

"Truth is confined to no age and to no country... what would have been the present degradation of science had the spirit of each generation been that of contempt for the labours and investigations of its ancestry? Science would exist in a state of perpetual infancy. Its abortive tendencies to improvement would expire with the short-lived labours of individuals and the extinction of every new race would again involve the world in the gloom of ignorance. Let us tremble to think that it would require the production of a new miracle to restore the forgotten discoveries of Newton." (27)
Chalmers is at pains to convince his student body that there is nothing at all difficult with geometrical mathematics:

"The most elevated doctrines of geometry lie open to the inquiries of any ordinary mind which can commend its faculty of attention; for in the process of a mathematical discussion there is nothing desultory -- there occurs no transition which it requires any uncommon power or rapidity to follow -- no interval which it requires the gigantic stride of a superior genius to cross". (28)

It is also to be observed that Chalmers applies the principles of geometry in his discussion on the vast distances between the sun and distant stars and from our own solar system. The great numbers and calculations involved make the mind feel impotent. He says, "We can exhibit them in figures and demonstrate them by the powers of a most rigid and infallible geometry." (29)

It is difficult to imagine that Chalmers was not aware of the development of higher mathematics on the continent, especially having studied under Playfair who had a keen interest in Algebra as stated above. Furthermore it should be remembered that James Brown encouraged Chalmers, whilst an undergraduate, to study French, for the express purpose of future studies in branches of higher mathematics. Although I have no evidence to support the claim, I assume that Chalmers achieved competence in the higher levels of
mathematics which were current in France, as Playfair was aware that France was the leader in the mathematical sciences. (30)

Chalmers' post-graduate experience with John Playfair equipped him for his position as lecturer in mathematics at St. Andrews University. Although his time in Edinburgh was most exhilarating, he nevertheless fell out with his teacher, John Playfair (Footnote). In 1805 John Robison died. His chair of natural philosophy at Edinburgh University was passed to John Playfair and the chair of mathematics became vacant. Chalmers, together with at least two others, applied for the chair. In a letter to the Lord Provost, John Playfair alleged that there were very few Scottish clergymen eminent in Mathematics or Natural Philosophy. Furthermore, argued Playfair, the vigorous and successful pursuit of these sciences was incompatible with clerical duties and habits. (31). This inflamed Chalmers' anger. Chalmers responded by publishing a leaflet entitled, Observations on a Passage in Mr. Playfair's Letter to the Lord Provost of Edinburgh, Relative to the Mathematical Pretensions of the Scottish Clergy. (32)

In this publication, he stated on the basis of his own experience "that after the satisfactory discharge of his parish duties, a minister may enjoy five days in the week of uninterrupted leisure for the prosecution of any science
in which his taste may dispose him to engage..." (33).

Little wonder that he did all he could, some years later when he accepted a call to Glasgow, to suppress this publication. (The text is printed in the acknowledgements section at the end of this chapter. 33A.)

Mr. Leske, a man of distinguished ability, secured the chair, much to Chalmers' disappointment.

The most influential of all the teachers who instructed Chalmers was Professor John Robison, professor of Natural Philosophy at Edinburgh from 1774-1805. The source of Chalmers' views on the divisions of natural science and his profound admiration of the Baconian method of investigation were all derived from Robison. Hanna notes, "the mode of mapping out the sciences, and drawing the boundary line between them" are adapted from Robison, "the great master generaliser". (35) It was through Robison's influence that Chalmers was delivered from philosophical scepticism brought about by studying Godwin and Mirabaud. Mirabaud's work on the Scepticism of Nature was first published in English in 1797. Mirabaud argued for an eternal universe of mere matter and motion.

The impact, on Chalmers, of this philosophy and Godwin's Political Justice was devastating.
"Those who were not particularly acquainted with him thought him going fast into a state of derangement. One very common expression in his public prayers and which showed the state of mind at the time — 'Oh give us some steady object for our mind to rest upon', was uttered with all his characteristic earnestness and emphasis." (36)

In a letter dated March 1st, 1846, Chalmers expresses to his correspondent that his deliverance from his personal experience of philosophical scepticism came through Beattie's Essay on Truth and the introductory lectures of Robison (37), the substance of which are printed in the third edition of the Encyclopedia Britannica (38) under the heads of 'Philosophy' and 'Physics'.

Robison's articles in the Britannica drew a distinction between natural history and natural philosophy. Chalmers was to develop this distinction throughout his scholarly life and the evidence of Robison is clearly observed in several of Chalmers' works.

Chalmers was invited by the Bishop of London, C.J. Blomfield, to write the first of the Bridgewater Treatises (38A), in which he delineates in some detail Robison's structure of science.
Robison arranged all philosophy into two sciences - one the science of contemporaneous nature; the other the science of successive nature.

Natural History is the science of contemporaneous nature, which takes cognizance of all those characters in external nature that exist together, which can be categorized as to "smell, colour, size, weight, and form and relation of parts, whether of the simple inorganic or more complex organic structures. (39) In contrast, when the elements of time and motion are introduced, we are then presented with the phenomena of successive nature -- this is deemed Natural Philosophy. Chalmers further subdivides natural philosophy into two distinct disciplines. The one is natural philosophy, strictly so called which deals with investigations into "changes which take effect in bodies by motions that are sensible and measurable". The other discipline is chemistry, or the science of those changes which "take effect in bodies by motions which are not sensible, or at least not measurable and which therefore cannot be made the subjects of mathematical computation or reasoning." (40) Not content with this subdivision, he suggests that chemistry is capable of a further division. The division being chemistry strictly so-called, in which investigations are made into the "changes effected by means of insensible motion in all-inorganic matter." The other part of the division is what he calls the science of
physiology, the province of which is to investigate "the like changes that take place in organic bodies, whether of the animal or vegetable kingdom". (41)

In his work, The Institutes of Theology, Chalmers acknowledges this distinction between Natural History and Natural Philosophy as being the work of Robison, who is described as "one of the ablest and profoundest of my literary friends". (42) The above distinction, argues Chalmers, is based upon the view that metaphysics has to do with "higher and wider generalizations" (43) than any of the individual sciences: it takes note both of the differences and likenesses between them.

"In so doing it will group not the objects of one science only, but the objects of several, and at length of all the sciences, by a wider generality, by a higher generic quality, comprehensive of a far larger number of individual objects than come within the view of the mere cultivators of any of the separate sciences. The work, then, of the metaphysician is essentially of the same kind with that of the ordinary philosopher; and the only difference is, that he has to do with larger and higher generalizations. We have already seen how common sense graduates into philosophy; and we may now see how philosophy graduates into metaphysics." (44)

Therefore Chalmers concludes, metaphysics is scientia scientiarum: her proper office is to assign the relations, whether of resemblance of distinction, which subsist between the various branches of human knowledge.
Simply put, for Chalmers, the dispositions of matter come within the gamut of Natural History, whilst the laws of matter or the "various moving forces by which it is actuated", fall within the parameters of Natural Philosophy. Using this expanded nomenclature, Chalmers showed that nature is controlled by its designer and it is possible in a limited way to ascertain the natural attributes of God. He claims that the argument for the wisdom and goodness of God is "the obvious adaptation wherewith creation teems, to a beneficial end." (45) He argues that the greater number of independent circumstances that can be assembled, the greater the evidence there is for design and the lesser probability of creation being left to the effect of chance. "A beneficent combination of three independent elements is not so impressive or so strong an argument for a Divinity, as a similar combination of six or ten such elements." He points to the many examples in astronomy and anatomy. The heavens have been framed with independent elements in which they meet together for the composition of a planetarium, i.e. the planets and moons which make up each solar system, yet there is one uniform law of gravity with a force of projection impressed by one impulse on each of the bodies, which could suffice to account for the revolutions of the planets round the sun and of the satellites around their primaries, along with the diurnal revolution of each and
the varying inclinations of the axis to the planes of their respective orbits. (46) The combination of individual elements in astronomy seems so few as compared to the science of anatomy.

"What a complex and crowded combination of individual elements which must first be effected before we obtain the composition of the eye" - "for the completion of which mechanism, there must not only be a greater number of separate laws as of refraction and muscular action and secretion; but a vastly greater number of separate and distinct parts, as the lenses and the retina and the optic nerve, the eye lid and eye lashes and the various muscles wherewith this delicate organ is so curiously beset, and each of which is indispensable to its perfection, or to the right performance of its functions." (47)

In the world into which we live there is, argues Chalmers, a more frequent and legible inscription of the Divinity than can be gathered from the magnificent survey of the skies brought to us by the wonders of modern astronomy.

4) CHALMER'S VIEWS ON THE PROOFS OF DIVINITY

It is in the area of Natural History which Chalmers sees evidence for a great Divine Designer.

The Infidels' argument to banish a designer God from the universe, says Chalmers, is to reason exclusively on the laws of matter. But by developing the Robison distinction, Chalmers seeks to overthrow the arguments of the Infidels.
He notes that if a single law of gravity could be applied to the astronomical system, it would greatly reduce the strength of the argument for a designing cause. La Place tried to demonstrate that the law of gravity, in respect of its being inversely proportional to the square of the distance from the centre, is an essential property of matter.

The conclusion of la Place is that gravity is in an unintelligent law which, operating out of blind necessity, explains and controls the movement of all the planets in their rotation upon their own axis and as well as their orbits around the sun. But yet, says Chalmers, la Grange had established that the law of gravity was essential to the stability of the cosmic constitution. The natural question which arises is that if la Grange is correct, then is stability in the cosmos possible if stability depends solely upon the doctrine of chance?

By pointing out that the infidels argue exclusively on the laws of matter, which is the province of Natural Philosophy, Chalmers responds to their arguments and argues that any proof of God is not located in the laws of nature but rather in the Dispositions or what he calls the Collations of matter, which is what writers such as Mirabaud in his Systeme de la Nature, fail to recognise, as in the passage quoted:
"These prejudiced dreamers", speaking of believers in a God, "are in an ecstasy at the sight of the periodical motion of the planets; at the order of the stars; at the various productions of the earth; at the astonishing harmony in the component parts of animals. In that moment, however, they forget the laws of motion; the power of gravitation; the forces of attraction and repulsion; they assign all these striking phenomena to unknown causes, of which they have no one substantive idea." (48).

This statement is a denial of any possibility of a natural theology or even a Theology of Nature. Reference to the laws of motion and gravitation and forces of attraction and repulsion, in this statement have no real explanation and are consistent with La Place's view that such laws are essential to the property of matter and operate by sheer blind necessity.

Chalmers argues that the proof of a divinity is located in the Dispositions of matter. Mere laws without collocations "would afford no security against a turbid and disorderly chaos" (49). He expresses no confidence in the traditional arguments for the existence of God. The famous a priori argument of Dr. Samuel Clark and other a posteriori arguments are invalid and meaningless (see acknowledgement 49A). The reason being that they do not view matter in its beneficial adaptation, there is no cognizance taken of those "goodly arrangements which bespeak design and so, a designer." They rather depend on the view that matter barely exists and from this property alone would infer an
antecedent mind which had summoned it out of nothing. Furthermore, argues Chalmers, these arguments suggest that eternity is incompetent to matter - for had matter been from eternity no adequate cause could be given, "no sufficiens causa why matter should not be here as well as there, or why all space should not be equally filled by it; and so, because all space is not so filled by it, matter must have had a beginning, or must have been created." (50)

The argument of dispositions is extended to that of the composition of a watch - there may be all the bits and pieces may be bundled together, all possessing the properties which belong to the instrument, but, says Chalmers, "without its dispositions, every evidence of skill would have been wholly obliterated". Chalmers concludes that to take the form of the planetary system and collocations away then this universe would instantly lapse into a heaving and disorderly chaos. Chalmers argues, "the thing wanted for the evolution of this chaos into an orderly and beneficial system is not the endowing of matter with right properties, but the forming of it into things of right shape and magnitude and the marshalling of these into right places". (51) Hence, Chalmers' key statement, which links the argument to the works of Isaac Newton, "should all the present arrangements of our existing natural history be destroyed, there is no power in the laws of an existing natural philosophy to replace them". (52)
There is no force known in nature and no combination of forces that can account for their commencement. The point is that the disposition of matter in the planetary system was fixed at the original setting up of the machine (53). We might imagine a sufficiency in the laws of nature; "but it is the first construction of the system which so palpably calls for the intervention of an artificer, and demonstrates so powerfully the fiat and finger of God". (54)

Chalmers appeals to Newton for support for his argument by referring to Newton's third letter to Dr. Richard Bently. It was common to believe, as many of the Infidels did, the notion of Descartes that new solar systems developed out of more primitive systems of matter in motion. But Chalmers explains that in Newton's third letter this notion of Descartes is impossible, viz,

"the growth of new systems out of old ones, without the mediation of a divine power, seem to be apparently absurd ... the system of nature was set in order in the beginning, with respect to size, figure, proportions and properties, by the councils of God's own intelligence". (55)

Chalmers sees in this extract an admission of Newton that it is in the dispositions of matter that divinity can be seen. Chalmers admits that Newton was at times confusing in respect to this distinction, but to prove his point, Chalmers in a footnote refers to the third book of Newton.

42
"For it became Him who created them to set them in order. And if he did so, it is unphilosophical to seek for any other origin of the world or to pretend that it might arise out of a chaos by the mere laws of nature; though being once formed, it may continue by those laws for many years" (56).

This disposition to resolve the collocations into the laws of nature proves, says Chalmers quoting Granville Penn:-

"not physical science but only some of its disciples have laboured to exclude the Creator from the details of his own creation; straining every nerve of ingenuity to ascribe them all to secondary causes". (57)

Also in the General Scholium, Newton proclaims that the

"beautiful system of the sun, planets and comets, could only precede from the counsel and dominion of an intelligent and powerful Being... and he governs all things, not as the soul of the world but as Lord over all and on account of his dominion he is to be called Lord God or Universal God." (58)

The same thread of thought is found in the 7th Boyle lecture delivered by Richard Bently (59). His thesis in the eight lectures is that

"should we allow the atheists, that matter and motion may have been from everlasting; yet if (as they now suppose) there were once no sun or stars nor earth nor planets; but the Particles, that now constitute them, were diffused in the mundane space in manner of a chaos without any concretion or coalition; these dispersed Particles could never of themselves by any kind of Natural motion, whether called Fortuitous or Mechanical, have convened into this present or any other like Frame of Heaven and Earth."
Bently disposes of the atheists' hypothesis by identifying their terms Fortuitous and mechanical. Fortune is regarded as no real entity, nor is it of physical essence but rather a mere relative signification denoting "a thing" (matter) which was effected by natural and necessary courses without reference to whom it is called Fortuitous. Thus, says Bently,

"to affirm that the world was made fortuitously is to say that before the world was made, there was some Intelligent Agent or Spectator who designing to do something else, or expecting that something else would be done with materials of the world there were some occult and unknown notions and tendencies in matter which mechanically formed the world beside his design or expectation".

He concludes that unless atheists affirm an Intelligent Agent who did dispose and direct the inanimate matter, then they must leave their atoms to their "mechanical affectation which are unable to bring about the formation of the world beyond the necessary laws of motion."

Therefore he concludes that the term fortune is but a synonymous word for "Nature and Necessity". Not being content with this line of argument, he seeks to heap ridicule upon ridicule by defining the meaning of chance which he says signifies all events casual, among inanimate bodies, are mechanically and naturally produced according to the determinate figures and textures and motions of those bodies. But, says he, those inanimate Bodies are not conscious of their own operations nor do they contrive and
cast about how to bring such events to pass. He now concludes that the doctrine of chance means that if atoms formed the world according to the essential properties of bulk, figure, and motion, they formed it mechanically; and if they formed it mechanically without perception and design, they formed it casually, therefore the names of Fortune, Chance, Nature and Mechanism all constitute the one and same hypothesis.

5) ADMIRATION OF BACON AND NEWTON

It would seem that no other conclusion can be arrived at other than Chalmers' division of the sciences. His metaphysical outlook and his proofs for the existence of God, all come from Robison. Thus far, Robison's influence in the areas already discussed moulded Chalmers' thought processes for the rest of his life. But this was not all. The Dictionary of National Biography notes that Robison was "one of those who led the way in turning the blind veneration of Francis Bacon into a rational worship". (60)

Hanna notes that it was through Robison that Chalmers received "his profound admiration of the Baconian method of investigation". (61). Hanna is of the opinion that Robison's exposition of the distinctive characteristics of
that method still remains one of the ablest of which our language can boast. Robison sees Isaac Newton as the faithful expositor of Francis Bacon.

"Newton's work was the result of "that maxim so warmly inculcated by Lord Bacon, that nothing is to be received as proved in the study of nature that is not logically inferred from an observed fact; that accurate observation of phenomena must precede all theory; and that the only admissible theory is a proof that the phenomena under consideration is included in some general fact, or law of nature". (62)

Throughout the works of Chalmers, there is a constant admiration and reference to both Francis Bacon and Isaac Newton. The influence of Robison was, to say the least, outstanding.

If the author of the reference to John Robison in the Dictionary of National Biography is correct in saying that Robison was "one of those who led the way in turning the blind veneration of Francis Bacon into a rational worship", then the same is true of Thomas Chalmers.

Chalmers sees the Baconian method through the work of Newton.

It was as early as 1802 that Chalmers, having been appointed as an assistant in Mathematics at St. Andrews, became fond of laying tributes at the feet of Newton whilst lecturing to a class in Mathematics. In his lectures, he
replied to the notion that "Mathematics has been condemned as contracting the best affections of the heart - chilling the ardours of its benevolence - blasting its heaven-ward aspirations" - a notion which was in great measure attributed to Dr. Johnston, who, in Chalmers' estimation, possessed the power of genius without its liberality. (63).

He pleaded with his students to regard such criticisms as groundless and pleaded with his students to possess the same humble and meek spirit of fellow countryman, Isaac Newton:-

"Newton, we invoke thy genius! May it preside over our labours, and animate to the arduous ascent of philosophy. May it revive the drooping interest of science, and awaken the flame of enthusiasm in the hearts of a degenerate people. May it teach us that science without virtue is an empty parade, and that philosophy deserves to be extinguished which pours contempt on the sacred majesty of religion." (65)

It is in the language of divinity that Newton is addressed! With such expression of commitment to Newton in his lectures in Mathematics, Chalmers only considered a settlement in a Parish as a means to an end. Newton and the sciences were the idols of his heart and his commitment to them was one of adoration and constant worship.

It was the 27th May, 1807, Chalmers visited Cambridge. His Journal notes
"it smells of learning all over and I breathe a fragrancy most congenial to me...everything wears a simplicity and chasteness allied to the character of philosophy; and the venerable name of Newton gives it an interest that can never die." (66)

It was some years later, in 1833, that he was to visit Cambridge again. In a letter addressed to his wife, Grace, (67) he gives an account of his stay in Cambridge whilst attending the meeting of the British Association for the Advancement of Science. It was Chalmers' duty to respond to a toast in honour of the Universities of Scotland. The burden of his speech was Sir Isaac Newton. His toast was "Trinity College, and long may the science of Newton and the Christianity of Newton be enshrined within her walls."

It is somewhat strange that Chalmers makes reference to the "Christianity of Newton". What he means by this is uncertain. Newton's theology stood in stark contrast with the orthodox Calvinism which Chalmers taught. Newton denied the doctrine of the Trinity on the grounds that such a belief was inaccessible to reason. The reference may be to Newton's commitment to a Biblical notion of creation and Providence which is referred to in his General Scholium.

This reference to his speech on Isaac Newton before the British Association was indeed interesting to say the least. William Hanna notes that on this occasion before
Cambridge literati he poured out glowing panegyric. (68). Cannon notes that at this meeting at Cambridge, John Dalton and John Herschel were the favourites of the meeting but she says there was an 'additional triumph' in the person of the Rev'd Dr. Thomas Chalmers - Britain's leading Evangelical preacher. (70) If Cannon is right in her assessment of Chalmers, it would be reasonable to assume that members of the association held him in high respect. Those members who belonged to the broad church tradition must have been amazed how a noted Evangelical preacher could possess such interest in the sciences. But such a statement also raises the question of whether or not Cannon is aware of the scientific interests of Chalmers or, indeed, that his effectiveness as a theologian and preacher was in large measure due to his scientific attainments.

Special mention is made in his letters to his wife of the "very elites of the nation in philosophy - Sir John Herschel and Sir David Brewster" (70A), whom he conversed with and 'ate breakfast with them'. Other distinguished men of science with whom he met and associated with were Professor Henslow who arranged his accommodation at Trinity College where Chalmers says "he enjoyed the luxury of relaxing within academic ground and among the hallowed retreats of genius; lulled to sleep by the vesper bells, which charmed centuries ago the ears of Bacon, Newton and Milton." (70B).
Chalmers writes that he 'fell in' with Professor Sidgwick and with Mr. Whewell, author of one of the Bridgewater Treatises. (71). Other personalities of academic distinction whom he met and knew were Professor Farish of Cambridge, Thomas Matthews and Professor Buckland of Oxford.

This comment on this Cambridge visit in 1833 is of importance, as it illustrates yet again the depth and the influence which Robison had on Chalmers. Although at this stage in his life, as Cannon points out, Chalmers was a preacher and theologian of renown (71a), his outlook is still scientifically orientated. It also tacitly implies that for him at least there is no conflict between Christianity and Science. This last suggestion will be expounded upon in another chapter. It also fulfils his expectation on his first visit to Cambridge in 1807. It was on that occasion that he said the name of Newton has given Cambridge an interest "that can never die". (71A). This was certainly true for Chalmers, as twenty six years later he returned to be elected to the council of the British Association and to relax "within academic ground and among the hallowed retreats of genius" (71B).

Robison declared that up to the time of Francis Bacon science was captive to the "futility of Greek philosophy", which was cultivated by the Schoolmen. This Scholastic philosophy, says Robison, was a combination of "absurd
metaphysics with a more absurd theology" (72). Robison refers to Aristotle as "the Stagyrite", whose philosophy was preferred by the Schoolmen because of his analysis of body into *matter and form* which encouraged the "countenance of the most incredible doctrine of trans-substantiation" (73). Whilst Robison acknowledges the importance of Martin Luther's works in the "freeing of men's minds", he does not compare to the greatness of Francis Bacon. It was Bacon, says Robison, who discovered the "absurdity of pretending to account for the phenomena of nature by syllogistic reasoning from hypothetical principles". (74) Bacon gave to the world a "new chart for human knowledge". This he did in two important works--

(i) *De dignitate et Augmentis Scientiarum*, in which he divided the human sciences into three branches, history, poetry and philosophy, corresponding to the three faculties of the mind—memory, imagination and reason.

(ii) *Novum Organum Scientiarum*. In this work he pointed out the proper method of interpreting nature which cannot be done by the logic which was then in fashion, but only by a painful and fair induction. Hypotheses and preconceived opinions were relegated to *idola theatre*. 51
This new chart for human knowledge meant that all material objects had to be grouped by means of their resemblance and arranged in these groups by means of their distinctions and relations.

By classifying material objects, the aim of Bacon was three fold

i) to observe with care and describe with accuracy the various objects of the universe;
ii) to determine and enumerate all the great classes of objects; to distribute and arrange them into all their subordinate classes;
iii) to determine with certainty the particular group to which any proposed individual belongs.

This classification and arrangement is known as Natural History and was an extremely important initial step towards the development of a new inductive procedure, or a mode of rational investigation practice in which active inquiry and real discovery would proceed together, in order to let nature declare itself, rather than to superimpose upon it patterns which have been reached by logic. Bacon maintained that logic can tell us nothing new, all it can do is to order what is already known. Basic to this new method was
an inquiry which is planned and actively controlled throughout by the use of experimental methods.

In his article on 'Physics' in the Britannica, Robison argued that observation of external nature presented us with an important discussion of all objects into two classes -- thinking and unthinking beings, mind and matter. (75) This distinction between phenomena of the material and immaterial world gave rise to a division of knowledge into the sciences of natural theology, phenomenology, logic, ethics and jurisprudence in the sphere of the immaterial world and physics and natural philosophy in the material realm. (76).

Physics for Robison was the study of the material realm and included both natural history and natural philosophy -- natural history involving descriptions and classification of phenomena as mentioned above and natural philosophy in the restricted sense of a body of scientific doctrines of laws and causes. (77)

The emphasis which Chalmers applied to the divisions of the scientific enterprise into Natural History and Natural Philosophy come directly from Bacon through Robison whom he regarded with "the profoundest admiration and to whom he was most largely indebted". (78) As late in his life as 1846, Chalmers is still found spelling out the influence of
John Robison, who introduced him to the Baconian method; the method which Chalmers sees as the outstanding characteristic in the work of Isaac Newton. Chalmers in his capacity as Principal of the New College said in his "Principal's Address", that "Lord Bacon is a great master on the field of general science".

Although Chalmers thought Bacon made many blunders in specific sciences such as chemistry and astronomy, it was his *Scientia Scientiarum* that would have made him the very best principal of "a college for the observational sciences", had there been such an institution. In fact he would have been better than Isaac Newton had he lived in the same age! Chalmers warns his readers to adhere to the basic principles of interpretation which had come from Bacon. He warns would-be scholars to be aware of the actual boundary of our knowledge, "that throughout every distinct step we might preserve that chaste and unambitious spirit, which characterises the philosophy" of Isaac Newton, which Chalmers regards as a faithful expression of Bacon's philosophy. (79).

Chalmers' stay in Edinburgh from the winter of 1799 not only exposed him to studies in mathematics, chemistry and natural philosophy, but it also exposed him to the Scottish Commonsense Philosophy. [See acknowledgement 79A]. He attended lectures given by Dugald Stewart who clarified
aspects of Reid's philosophy.

Although Common Sense Philosophy is very extensive, a brief reference must be made with regard to Chalmers. Daniel Rice claims that it was the Commonsense School of thought, particularly that of James Beattie, which was responsible in resolving Chalmers' confusion of mind brought about by Thomas Godwin and Baron de Holbach.

For the purpose of this brief segment, let me quote from Rice the importance of this school of thought on Chalmers.

"What is important here is that two basic thrusts of Scottish Common Sense philosophy entered into Chalmers' thought and had significant bearing on his theology. Both of these had to do with the formulation of a theological anthropology. First of all, Beattie's contention that truth is that 'which the constitution of our nature determines us to believe', and his distinction between reason as 'that faculty by which we perceive truth in consequence of a proof' and common sense as 'that faculty by which we perceive self-evident truth', contributed to the restoration of certainty to a world reeling under the reductio ad absurdum of scepticism. In this way the mentalistic features of Scottish philosophy were set against the physicalistic temper of the French materialists, while the a priori upon which common sense rests staved off the implications of Hume's empiricism. Secondly, and equally important, Chalmers found enduring comfort in the fact that the theistic and ethical orientation of the Scottish philosophy could be set in opposition to the atheism of both.

The crucial point in Chalmers' relationship to this philosophy is most evident in his use of the basic contention that within the constitution of the mind there are underived principles operating that guarantee the credibility of our
experiencing and knowing. Aside from its contribution in turning back the tide of scepticism from whatever quarter, this notion, in conjunction with the idea of nature's constancy, made possible the continuation in Chalmers' thought of the older eighteenth-century assertion that the entire range of organic life from the instincts of animals to the manifold configurations of man's emotional and mental constitution exhibit a harmony of purpose and adaptation from which one can only infer the workings of a benevolent and all-wise God. It is precisely here that a synthesis between the philosophy of Common Sense and a generalised natural theology is most prominent in Chalmers' thinking. The view that the constancy of nature and the moral constitution of the mind attest to the activity of a moral God in a moral universe was of utmost importance to him. But he did not rest content with this. Such a view was important to him primarily because it provided him with an apologetical base from which he could establish the credibility of the Christian faith itself. And given the fact that to engage in a meaningful defence of the relevance of Christianity during Chalmers' era one had first to establish the existence of God on purely rational grounds, the credibility of Christianity depended to a great degree upon the credibility of natural theology.

The time Thomas Chalmers spent in Edinburgh was of critical importance. His studies in mathematics, chemistry, the exposure to Common Sense Philosophy and the influence of John Robison in Natural Philosophy was such that his thought was being moulded in such a way so as to fit him admirably for his future scholarly attainments, especially in theology.
ACKNOWLEDGEMENTS - Chapter 1


(2) Ibid., p. 8.


(7) Hanna, op. cit., p. 10.


(9) Hanna, op. cit., p. 12.

(10) Ibid.


(15A) "If the thermometer is placed indifferently without the reach of any of the mirrors, it will exhibit the temperature of the room; place it in the focus of a concave mirror A, the consequence is, a small elevation of temperature; for though the rays from any object in the axis of the mirror do not light upon the mirror in a parallel direction, yet, as you remove from the mirror, the divergency of these rays is so small, that though not accurately collected in a point, they fall in great abundance upon the bulb, and raise its temperature. It is impossible to say, a priori, whether, if you now place another concave mirror B in the axis of this mirror, it will have any effect in producing a further elevation of temperature. Certain it is, that the air in the focus of the mirror B is more powerful than before, because its emanating rays are more accurately collected in the bulb of the thermometer; but, again, the divergent rays from the more remote portions of air are thereby intercepted. However this be, it does not affect the validity of the second method, which I humbly propose for determining the truth of Dr. Hutton's opinion. Let both the mirrors still retain in the same place; let the cold body be placed in focus A, and let the temperature upon the bulb in B be observed. The deviation of this temperature from the temperature of the room arises from the joint effect of those rays which are accurately collected from the intermediate axis between the mirrors. Let the mirror A, in whose focus the cold body is placed, be now turned round, and observe the change of temperature which ensues when the convex side of it is now presented to the cold body. The change, whatever that be, is owing solely to the collected emanations of the cold body being now removed from the bulb of the thermometer, for all other circumstances remain the same. The divergent rays from the more remote parts of the axis are still intercepted by the mirror A, and those in the intermediate part of the axis fall on the mirror B as before, and have the same effect on the temperature of the bulb. Hence, if this change be an increase of temperature, it proves that the emanation from the cold body had a positive efficiency in reducing the temperature, since the abstraction of these emanations increases that temperature. But if the change be a reduction of temperature, it proves that the abstraction of these emanations is a diminution of caloric, and that the arguments which those who
oppose the materiality of heat derive from this phenomenon fall to the ground."


(17) Ibid., p. 471f.


(19) Ibid., p. 475f.


(23) Ibid., p. 165.


(27) Ibid., p. 40.

(28) Ibid., p. 39f.


(31) Hanna, op. cit., pp. 64ff.

(32) Hanna, ibid., p. 65, Contained in a letter to his brother, James, dated Sept. 3, 1805.

(33) Hanna, op. cit., p. 66.

(33A) The following is part of the publication (located in Hanna's Memoirs, Vol. 1, 1852 edition pp. 488-489) in which Chalmers' vindictive is vented upon John Playfair. It also reveals Chalmers' estimate and value of mathematical science to a minister of the gospel, namely a philosophy "which raises us in
adoration to the Almighty Being”.

"There is almost no consumption of intellectual effort in the peculiar employment of a minister. The great doctrines of revelation, though sublime, are simple. They require no labour of the midnight oil to understand them -- no parade of artificial language to impress them upon the hearts of the people. A minister's duty is the duty of the heart. It is his to impress the simple and home-bred lessons of humility and justice, and the exercises of a sober and enlightened piety. It is his to enlighten the sick-bed of age and of infirmity; to rejoice in the administrations of comfort; to maintain a friendly intercourse with his people, and to secure their affections by what no art and no hypocrisy can accomplish -- the smile of a benevolent countenance, the frank and open air of an undissembled honesty. The usefulness of such a character as this requires no fatiguing exercise of the understanding to support it; no ambitious display of learning or of eloquence; no flight of mysticism; no elaborate discussion; no jargon of system or of controversy. What can we find in the peace and piety of a minister's retirement to withdraw his attention from the exalted occupations of philosophy; that philosophy which the light of mathematical science unfolded to the immortal Newton; that philosophy which has introduced us into a new creation of order and magnificence; that philosophy which has opened up to us an immense theatre, where the divinity of wisdom presides, and worlds on worlds revolve in silent harmony; that philosophy which raises us in adoration to the Almighty Being, whose all-seeing eye no variety can bewilder, whose care extends to the minutest of His works and who, while He reigns in the highest heaven, can look down on earth, to revive the spirit of the desolate, and to enlighten the sick-bed of age and of infirmity?

"Sir Isaac Newton has demonstrated to us the triumphs of the inductive philosophy when applied to the investigation of material phenomena. I will not pretend to say whether it is the same cautious and hesitating spirit of induction that has led Mr. Playfair to his wonderful discovery, to this his curious and unexpected fact in the philosophy of the mind, to this stubborn peculiarity in the science of the mathematics, that it should deny every clergyman of the Church of Scotland access to its mysteries. The discovery of unexpected connexions is the evidence of original genius, and of a mind superior to the dull sobriety of vulgar apprehensions. Let Mr. Playfair go on and prosper. He has opened up to us a
new and interesting field for original observation. I would advise him not to stop short in the career he has so successfully begun. Go on, sir, and give us some more specimens of this magical and unheard of influence. Extend your observations to all the other trades and professions in the country; record their friendly and adverse tendencies to mathematical science; you have settled the clergymen; proceed in the plenitude of your sagacity, and give us your decisions upon the physician, the lawyer, the mole-catcher, the currier of leather, &c., &c., to the enrichment of the philosophy of mind, and the great edification of patrons to university livings in all future ages."


(35) Hanna, 1854 ed., p. 27. (See also T. Chalmers, Institutes of Theology, vol. 1, (Sutherland & Knox, Edin., 1849), pp. 28-29, 80.

(36) Hanna, op. cit., p. 29

(37) Hanna, op. cit., p. 27f.


(38A) BRIDGEWATER TREATISES. The Eight treatises, published between 1833 and 1840, upon various aspects of 'the power, wisdom and goodness of God, as manifested in the Creation.' They were produced under the will of F.H. Egerton, 8th Earl of Bridgewater (1756-1829), who left a sum of 8000 pounds to the president of the Royal Society, to be paid to one or more authors selected by him to write and publish treatises on this subject. The eight authors chosen were: T. Chalmers, J. Kidd, W. Whewell, Sir C. Bell, P.M. Roget, W. Buckland, W. Kirby, W. Prout. The 'Ninth Bridgewater Treatise' (1837) by C. Babbage does not properly belong to the series.


(40) Chalmers, op. cit., p. 15.
(41) Ibid. p. 15.


(44) Ibid., p. 29.

(45) Bridgewater Treatise, op. cit., p. 6.

(46) Ibid., p. 6.


(49A) The terms 'a priori' and 'a posteriori' refer to systems of reasoning.

To reason from cause to effect is to reason deductively. This system is known as 'a priori'. The opposite system of reasoning is the inductive method, i.e. reasoning from effects to causes. This is called 'a posteriori'.

A priori knowledge, while most prominent in mathematics and logic, is not limited to these subjects. Philosophers have been divided into rationalists and empiricists according to whether they stressed the a priori or the empirical element more. The possibility of metaphysics depends on a priori knowledge, for our experience is quite inadequate to enable us to make on merely empirical grounds, any sweeping generalizations of the kind the metaphysician desires.


(56) Ibid., p. 17.
(57) Ibid., p. 17.
(61) Hanna, vol. 1, 1854 ed., op. cit., p. 27
(70B) Op. Cit., p. 381.


(71a) Cannon, Ibid.

(71A) Hanna, vol. I, 1854 ed.,


(72) Encyclopedia Britannica,

(72A) Ibid., p. 581.

(73) Ibid., p. 581.

(74) Ibid., p. 581.


(79A) It is the name for the philosophy of 'common sense,' characterized by its devotion to psychology, its adherence to the inductive method in philosophical research, and its determination to find in human nature itself, the guarantee for truth. It owed its great impulse, in the 18th cent., to Thomas Reid in Aberdeen, and was supported and expounded by several of his colleagues in the Aberdeen Philosophical Society - mainly by George Campbell, James Beattie, and Alexander Gerard. It was called forth by opposition to the principles and reasoning of David Hume; and while having as its chief aim, the due appreciation of the moral and religious tendencies of man, it paid full regard to the theoretical or speculative side of human nature. It was opposed to Hume, but, at cardinal points, to Locke and to Berkeley also and to what Reid called 'the ideal system', in all its forms. It was a spiritualistic philosophy, cautious and measured, designed to meet scepticism and to remove doubt by an appeal to what it conceived to be most fundamental in man's constitution.
(70B) Op. Cit., p. 381.


(71a) Cannon, Ibid.


(71B) Hanna, vol. III, 1851 ed., p. 381


(72A) Ibid., p. 581.

(73) Ibid., p. 581.

(74) Ibid., p. 581.


(79A) It is the name for the philosophy of 'common sense,' characterized by its devotion to psychology, its adherence to the inductive method in philosophical research, and its determination to find in human nature itself, the guarantee for truth. It owed its great impulse, in the 18th cent., to Thomas Reid in Aberdeen, and was supported and expounded by several of his colleagues in the Aberdeen Philosophical Society - mainly by George Campbell, James Beattie, and Alexander Gerard. It was called forth by opposition to the principles and reasoning of David Hume; and while having as its chief aim, the due appreciation of the moral and religious tendencies of man, it paid full regard to the theoretical or speculative side of human nature. It was opposed to Hume, but, at cardinal points, to Locke and to Berkeley also and to what Reid called 'the ideal system', in all its forms. It was a spiritualistic philosophy, cautious and measured, designed to meet scepticism and to remove doubt by an appeal to what it conceived to be most fundamental in man's constitution.
Its appeal was to 'first principles,' intuitively apprehended. Experience was by no means ignored, but it was not looked upon sufficient in itself for everything. While explaining much in human life, it needed itself to be explained: it could not account for principles that it itself presupposed, and whose authority was drawn from another source.


It has been stated clearly in this thesis that Chalmers was committed to geometrical mathematics, while there were developments in analytical mathematics in Europe. Richard Olson argues that the reason why Britain, and in particular, Scotland, fell behind Europe, was the link between Common Sense Philosophy and mathematics. He claims

"...that the epistemological doctrines associated with the Common Sense Philosophy of Thomas Reid and Dugald Stewart not only reinforced an appreciation of geometrical reasoning, but also provided a significant obstacle to the acceptance of analytical methods by Scottish mathematicians.

Common Sense attitudes towards the origin of mathematical concepts demanded sensory referents underlying all meaningful terms; and no such referents could be found for the imaginary quantities or the negative quantities which appeared frequently in analytical mathematics. In addition, the Scottish philosophers' theories of liberal education and mental training, emphasized the desirability of the extended trains of reasoning which are a central characteristic of ancient geometry but which are replaced by manipulations of symbols in the newer analytical mathematics. The importance of these epistemological and pedagogical considerations challenges the fundamental position taken by the modern historian Derek Whiteside who has claimed that post-Renaissance mathematical developments can usually be studied in isolation from their cultural context.


Also James McCosh The Scottish Philosophy: Biographical Expository and Critical, (Robert Carter, N.Y., 1875).
CHAPTER 2

ORDINATION AND CALL TO KILMANY

In the year 1802, a number of important changes took place within St. Andrews University. Dr. J. Brown became professor of Natural Philosophy in the University of Glasgow. The teaching of mathematics at St. Andrews was committed to Mr. Coutts and Mr. Duncan. But during 1802 Mr. Duncan was appointed to the Rectorship of the Academy of Dundee. This move created a vacancy in the assistantship of mathematics. (1)

Chalmers' aim in life was to fill the mathematical chair in one of the Scottish Universities, and he saw the assistantship in mathematics at St. Andrews as a possible stepping stone to achieve this end. He presented himself in person to the officials at St. Andrews and secured the vacant position together with a guarantee that the University would recommend him to the vacancy in the parish church of Kilmany. On the 2nd of November, the Principal and professors unanimously agreed to elect Chalmers as the new minister of Kilmany. For a Presbyterian Church this seems a strange procedure but it is to be remembered that at this time in Scottish Church history moderatism held sway in the Church. This meant that the local members of
the Church had little to say in the call of a minister.

Chalmers returned to his lodgings at Hawick and prepared himself for the mathematical lectures. The Presbytery of Cupar ordained him as a minister of the Gospel at Kilmany on the 12th May, 1803. Chalmers had calculated on retaining the mathematical assistantship whilst he was the minister of this parish, as it was only nine miles from St. Andrews.

He threw himself into lecturing "with all the fervour of an overflowing enthusiasm" (2). His enthusiasm was infective as one of his pupils writes...

"The study of mathematics was felt to be hardly less a play of the fancy than a labour of the intellect -- the lessons of the day being continually interspersed with applications and illustrations of the most lively nature, so that he secured in a singular manner the confidence and attachment of his pupils". (3)

During the spring, Chalmers warned his students against the temptation of idleness and encouraged them to pursue with diligence the study of mathematics...

"Let the supreme importance, then, of the subject that is now to occupy us, animate and sustain your exertions. I again repeat my call to industry and to perseverance". (4)

Chalmers had reason to speak to his students in such a manner. It would seem that the old professor of mathematics, Professor Vilant, considered that the academic
performance of students in previous years seemed to be ahead of the class taught by Chalmers. Chalmers' appeal to the students also seemed to upset the ageing professor. Chalmers' style did not receive the sympathy of the academic community and his closing speech to his students at the conclusion of the session would indicate that he was not at all happy with the situation. It was a speech which sought to justify his own performance.

"In reviewing my labours as your mathematical instructor, I will not assert that I have been infallible, but I will assert that I have been anxious and sincere; that oppressed as I was by the want of time, I have improved it to the best of my judgment, and filled it up with the labours of an active and unremitting industry; that I have discharged my duty with integrity to my employer, and -- let malignity frown when I say it -- I have consecrated my best exertions to his service. Supported as I am by these reflections, you will not think that I profess too much when I profess contempt for the suggestions of an envious and unprincipled criticism -- when I profess that sense of independence to which I feel myself entitled by the testimony of an approving conscience. You will not think that I say too much when I say that I have studied your interests with anxiety, if not with success. I have been anxious to maintain the purity of science, and to exercise that inviolable discipline which can alone protect the industrious from noisy interruption, and from the infection of irregular example. Let me now dismiss the authority of a master, and address you in the language of sincere and affectionate friendship. May you ever be preserved from the deceitful allurements of vice. May you walk the proud career of integrity and honour; and while I live; I have a heart to feel and a voice to plead for your interests". (5)

The University advised Chalmers that his services would not be required during the next session. Hanna notes that this dismissal not only tore him away from the occupation which
he loved, but it confined him to parish work which he felt was uninteresting. (6) This assessment by Hanna shows how deeply committed Chalmers was to the sciences and the work of the Church's ministry was a matter of convenience.

It had been alleged by the University that his dismissal was due to inefficiency as a teacher. Hanna suggests that the reason was impropriety and imprudence. (6A). If this allegation was true, then his future prospects for university preferment would be seriously impaired.

Chalmers reacted by announcing his own mathematical classes outside of the University in St. Andrews township rivalling the classes at the University. This was the only way in which Chalmers believed that he could restore his scientific honour and show that the University was wrong in its decision to relinquish his services. Chalmers is quoted as saying

"My only motive is, to restore that academical reputation which I conceive to have been violated by the aspersions of envy. It is this which has driven me from the peaceful silence of the country, which has forced me to exchange my domestic retirement for the whirl of contention". (7)

On the 6th December, Chalmers announced his intention to lecture within the township and not within the University, a rival class in chemistry. Classes in chemistry commenced on December 19th. His introductory lecture in chemistry is
located in the appendix to this chapter.

The rival lectures in mathematics and chemistry became popular. According to his diary entries, it appears that there was considerable acceptance of these lectures among the townspeople...so much so that by 4th January, 1805, there is every indication that there were moves within the University for a reconciliation with Chalmers. (8)

Life for Chalmers was still the single-minded pursuit of science. There was little time for the Church to which he was ordained. Each week he led three classes of mathematics as well as his chemistry class. Each Saturday he returned to the Manse to discharge his duties as a clergyman on the Sunday and then returned to St. Andrews early Monday morning. His diary of March 14th notes

"My hands are full of business. I am living just now the life I seem to be formed for -- a life of constant and unremitting activity. Deprive me of employment, and you condemn me to a life of misery and disgust."
(9)

It was Chalmers' "open hearted honesty - the unwavering purpose - the indomitable energy displayed", (10) which redeemed him from the charge of impropriety and imprudence. The opposition of the University subsided and it turned, says Hanna, into a "tide of applause" (11). The Chemical lectures proved so popular that he repeated them the
following winter, but he decided to relinquish the mathematical classes.

Whilst his relationship with the University appeared to be on the mend, it came to his attention that several ministers within the presbytery sought to summon him before the court. Their intention was that Chalmers should be required to dismiss his classes, as there was some concern in regard to his absenteeism from Kilmany. Chalmers prepared a written explanation and defense. He argued that his rival lectures to those given at the University were necessary to retrieve his scientific honour and his hopes for literary distinction. (12)

The matter did not arise in the Presbytery until the 4th September, 1804. At the suggestion of Mr. Martin, the Presbytery inserted in its minutes that Mr. Chalmers' lectures in Chemistry were improper in that his time should be spent performing his pastoral duties and ought to be discontinued. Chalmers insisted that the Presbytery also insert in its minutes that "after the punctual discharge of his professional duties, his time was his own and he considered that no man or no court had a right to control him in the distribution of it". (13)
Arguing in his own defence, Chalmers saw no difference in a clergyman indulging his time in feasting, playing music and painting and a clergyman indulging his spare time in chemical lectures. Those who brought the charge against him were referred to as "officious intermeddlers". (14) The time spent in lecturing was more in keeping with a full time teaching position. The time Chalmers spent in his pastoral duties was more in keeping with part time activity.

Whilst Chalmers was the minister at Kilmany, he did not only confine himself to the sciences of mathematics and chemistry. In a letter to his brother, James, he declares he has written for publication a work on political economy, the title of which was *Inquiry into the Extent and Stability of National Resources*. One of the features of this work was the chapter on taxation. Chalmers maintained that the basis of taxation should be "the excess of income above that which is laid out in purchasing the necessaries of existence, which contributes the only fund out of which the public revenue is raised. Let a man be taxed then by the portion he possesses of this fund; let him be exempted for that part of his income which only raises him to an equality with the labourer". (15)

During the winter of 1808 Sir David Brewster had invited Chalmers to be a contributor to the *Edinburgh Encyclopaedia*. In a letter to Brewster on April 23rd, he
reports his progress and states "I will undertake Trigonometry, I am now busy with Cagnoli and I think it would be doing a service to give a view of the very extensive application of trigonometrical formulae both to analysis and physics". (16) Soon after he wrote again suggesting to Brewster that he be given the task of writing an article on "Christianity" as well.

Before finishing the article on Christianity, and just after he had made his maiden speech in the General Assembly of 1809, he fell into sickness which affected him for the next 18 months. Late in 1809, his illness was so severe he was confined to his room for four months and did not preach for the next six months. This was the beginning of a major change in Chalmers' life. He was soon to embrace evangelical Christianity (for definition see acknowledgement 16A) with equal enthusiasm and devotion as he did the sciences.

Just prior to his illness, Chalmers was faced with much sadness due to bereavement in his own family. He had lost both a brother and a sister and two more sisters were threatened with the same medical complaint. This caused a real anxiety about his own physical and spiritual well-being.
At the beginning of his own illness, it happened that Mr. Ballardie, an uncle to Thomas and a kind of second father to him, was found dead in a posture of prayer. Realising that his own father was nearly seventy, Thomas, together with all the members of the family, began to panic, believing that there would soon be many more deaths within the family. Mr. Ballardie's passing was an occasion of great sadness to Thomas, as he received his first instruction in mathematics from this man. Thomas believed that he himself was about to depart this world. In a letter addressed to a friend, the Rev'd Carstairs of Anstruther, dated February 19th, 1809, he writes:

"My confinement," he wrote, "has fixed on my heart a very strong impression of the insignificance of time — an impression which I trust will not abandon me though I again reach the heyday of health and vigour. This should be the first step to another impression still more salutary — the magnitude of eternity. Strip human life of its connexion with a higher scene of existence, and it is the illusion of an instant, an unmeaning farce, a series of visions and projects, and convulsive efforts, which terminate in nothing. I have been reading Pascal's Thoughts on Religion; you know his history — a man of the richest endowments, and whose youth was signalized by his profound and original speculations in mathematical science, but who could stop short in the brilliant career of discovery, who could resign all the splendours of literary reputation, who could renounce without a sign all the distinctions which are conferred upon genius, and resolve to devote every talent and every hour to the defence and illustration of the Gospel. This, my dear sir, is superior to all Greek and to all Roman fame." (17)
Chalmers began to study books which had long been neglected; the Westminster Confession of Faith, the works of Jonathan Edwards, John Owen, John Calvin, John Newton, Wilberforce and the Bible. (19)

His journal entry for 17th March, 1810 suggests that a major shift in priorities had already taken place. He notes with regret that for the past thirty years there has been a "total estrangement of my mind from religious principle". (20) He prays that the labours of mind may be subservient to the interests of the gospel. This is borne out by the fact that he is now prepared to devote more time to spiritual endeavours.

Chalmers finds some difficulty in adjusting to his new series of priorities. His journal dated August 21st notes

"Have conceived the idea of abandoning severe mathematics and expending my strength upon theological studies. Eminence in two departments is scarcely attainable.... the sacrifice is painful but I must not harass and enfeeble my mind with too much anxiety; and let me leave myself entirely of all those discussions which are connected with the defence of Christianity, the exposition of its views and the maintenance of its interests, as affected by the politics and philosophy of the times". (23)

By March 1811, the change of direction in Chalmers' life was all but complete. His journal of March 13th indicates a real commitment to the Gospel and a genuine change of heart.
toward the care and pastoring of his people.

"Now that I have got well, let me devote a great part of my time to the business of my parish; and may it be the main anxiety of my life, O Lord, to promote Thy glory, and to testify the gratitude of my heart for the merciful scheme of reconciliation made known and offered to us in the gospel. May I every day feel a growing interest in the covenant of grace; and let me evince in my own conduct that the doctrine of faith is a doctrine according to godliness" (24)

On the 15th March, there is this interesting note in respect to his scientific interests --

"Called on sick people in the village. I am a good deal weaned from the ardour for scientific pursuits; and let me direct my undivided attention to theology." (25)

The change that had taken place was more than noticeable by his parishioners. A delightful story is told by Hanna which will illustrate the impact of his conversion experience.

"His regular and earnest study of the Bible was one of the first and most noticeable effects of Mr. Chalmers' conversion. His nearest neighbour and most frequent visitor was old John Bonthron, who, having once seen better days, was admitted to an easy and privileged familiarity, in the exercise of which one day before the memorable illness, he said to Mr. Chalmers --"I find you aye busy, sir, with one thing or another; but come when I may, I never find you at your studies for the Sabbath." "Oh, an hour or two on the Saturday evening is quite enough for that," was the minister's answer. But now the change had come, and John, on entering the manse, often found Mr. Chalmers poring eagerly over the pages of the Bible. The difference was too striking to escape notice, and with the freedom given him, which he was ready enough to use, he said, "I never come in now, sir, but I find you aye at your Bible." "All too little, John, all too little", was the significant reply." (26)
ACKNOWLEDGMENTS - Chapter 2

(3) Ibid.
(8) Journal entries, Hanna, op. cit., p. 54.
(9) Ibid., p. 54.
(12) See transcript in Appendix 1, conclusion of thesis
(14) See transcript of his speech before the Presbytery in Appendix 2, conclusion of thesis
(15) Hanna, Memoirs, op. cit., p. 92f.
(16A) Thomas Chalmers was the great evangelical apostle of Scotland until his death in 1847.

Perhaps the most important statement of definition of Evangelicalism is to be found in an address which Chalmers himself delivered to his parishioners at Kilmany just prior to his move to Glasgow. In this address there is a real, passionate emphasis on Biblical Christianity which realizes the righteousness and holiness which his early preaching utterly failed to produce.
Address delivered at Kilmany, 9th July 1815.

"Choose Christ, then, my brethren, choose Him as the Captain of your salvation. Let Him enter into your hearts by faith, and let Him dwell continually there. Cultivate a daily intercourse and a growing acquaintance with Him. Oh, you are in safe company, indeed, when your fellowship is with Him! The shield of His protecting mediatorship is ever between you and the justice of God; and out of His fullness there goeth a constant stream, to nourish and to animate, and to strengthen every believer. Why should the shifting of human instruments so oppress and so discourage you, when He is your willing friend; when He is ever present, and is at all times in readiness; when He, the same yesterday, to-day, and for ever, is to be met with in every place; and while His disciples here, giving way to the power of sight, are sorrowful, and in great heaviness, because they are to move at a distance from one another, He, my brethren, He has His eye upon all neighbourhoods and all countries, and will at length gather His disciples into one eternal family! With such a Master, let us quit ourselves like men. With the magnificence of eternity before us, let time, with all its fluctuations, dwindle into its own littleness. If God is pleased to spare me, I trust I shall often meet with you in person, even on this side of the grave; but if not, let us often meet in prayer at the mercy-seat of God. While we occupy different places on earth, let our mutual intercessions for each other go to one place in heaven. Let the Saviour put our supplications into one censer; and be assured, my brethren, that after the dear and the much loved scenery of this peaceful vale has disappeared from my eye, the people who live in it shall retain a warm and ever-during place in my memory; - and this mortal body must be stretched on the bed of death, ere the heart which now animates it can resign its exercise of longing after you, and praying for you that you may so receive Christ Jesus, and so walk in Him, and so hold fast the things you have gotten, and so prove that the labour I have had amongst you has not been in vain, that when the sound of the last trumpet awakens us, these eyes, which are now bathed in tears, may open upon a scene of eternal blessedness, and we, my brethren, whom the providence of God has withdrawn for a little while from one another, may on that day be found side by side at the right hand of the everlasting throne."
W. Hanna, Memoirs, 1854 ed., p. 346-347


(19) The book which had an enormous impact was Wilberforce's Practical View. Chalmers' estimate of this work located in two letters addressed to his brother, Alexander. See Memoirs, 1854 ed., op. cit., p. 138.

In the course of this pilgrimage, the formative influences were Wilberforce's Practical View, read by Chalmers in 1811 (see Hanna, op. cit., p. 136); Thomas Scott's The Force of Truth, which he commenced reading on 22nd February 1811 (ibid., p.151); and Richard Baxter's Call to the Unconverted, which Chalmers read on 13th September, 1811, and which incidentally, he intended for republication (ibid., p. 164). Fisher's The Marrow of Modern Divinity (1644) introduced into eighteenth-century Scottish thought by Thomas Boston, fell into Chalmers' hands on 23rd August, 1812. On this work Chalmers remarks: 'I am reading the Marrow of Modern Divinity, and derive from it much light and satisfaction on the subject of faith. It is a masterly performance, and I feel a greater nearness to God, convincing me that Christ is the way to him, and an unconditional surrender of ourselves to Christ is the first and most essential step of our recovery ... Finished the Marrow. I feel a growing delight in the fulness and sufficiency of Christ' (entries in the Journal for 23rd and 24th August, 1812). In addition the writings of Calvin, Doddridge, Owen, Guthrie, Romaine and Matthew Hale, among others, had a deep and lasting influence on Chalmers' mature thought. (See particularly Chalmers' Introductory Essays to Select Christian Authors (CW vol XIII) (Wm. Collins, Glasgow, and Hamilton, Adams and Co., London, 1835)


(25) Ibid., p. 152.

CHAPTER 3

MINISTRY AT GLASGOW

In 1814, Chalmers accepted a call to the Tron Church in Glasgow, Scotland's largest city. There he remained for the next eight years, preaching with passionate eloquence to a crammed Church. He laboured among the multitudes who had no link with the Church and his pastoral ministry was outstanding.

The intention of this Chapter is not a resume of his pastoral work, but an account of his scientific interests which began to surface within his pulpit ministry.

It was during 1816 that Chalmers delivered what was known as the Astronomical Discourses. Each Discourse was delivered in the Tron Church on a Thursday, once every two months. The Discourses disclosed and then countered the argument, against the Christian Revelation. The argument was based on the vastness and variety of those unnumbered worlds which lie scattered over the immeasurable fields of space. He sketched, before his audience the
"recent discoveries of astronomy -- distinct in outline and drawn with all the ease of one who was himself a master in the science, yet gorgeously magnificent in many of its details, displaying amid the brilliant glow of a blazing eloquence, the sublime poetry of the heavens". (1)

The Discourses were received with great enthusiasm. According to Hanna, many of the busiest merchants of the city closed their business premises and allowed their staff to hear the famous preacher.

In the January of 1817, the Discourses were ready for publication. In ten weeks, 6000 copies were sold. Within a year there were 9 editions and 20,000 volumes in circulation. Hanna claims that never before had a volume of sermons met with such immediate and general acceptance. (2)

It was in this series of sermons that Chalmers used the conclusions of modern science, to proclaim the Gospel.

It will be useful to highlight some of the salient points in these Discourses, which are to be found in Vol. 7 of his collected works.

The first Discourse is entitled "A Sketch of Modern Astronomy". In this discourse, Chalmers attempts to disarm before hand those narrow-minded Christians who may feel
that the whole project of taking issue with the materialists of the day is useless and unworthy.

Chalmers offers a description of the solar system and sketches in the background of the vast stellar universe. From the littleness and insecurity of man's position in a world that seems so insignificant when compared with the rest of the universe, he concludes that man should be humble and grateful to God because "He is mindful of us", obviously a reference to Psalm 8: 4-5.

"What is man, that thou art mindful of him? and the son of man, that thou visitest him? For thou hast made him a little lower than the angels, and hast crowned him with glory and honour". (4)

But, says Chalmers, these thoughts of the Psalmist have been appropriated by the forces of 'infidelity', and in the language of the text, has been used to and applied in such a way as to be hostile to the Christian faith. Chalmers is referring of course to the claim of infidels, ie, the materialists of his day who claimed that it is not likely that God would send His eternal Son to die for the puny occupiers of so insignificant a province in the mighty field of His creation. (5)

The second *Discourse* is entitled 'The Modesty of True Science'. This *discourse* is built around the work of Isaac Newton. Newton's real greatness, claims Chalmers, lay in
his scientific method and all big discoveries had their origin in this method. The anti-theistical claim of the materialists from the time of Voltaire, claims Chalmers, rested on pure speculation and violated Newton's method. Voltaire had scathingly criticised Newton for his commentary on the Book of Revelation. Voltaire made Newton the butt of his gibes, saying that the work was a proof of the dotage of the human understanding. However, Chalmers did not see it that way at all. He considered Newton to be more scientific than Voltaire, not only because he avoided unverifiable speculations about other worlds, but because of his outlook on the Christian faith. Voltaire is guilty of baseless and unverifiable assertions.

In the third Discourse, entitled "The Extent of the Divine Condescension", he accepts for the sake of argument the unprovable hypothesis that the divine plan of Salvation has been put into operation on our earth alone. He asks, "Is there anything here which is really incredible to the intellect?" Discourses four, five and six assist the argument that the principal purpose of revelation is not to give information about far distant places in creation, but to inform us of our fearful guilt and danger and to lay before us God's overtures of reconciliation.
There are a number of Discourses of a kindred character in Vol. 7 of Chalmers' collected works which were not part of the original Astronomical Discourses delivered in 1816. These other discourses are:

"The Constancy of God in His Works, an argument for the faithfulness of God in His Word." pp. 203-233

"On the Consistency between the efficacy of prayer - and the uniformity of nature." pp. 234-262

"The transitory nature of visible things." pp. 263-279

"On the new heavens and the new earth." pp. 280-299

"The Nature of the Kingdom of God." pp. 300-319

"Heaven, a character and not a locality." pp. 320-338

"On the reasonableness of faith." pp. 339-358

Perhaps the two most important are Discourses 1 and 2, as these deal with the doctrine of uniformity.

From this cursory look at the Discourses, it is self-evident that Chalmers is defending the Christian doctrine of revelation as there were those who claimed that
it was not likely that God would send His eternal Son to
die for the puny occupiers of such an insignificant part of
the stellar universe. Throughout the *Discourses*, the term
"Infidel" is used to describe those who saw either no place
for God in the universe or those who held to the Deistical
school of thought. Chalmers was conversant with the
philosophies of the Infidels. Whilst a student at St.
Andrews, he had studied the works of Godwin, Voltaire,
Mirabaud and others. Mirabaud argued for an eternal
universe of mere matter and motion in which all the good
processes of nature were but the necessary evolutions of
the powers and properties in which all parts of nature had
been so endowed from eternity. What appeared as beneficent
design and contrivance were only harmonies which naturally
occurred, upon matter's original properties developing
themselves according to motion's immutable laws. (6) Such a
system of philosophy was truly atheistic, as it had no
place for a doctrine of revelation.

It is in the second *Discourse* in which Chalmers
specifically mentions Voltaire. Voltaire is seen as a
brilliant and specious person, "but withal superficial
apostle of Infidelity". (7)

Voltaire represented a movement which sought to destroy the
Christian notion of Revelation and to elevate REASON as a
new god, capable of governing all aspects of life and
scientific endeavour. There were those who advocated the abolition of religion, as the Christian Religion was founded on the ignorance of the laws of nature and was an obstacle to all progress. It was further believed that, as time progressed, revealing truth about nature, religion would gradually be overcome.

Theodore Besteman, a leading authority on the life and work of Voltaire, notes that Voltaire was far less interested in philosophical abstractions than in the immediate need to destroy fanaticism and superstition and to bring about the reign of law and justice. (8)

To Voltaire, God was irrelevant, as He could not be proved or disproved. There was great advantage in accepting God as a mere final cause and as a moral judge. Voltaire claimed that the idea of a God and the problem of proving or disproving his existence existed long before Christianity. Therefore he concludes that the validity of God exists independently "of this or that faith". (9) Irrespective of the argument in his Dictionnaire Philosophique that most of the great ones of the earth live as if they were atheists, he adds that everyone who has experience of the world knows that belief in God has not the slightest influence on war and ambition, interests and pleasures.
To the Enlightenment thinkers such as Voltaire, man and society were perfectible through the application of reason alone. God was clearly displaced by Reason. Marquis de Condorcet (1743-1794), a mathematician and friend of Voltaire, outlined nine stages of progress. While hiding from the Terror of Robespierre's secret police, he wrote, "We have witnessed the development of a new doctrine which is to deliver the final blow to the already teetering structure of prejudice. It is the idea of the limitless perfectibility of the human species". (10)

The most important of these, perhaps, is to have destroyed prejudices and to have redirected the human intelligence, which had been obliged to follow the false directions imposed on it by the absurd beliefs that were implanted in each generation in infancy by the terrors of superstition and the fear of tyranny.

All errors in politics and morals are based on philosophical errors and these in turn are connected with scientific errors. There is not a religious system nor a supernatural extravagance that is not founded on ignorance of the laws of nature. The inventors, the defenders of these absurdities could not foresee the successive perfection of the human mind. Convinced that men in their day knew everything that they could ever know and would
always believe what they then believed, they confidently supported their idle dreams on the current opinions of their country and their age.

Advances in the physical sciences are all the more fatal to these errors in that they often destroy them without appearing to attack them, and that they can shower on those who defend them so obstinately the humiliating taunt of ignorance.

At the same time the habit of correct reasoning about the objects of these sciences, the precise ideas gained by their methods, and the means of recognising or proving the truth of a belief should naturally lead us to compare the sentiment that forces us to accept well founded opinions credible for good reasons, with that which ties us to habitual prejudices or forces us to submit to authority. Such a comparison is enough to teach us to mistrust opinions of the latter kind, to convince us that we do not really believe them even when we boast of believing them, even when we profess them with the purest sincerity. This secret, once discovered, makes their destruction immediate and certain. (11)

These changes were well advanced in France. Man's reason, developed by scientific thought, had conquered religious fanaticism and political tyranny. Condorcet and Voltaire
and other of like mind believed that the progress of science had no limits and would eventually remove the sources of man's misery and usher in unusual happiness. Religion, superstition, priests and despots would all continue to fall before advancing science and reason; man's enslavement by prejudice would be replaced by enlightenment and liberty.

Voltaire's major contribution was to discover this principle of reason and to broadcast it urbi et orbi (the city and the world). (12)

Such a philosophy had no place for the Christian doctrines of Revelation. God as conceived by the Christian Church was of little or no value except for framing a system of morality. If God existed at all, he was at best the God of Deism.

Chalmers was also mindful that Voltaire adapted the same method of attack against the Christian revelation as the English Deists. (13)

N.L. Torrey argues that Voltaire borrowed extensively from the apocryphal codes of Fabricus (14) and thereby drew upon himself a greater reputation for learning than he might have secured from following Toland's more popular work. Without Fabricus, much of Toland's thought and spirit would
have been passed on to Voltaire through Peter Annet, who saw most clearly and developed the implications of Toland's researches.

As early as 1734, Voltaire had accepted Anthony Collins' argument that not a single prophecy of the Old Testament could be considered as referring to Jesus or as being fulfilled by him. He also had read Baron d'Holbach's adaption of Collins' *Grounds and Reasons of the Christian Philosophy and Scheme of Literal Prophecy Considered*. (15) In turn, Collins' work had a marked impression upon Annet and Woolston. It was Woolston who ridiculed the miracles and Voltaire reduced the ridicule to short witty sarcasm.

Matthew Tindal's work, *Christianity as Old as Creation* was another important source for Voltaire. Tindal tried to show the inferiority of the revealed Scriptures by noting the barbarities and cruelties of the Jews, the questionable conduct of the prophets and the contradictions and immoralities of Christ's teaching. Voltaire magnified these aspects of Tindal's work. (16)

The source of information and method drawn from the English Deists, says Torrey, fortified Voltaire's conviction that the "Christian religion, like other revealed religions, was founded on fraud and imposture and that the history of the Church was fundamentally unreliable. It convinced him that no comfort could be found for the orthodox in the arguments
drawn from miracles and the prophecies..." (17).

It is understandable why Chalmers was anxious to refute arguments such as these. From the Christian standpoint, such arguments bring God down to the level of man's comprehension, "God would be clothed in the impotency of man"..."we would transfer to his wonderful mind all the imperfection of our own faculties. When we are taught by astronomy that He has millions of worlds to look after, and thus to add in one direction to the glories of his character, we take away from them in another, by saying that each of these worlds must be looked after imperfectly". (18)

It would seem, therefore, that Chalmers, seeing the unsettling aspects of Science, especially Astronomy on society, found it necessary to refute the arguments of the "Infidels" on two counts:

a) because believing in a Creator God who created all things including natural law, it was inconceivable that science could be in any conflict with the Revealed Christ of faith;

b) because the philosophical base for the objection lay in English Deism. Chalmers claimed that the Infidel's argument had no scientific credibility.
There is no doubt that Chalmers understood that Deism was a most significant problem, though it may not have been recognized among the public. The fundamental arguments of the Infidel philosophy, which uses the vehicle of science in order to eclipse the Christian Revelation in the New Testament and all the Deism which is grafted upon it, is a "contempt for the Gospel and is associated with the flippancy of superficial acquirements". (19)

Chalmers acknowledges the widespread influence of this philosophy throughout Britain when he describes it as a "superficial philosophy ... possessing the spirit of anti-Christ into many of the literary establishments of the age" (20).

This philosophy, argues Chalmers, spurns the authority of the Bible and its doctrine; the New Testament is eclipsed i.e., the message of Revelation through Christ, the miracles, etc; the attributes of evidence of power are retracted, implying that God has no ultimate control over the created order. To do this, argues Chalmers, is to "clothe God in our impotency". (21) Such belief is characteristically identical with Deism.

93
Whilst it is acknowledged that Deism was a very influential movement during the 18th century and formed an important component in Voltaire's philosophy which promoted the writers of "man's reasoning power", especially in the sciences, at the expense of Revelational theology, it must be stated on the other hand that the Deist school of thought was dealt serious blows at the hands of David Hume and Bishop Butler. The Deist movement could not survive the transformation of Lockian philosophy at the hands of David Hume. Deism had arisen through the application of Locke's philosophy to the subject matter of religion. Its position ceased to be tenable, so soon as that philosophy was found to issue in general scepticism. The common person whom Chalmers was addressing would, in all probability, be quite unaware of the philosophical implication of either Hume or Butler. To the common mind, the conclusion of scientific enterprise confirmed the widespread scepticism which had been generated in the previous century and the average person concluding that there was a serious conflict between science and religion.

Chalmers outlines clearly four arguments which the Infidels put forward, which militate against the assumptions of the believer. The four questions are:-
i) "Is it likely, asks the Infidel, that God would send his eternal Son to die for the puny occupiers of so insignificant a province in the mighty field of his creation?

ii) Are we the befitting objects of so great and so signal an interposition?

iii) Does not the largeness of that field which astronomy lays open to the view of modern science, throw a suspicion on the truth of the gospel history? and

iv) How shall we reconcile the greatness of that wonderful movement which was made in heaven for the redemption of fallen man, with the comparative meanness and obscurity of our species?" (22)

These four questions of the Infidel operate on the assumption that the final reference point for all interpretation is located in the mind of man. In the four questions stated, it is man who wants to ask the questions relating to the estimate of man; the issues of time and space; and reconciliation. This is in contrast to Chalmers who sees the reference point of all interpretation located in the mind of God. It is God who has created with a purpose and cares for his creation in a providential way.
Although the Discourses were delivered in grand style, as David Cairns suggests, they were "somewhat repetitive but splendid and flamboyant oratory and occasionally almost toppling over into the absurd... they gave the reader a vivid sense of the power and passion of Chalmers as an apologist and as a preacher" (23), and despite the fact that the published version had an immediate success, there was never the less criticism from a critique in the Eclectic Review and other journals. John Foster blamed Chalmers for "dragging into notice a stale and impotent objection against the truth of the Christian religion, and giving a wide spread by his discourses to an argument which, so far as we can find, is almost unknown". (24)

The Monthly Review offered the reading public a scathing critique of the Discourses. Having quoted a passage from the Discourses, the reviewer says --

"When the reader has taken time to peruse this passage, he will perhaps no longer wonder that the preacher, in his late visit to our metropolis, excited a burst of admiration, and occupied as much of the eager buzz in places of resort as if a new missionary of the gospel had actually arrived from the moon to bring us news from other worlds and to strike infidelity dumb. Dr. Chalmers, however, should recollect, that the vacant stare of the thoughtless and the idle is no proof of superior powers in him at whom they gaze, and that the applause of the frivolous or the ignorant is usually coincident with the disapprobation of the reflective and the wise. * * *
The unusual share of public attention which the 'Discourses' have accidentally attracted has induced us to allot more space to them than they would otherwise have merited or received; for we consider them as, on the whole, impotent in point of argument, and vicious in point of style. * * * The Doctor has acquired an ephemeral reputation, but it can be only ephemeral, at least in the southern part of our island, for it possesses none of the constituents of lasting fame. His mind is neither vigorous nor comprehensive; his sentiments are often grovelling and intolerant; and his diction never permanently attracts by real beauty, or nobly elevates by true sublimity."

In many respects, these criticisms have merit. Foster is correct that the Deistical debate was now a past issue, ever since David Hume levelled a broadside against the premises of natural theology (25A). It is also true that the general public were possibly unaware of these serious objections. However, the objections raised by the Infidels were well known in academic circles; it was only a matter of time before such atheistical philosophies began to filter through to a larger section of society. After all, Chalmers read these works of Godwin, Voltaire and others whilst an undergraduate.

Although I acknowledge the critique of Foster and others, I would advance a few reasons why Chalmers advanced the arguments contained in the Discourses.

It should be remembered that only a short time had elapsed between his 'conversion' and the delivery of the Discourses, some 6 - 7 years. In this period his priorities
of life were radically restructured. The Discourses reveal a mind of scientific understanding and a readiness to use his scientific knowledge to advance the kingdom of God. Hanna says that Chalmers' chief purpose in the Discourses after unfolding the wonders of the starry heavens was

"to illustrate and exalt the condescension and kindness of the Deity, and so to picture forth the magnitude of those interests which human salvation involved, and so to glorify that act of incalculable grace to which, for the effecting of this salvation, He has been pleased to stoop, as to throw around the character and doings of the God of the New Testament, the God and Father of our Lord Jesus Christ, a splendour far higher than even that which the sovereignty of the heavens confers. In doing so, another if not a higher service was rendered to the Christian cause than any which the mere force of triumphant reasoning could achieve." (26)

Despite the critique by the press, Chalmers was the first of the Evangelical preachers of the early 19th century to introduce the conclusions of modern science to the Scottish pulpit. The critics overlooked the importance of this point. As stated elsewhere in this thesis, Chalmers believed that there is nothing inconsistent with the truths of science and God's written revelation. Scientific investigation can only enhance man's understanding of the structure and governing laws of the universe which God has created. For the first time, the evangelical movement had a competent preacher, trained in the sciences, who could effectively answer the challenges of the broad churchmen and those who believed that Christianity and science were
mutually exclusive.

The first Discourse, as mentioned earlier in this chapter, is entitled "A Sketch of modern Astronomy." The content is based upon the research of William Herschel. Nowhere does Chalmers acknowledge that Herschel was the person responsible for the advancement of modern astronomy. Up until the time of Herschel, the interest of astronomers was almost exclusively fixed upon the Solar System. Since the days of Ptolemy the stars had been relegated to a secondary position within astronomical science. It was Herschel who unfixed the stars and showed that the stars could be thought of as objects arrayed in depth. The first event that foreshadowed the gradual shift of interest from the Sun's family to the stellar universe - which Herschel made clear - was the discovery by Halley in 1718 that four bright stars had altered their positions in the sky since the time of Ptolemy.

Chalmers makes a number of references to modern astronomy which can only be made with a detailed knowledge of Herschel's discoveries. In fact, Herschel's name is invisibly stamped upon every page of the first Discourse. There are two principal aspects of Chalmers' first Discourse which bears the undeniable imprint of Herschel. (1) References to the stellar universe with particular mention of the Sun's motion and the vastness of the
galactical system and that our Solar system is but one of many such systems within our own galaxy. (ii) References to the "Nebulae". In respect to (i) Chalmers makes the following statements:

"The heavenly bodies appear small to the eye of an inhabitant of this earth, only from the immensity of their distance. When we talk of hundreds of millions of miles, it is not to be listened to as incredible. For remember that we are talking of those bodies which are scattered over the immensity of space, and that space knows no termination. The conception is great and difficult, but the truth is unquestionable. By a process of measurement which it is unnecessary at present to explain, we have ascertained first the distance, and then the magnitude of some of those bodies which roll at the firmament." (27).

"We should learn not to look on our earth as the universe of God, but one paltry and insignificant portion of it." (28).

"Are they (the stars), luminous of themselves, or do they derive their light from the sun, like the bodies of our planetary system? Think of their immense distance, and the solution of this question becomes evident. The sun, like any other body, must dwindle into a less apparent magnitude as you retire from it. At the prodigious distance even of the very nearest of the fixed stars, it must have shrunk into a small indivisible point. In short, it must have become a star itself, and could shed no more light than a single individual of those glimmering myriads, the whole assemblage of which cannot dissipate and can scarcely alleviate the midnight darkness of our world. These stars are visible to us, not because the sun shines upon them, but because they shine of themselves, because they are so many luminous bodies scattered over the tracts of immensity - in a word, because there are so many suns, each throned in the centre of his own dominions, and pouring a flood of light over his own portion of these unlimitable regions." (29).
"Our sun is only one of these luminaries and we know that he has worlds in his train... Why may not each of them be the centre of his own system and give light to his own worlds?" (30).

In these statements is accepting a vastness of the universe which is far greater than the astronomers prior to Herschel could ever imagine. The incredible magnitude of the universe can only be appreciated in terms of light years. Chalmers could only have realized this after Herschel discovered that the stars had a life of their own, hence the statement that each star may be the centre of its own system and give light to its own worlds. If such a sun can only be seen by the naked eye as a small twinkling light, then its distance from earth must be infinitely greater than the distance between our earth and our own sun.

The magnitude becomes greater still when Chalmers considers the discovery of Herschel that our own system is but one of many such systems whirling through space.

During March 1783, Herschel announced to the Royal Society in a paper entitled On the Proper Motion of the Sun and Solar System, that the Sun is in fact moving through space towards that region of the sky occupied by the central part of the constellation Hercules (30A). This announcement was received with a degree of scepticism as the view was founded on insufficient data. However, his view was confirmed in two papers delivered to the Royal Society in
1805 and 1806 (30B). In the paper of 1805, entitled *On the Direction and Velocity of the Motion of the Sun and Solar System*, he refined his first result by the inclusion of 32 additional proper motions which were supplied by his friend Aubert, based upon the differences of position in the catalogues of Olaf Romer 1706 and Christian Mayer 1756. In the 1806 paper, entitled *On the Quantity and Velocity of the Solar Motion*, he attempted to define more precisely the direction of the Sun's motion as well as its velocity.

The principle upon which Herschel based his original idea was simple and is illustrated by J.B. Sidgwick:-

"If you drive at night down a long straight road, lit on either side by street lamps, you will notice that the combination of perspective and your own motion produces two quite different appearances when you look out through the windscreen in the direction of the car's motion, and out of the rear window in the direction from which it has come. In the former direction the lights on either side of your line of travel appear to be opening out: clustered close together in the far distance, they separate progressively up to the time that you pass them. Then, from the rear window, the reverse process is seen: the lights close in again, being clustered close together by the time that they vanish in the distance.

It was this principle that Herschel applied to discover the direction of the Sun's motion within the system of the stars scattered around it on all sides in space. His street lamps were the stars: if the Sun is in motion, the stars in the direction of this motion should exhibit the 'opening out' effect, whilst the stars in the diametrically opposite part of the sky should be 'closing in'." (31).
The following statement shows that Chalmers was very aware of the detail of Herschel's work. It is somewhat a long quotation but it is important to see Chalmers' understanding of Herschel and his belief, that such a system can only be explained in terms of a fiat creation by God.

"...each of our planets may have had its compound motion communicated to it by one single impulse; and, on the other hand, if ever the rotatory motion be communicated by one blow, then the progressive motion must go along with it. In order to have the first motion without the second, there must be a two-fold force applied to the body in opposite directions. It must be set a-going in the same way as a spinning top, so as to revolve about an axis, and to keep unchanged its situation in space. The planets have both motions; and, therefore, may have received them by one and the same impulse. The sun, we are certain, has one of these motions. He has a movement of revolution. If spun around his axis by two opposite forces, one on each side of him, he may have this movement, and retain an inflexible position in space. The planets have both motions; and, therefore, may have received them by one and the same impulse. The sun, we are certain, has one of these motions. He has a movement of revolution. If spun around his axis by two opposite forces, one on each side of him, he may have this movement, and retain an inflexible position in space. But if this movement was given him by one stroke, he must have a progressive motion along with a whirling motion; or, in other words, he is moving forward; he is describing a tract in space; and, in so doing, he carries all his planets and all their secondaries along with him.

But, at this stage of the argument, the matter only remains a conjectural point of speculation. The sun may have had his rotation impressed upon him by a spinning impulse; or, without recurring to secondary causes at all, this movement may be coeval with his being, and he may have derived both the one and the other from an immediate fiat of the Creator. But there is an actually observed phenomenon of the heavens, which advances the conjecture into a probability. In the course of ages, the stars in one quarter of the celestial sphere are apparently receding from each other; and, in the opposite quarter, they are apparently drawing nearer to each other. If the sun be approaching the former quarter, and receding from the latter, this phenomenon admits of an easy explanation; and we are furnished with a magnificent step in the scale of the Creator's workmanship. In the same manner.
as the planets, with their satellites, revolve round the sun, may the sun, with all his tributaries, be moving, in common with other stars, around some distant centre, from which there emanates an influence to bind and subordinate them all. They may be kept from approaching each other, by a centrifugal force; without which, the laws of attraction might consolidate, into one stupendous mass, all the distinct globes of which the universe is composed."

(32).

Considering the content of this statement it could well be said that William Herschel was the preacher in the Tron Church. Chalmers makes no acknowledgements to Herschel at all. By today's standards this is unacceptable, but it must be remembered that in Chalmers' day referencing acknowledgements in scientific work was not deemed to be all that important. Chalmers is not isolated in this practice. George Hill's *Lectures in Divinity* has very few references and George Campbell's *Ecclesiastical History* has no references at all (31A).

In respect to point ii) i.e. references to the Nebulae, Chalmers claims that the discovery of the Nebulae is the finding of "...more recent observations of astronomy." (32). He is aware of the implications of this discovery for the structure of the universe.

"We allow that it is but a dim and indistinct light... The universe might appear to have been composed of an indefinite number of suns, about equi-distant from each other, uniformly scattered over space and each encompassed by such a planetary attendance as takes place in our own system."

104
Although this is what was thought to be the case, the most recent observations suggest that they are arranged into distinct clusters and

"...in the same manner as the distance of the nearest fixed stars so inconceivably superior to that of our planets from each other, marks the separation of the solar systems so the distance of two contiguous clusters may be so inconceivably superior to the reciprocal distance of those fixed stars which belong to the same cluster, as to mark an equally distinct separation of the clusters and to constitute each of them an individual member of some higher and more extended arrangement." (34).

It is clear that Chalmers traces the progress of Herschel's discovery. On December 9th 1784, Herschel presented to the Royal Society his first Catalogue of One Thousand New Nebulae and Clusters of Stars (34A). The discovery of such clusters only enhanced Herschel's theory to proceed to adequate explanations of the structures of the universe. His paper to the Royal Society in February 1785 entitled On the Construction of the Heavens, made an analysis of the clusters on the following assumption:--

"...of uniform stellar distribution established the disc theory on a firm observational basis: 'That the milky way is a most extensive stratum of stars of various sizes admits no longer of the least doubt; and that our sun is actually one of the heavenly bodies belonging to it as evident.' This 'stratum of stars' was revealed as a roughly lens-shaped structure with a diameter rather more than four times its central thickness; on one side it is split in its median plane to a depth of about one-quarter of its diameter (the Cygnus rift); and near, but not at, the centre of this
vast, flattened cloud of stars lies the Sun." (35).

Herschel was of the opinion that all the nebulae were star clusters and the tendency of stars to congregate into isolated clusters was the result of gravitation acting throughout the universe. This disc theory of 1785 has to be modified later, as Herschel gradually realized that stellar distribution could not be taken as even approximately uniform and all nebulae are resolvable into stars.

It is obvious that Chalmers was abreast of all the latest research from Herschel. He was aware of the first idea of uniformity of star distribution and the modification of that first theory. Chalmers notion of gravity being the explanation of the stars congregating into clusters also a 'lift-out' from Herschel's work.

It is with a real sense of wonderment that Chalmers says

"...the mansion which accommodates our species might be so very small as to lie wrapped in microscopical concealment; and, in reference to the only Being who possesses this universal eye, well might one say 'What is man, that thou art mindful of him; or the son of man, that thou shouldst deign to visit him?'" (36).

The evidence is too overwhelming to deny that Chalmers was the first of the great Scottish Evangelical preachers to use up-to-date astronomical research in the Scottish pulpit. The evangelical preachers from the turn of the
century to 1816 followed a style of proclamation which avoided the challenging issues of science; their content was confined to the great Biblical themes of the Doctrines of Man, Soteriology, Judgement, etc. This is well illustrated by the undisputed leader of the evangelical movement in the Church of Scotland during the early years of the 19th century, the Rev. Dr. Andrew Thomson (1778-1831), minister of Sprauston 1802-8, Perth 1808-10, New Greyfriars, Edinburgh, 1810-14 and St. Georges, Edinburgh 1814-31. Under the leadership of Thomson the evangelists established forums for discussion in order to educate the new generation of public opinion. The evangelists founded the Edinburgh Christian Instructor, a monthly evangelical literary review.

The content of Thomson's sermons can be well illustrated in two sermons delivered in February 1817. The title was Sin and Danger of being Lovers of Pleasures more than Lovers of God (37). These sermons constitute classical explanatory preaching. In this instance from II Timothy, 3:4, Thomson calls upon his members to examine themselves as to whether they have transgressed the moral law given by God in Deuteronomy 6:5. He warns of the dangers of self-deception and indulging in innocent pleasures improperly or to excess. Thomson exhorts his listeners to possess a healthy regard for divine authority and to the interests of practical guidelines which will lead to self-denial. The
primary principle by which Christians are to live is the
command,

"Thou shalt love the Lord Thy God with all thy heart
and with all thy soul and with all thy strength and
with all thy mind."

This, says Thomson, is the foundation of all religious and
moral duty and is binding upon every individual. The great
object of Thomson in these sermons is to see a forsaking of
evil pleasures:

"My first and only wish is that you should cast them
from you and give them to the winds... My heart's
desire and prayer for you is, that you may be saved
and for that end I would address you with all boldness
and with all earnestness." (38).

Chalmers gained the reputation as being the greatest
preacher in Scotland. This reputation was achieved through
the Astronomical Discourses. This reputation was not only
achieved by his brilliant oratory which was compared to
Demosthenes, Cicero, Burke and Sheridan (39) but also
because it supplied answers to an audience which had been
perplexed and confused about the interrelationships
between science and the Christian Revelation. Chalmers' critics may well have been correct in respect to the
educated, but the popularity of the Discourses indicate an
eagerness on the part of common people to understand that
science posed no threat to the Christian faith. Such was
Chalmers' understanding of people's needs, people flocked
to hear him preach. His popularity was such that at his
farewell sermon in Glasgow, over 3000 people crammed the
church which seated only 1700. A regiment of soldiers were
called upon to control the crowds.

Hanna is undoubtedly right as Chalmers brings to the fore
in Discourses 6 and 7 the importance of the Gospel of Jesus
Christ as it relates to humanity. Chalmers argues that an
understanding of God's creative power in the universe and
the acknowledgement of the failure of the Infidels' philosophy is not sufficient until man is a "hearer and a
doer of God's Word".

"Think it not enough, that you carry in your bosom an
expanding sense of the magnificence of creation. But
pray for a subduing sense of the authority of the
Creator. Think it not enough, that with the justness
of a philosophical discernment, you have traced that
boundary which hems in all the possibilities of human
attainment, and have found that all beyond it is a
dark and fathomless unknown. But let this modesty
of science be carried, as in consistency it ought, to the
question of revelation, and let all the antipathies of
nature be schooled to acquiescence in the authentic
testimonies of the Bible. Think it not enough, that
you have looked with sensibility and wonder at the
representation of God throned in immensity, yet
combining, with the vastness of his entire
superintendence, a most thorough inspection into all
the minute and countless diversities of existence.
Think of your own heart as one of these diversities;
and that he ponders all its tendencies; and has an eye
upon all its movements; and marks all its waywardness;
and, God of judgment as he is, records its every
secret, and its every sin, in the book of his
remembrance. Think it not enough, that you have been
led to associate a grandeur with the salvation of the
New Testament, when made to understand that it draws
upon it the regards of an arrested universe. How is it
arresting your own mind? What has been the earnestness
of your personal regards towards it? And tell us, if all its faith, and all its repentance, and all its holiness, are not disowned by you? Think it not enough, that you have felt a sentimental charm when angels were pictured to your fancy as beckoning you to their mansions, and anxiously looking to the every symptom of your grace and reformation. Be constrained by the power of all this tenderness, and yield yourselves up in a practical obedience to the call of the Lord God, merciful and gracious. Think it not enough, that you have shared for a moment in the deep and busy interest of that arduous conflict which is now going on for a moral ascendancy over the species. Remember that the conflict is for each of you individually; and let this alarm you into a watchfulness against the power of every temptation, and a cleaving dependence upon Him through whom alone you will be more than conquerors. Above all, forget not, that while you only hear and are delighted, you are still under nature's powerlessness and nature's condemnation -- and that the foundation is not laid, the mighty and essential change is not accomplished, the transition from death unto life is not undergone, the saving faith is not formed, nor the passage taken from darkness to the marvellous light of the gospel, till you are both bearers of the word and doers also. "For if any be a hearer of the word, and not a doer, he is like unto a man beholding his natural face in a glass: for he beholdeth himself, and goeth his way, and straightway forgetteth what manner of man he was." (40)

It is to be remembered that by 1816 Chalmers was greatly concerned with the constant claims that science and religion were incompatible, especially in common conversation and that it caused "serious perplexity" on the part of many people.

In the Preface of the Astronomical Discourses, Chalmers acknowledges that there is in the minds of many, in private conversation, a "serious perplexity" and "alarm" over the astronomical objections against the truth of the Gospel.
He says there is an imposing splendour in the Science of Astronomy, and it is not to be wondered at, if the light it throws or appears to throw over other tracts of speculation than those which are properly its own, should at times dazzle and mislead an enquirer. It is the "air of philosophical greatness" of the astronomical objections among the young people which destructively allures the young, the ardent and the ambitious.

In the chapter on the "Modesty of True Science", reference is made to the effectiveness of infidel philosophy. He says, "Infidelity has now got down among us to the humblest walks of life". He argues that it can now be seen to be audacious enough to attack the "priesthood" and manipulate the Bible and "bid stout defiance to all its denunciations". (41)

The early part of the 19th century was a time of flux for many thinkers due to advances in many areas of philosophy, science and theology. Of particular importance was the advance in the science of Astronomy. In his first Discourse, Chalmers argues that man should learn that the planet earth is but one paltry and insignificant portion of the universe which astronomy has made visible through the mighty telescope. "It is only one of the many mansions which the Supreme Being has created for the accommodation
of his worshippers and only one of the many worlds rolling
in that flood of light which the sun forms around him to
the out limits of the planetary system". (42)

Perplexity of mind among the populace had been of concern
to Chalmers for some years. During 1812 he wrote of his
concern in the Edinburgh Christian Instructor

"Men of tasteful and cultivated literature are
repelled from theology at the very outset by the
unseemly garb in which she is presented to them. If
there be room for the display of eloquence in urgent
and pathetic exhortation, in masterly discussion, in
elevating greatness of conception, does not theology
embrace all these, and will not the language that is
clearly and appropriately expressive of them possess
many of the constituents and varieties of good
writing? If theology, then, can command such an
advantage, on what principle should it be kept back
from her?... In the subject itself there is a grandeur
which it were vain to look for in the ordinary themes
of eloquence or poetry. Let writers arise, then, to do
it justice. Let them be all things to all men, that
they may gain some; and if a single proselyte can be
thereby drawn from the ranks of literature, let all
the embellishments of genius and fancy be thrown
around the subject. One man has already done much.
Others are rising around him, and with the advantage
of a higher subject, they will in time rival the
unchristian moralists of the day, and overmatch them."
(43)

These words are prophetic if the "one man" in the last
sentence is a reference to himself; there is no reason to
suspect that this is not the case. Despite the criticisms
the Discourses received, Chalmers was able to fulfil the
sentiments expressed in the Christian Instructor in 1812.
He used his knowledge of the sciences and presented Bible
truths in a novel way which captivated the reading public. Hanna notes that Hazlett is reported to have said, "These sermons ran like wildfire through the country, were the darlings of watering-places, were laid in the windows of inns and were to be met with in all places of public resort." (44)


(4) Holy Bible, KJV Version.


(10) Quoted by Francis Schaeffer, How Shall We Then Live, (Fleming Revell, New Jersey, 1976), p. 121.


(12) Besteman, op. cit., p. 369.

(13) This is the conclusion drawn from the comparative study of Voltaire and the English Deists; see N.L. Torrey, Voltaire and the English Deists, (Mareton Press, Oxford, 1963).

(14) J.A. Fabricius, 1668–1736, was the greatest of the 18th century bibliographers. This German classical scholar's masterpiece was his Bibliotheca Graeca.

(15) It is to be remembered that Chalmers had read Thomas Godwin's work on social justice in the 1790's. Godwin was d'Holbach's disciple in England. Chalmers was very impressed and motivated by the work during his undergraduate years.
(16) Most of this information is drawn from N. Torrey's work already quoted. See pp. 199-206.


(25A) See D. Hume, Dialogues Concerning Natural Religion.


(31) J.B. Sidgwick, William Herschel, (Faber and Faber, Lon., 1953), p. 113.


(33) Chalmers, *op. cit.* p. 35.


(34A) Chalmers, *op. cit.* p. 35f.


(36) Chalmers, *ibid.* p. 36.


Hazlitt, 1778-1830 was a popular English writer remembered for his essays which are of permanent value for their analytical and sensitive appeal. From 1811 he became established as a foremost critic, journalist and essayist.
In the preceding chapter, mention was made of some of the criticisms which were levelled at Chalmers upon the preaching and publication of the *Discourses*. Note should be made of the fact that Chalmers preached the *Discourses* at a time of great flux due to developments in philosophy, science and theology. It is true that the majority of the population may not have been aware of the philosophies of Godwin, Voltaire or the details of English Deism, but the educated class of society were certainly aware of the new philosophies. There were the new ideas being promulgated by theologians on the Continent and also the exciting developments in astronomy, each contributing to the state of flux.

Sufficient has been said in previous chapters to indicate the challenges of atheistic and deistic philosophy to the traditional Christian doctrines of Revelation. Some mention must now be given to developments in science and theology.
The improvements of scientific instruments, especially in the field of astronomy, led Chalmers to ask, "Who shall assign a limit to the discoveries of a future age? Who can prescribe to science her boundaries, or restrain the active and insatiable curiosity of man within the circle of his present requirements?" (1). The achievements of contemporary astronomy had been astonishing. Chalmers sees clearly and appreciates the immeasurable distances which astronomy has placed before the observer and illustrates his appreciation with the analogy of the velocity of a cannon ball -- "If a body were projected from the sun with the velocity of a cannon ball, it would take hundreds of thousands of years before it described that mighty interval which separates the nearest of the fixed stars from our sun and from our system". (2) The calculation of these distances are so great that "the mind feels its own impotency in attempting to grasp them. The numbers can only be demonstrated by the powers of a most rigid and infallible geometry". (3)

To illustrate the vastness of the universe in contrast to the globe on which we live, Chalmers states that the stars which we observe in the darkness of our earthly night, produce their own light, they do not derive their light from our sun like the planets in our system. This means that the sun in our system is only a star itself and could "shed no more light than a single individual of those
glimmering myriads, the whole assemblage of which cannot
dissipate and can scarcely alleviate the midnight darkness
of our world." (4) Each star may be, says Chalmers, the
token of a system as vast and as splendid as the one which
we inhabit and speculates that their worlds must be the
mansions of life and of intelligence.

Chalmers seems to be quite taken with the recent discovery
of nebulae. Until this discovery, the universe might have
appeared to have been composed of an indefinite number of
suns, about equi-distant from each other, uniformly
scattered over space; and each encompassed by such a
planetary attendance as takes place in our own system. 'But
the discovery of nebulae, though a dim and distant light,
suggests that instead of the universe lying uniformly, and
in a state of equi-distance from each other, they may be
arranged into distinct clusters -- that, in the same manner
as the distance of the nearest fixed stars so inconceivably
superior to that of our planets from each other, marks the
separation of the solar systems, so the distance of the two
contiguous clusters may be so inconceivably superior to the
reciprocal distance of those fixed stars which belong to
the same cluster, as to mark an equally distinct separation
of the clusters and to constitute each of them an
individual member of the same higher and more extended
arrangement.' (5)
Chapter Three has already shown that Chalmers was intimately acquainted with contemporary astronomy and its revelations. It will be worthwhile to note how this science advanced and how it naturally captured the attention of the common person.

Practical and theoretical astronomy advanced simultaneously in both England and France during the late 18th and early 19th Centuries. As each country spurred the other on, the tools for modern astronomy were improved (telescope, quadrant and calculus). This was the time when Chalmers was devoted to mathematics, at the universities of St. Andrews and Edinburgh. Edinburgh at that time was enjoying the reputation as being perhaps the leading university in Europe for the teaching of mathematics. Further, his knowledge of French was of immense value in the study of mathematics.

The science of astronomy had by 1816 brought some conflict between science and religion. Astronomy had become popular from the time of William Herschel. It was he who gave astronomy a new direction and a fresh impetus to thought. There were a number of events that occurred which culminated in public excitement in astronomy.
* The predicted return of Halley's comet in 1759 verified, in an unprecedented fashion the computations of astronomers; it marked the astronomers as denizens of the solar system.

* The transits of Venus in 1761 and 1769 were discoveries which excited the popular scientific mind.

* Imposing preparations, journeys to remote and inaccessible regions, official expeditions, international communications all for the purpose of observing the latest planetary discoveries, brought astronomers' high significance widely to the public consciousness.

* The facile pen of Lalande, in rendering intelligible the means by which these elaborate arrangements were to issue in an accurate knowledge of the sun's distance from earth.

* Herschel's discovery of Uranus, 13 March, 1781, had the surprising effect of utter novelty. The event broke with "immemorial traditions and seemed to show astronomy as still young and full of unlooked-for possibilities".

Further popularity accrued with Herschel's work --
huge telescopes, which detected two Saturnian moons and as many Uranian moons;

* his scrutiny of the sun;

* his discovery of stellar revolving systems;

* his bold soundings of the universe;

* his grandiose ideas;

all of which were conveyed in "elevated, yet simple language". The popular excitement for astronomy was not confined to Britain, but gradually spread to Germany. Lalande, by his popular lectures and treatises helped to form an audience which Laplace himself did not disdain to address in the Exposition du Système du Monde. All this gave the impulse to a rapid progress of Astronomy in the 19th Century. (6) By the turn of the century, the number of star watchers had multiplied, observatories were located in many parts of the world and associations were formed for mutual help and counsel.

A formal astronomical congress met in 1798 at Gotha and the Astronomical Society of London was formed in 1820. Prior to the first public meeting of the Society in London, a paper was distributed to explain the objects it proposed. Specific mention was made of the "extensive progress of astronomy" and that it had attracted a large share of public attention "owing to the great perfection which the construction of optical instruments has attained in England and the taste for scientific research universally prevalent.
and number of private and public observatories in which the celestial phenomena are watched and registered with assiduity and accuracy.

Due to difficulty of publication, much of this valuable research "must inevitably perish or at least remain buried in obscurity, and be lost to all useful purposes". (7) Therefore, there was the need for the Society to be formed.

Astronomy had opened up the heavens so wide that the Psalmist's words

"when I consider your heavens, the work of your fingers, the moon and the stars, which you have set in place, what is man that you are mindful of him, the son of man that you care for him? You made him a little lower than the heavenly beings and crowned him with glory and honour" (8) took on new meaning for "believers".

Chalmers' sketch of contemporary astronomy in his first Discourse obviously appealed to that section of the public who were interested in the emerging science of astronomy. It meant that Chalmers' preaching was relevant to his day and was prepared to introduce contemporary issues into the pulpit. Despite the critiques which appeared on the Discourses, the fact remains that those who had been led to believe that astronomical science and Biblical revelation
were incompatible, now received from a notable preacher, who was also a notable man of science, a view which strongly defended the compatibility of science and revelation. Serious thinkers were forced to think again.

Contributing to the state of flux at the turn of the 19th century, was the emerging science of Geology. In Edinburgh, the influential geologist James Hutton put forward a thoroughgoing uniformitarian account of the earth's crust. His theory was one of stability; "oceans become solid land, and solid land sinks down to become sea bed. The world, like a living body, renovates itself in the endless repetition of geological cycles; it has perpetual youth; continents come and go, but the earth as a system shows no sign of decay. The same wisdom is also manifest in the animal and vegetable kingdom". (9) According to Hooykaas, Hutton rejected cosmological speculation, his data was drawn by a thoroughgoing investigation of the earth's crust and professed to draw from them the conclusion that "we see no vestige of a beginning, no prospect of an end". (9A)

Hutton was accused of atheism and representing the world as the result of chance or of necessity and not as a divine plan, despite the declaration in his 'Abstract of a Dissertation concerning the System of the Earth' that this world had neither a beginning, nor an end." (10)
What is noticeable in Hutton's theory is the "wisdom that presides over nature...it gives consistency to the rest, by proving that equal foresight is exerted and that no less care is taken to maintain the constitution of the earth, than to preserve the tribe of animals and vegetables which dwell on its surface". (11)

Hutton's views were well known in Edinburgh at the turn of the 19th century. He died in 1798 and his cause was taken up by his biographer, John Playfair. It is to be remembered that at about this time, Chalmers was well aware of Hutton's views and is intimately acquainted with the contemporary issues in geology. Discussing the crystallization of rocks, he notes that there has been considerable controversy. It was common opinion that the crystallised matter was at one time a liquid state, but the controversy centred on the solvent power, or whether the matter in question had been melted by heat or dissolved by water. With this, however, and many other diversities, there seems to have been a very general agreement amongst all -- with the exception of those who have been termed the Mosaic geologists -- that this earth has been the theatre of many and great revolutions --that the present economy of things has arisen from a chaos brought on by the last of these, but that each of the former catastrophes was also succeeded by a peculiar economy of its own, that in like
manner as now, the innumerable rivers which are wearing
down our present land, bearing it down in sediment, and
spreading it in successive layers over the bottom of the
sea, and so as to form the strata of the next order of
things which will come after the present one, in like
manner, under each of the former economies, strata were
deposited in the same way, and so as to form the materials
of that economy by which it was succeeded and replaced. (12)

It is undeniable that Chalmers was very well aware of
current issues in contemporary science and the disturbance
which new ideas caused among clergy and laity alike (see
Chapter Three).

As these new ideas of science continued to progress, so the
traditional Christian view of Creation continued to lose
acceptance as an explanation of the beginning of the
universe, and the Christian doctrine of Revelation began to
give way to the conclusions of science.

Traditional Christian orthodoxy during the 19th century was
also in a state of flux due to new ideas emerging from the
continent. These new ideas assisted those who wished to
promote contemporary scepticism as the ideas cast serious
doubt upon the orthodox view on the authority and
inspiration of scripture.
During the 18th century, there was a gradual development of the techniques of literary and historical criticism of ancient records. The development of modern critical historical methods was begun by scholars working on the Biblical text. Some of these scholars were rationalists whose aim was to destroy the credibility of the Biblical history. J.D. Michaelis, was one such person who in 1750 published his *Introduction to the New Testament*. By 1753, a French Catholic, the physician Jean Astruc, had published (anonymously) his analysis of the two sources of the Book of Genesis (now known to Bible students as J & E). The new critical history was by the 1750's well on the road to greater development. The names of J.C. Gatterer, J.S. Schlozer and J.S. Semler were responsible by genuinely combining the critical historical approach with real penetrating acumen. (11) In 1780, there appeared *Education of the Human Race*, written by G.E. Lessing. This publication marked a turning point in the development of human thought. Lessing taught that revelation both in Scripture and afterward meant progressive enlightenment. The Old Testament was only a preliminary stage in the process, notable for the childhood of the human race. The New Testament marks a higher stage, but it will itself be superseded by the coming of a genuinely rational awareness of the divine purpose of mankind.
This new school of thought known as Higher Criticism was disturbing to Church leaders in Britain, mainly because it was associated with the views of extreme rationalists, propagandists such as H.S. Reimarus (1694 - 1768) and H.G. Paulus (1761 - 1851) who sought to use the new historical approach to Biblical literature in their assault on traditional Christian doctrine. J. Strachan notes that the new movement tended to be discredited in Scotland due to the publication of the work of Alexander Geddes, a Scottish priest, educated in Paris, where he studied Hebrew at the Sorbonne. Strachan says that "He was a remarkable man and no mean scholar, who certainly deserves to be remembered among the pioneers of criticism; but by excess of zeal -- the Perfervidum Ingenium Scotorum -- he led criticism astray, and tended on the whole to discredit the movement. Scorning the timid theory of Astruc and Eichhorn, -- that Moses used only two fundamental documents in the composition of Genesis -- he launched the hypothesis that the whole Pentateuch was nothing but a collection of loose scraps, of various age and worth, probably combined in the time of Solomon. He had no difficulty in pointing out an immense number of these originally independent fragments, in the conjunction of which he saw no orderly plan or leading motive. He thus became the author of the 'Fragment Hypothesis', which was introduced into Germany by Vater, who translated or paraphrased a large part of Geddes'
Critical Remarks. Vater thought the Book of Genesis was composed of thirty-nine fragments. The theory made much noise for a time, but received its death-blow at the hands of the greatest Old Testament scholar of last century, Heinrich Ewald of Gottingen, in his *Die Composition der Genesis kritisch untersucht*, which he wrote when he was a youth of nineteen (1823). Geddes's opinions cost him his priestly office. Aberdeen consoled him with a Doctorate of Laws. (14)

Developments in the rapid progress of the sciences, particularly astronomy and geology, and the new theories in historical criticism, especially in Biblical studies all contributed to the 'state of flux' and uncertainty in the minds of many, especially within the Churches.
ACKNOWLEDGMENTS - Chapter 4


8 Psalm 8: 3-5, The Holy Bible, New International Version.


9A Ibid.

10 Ibid.


CHAPTER 5

THE INFIDELS ANSWERED

It is the scientific method of Newton which Chalmers employs to expose the error in the Infidels' objections. Where is the evidence? - asks Chalmers. "How do infidels know that Christianity is set up for the single benefit of this earth and its inhabitants? How are they able to tell us, that if you go to other planets, the person and the religion of Jesus are there, unknown to them?" (1)

Chalmers argues that the assertions of the infidel are not consistent with the maxims of their own philosophy. "They have made their argument against us, out of an assertion which has positively not ascertained fact to rest upon, an assertion which they have no means whatever of verifying - an assertion, the truth or falsehood of which can only be gathered out of some supernatural message, for it lies completely beyond the range of human observation." (2) Astronomers who uphold the "infidels" notions "transgress the limits which Newton forbears to enter". (3) Needless to say that Chalmers, a practising scientist turned theologian/ preacher, uses Newtonian maxims to best advantage from the pulpit.
Chalmers claims that Newton possesses in the public mind a kind of mysterious greatness, primarily due to the force of his understanding of scientific issues. It is unfortunate that the same public mind is unaware of the reasons why this "mysterious greatness" has been conferred upon him. There is a great need, says Chalmers, that the public mind be told the distinctive features of Newton's philosophy so that "they may borrow from his safe example and how to profit by that superior wisdom which marked the whole conduct of his understanding". (4) His greatness was located in his sagacious spirit "to perceive, and the vigour to lay hold of the proofs", (5) for the mechanism of the planetary system and the composition of light. He conferred upon these doctrines "all the establishment of a most rigid and conclusive demonstration". (6)

Chalmers claims that the philosophy of the Infidels has not proceeded on the principle of observation and proof which was the distinguishing feature of Newton's philosophy, rather they have "debated and dogmatized with all the pride of a most intolerant assurance". (7)

The Astronomical objections which Infidelity has professed against the truth of Christianity contain two essential components: there is an assertion which is, that Christianity is set up for the exclusive benefit of our
solitary world; and there is an argument which is, that God
would not lavish such a quantity of attention on so
insignificant a field.

Chalmers argues that if the assertion were admitted, the
objection has serious difficulties due to the lack of
evidence, as already quoted. He asks

"how do infidels know that Christianity is set up for
the single benefit of this earth and its inhabitants?
How are they able to tell us, that if you go to the
other planets; the person and the religion of Jesus
are there unknown to them? We challenge them to the
proof of this announcement". (8)

The assertion and argument of the Infidels does not comply
with the maxims of Newtonian philosophy. There are no
facts, there is an assertion which can not be verified in
any way.

The theology of other planets is, as Chalmers says, as
inaccessible a subject as their politics or their natural
history. The objection is therefore grounded upon an
assumption which can have no influence on the thinking of a
mind which is trained in the "rigorous school of Newton".
(9)

Chalmers concludes,
"The man who could embark in an enterprise so foolish and so fanciful, as to theorise on the details of the botany of another world, or to theorise on the natural and moral history of its people, is just making as outrageous a departure from all sense, and all science and all sobriety, when he presumes to speculate, or to assert on the details or the methods of God's administration among its rational and accountable inhabitants". (10)

The real problem between Infidelity and theologians such as Chalmers is one of presuppositions. The infidel presupposition that Christianity is set up for the exclusive benefit of this world and hence, the argument that God would not lavish such attention on such an insignificant a field, is, of course, unverifiable. It must be acknowledged that the presuppositions of Chalmers which asserts the authority and inspiration of the Scriptures and that the whole of creation took place ex nihilo by the God of the Bible, is just as unverifiable, in the strict scientific sense.

Chalmers is correct in asserting that the basic principle of Infidelity is "to bring God to the level of our own comprehension, we would clothe him in the impotency of a man. We would transfer to his wonderful mind all the imperfections of our own faculties." (11) In other words, the final reference point for all interpretation, meaning and purpose for the Infidel is man, whereas for Chalmers it is located in the omnipotent God of the Bible. The
acceptance of the case for the Christian Revelation depends not on the mind of man, but upon the acceptance of the Bible as God's authoritative word. The infidels assume that God cannot care for all his worlds but Chalmers argues that the God of the Bible can dwell on a multiplicity of objects at one and the same time and he is able to attend fully and provide as richly and manifest all His attributes on every one of these objects as if the rest had no existence.

Arguing from this presupposition, Chalmers offers three pieces of evidence, namely

(i) the appeal to the personal history of each individual.

By this he means the personal history of each person who accepts the Christian Revelation. He claims that a Christian person's life and experience is upheld and motivated by the personal presence of God's Spirit.

"His Spirit is intimately present with every thought of my heart, His imagination gives birth to every purpose within me. His hand impresses a direction on every footpath of my goings. Every breath I inhale is drawn by an energy which God deals out to me". (12)

This says Chalmers, is extended to "every distinct individual in this world's population" (13).

Therefore, says Chalmers, we are ungrateful if we draw a limit around the perfections of God. What God can do for us in this world, He can do for the multitude of other worlds.
It is evident that such a claim as this is impossible to verify unless there is the acknowledgement that the Scriptures are the Word of God.

(ii) Chalmers argues secondly that "were the mind of God so fatigued, and so occupied with the care of other worlds, as the objection presumes Him to be, should we not see some traces of neglect, or of carelessness, in His management of ours?" (14) He asks the infidels where is in the whole field of astronomy, which has opened up the heavens, one indication of God's reduction of care. Chalmers claims that the evidence indicates God's perfect superintendence over the whole of the created order.

(iii) Thirdly, Chalmers suggests that Infidelity has overlooked the overpowering evidence of the microscope. Astronomy, says Chalmers, led him "to see a system in every star". The microscope "leads me to see a world in every atom". (15)

Both the telescope and microscope show how "the wonder working God finds room for the exercise of all His attributes, where he can raise another mechanism of worlds and fill and animate them all with the evidence of His glory". (16)
In all he concludes that the telescope proves that no magnitude of the universe is beyond the "grasp of His Divinity" and the microscope proves that no minuteness is beneath the condescension of God's loving and superintending care.

All three pieces of evidence which Chalmers submits are evidence which only a theist is able to accept. It is not acceptable to an atheist. Chalmers' first argument would be totally rejected on the grounds of a lack of scientific scrutiny. The argument is more moral and psychological, rather than scientific. The second and third arguments can be dismissed in favour of some kind of evolutionary hypothesis. It could be argued that Chalmers is merely imposing an interpretation upon what he sees as evidence.

All this would indicate an immense gulf which separates the starting points of Chalmers' theistic approach and the Infidels' non-acceptance. What Chalmers did show was the lack of verifiable evidence for the Infidels' claims and they did not comply with Newton's philosophy.

Chalmers makes it plain in his argumentation that his desire throughout this exercise is that the Infidels' minds might be brought "to submit its thoughts to the captivity of the doctrine of Christ". (17)
Chalmers was to acknowledge at a later time that all the rational argument in the area of natural theology could not change an Infidel's nature. Natural theology in itself could not bring about regeneration. (17A)

It is to be remembered that during the 18th century, Natural Theology enjoyed a real popularity; its impact was acknowledged in the 19th century. The prevailing mood of the 18th and early 19th centuries was one of rational debate rather than a strict dependence on the "Christian Revelation".

In an imposing work, R.S. Westfall (18) claims that by the time of Newton, the mechanical universe which was run by immutable natural laws, the transcendent Biblical God was removed and separated from creation and the moral law took the place of spiritual worship and rational man was able to discover true religion without the aid of special revelation. By 1816, when the Discourses were delivered, a wedge had certainly been driven between science and religion and many upheld the philosophical maxims of Voltaire and others who subscribed to pure atheism or at least a Deistic persuasion.
During the 19th century, Keble, a member of the Tractarian movement, was able to write

"There is a book, who runs may read,  
which heavenly truth imparts,  
And all the lore its scholars need,  
Pure eyes and Christian hearts.

The works of God above, below,  
Within us and around,  
are pages in that book, to show  
How God himself is found."

Such verse clearly shows a distinct shift away from the traditional view of the Bible as the source of God's truth to the appreciation of God in nature. This helped to create in the minds of many, the idea that a wedge existed between Christianity and science.

Men like Chalmers refused to accept that there was any wedge between the natural sciences and religion. The wedge existed only as a mental construction of unbelieving men. The scepticism of David Hume and others may have, from a logical standpoint dealt a blow to the system, known as natural theology but Chalmers had written two volumes on natural theology only to conclude that this system was an abject failure.

Chalmers reminded the scientific community by implication, that Newton's success lay not only in his acceptance of Baconianism, but also in his basic presupposition that the
Christian revelation and the light of the New Testament has not been eclipsed by modern science. (19) As Chalmers notes in his Discourses:

"Newton clung so determinedly to his Bible, as the record of an actual annunciation from God to the inhabitants of this world. When he turned his attention to this book, he came to it with a mind tutored to the philosophy of facts - and when he looked at its credentials, he saw the stamp and the impress of this philosophy on every one of them."

"...and there was nothing in the whole compass of his own astronomy to dazzle him away from it." (20)

To read Chalmers' Discourses and the references to Newton's science and theology, he was obviously acquainted with Newton's pre-supposition and conclusions especially as found contained in the General Scholium. (21)

The success of science up to the time of Isaac Newton was largely attributed to a number of theological pre-suppositions, which Chalmers not only accepted but exposed. Newton considered that man could not reduce the world to mere mechanical forces, without regard to its origin or its structure. The geometrical and mechanical order for the world is evidence of an intelligent creator or designer.

R.H. Hurlbut (22) states that Newton's specific theological use of scientific discoveries was in two ways.
(i) He set limitations to his mechanical science; it is not sufficient to explain the origin and ultimate order of the world.

(ii) Newton stated that the very motions, positions, velocities which his science so successfully described are evidence for the belief in the existence of a "creator mechanic".

For Newton, the realm of science was dependent on the God of religion and "let the reverent mind to a fuller assurance of his reality and a readier obedience to his commands".

It is Newton's "General Scholium" where he discovers the difficulties which pervade the hypotheses of varieties. But it is here where Newton's basic pre-suppositions of science emerge. (23)

Newton concludes that the motion of the comets are regular, are governed by the same laws with the motions of the planets, and can by no means be accounted for by the hypotheses of vortices, "for comets are carried with very eccentric motions through all parts of the heavens indifferently, with a freedom that is incompatible with the motion of a vortex." Newton shows that the "beautiful
system" of planetary motion, i.e. the six primary planets with their ten moons revolving around them in circles concentric with them, in the same direction of motion and nearly in the planes of orbits of those planets, cannot be explained in terms of some mechanical cause.

The beautiful system "could only proceed from the counsel and dominion of an intelligent and powerful Being". This Being, says Newton, "governs all things, not as the soul of the world (that is pantheism), but as Lord over all; and on account of His dominion, He is and wants to be called "Lord God" -ΤΩΝ ΚΩΝΣΤΑΝΤΩΝ - or "Universal Ruler", for God is a relative word and has a respect to servants; and Deity is the Dominion of God and not over his own body, as those imagine who fancy God to be the soul of the world, but over servants. The Supreme God is a Being eternal, infinite, absolutely perfect. He endures for ever and is everywhere present and by existing always and everywhere, he constitutes duration and space. Since every particle of space is always and every indivisible moment of duration is everywhere, certainly the Maker and Lord of all things, cannot be never and nowhere. In contrast, says Newton, blind metaphysical necessity, which is certainly the same always and everywhere, could produce no variety of things. All that diversity of natural things which we find suited to different times and places could arise from nothing but the ideas and will of a Being necessarily existing.
The *Discourses* reveal the same basic presuppositions. Newton's "beautiful system" of planetary motion is to Chalmers "trophies of Divinity". Admitting the littleness of our world as compared to the 80 millions of suns, the littleness of earth becomes insignificant as that "the glories of an extended forest would suffer no more from the fall of a single leaf, than the glories of this extended universe would suffer... if this earth should be dissolved". The implication of Chalmers' argument is that this earth is not dissolved because God has control of all the systems of all the suns. God "sits enthroned on the magnificence of His own works". As with Newton, there is no other possible explanation. The comparative insignificance of this earth becomes an argument for the existence of an intelligent and powerful Being. (24)

Science, claims Chalmers, has not exiled God from His own universe. "She has not forced the Deity to quit His hold of its machinery, or to forego by one iota the most perfect command of all its evolutions". (25) He argues that without any superstition a full recognition of science should make man feel an immediate dependence upon God.
ACKNOWLEDGEMENTS - Chapter 5

2. Ibid., p. 56.
5. Ibid., p. 46.
6. Ibid., pp. 46-47.
10. Ibid., p. 57.
13. Ibid., p. 77.

17A. See his argument in T. Chalmers, Institutes of Theology, Posthumous Works, vol. 7, (Sutherland & Knox, Edin.), p. 136.


The legacy which Chalmers left to science and theology can be discussed under three sub-headings:

- Science and Theology
- The Gap Theory
- Science and the New College.

1. Science and Theology

It was from John Robison that Chalmers inherited his "unqualified appreciation of the mode of mapping out the sciences and drawing the boundary line between them" and "his thorough knowledge and his preferred admiration of the Baconian method". (1) This was to influence Chalmers' work in the theological area.

Chalmers turned the traditional Reformed/Calvinistic approach to theology upside down. Regarding the study of theology as a science, he sees that any enquiry should begin with facts which are at hand and have an immediate
impact upon the thinking process. In the previous chapter, reference was made to Chalmers' belief that Natural Theology was in itself a failure to bring about the regeneration of the human soul. Acknowledging this, Chalmers nevertheless maintained that man can be introduced to the reconciling ministry of Jesus Christ. 'It is only when the Scriptures of the Old and the New Testaments are accepted as "a real communication from heaven and earth" that "anxieties about man's depravity", assured by natural theology, can be resolved. It is the message of the Gospel that brings about a reconciliation between God and man. It is only then that the traditional doctrines of the constitution of the Godhead can then be studied and the climax of systematic theology can then be reached with the doctrine of the Trinity. (2) In other words, he sees nothing wrong in commencing with the doctrine of man's moral character and concluding with the doctrine of God's mysterious constitution in what he calls the "argumentations of our science". (3) This method is in direct contrast with accepted orthodoxy. Calvin, Turretin and Pictetus and his own contemporary, Professor Charles Hodge of Princeton, all began their theologies with the doctrines of the Constitution of the Godhead. Chalmers claims that his novel method is given strength by the relation in which Natural stands to Biblical theology. Whilst claiming this, he rightly points out that Natural theology is not the foundation to Biblical theology. All
natural theology is able to achieve is a prompting of the
natural conscience to awaken a sense of guilt.

It is here that a problem of consistency arises. If it be
ture that man possesses sufficient light in his conscience
to awaken a sense of guilt, i.e., the failure to perfectly
fulfil the requirements of God's moral law, as expressed in
the decalogue, then Chalmers would seem to be diluting the
doctrine of the Fall. To push this line of thought, would
lead to a similar position held by Thomas Aquinas. Chalmers
however, held to the traditional Calvinistic view of the
Fall. Therefore, what Chalmers really means is that God the
Spirit is able to enlighten the conscience and effect a
sense of guilt, through the wonders of God's creative
activity -- the study of which Chalmers calls natural
theology. He summarises this practical approach to
Christianity under three heads:--

i) First doctrines are those which meet the anxieties
of the Spirit in the quest for peace with God;

ii) the second, those which guide the disciples' way
along the progressive holiness that qualifies him for
the pleasures and the companionship of Paradise;
iii) the third, place hopes and transcendental themes, which sublime the contemplation both of the saint and of the scholar, and shed a certain mystic glory over the whole system of Christianity. (4)

This novel methodology would seem to arise out of Chalmers' commitment to "Baconian principles". He claims that there is a strong practical analogy between a system in theology and a system in general science; the analogy is not perfect as there are important differences between them. The attaining of a law of nature is granted on the basis of an extensive induction. This same inductive method must also be applied to Scripture, not for the purpose of adding to proof texts but to the general truth of revelation. He states

"there remains a sufficient and most instructive analogy between the work of the observer in science and that of the Scripture critic in theology, on the one hand; and on the other, between the philosopher in science and the systematizer in theology; such an analogy in fact as might guide to the explanation and vindication of the uses of both". (5)

Chalmers draws out the analogy this way: Just as the observer of nature accumulates facts from his observation, so does the Scripture critic, who uses the Scriptural text and lexion, instead of a microscope or similar instrument. Without basic facts, there can be only speculations, unsupported theories which have no experimental basis to
rest on. The vast collection of facts are examined to discover any resemblances. It is the recognition of likeness that is important. It is the discovery of a universal likeness among all the instances of bodies approaching each other in free space, that led to, or "rather constituted the discovery of the universal law of gravitation". It is at this point that Chalmers leans upon the work of Robison, who claimed "that a law of nature is the expression of a general fact grounded on the observations of particulars and affirming within the limits of a brief and compendious utterance a something that was common to them all". (6) Chalmers continues to show that there may have been thousands of similar observations in different parts of the world at different periods of time, but until the similarity was discovered, they formed a loose aggregate of individuals. The announcement of a law of nature was for Chalmers "the revelation of nature's most magnificent harmony". (7)

The Scripture critic, using the same method, groups his facts and when a hundred "facts", re Bible verses, exhibit the same truth and are sustained on "the basis of a multiple testimony, may by means of a brief and comprehensive affirmation become the article of a creed". (8)
Chalmers differentiates between the experimenter/observer and the philosopher of a science. "The scripture critic is in Christianity what the experimentalist or the observer is in science; and the systematic theologian is in Christianity what the philosopher is in science". There is a mutual agreement between the two; one cannot exist without the other.

This method has its dangers and temptations. Chalmers warns that to systematise is not to theorise. "To frame a speculation from the gratuitous fancies of one's own spirit is a wholly different exercise from that of classifying according to their observed resemblances, the observed individuals which have a place and a substantive being in some outer field of contemplation". (9) This distinction is of critical importance if Baconian principles are to be implemented. The distinction between Scripture Criticism and Systematic Theology has its counterpart in Newton's law of gravitation. Chalmers sees this as a splendid example whereby the general doctrine and the observation of special phenomena acted and reacted so powerfully on each other. (10)

This, claims Chalmers, is the very essence of Bacon's philosophy. It is little wonder that Chalmers has more than a scientific affinity with Bacon; it is a common affinity.
which has its roots in the fertile soil of Reformational theology which draw a heavy distinction between Grace and Nature. Reacting against the Scholasticism of the Middle Ages, there emerged the doctrine of Grace which had dominion, primary and precedence in all things, for man's salvation is due to God alone and even his knowledge of God derives its possibility solely from God's Grace and condescension; but the realm of nature, man is given by Grace dominion, primacy and precedence, for all things are given under his command. Both in the realm of Grace and nature, man is created and called to be a partner in covenant with God.

This had the effect of giving man full place as knowing subject and against the object. Bacon therefore interpreted this as meaning that man could pursue natural science as a religious duty. (11) By this he understood that God has kept the Godward side of nature hidden. Keeping within the parameters which God has set, man has a function to interpret nature and build up his kingdom on scientia. (12) It is man's right by creation, although man is "fallen", to labour by the sweat of his brow to discover natural law in the actual investigation of nature itself. (13)

Accepting this distinction of Grace and Nature, Bacon, as a man of science, overcame the Aristotelian metaphysics which had so impregnated nature with final causes that he
substituted nature for God and so made the conception of nature useless. This drove men to enquire into metaphysical causes which yielded no fruit in the physical sciences. As T.F. Torrance concludes "Aristotelian metaphysics was a pernicious attempt to find ultimate truths in nature that led to divorce of theoretic understanding from experimental contact with nature, and so allowed nature itself to slip through men's hands." (14)

The adaption by Chalmers of the Baconian method was only a short term success. Chalmers' impact, as a theologian and ecclesiastical statesman, is undeniable, especially with the success of the Free Kirk in the famous disruption in 1843, but nevertheless, his work and influence was soon eclipsed by the popularity of the German school of Higher Criticism and the widespread acceptance of Darwin's hypothesis. The inherent problems of such a method halted any lasting effect that the method may have achieved. It was only eleven years after Chalmers' death that Charles Darwin's "Origin" was published with immediate acceptance. The popularizers of Darwin, namely Thomas Huxley and Herbert Spencer, to name but two, soon made Darwin's name a household word. Darwinists were claiming victory over Christian orthodoxy. For the naive, it was a choice between science and religion.
During the early part of the 19th century, Chalmers would have been completely unaware of the pitfalls of the simplistic Baconian approach to science. The claim of David Hume that induction is circular because it employs the very kind of inductive argument the validity of which is supposed to be in need of justification, would have certainly been dismissed on the grounds that science proceeded to great achievements under Robert Boyle and Isaac Newton. Besides, Chalmers considered Hume's philosophy as being antitheistic, as David Hume was regarded as an infidel.

It seems as though Chalmers was unaware of the role of assumptions which the inductivist brings to the processes of observation. For example, in his discussion of the relationship of Scripture Criticism and Systematic theology we see clearly the simplistic Baconian method with its inherent problems of circular reasoning. In the quoted passage below, note that there is no awareness of the role of assumptions that the inductivist brings to the process of observation. It is self-evident that in this passage Chalmers does bring a set of assumptions into play; the assumption that the Scriptures are truth.

154
"It is true that when Scripture criticism is carried to its full extent, the work of systematizing has already begun, for one of its objects is to ascertain the truth of a doctrine. But we might conceive one (ie. a student or an observer) to go forth on Scripture (ie. to study the scripture) without one notion of systematic theology in his head, yet with the highest degree of that talent and preparation which might enable him to estimate the import of words and phrases. We might suppose him incapable of deriving any guidance to the meaning of a passage from the analogy of the faith; and that he therefore assigns its meaning to each passage on the pure principles of philology alone. He is like an observer going forth, innocent of all theory, on the field of nature. The scriptural observer can render accurately each separate word and sentence -- just as the natural observer can describe accurately each individual object that lies within the domain over which he expatiates. The one, let us say, with his lexicon, and with all those lights which long practice and recollection in this walk of investigation can supply; the other, perhaps, with his microscope, or his balance, or the busy use of his now well-exercised senses, and the benefit of all those habits which belong to him either as a diligent collector of individual facts, or as a scrupulously accurate describer of the properties of individual objects. The mere linguist is to Scripture what the mere observer is to science. The office of the one is to expound accurately all the separate sayings in the volume of God's word. The office of the other is to expound accurately all the separate things in the volume of God's work, whether you (ie. the reader of Chalmers' lecture) view them as objects, which is the light in which you regard them when you study contemporaneous nature, or view them as events, which is the light in which you regard them when you study successive nature." (15)

Chalmers was in no way neutral in his approach. His voluminous works constantly adhere to his belief in God, the authority and inspiration of the Scriptures, creation is creation by fiat ex nihilo, natural theology is incapable of resolving man's dilemmas and sinful nature. These assumptions obviously influence any interpretation
and conclusion. It could well be said that there is no neutrality in a scientific method. Generally speaking, the assumptions that are brought to any scientific enquiry can be divided into two broad schools of thought. Either the assumptions are like those of Chalmers, ie, theistic or they are anti-theistic. "Facts" that constitute the raw data for the empirical sciences as regarded by the theist (like Chalmers) continue to exist by the virtue of the providence of God and every fact and every law in the created universe accomplishes what it does accomplish by virtue of the plan or purpose of God. This is in contrast to the anti-theist approach in which facts are just mere facts or brute facts which have no relationship to a creative God. Bare facts become ultimate. A method which denies a purposeful creation by God has no other alternative other than to resort to a philosophy of chance as a philosophical base upon which to make interpretations. The option of neutrality by its very nature must allow for brute facts. This implies a denial of Christian Theism.

To illustrate this, C. Van Til examines the scientific ideal as proposed by Morris Cohen in the book, *Reason and Nature*. According to Cohen, Science has the ideal of complete comprehension. "A completed rational system having nothing outside of it, nor any possible alternative to it; both presupposed and beyond the actual attainment of any one moment. It coincides in part with the Bradleyan
Absolute, but it is an ideal limit rather than an actual experience. Unrealized possibilities are within it precisely to the extent that it contains endless time." (P. 158) (16)

Van Til, arguing from a Christian perspective, notes that Cohen's view wipes out the basic distinction between Creator and creature. It is based upon the suppositions of a non-Christian philosophy. He sees two fundamental objections --

i) it does not allow that all facts exist by virtue of their previous interpretation by God;

ii) the scientific ideal does not realize that it is illegitimate for a creature to set before itself the notion of comprehending all existence. To do so is to set before itself the being of God as penetrable to the mind of man, inasmuch as he is part of existence. This denies the incomprehensibility of God. (17)

Both the theistic and anti-theistic approach begins by an act of faith - faith in either a God or no God. From a simplistic point of view, therefore, the scientific method based on either "faith" is but a construction of man to interpret and discover reality for utilitarian purposes.
Thomas Chalmers, although adopting Baconian principles, lived at a time when he straddled the Theist approach in sciences as it climaxed in the work of Isaac Newton and the anti-theistic approach which developed after the publication of Darwin's *Origin* and *Descent of Man*.

Within the lifetime of Chalmers, he saw the beginnings of the failure of his inductive method within the Church. He witnessed the beginnings of the German higher critical school, which did so much to assist the demise of traditional orthodoxy. In 1835, D.F. Strauss published his *Leben Jesu*, in which he applied the "myth theory" to the life of Christ. He denied the historical foundation for all supernatural elements in the Gospels and the growth of primitive Christianity was to be understood in terms of the Hegelian dialectic. His works were to have an enormous influence. The acceptance of the Baconian principles no longer meant a natural support for orthodoxy as "Bible scholars" brought to their inductivism assumptions which were not necessarily consistent with accepted Bible teaching. This was equally true in Chalmers' own Church. Edward Irving became Chalmers' assistant in Glasgow in 1819. He was excommunicated by the Church of Scotland for his heretical views. He did not follow Chalmers' methodology as he assumed that Christ's human nature was sinful and in the 1830's he established the Catholic
Apostolic Church which emphasised tongue speaking and healings. It was essentially the modern counterpart of the Charismatic/Pentecostal movement. If Chalmers could see the failure of the Baconian method within his own church, the treasured method must have been doomed as there was a growing number within scientific circles abandoning traditional orthodoxy.

2. The Gap Theory

Chalmers refused to accept the traditional view that creation took place in 4004 BC. This date, although supported, generally speaking, by such renowned Biblical scholars as Calvin, Luther, Melanchthon and Gerhard and others, was not acceptable as the Scripture does not refer to dates and besides the date was clearly in conflict with the emerging sciences of botany, zoology and geology. He argued that we now tread on platforms that are raised above the waters and are covered with its own peculiar herbage for the sustenance of its own peculiar tribes and genera and species of living creatures. Mineralogists, says Chalmers, can now show that "each undergoing the same process of decay along which our present world is visibly hastening to its end and each attesting its own station in the order of descent by the place its ruins now occupy" (18). Such conclusions are also being confirmed by botany
and zoology by the discovery of and examining of fossil records of plants and animals. This says Chalmers is a kind of astronomy itself. It means that we "must lift our computation from thousands of years to thousands and millions of centuries". (19)

This view of Chalmers was arrived at by the weight of scientific evidence and his acceptance of the principle of the uniformity of nature.

In sermons based on Psalm 119: 89-91 and II Peter 3, on the basis of observation, Chalmers argues that the doctrine of uniformity in nature proceeds in one invariable order - "insomuch that the same antecedents have without exception, been ever followed up by the same consequents; ...and all things have so continued since the beginning of creation." (20) This doctrine of the constancy of nature or uniformity of natural law is welded into a significant theology of nature which is indispensable to the functioning of science.

"It is not the recurrence of the seasons and the knowledge of established natural processes but there are many periodic evolutions of the bright and the beautiful along the march of His administrations -- as the dawn of morn; and the grateful access of spring, with its many hues, and odours, and melodies; and the ripened abundance of harvest; and that glorious arch of heaven, which Science hath now appropriated as her own, but which nevertheless is placed there by God as the unfailing token of a sunshine already begun, and a storm now ended -- all these come forth at appointed seasons, in a consecutive order, yet mark the footsteps of a beneficent Deity." (21).
Chalmers argues from Psalm 119 that there is uniformity or constancy in nature simply because God created it and ordained it that way. This constancy does not need to be proved by the setting up of any scientific apparatus, it is proved from "universal experience". Nature "walks by a rule which knows no abatement". Such is the universal proof, he says, men of science no longer doubt it and the semblance of irregularity in the universe is due to the ignorance of man, not the fickleness of nature. The various intensities of weather patterns and the occurrences of wind, rain, sunshine, etc. follow each other by a method of succession which though greatly more intricate, is yet as absolute in itself as the order of the seasons or the mathematical courses of astronomy. (22)

The absolute dependency that science relies upon is remarkably expressed in lucid and profound language --

"The very child knows and proceeds upon it. He is aware of an abiding character and property in the elements around him -- and has already learned as much of the fire, and the water, and the food that he eats, and the firm ground that he treads upon, and even of the gravitation by which he must regulate his postures and his movements, as to prove, that, infant though he be, he is fully initiated in the doctrine, that Nature has her laws and her ordinances, and that she continueth therein. And the proofs of this are ever multiplying along the journey of human observation: insomuch, that when we come to manhood, we read of Nature's constancy throughout every department of the visible world." (22)
The only explanation for uniformity, argues Chalmers, is that God has placed this "disposition" into our minds insomuch we universally look for a recurrence of the same event in the same circumstances. It is only upon this principle that any scientific investigation can take place. He illustrates the instinctiveness of uniformity by pointing to the behaviour of an infant child --

"The infant who make a noise on the table with his hand, for the first time, anticipates a repetition of the noise from a repetition of the stroke, meets as much confidence as he who has witnessed, for years together, the unvariableness wherewith these two terms of the succession have followed each other" (23)

In other words, God has placed faith (common faith) into every creature, making it a necessary part of his mental constitution. In terms of the Robison distinctions between natural philosophy and natural history, which Chalmers developed, faith becomes a disposition which points to the necessity of a beneficent God.

If, as Infidels argue, there is no God and the world operates mechanically upon a philosophy of chance, does it not seem somewhat strange that this instinctive faith in uniformity could be so regular, constant, for as long as recorded history can tell? If such instinct can be so regular on the basis of chance, then I should be able to throw a six with a dice so regularly as to break the bank
of every gambling casino in the country!

Chalmers concludes that God has so formed the machinery of our perceptions that we are led irresistibly to expect everywhere events will follow each other in the way we expect and when he so sustains the uniformity of Nature and so rigidly so, He is just manifesting the faithfulness of his character. (24)

Chalmers is echoing perhaps in a more theological way what Isaac Newton also accepted but expressed in more scientific language. Rules II and III in Newton's Principia under the head "Rules of Reasoning in Philosophy" (25) --

Rule II states "Therefore to the same natural effects we must, as far as possible, assign the same causes".

It is a basic principle in the inductive science that experiments repeated under the same conditions achieve the same results. It is so because the same cause always produces the same effect. Experimental science can only operate on this basis. If nature operated upon the basis of chance, then there is no guarantee that a repeated experiment under the exact same conditions will produce the same effect. In other words, the doctrine of uniformity is essential.
Rule III states "The qualities of bodies, which admit neither intensification nor remission of degrees, and which are found to belong to all bodies within the reach of experiments, are to be esteemed the universal qualities of all bodies whatsoever". (26)

Newton maintains here that the qualities of bodies are universal and it is because of the universality that experiments can be valid. The qualities of bodies can only be known by experiment.

In other words, for Newton experimental science can only operate on a doctrine of uniformity. Although expressed differently, Chalmers says the same as Newton. The only area of difference if it could be called is that Chalmers expresses in theological terms his view of uniformity in the language of what became known as "Commonsense Philosophy". For both Newton and Chalmers experimental science became impossible if uniformity is displaced in favour of a philosophy of Chance.

It would seem that the only possible explanation for a successful experimental science in the hands of the "infidels" is either, the infidel holds to a form of Deism, which has already been discussed, where God is recognised only in a limited way, or the thoroughgoing atheist must "borrow" the notion of uniformity which can only operate as
Chalmers points out by means of a designing and beneficent God.

By contrast, however, another aspect to the doctrine of uniformity to be considered. The notion of uniformity set out above which has its emphasis on uniformity of natural law, was extensively developed into another notion which explained the past history of the earth in terms of causes that can presently be observed to be in operation without resorting to supernatural explanations that had ceased to operate. This idea of uniformity is a direct extension of the philosophy of the "infidels" and not from the view of uniformity held by Chalmers. The view of Chalmers depended on a belief in creation by fiat, *ex nihilo*. Those who refused the notion of creation by fiat, *ex nihilo* became known as "uniformitarians". They claimed that it was unnecessary to invoke spectacular catastrophes to account for geological phenomena when the processes we observe today could account for them, providing there was allowed a long period of time. It is to be recalled in a previous section of this Chapter, Chalmers had already committed himself to a very old earth, as far as he could understand the evidence of the varying sciences, the evidence pointed to an age, of millions of years.
Having studied under John Playfair, Chalmers was aware of his defense of Hutton against charges of atheism. Hutton had stressed the role of heat in the development of the earth and argued that many crystalline rocks such as granite and basalt were in reality the products of crystallization of very intensely hot molten rock. (27) The upshot of Hutton's theory was that those who accepted a literal interpretation and time scale of 6000 years, regarded his theories as being inconsistent with Genesis Chapter 1. Playfair held in his defence of Hutton that there was no evidence of a beginning or an end. He denied that the Bible fixed the age of the earth. Chalmers' awareness of this is found in his reference to the modern science of geology. Chalmers accepted Cuvier's catastrophism which had been synthetized with Genesis Ch.1 by George Parkinson's work *Organic Remains of a Former World* (1804-1811), in which the days of Genesis were treated as vast periods of time. Chalmers, not wishing to take liberties with the Biblical text, proposed six literal days but the geological catastrophies presumably existed before the six days. He could then say

"...that this earth has been the theatre of many and great revolutions and the present economy of things has arisen from chaos brought on by the last of these, but that each of the former catastrophes was also succeeded by a peculiar economy of its own, that in like manner as now, the innumerable rivers which are wearing down our present land, bearing it down in sediment, and spreading it in successive layers over the bottom of the sea, and so as to form the strata of the next order of things which will come after the
Chalmers was therefore very much aware of the rise and development of this notion of geological uniformitarianism. His contemporary, Charles Lyell (1797-1875) published his *Principles of Geology* which developed a full blown uniformitarian point of view.

Chalmers suggested to his friend, John Fleming, the scheme of reconciliation between geology and Genesis on the basis of successive creations concept put forward by Cuvier. This theory was elaborated by Fleming in his *Lithology of Edinburgh* (1859). It assumed that the pre-Adamic life had been destroyed by some extraordinary cause accompanied by deluges of water rushing over the earth. The species of animals and plants of the present epoch had then been created during the six days/periods described in Genesis I. This view of Fleming's and Chalmers' was in opposition to Lyell's interpretation of uniformitarian view.

Charles Lyell's widely accepted views saw no need for global catastrophes, as surficial gravels and boulders could be possibly explained in terms of local floods. Lyell argued that geological phenomena could be explained in terms of modern day processes of rivers and marine erosion and deposition acting at essentially the same spots as now over a long period of time. In his *Principles* his greatest difficulty was to overcome the clear evidence for a warmer
climate during the past geological epochs even in the northern altitudes. He showed how not only local climate but even worldwide climatic conditions depend on the pattern of distribution of land and sea and would therefore be altered by changes in their distribution. An increase in the proportion of land near the equator and of ocean area towards the poles would tend to create a warmer world climate and vice versa. (31)

This type of uniformitarianism was opposed by Chalmers' friend and colleague, John Fleming.

Whilst Lyell discounted the catastrophism of Cuvier and Buckland, so did Fleming.

It is necessary to trace out briefly the historical development of this topic as it relates to Chalmers. Chalmers proposed the restitution theory which advanced the idea that the long period of time required by geology could be accounted for by assuming that the first two verses of Genesis Chapter I depended on a condition that lasted an indeterminate amount of time and preceded the six days of creation. In his *Daily Scripture Readings*, Chalmers clearly states this view and states further that his opinion on this was published in 1814.
"The beginning spoken of here has been variously estimated. My own opinion (as published in 1814) is that it forms no part of the first day -- but refers to a period of indefinite antiquity when God created the worlds out of nothing. The commencement of the first day's work I hold to be the moving of God's Spirit on the face of the waters. We can allow Geology the amallest time for its various revolutions without infringing even on the literalities of the Mosaic Record -- while Nature herself bears witness to the need of a creative interposition, more especially for the later part of the work of the third day -- even though geologists should be able to assign a competent natural process for the former part of that day's work. If the one could be executed by the old laws of matter, the other requires new dispositions -- these incontestable evidences of a directing wisdom in the formation of the actual economy of things." (32)

This necessitated Chalmers to reject the view held by large numbers within the Church, that the world was only about 6000 years old. There arose with this developing science of geology a great deal of scepticism on the part of many within the Church. John Fleming claimed, as did Chalmers, that such antagonism was held only by the uninformed. It is not until serious consideration is given to the contribution of outstanding Christian men within the Scottish Church such as Thomas Chalmers, John Fleming, Sir David Brewster, that one realises the impact of an informed Christian view of science and religion had within the Royal Society of Edinburgh.

These men could not allow the uninformed prejudices of a few to hold sway over current scientific enquiry and research in geology of the age of the earth. If God in
creation created the universe, then the correct conclusion of science must be agreeable to God's written Word. Since Genesis does not specify the "time" of creation, then man's opinion of the age of the earth must be prepared to change with the truth of scientific enquiry.

Chalmers had found this view quite early in his career. It was in 1804 that he publicly said --

"There is a prejudice against the speculation of the geologist which I am anxious to remove. It has been said that they nurture infidel propensities. By referring the origin of the globe to a higher antiquity than is assigned to it by the writings of Moses, it has been said that geology undermines our faith in the inspiration of the Bible, and in all the animating prospects of immortality which it unfolds. This is a false alarm. The writings of Moses do not fix the antiquity of the globe. If they fix anything at all, it is only the antiquity of the species." (33)

Chalmers was also prepared to speak out on Cuvier's Essay on the Theory of the Earth when it was published as an English edition by Jamieson in 1813. On that occasion, he wrote

"it is high time to confront the theory of our geologist with the sacred history -- with a view both to lay down the points of accordancy, and to show in how far we are compelled to modify the speculation, or to disown it altogether". (34)

It was his view to retain the literal days of the Mosaic record, "We cannot do the stretching out of the days, spoken of in Genesis, Chapter I, into indefinite periods of
time" (35). However, there was a way to preserve the integrity of both the Mosaic record and the views of science and that was the restitution theory. This was an honest attempt by Chalmers to solve the dilemma.

"We conclude with adverting to the unanimity of geologists in one point,—the far superior antiquity of this globe to the commonly received date of it, as taken from the writings of Moses. What shall we make of this? We may feel a security as to those points in which they differ, and, confronting them with one another, may remain safe and untouched between them. But when they agree, this security fails. There is no neutralization of authority among them as to the age of this world; and Cuvier, with his catastrophes and his epochs, leaves the popular opinion nearly as far behind him, as they who trace our present continent upward through an indefinite series of ancestors, and assign many millions of years to the existence of each generation.

Should the phenomena compel us to assign a greater antiquity to the globe than to that work of days detailed in the book of Genesis, there is still one way of saving the credit of the literal history. The first creation of the earth and the heavens may have formed no part of that work. This took place at the beginning, and is described in the first verse of Genesis. It is not said when this beginning was." (36)

Genesis Chapter I, verse one, was regarded as the primary act of creation and this act of creation should be placed as far back as necessary to accommodate the age of the earth as scientific research would require. Verse two of Genesis would therefore be divided into two sections: the first "and the earth was without form and void", was the state of the earth after it had been through the processes of geological revolutions. The second part of the verse "And the Spirit of God moved upon the face of the waters", 171
should be regarded as being the beginning point of the
detailed operation leading to the present earth.

This view of Chalmers is consistent with the view held by
John Playfair.

Playfair claimed that the greatest obstacle to the
acceptance of Hutton's theory of the earth was that popular
opinion equated the Mosaic narrative with the 6000 years
time scale. (37)

It would seem that Chalmers adapted Playfair's view on the
age of the earth, especially as it relates to the Bible.
Playfair claims that "the Scriptures seem to be little
interested in what regards the mere antiquity of the earth;
nor does it appear that their language is to be understood
literally concerning the age of that body, any more than
concerning its figure or its motion". (38) To accommodate
the Genesis narrative with the conclusion of geological
science, Chalmers accepted the same premise as did Hutton.
Playfair writes that "Dr. Hutton's theory stands precisely
on the same footing with the system of Copernicus; for
there is no reason to suppose that it was the purpose of
Revelation to furnish a standard of geological anymore than
of astronomical science." (39) Playfair argued that the
geologist must be given the same liberty of speculation
which the astronomer and mathematician already enjoys. This
can be achieved, says Playfair, if the chronology of Moses relates only to the human race. (40)

It would be reasonable therefore to assume that the beginning of Chalmers' "Gap" theory is to be located in the works of Hutton and Playfair.

Buckland was to take up this same theme and develop it further. Buckland disagreed with the literal interpretation of Genesis I. Buckland could see no valid reason why the days of Genesis, Chapter I, could not be lengthened. Like Chalmers, however, Buckland developed the restitution theory so as to defend both the biblical account of creation and the conclusion of modern geology.

"It may seem just a matter of surprise, that many learned and religious men should regard with jealousy and suspicion the study of any natural phenomena, which abound with proofs of some of the highest attributes of the Deity; and should receive with distrust, or total incredulity, the announcement of conclusions, which the geologist deduces from careful and patient investigation of the facts which it is his province to explore. These doubts and difficulties result from the disclosures made by geology, respecting the lapse of very long periods of time, before the creation of man. Minds which have been long accustomed to date the origin of the universe, as well as that of the human race, from an era of about six thousand years ago, receive reluctantly any information, which if true, demands some new modification of their present ideas of cosmogony; and, as in this respect, Geology has shared the fate of other infant sciences, in being for a while considered hostile to revealed religion; so like them, when fully understood, it will be found potent and consistent auxiliary to it, exalting our conviction of the Power, and Wisdom, and Goodness of the Creator." (41)
It was in his lecture at Oxford University that Buckland took up Chalmers' theme. In his lecture he defines "beginning" in Genesis, Chapter I, as expressing "an undefined period of time, which was antecedent to the last great change..." (42)

He argues that the "days" of the Mosaic record need not be understood as 24 hours. "There is no sound critical or theological objection to interpreting 'day' as meaning a long period of time". (43)

Or again, "The heaven and earth were made by God without limiting the period when creative agency was exerted", is in perfect harmony with the discovery of geology. (44)

Chalmers' friend and colleague, John Fleming, whilst agreeing with Chalmers' theory, nevertheless disagreed with his views on the Mosaic days being 24 hours. With the influence of John Playfair still fresh in mind, he was prepared to accept the fundamental concepts of Hutton. He was willing to argue that the depositions of gravels and fossil bones could only be explained by a vast period of time. The popular Bucklandian diluvialism was no real explanation and was regarded by him as being both unscientific and unbiblical. Such was the impact of his critique that the third edition of Relequiai Diluvianae was
withheld from the press. Professor Sidgwick said of the critique which was published in the *Edinburgh Philosophical Journal* in 1826 that "he had often heard of the tomahawk and scalping knife being used in warfare, but this was the first time he had seen it employed in scientific literature". (45)

Although Fleming disagreed with Chalmers on this point, he still stood within the same theological tradition and like Chalmers sought an earnest enquiry into the harmonising of Biblical teaching and the modern sciences. Such was Chalmers' admiration for Fleming's work, that when Chalmers established a chair of Natural Science in the New College (46) at a meeting of the General Assembly in 1844 of the Free Church, Fleming was elected to the Chair.

The point of all this discussion on Buckland and Fleming is to show that at that time in history, leading Christian scholars were prepared to acknowledge that the earth was more than 6000 years old. They were prepared to be men of honest intellect and prepared to overturn past prejudices of Biblical interpretation when the Biblical text allowed a difference of opinion without altering the essential message of the text. In hindsight, there would be those in this twentieth century who would accuse Chalmers, Buckland, Fleming and others of paving the way to the acceptance of Charles Lyell's uniformitarianism which had a wide impact.
and acceptance which in turn prepared the way for the popular acceptance of Charles Darwin's hypothesis.

A recent publication has raised this precise matter. W.W. Fields has claimed that there are those who consciously or unconsciously "dismiss the Bible as unscientific, have unwittingly compromised the truths of Scripture by seeking what appear to be unnatural interpretations of Scripture, in order to form supposed harmonizations between the Scriptures and scientific conclusions." (47) Specific mention is made of Chalmers,

"Chalmers deemed it necessary to harmonise the Scriptures and science in order to save Christianity from the onslaught of Atheism." "Little did he suspect that such harmonizations actually served the purposes of evil they were supposed to prevent, for a Christianity which is no longer immutable and a Bible which must be constantly harmonized with fluid and ever changing Science are so sterile that atheism will never be cowed by their spectacle". (48)

Such comments are unjust to say the least. Chalmers never advocated that Christianity was dependent upon harmonizations with science for its survival. Scripture does not conflict with science due to the fact that the Bible nowhere states how and when God created the universe. Despite the fact that Buckland, Fleming and Chalmers may have differed in their interpretation of the Mosaic Days in Genesis I, it did not alter the fact that to
them, God is still the saving Creator and that man is still a "fallen" creature who needs to be redeemed. It is to be remembered that Chalmers was at pains to show that the rise of popular acceptance of "Atheism" was based on an "unscientific methodology" especially that method of induction which came through Francis Bacon and Isaac Newton. The forms of Atheism did not conform to the Newtonian tradition, the movement was philosophical, not scientific.

It would seem that William Fields makes his criticism not so much from a scientific point of view as from a preconceived view which accepts that creation took place only a few thousand years ago and has given an interpretation of Genesis I: 1-2 which the Bible knows nothing about. Chalmers never allowed preconceived ideas to influence his scientific approach to the sciences and theology, so far as it was possible.

It is also worth noting that Chalmers relegated this whole area which he calls "Natural Theology" which really means a "Theology of Nature" as no proof of God. "Natural Theology" is a failure and is incapable of transacting a real change of heart and status of man before God. It is only through God's Grace of the Gospel that that change can take place. In effect, Chalmers, whilst acknowledging the usefulness of Natural Theology, sees the future of Christianity
depending on the Saving Grace of God in the Gospel and not on any harmonization of the Biblical text and modern science.

Fields specifically states that Chalmers was a contemporary of Lyell and Darwin and because of the influence of such men, he needed a harmonization. (48A). However, it should be noted that the views of Chalmers were established by 1816 with the publication of the *Discourses*. Lyell published his Principles in 1831-32 and when Darwin published the Origin of the Species, Chalmers had been in his grave for 12 years!!

Although the uniformitarianism of Lyell became widely accepted, Fleming was highly critical of his work. He points to a number of assumptions on which the work proceeds, that raises considerable doubt.

"(i) The species have perished from off the earth by no sudden destruction, but by degrees and that species have made their appearance to succeed them by no sudden creation, but imperceptibly. If this notion be based on truth, it will cause a great modification in the commonly received opinions respecting chaos, and the commencement of the present races of animals on the globe. It leaves untouched the proof of creative power by acknowledging the appearance, from time to time, of new species on the earth and it admits the destruction of species which have frequently prevailed. At present, we are chiefly concerned with the question, "Is the notion consistent with scientific truth?"
When we consider the quadrupeds, birds, reptiles and fishes of the Parish and London basins out of the eocene period of Lyell, we do not find that a single species had survived and been coeval with any of the existing races -- so that is not interval here -- no dawn. The 96 1/2 % of shells which constitute the testaceous fauna of the tertiary period all perished and only 3 1/2% of their companions are supposed to have survived, so as to constitute the connecting links with the succeeding or modern group. But the identification of these species of the dawn has not been established by competent observers, is doubted and controverted. (49)

Whilst there may be charges and countercharges in our modern era about Chalmers and Fleming, the point is that these men and their associates were prepared to preserve both Biblical and scientific integrity. Chalmers could see no reason scientifically or Biblically in accepting a "gap" between Genesis 1:1 and verse 2 to account for the time factor in modern geology and accepting as he did (with little or no support from others in the scientific community) the 24 hours of each of the Mosaic days.

It could be asserted that the views of Chalmers and Fleming were representative of the views held by the Free Church by virtue of high reputation and scholastic ability that these two men possessed. Their views on uniformity should not be equated with the twentieth century notion of what Davis Young calls "substantive uniformitarianism" (50). This term is usually interpreted by the modern catastrophist-
creationist as meaning the idea of "uniformity of processes through time and also uniformity of intensity or rates of processes through time". The intensity is regarded as that which is presently observable. By definition, this modern movement suggests that there are no catastrophes. Such is this modern view that Young suggests that the modern catastrophists seem to think that "uniformitarians reject a priori the very possibility of great catastrophes" (51). However, says Young, modern geology rejects the idea of substantive uniformitarianism with its emphasis on a Flood universal catastrophe. The fact is, says Young, modern Geology holds to methodological uniformitarianism which is simply the "idea that the laws of nature are invariant in time and space and the earth processes of the past behave in accord with those laws just as they do now". (52)

"that creationists have completely misunderstood the nature of the uniformitarianism used by modern geologists. We do not reject a priori catastrophes nor do we automatically assume that geological process rates have always been "excruciatingly slow". We infer rates of processes from the record of the rocks. Where rocks contain features like polystrate trees we are ready to infer that sedimentary deposition was extremely rapid in that place when the deposition occurred. But when rocks contain features like lake deposits, we infer that sedimentation was very likely extremely slow. Both creationists and modern geologists infer process rates from the rock record. The creationists, however, have looked only at those rocks that were probably formed relatively rapidly. Geologists have looked at all the rocks. The evidence of the rocks suggests strongly that it took several billions of years for the Earth to form." (53)
3. Science and the New College

The result of the great "Disruption" in the Church of Scotland in 1843 saw the resignation of two ornaments of the University of Edinburgh, namely Dr. Thomas Chalmers and Dr. Welsh. At the first General Assembly of the Free Church, ie, the Church which came about at the Disruption, in 1843 at Glasgow, there was no hesitation in approving the opening of a Divinity Hall, ie, a Theological College. A committee was empowered to appoint professors, to engage premises and to have everything prepared for a commencement in the November of that year. Dr. Chalmers and Dr. Welsh were to be joined by Dr. Duncan as Professor of Hebrew and Dr. Cunningham in the Chair of Church History (54). The New College was opened in November and the inaugural address being delivered in the Brick Church, Castle Terrace, by Dr. Chalmers. At the commencement of that first academic year, 103 men enrolled as students of divinity. It was soon realised that the church needed to provide its own buildings. Within a short time, buildings were erected at the head of the Mound at an expense of $46,506.

This new college established by the Free Church had as its essential minimum for its first year, a Theological Faculty with a full curriculum in the recognised theological
disciplines, but its aim was a self-contained institute in which students might have their literary and philosophical training as well.

The reasons why the Free Church went beyond the normal theological disciplines can at least be partially explained in an undated document which embraces all kinds of questions from the Vesting of College property to the mode of electing Professors and the extent of Education. Hugh Watt remarks that the document evidently belongs to 1843 and bears internal evidence of being the work of Thomas Chalmers (55). This document was found among his personal papers, presumably after his death.

Although Watts does not itemise the internal evidence, it is easy to see the marks of Chalmers, eg,

References to guard against 'infidel attacks',
Cosmogony, Geology

References to the importance of mathematics, "should not the mathematical department include elements of Physics, so as to prepare more thoroughly for higher branches of Natural Philosophy"
Both these quotations refer to important areas in Chalmers' life. The mere suggestion that Natural Science be included in the curriculum is the natural outcome of Chalmers' development of Robison's distinction between Natural Philosophy and Natural History.

This document expresses concern at the deficiencies of State Colleges in several branches of the Arts and the danger of the "evils of Sectarian Education". The document also expresses interest in a "thorough education" for ministers, hence it suggests that instruction should be given in the cognate branches of Latin, Greek, Mathematics, Moral Philosophy, Logic and Natural Science.

The chairs of Moral Philosophy, Logic, Natural Science were the only ones that were ever filled.

It had always been the conviction of Chalmers that future ministers should be fully instructed in those questions which lay on the border of science and religion. (56)

It was upon the strong recommendation of Chalmers that the General Assembly of 1845 created a chair in Natural Science due to the "deep sense of its importance, in connection with the presently prevailing relations of revelation and science". (57) His friend, Dr. Fleming, who has already been mentioned, accepted the chair and occupied it for the
next twelve years.

Upon the death of Fleming, the General Assembly decided to install a lecturer in Natural Science, rather than a professor. In 1869, a bequest of £9000 was received for Natural Science. Consequently, the lectureship was again raised to that of a professorship. Dr. Dunns was inducted into the Chair. In 1903, Dunns died, and after considerable debate the General Assembly filled the chair in the person of Dr. J.Y. Simpson (1873-1934). His father was the nephew and assistant to Sir James Young Simpson, the pioneer in chloroform anaesthesia. Simpson published *Landmarks in the Struggle between Science and Religion* in 1925. He served the New College with distinction. But in 1934, on the eve of the General Assembly, he died. In the Assembly's wisdom, it carried the recommendation "that no appointment be made to the Chair of Natural Science, now vacant". (58)

Watt says that the Chair of Natural Science disappeared without a ripple because the mind of the Church decided that Natural Science belonged to another faculty and the theological arguments drawn from them belonged to the Chair of Apologetics.

Chalmers' ideal of a thorough-going Christian educational institution for higher learning now vanished after ninety one years. The mere fact that the Chair of Natural Science
lasted for so many years bears testimony to the influence of Chalmers.

Chalmers' legacy to Science, although all but forgotten today, will be found to be carved into the history of Edinburgh University and the New College, for those who desire to seek it out. The three occupants of the Chair of Natural Science were outstanding men of their day and did justice to the ideal which Chalmers sought to achieve.
ACKNOWLEDGEMENTS - Chapter 6


7. Ibid.

8. Ibid., p. 333.


19. Ibid., p. 88.

22. Ibid., p. 204f.
29. John Fleming was a contemporary of Chalmers 1785-1857. He was a clergyman of the Free Church of Scotland and became professor of Natural Science in the New College, Edinburgh in which Chalmers was Principal. He was regarded as Scotland's foremost zoologist, as early as 1815.
37. John Playfair, *Works*, vol. 1, (Edin., 1822), p. 137. This work is available in microcard.
38. Ibid., p. 137.
39. Ibid.
40. Ibid.

Buckland was professor of Geology at Oxford and was also an Anglican clergyman who adopted the Cuvierian catastrophism, but in a modified form. He looked for geological evidence for a short lived universal flood.


46. Ibid., p. 670. It is worthwhile to note that at this time he was widely acclaimed as the foremost zoologist in Europe and also Professor of Natural Philosophy at the University of Aberdeen.

See also "Scottish Natural Science", North British Review, 21, 1958, p. 39-55.


48A. Ibid.


51. Ibid., p. 141.


CONCLUSION

Chalmers saw the connection between Christianity and the "world" in these terms:

"It is false, that the principle of Christian sanctification possesses no influence over the familiarities of civil and ordinary life. It is altogether false, that godliness is a virtue of such a lofty and monastic order, as to hold its dominion only over the solemnities of worship or over the solitudes of prayer and spiritual contemplation.... There is nothing that meets us too homely to be beyond the reach of obtaining, from its influence, the stamp of something celestial. It offers to take the whole man under its ascendancy, and to subordinate all his movements." (1)

Throughout his ministerial life in the Church, everything was influenced by and brought under the control of the Gospel of Christ. This is particularly true of his scientific interests. Although he studied for the ministry of the Church of Scotland, and ordained into it, his principal interests up to 1810 were in the sciences, particularly mathematics.

His conversion to Evangelical Christianity meant the end to any specific career in the sciences. All his scientific interests became subsequent to the Gospel of Christ. His status as an Evangelical Statesman was soon established by his powerful oratory and writings. At the death of Dr. Andrew Thomson, he was claimed to be the country's
greatest preacher.

The reading of any biography of Chalmers leaves the justifiable impression that he was a compassionate man who cared for people. S.J. Brown claims that his real impact as a Professor of Divinity lay in his regular lecture hall discussion of such subjects as pastoral visiting and counselling, administration of charity and political economy. (2). He wrote extensively on such subjects, all of which can be found in his collected works under such titles as Political Economy, Christian and Civic Economy, Doctrine/Christian Charity etc.

His active interest in such matters which relate to the state, together with his task as a Professor of Theology and the leader cum administrator of the Free Church affairs which resulted in the Disruption of 1843, had serious implications for his role as a theologian and his interests in the sciences.

Had Chalmers lived in a less turbulent time in both Church and scientific history, he may well have applied his genius more singularly to theology or science. Had this been the case, he may well have become an outstanding theologian or scientist or both.
Nevertheless his work was outstanding under the circumstances he found himself. His love for the sciences left an imprint on his work which was to last well into the twentieth century.

It was John Robison who transformed Chalmers into a Baconian by showing him that science could be compatible within a metaphysical scheme by working from the known to the unknown. He possessed an ability to translate the conclusions of science into a language which common people could understand. It was his adherence to Baconian principles together with his oratory which made his *Astronomical Discourses* so popular. It was through the preaching of these Discourses that Chalmers became the first of the great Evangelical preachers in Scotland during the 19th century to use contemporary scientific issues in the pulpit.

Applying Baconian principles in Biblical studies he saw that the observer of nature and the accumulation of facts from nature is similar to the observer of Holy Scripture who uses the Scriptural texts and lexicon, instead of a microscope or some other scientific instrument.
Accepting the distinctions of Grace and Nature by which the reformers of the 16th century overcame the powerful influence of Aristotelian metaphysics, Chalmers saw that it was man's duty to investigate nature. This he did. The study of chemistry, astronomy and geology as well as his devotion to mathematics, left its mark on his work. He refuted the notion that science and Christianity were in some way incompatible. He maintained that creation was a creation by fiat, ex nihilo, by an all-powerful, beneficient and designing God, the God of the Bible.

The establishment of a chair in Natural Science in the New College, Edinburgh, and his continuing membership of the British Association of Science was a testimony that Chalmers, although a theologian and an ecclesiastical statesman, was a man of science. The words of A.C. Cheyne are pertinent here:

"His penchant for natural religion and scientific discovery, and his struggle to reconcile faith and reason, equipped him particularly well to bridge the gap between the rationalistic world of the 18th century and the individualism and uncertainty of the 19th century". (3).

The passion that Chalmers possessed for both the sciences and theology and his concern for the practical welfare of humanity, may well be expressed from a passage quoted often during his life, from the Moravian Gambald:

193
"The man
That could surround the sum of things and spy
The heart of God and secrets of his empire
Would speak but love. With love the bright result
Would change the hue of intermediate things
And make one thing of all theology." (4).
ACKNOWLEDGEMENTS - Conclusion


"My intention to reside in St. Andrews originated in a motive which I contend is justifiable. Is it unjustifiable to extend your literary reputation, or to restore it when you conceive that that reputation is violated? Can this be denounced as a criminal ambition? It originated in a desire to acquit myself to the public as a mathematical teacher, with a view to justify my claims to academical preferment. Can this be branded as an unprincipled enormity? It originated in attachment to my pupils, and in a wish to conduct them to the termination of those studies which they had so successfully begun. Can this be alleged as the evidence of a hardened indifference to the feelings or considerations of morality?

Few of you are perhaps acquainted with the peculiarities of my situation as assistant teacher in the mathematical classes of St. Andrews University. I felt my business to be agreeable; I rejoiced in the education of youth as the most important and delightful exercise of a man's powers; but before one-half of the session had elapsed, I felt myself surrounded with all the cares and perplexities of opposition. Unfortunate misunderstandings arose, which it is neither for you to hear nor for me at present to explain. I shall only say that I was deserted both by my employer and the University, and my career as the mathematical assistant was at last closed by the ignominy of a dismissal from my employment. I was now disposed of.

I was consigned to the obscurity of the country. I was compelled to retire in disgrace, and leave the field to my exulting enemies. They had gained their object -- a name expunged from the list of competition -- no further disturbance from interlopers -- no literary upstart to emulate their delicious repose, or to outstrip them in public esteem -- no ambitious intruder to dispel their golden dreams of preferment, or to riot along with us in the rich harvest of benefices. I have few friends -- no patronage to help me forward in the career of an honourable ambition. All that I had to trust in was my academic reputation and the confidence of an enlightened public. But where is the enlightened public to which a slandered mathematician may appeal? There is no more such an enlightened public in St. Andrews than there is in the interior of Africa.
But I had one consolation: I was supported by the respectful attachment of my students. But even to their progress, my appeal was far from being effectual. I had only taught them one session; I had only initiated them into the elements of the science. I was proud enough to think that I had succeeded in inspiring a taste and an ardour for mathematical learning. I was proud enough to think that if they persevered as they had begun, they would be to me the most honourable of all testimonies. At the end of last winter, I had no formed mathematicians to whom I could appeal, as the argument of a successful or conscientious teacher. The credit of my more advanced students was divided between me and my predecessor; the credit of the students whom I initiated, between me and him who had succeeded me. What could I do? Was I to leave my reputation to the candour of the University, or to the testimony of him who had disgraced me? I confess I felt no such confidence. I foresaw an end to all my hopes of literary distinction. I had nothing to expect from the spirit of a grasping monopoly. I must either have resigned myself to the silence of despair, or attempted the testimony of an independent public.

* * * * *

"I am not able to guess at the precise object of the gentleman in the public appearance he has just made. Does he mean that I should desert my classes, and renounce the interests of those whose friendship has consoled my feelings in the hour of perplexity? Does he mean that I should surrender those few who remained with me in my worst days, and rallied to support me amid the storms of persecuting violence? I will say it, in my cause they have evinced a spirit of the most exalted virtue. They have withstood the allurements of interest. They have defied the threats of persecution. They have spurned at the cold and withering suggestions of prudence. They have sacrificed all at the shrine of friendship; and though surrounded with the most corrupting atmosphere to which the manly and independent virtues were exposed, they have maintained the purity of an untainted honour, and the fidelity of an inviolable attachment.

And are these the men whom the gentleman would force me to desert? Is this the painful humiliation he would impose upon me? Shall I leave them to the ridicule and triumph of those whom their attachment to me has rendered their enemies? He talks of the religious interests of my parish. I know nothing from which religion has suffered so severely as from the disgrace of its teachers. Compel me to retire from my classes, and you will give a blow to the religious
interests of my parish which all the punctualities of discipline will never restore. You render me the laughing-stock of the country; you cover me with infamy; you render me the object of public contempt and public execration. Compel me to retire, and I shall be fallen indeed. I would feel myself blighted in the eyes of all my acquaintances. I would never more lift up my face in society. I would bury myself in the oblivion of shame and solitude. I would hide me from the world. I would be overpowered by the feeling of my own disgrace. The torments of self-reflection would pursue me; they would haunt my dreams; they would lay me on a bed of torture; they would condemn me to a life of restless and never-ceasing anxiety. Death would be to me the most welcome of all messengers. It would cut short the remainder of my ignominious days. It would lay me in the grave's peaceful retreat. It would withdraw me from the agitations of a life that has been persecuted by the injustice of enemies, and still more distracted by the treachery of violated friendship."

(Hanna, Memoirs, 1854 Ed., vol. 1, pp. 57-60.)
"MODERATOR, -- In the olden times, ecclesiastical persecution doomed one of its victims to be heavily fined; it doomed another to imprisonment; another to the loss of his ears; and another to the horrors of execution. Now I would fain hope that the gentleman's appearance arises rather from an error in judgment than from the workings of an unfair and arbitrary disposition. He may perhaps think, that what is perfectly lawful in professors and professors' sons, is great presumption and great vice in a poor literary pedlar, who trudges on to his literary station with a bundle of manuscripts and old wares from the country. Whatever rank, however, my brethren of the Presbytery may choose to assign to me, I must protest against the unequal distribution of punishment. They know it is not in their power to inflict execution. Such is the happy constitution of our country that my ears are completely protected from their violence. As to imprisonment, I shall resist them with all my might if they attempt to confine me within the boundaries of my parish; but as to fines, such is my confidence in the equity of our worthy comptroller, that I will pay down with cheerfulness whatever he shall think my delinquency deserves.

I have thought that the fundamental error of this business consists in beginning the inquiry at the wrong end. The gentleman sees me indulging in an amusement that is certainly foreign to the nature of my profession, but not more so than the amusements of feasting, and playing, and music, and painting—indulgences which we all enjoy, and from which no absurd scruple of conscience ought to keep us. Suppose that any of my brethren is much given to the dilettante occupation of music, the Presbytery, I should presume, would never think of disturbing his enjoyment, unless he was so exclusively devoted to his favourite exercise as to desert his sermons -- desert his examinations -- desert his attention to the sick. You tolerate him in his indulgence, and why? because you find that the duties which belong to his ministerial office are punctually executed. Should not the same reason apply in equity to the case before us? I am indulging in a favourite amusement. You have no right to presume that I am therefore deserting the duties of my professional employment. Such presumption at least does not supersede the necessity of inquiry. Now, let the gentleman traverse the boundaries of my parish; let him begin with the houses of my wealthy proprietors, and descend to the lowest tenements of poverty and disease, I will defy him to find a single individual who can substantiate the charge of culpable negligence.
against me. I will defy him to find a single individual who will say that I have been outstripped by any of my predecessors in the regularity of my ministerial attentions, or who will say that he has discovered anything in my conduct which betokened a contempt for religion or indifference to its sacred interests. What more will the gentleman require of me? Has he any right to control me in the distribution of my spare time? I maintain he has none. I spurn at the attempt as I would at the petty insolence of a tyrant; I reject it as the interference of an officious intermeddler. To the last sign of my heart I will struggle for independence, and eye with proud disdain the man who presumes to invade it."

In November, the chemical lectures were resumed at St. Andrews. On the 10th of that month, Mr. Chalmers writes to his brother:--

"Dear James,-- You allude to the quantity of business I have in hand. This is neither more nor less than teaching a class of chemistry in St. Andrews during the winter. It only withdraws me from my parish two days in the week. It affords a rational and dignified amusement, and it fills up that spare time which I would otherwise fret away in indolence and disgust. It did not altogether meet my father's approbation at first, influenced as he was by his scruples about clerical residence; but he must now be convinced that it trenches upon no essential duty, and that I expend as much effort upon the religious improvement of my people as any minister within the bounds of my Presbytery.---
Yours affectionately,
THOMAS CHALMERS."

(Hanna, Memoirs, 1854 ed., vol. 1, pp. 61-63.)
APPENDIX 3

EXTRACT FROM INTRODUCTORY LECTURE TO A COURSE OF CHEMISTRY

"Chemistry is one of the most interesting and dignified of pursuits. It has all the charm and freshness of novelty to recommend it. It is fast hastening to perfection. It is daily extending its triumphs. The annals of every year are recording some new and important discovery, and its cause is supported by the labours of more than half the philosophers of Europe. A mind devoted to the interests of science, you can easily conceive, will sigh for an opportunity of teaching it. Such a mind rejoices in communication; it rejoices in imparting to all around that enthusiasm which animates its own exertions; it rejoices in awakening among its hearers the flame of emulation and enterprise, and triumphs in the silence of their attention as the most flattering of all testimony. Let it not be disguised - I look on these hours which are consecrated to the labours of instruction as the most important and delightful exercise of my powers, and exult in the office of an instructor as the product station which a man can occupy. * * *

"When introducing a new science, it is customary to begin at the first period of its discovery, to unfold the progress of its improvement, to pursue the successive steps of its history, and to settle its metaphysics and first principles on an unquestionable foundation. This order I reprobate as unnatural. It is altogether unfit for the purposes of instruction. The history of a science can never be delivered without a perpetual recurrence to that phraseology which is peculiar to it - a phraseology which, at the commencement of your studies, you are not prepared to understand. There is nothing that I am more cordially disposed to execrate than an ostentatious parade of technicals - a pitiful attempt to excite the stare and astonishment of ignorance - the wretched ambition of exhibiting yourself to a gaping populace as a great philosopher, a wonderful head-piece, a stupendous intellect, read in the mysteries of nature, and versed in all the lore of antiquity. My sole object in instituting a course of lectures upon chemistry is to introduce you to one of the most important departments of philosophical investigation. I wish to divest it of that mysterious attire in which it has too often repelled the attempts of the solitary and unassisted inquirer. It may be remarked of chemistry, with more justice than of any other science, that it is seldom a self-taught acquirement. A taste for chemistry is seldom derived from the mere perusal of chemical treatises, or from the efforts of solitary reflection. To be a chemist, you must have frequented the
instructions of some chemical teacher - you must have repaired to some hall of chemical experiments - you must have familiarized your conceptions to the subjects of chemistry by the actual exhibition of these subjects to the senses. You are miserably mistaken if you think you can derive the same from the perusal of books, or from the labours of unassisted ingenuity. They will fail in giving you a distinct conception of the apparatus and experiments of chemistry. It is altogether an antiquated idea to think of deriving the knowledge of external nature from the meditations of solitude. You may as well think of demonstrating the functions of the planetary system by the construction of a syllogism. This might have done with the monastic philosophy of the Middle Ages, but it will not do with the actual and enlightened philosophy of the present day. The spirit of modern philosophy is a spirit of patient and industrious inquiry. It reflects the speculations of an ardent and unbridled fancy; it denounces every system that is not founded on the basis of experience, however much it may charm by its simplicity or arrest by its significance; it is an enemy to all rash and precipitate conclusions; it will suffer nothing to divert it from the path of sober and experimental inquiry; it will suffer nothing to disturb the calm and unruffled solidity of its convictions. In vain for her will fancy ply its siren allurements, or attempt to delude her by the charm of novelty and the brilliancy of speculation. She acknowledges no master; she will yield to nothing but the stubborn and incontrovertible evidence of facts. With her the result of a single experiment is sufficient to overthrow a whole system, though supported by the testimony of ages, and enthroned in all the pride of antiquity. It is under her fostering influence that Chemistry has arisen the proudest monument of the science and invention of civilized Europe. It is astonishing to reflect, that this splendid fabric is the production of half a century. The science of chemistry may be regarded as a new invention. It rose from a state lower than non-existence; it has arisen from that degradation to which the corrupting philosophy of the Middle Ages had sunk every department of philosophical inquiry; it has arisen from the barbarity and ignorance of the schools; it has shaken off the fetters imposed on it by the authority of name, and the insolence of literary despotism. True, chemistry had existed for centuries, but not as a science; there was not a vestige of science in the contentious jargon and crude speculations of the old naturalists - not a vestige of science in the crucible and melting-pots of alchemy - not a vestige of science among those ridiculous beings who, in search of the philosopher's stone, were enveloped for days and nights in the smoke of furnaces and the suffocating dust of a laboratory. How could it be otherwise? They were misled by the visionary dreams of theory. Their mode of proceeding was not to reduce theory to experiment, but to
explain experiment by theory. They spurned that humble and unassuming spirit which has since raised the philosophy of modern times to an elevation that all the sophistry of the schools can never overthrow. Instead of creating a system of nature, we have become her disciples, we listen to her instructions, we record her phenomena, and we bend in silent humility to her authoritative voice. The philosophers of the old generation adopted a different style of proceeding. They were determined to go dashingly to work. They constructed their systems of the universe within the retirement of a monastery; they settled their opinions by the quibbles of a pedantic and contemptible logic; they scorned to derive any aid from the low work of experimenting, or from the observations of their senses. They confided in the light of their own minds, and spurned at the drudgery of experiments. If an experiment appeared to contradict their favourite system, it went for nothing; it was merely a circumstance; they had ever a syllogism at hand to explain the difference, and to save the consistency of their own speculations. But the case is different with the philosophers of modern Europe. With them experiment is the touchstone of truth. They have learned that nature takes her own way, unmindful of the closet speculations of theory. They laugh at dreams of systems, as equally contemptible with the conceits of infancy. They step abroad into the world, and eye nature in all her operations. With them the result of an experiment is the most interesting of all lessons, and they think no drudgery too painful to arrive at it. They will descend to the workshop of the artist - they will handle his instruments - they will observe the powers and elements of nature with a steady and reflecting eye - they will throw her into all her attitudes. Does any doubt if this mode of proceeding is successful? We appeal to the labours of those illustrious men who have walked the proud career of discovery; - we appeal to the great Newton, and to his numerous train of disciples and admirers; we appeal to the present state of chemistry. What important accessions does it gain each year from the labours of experimental philosophy! With what rapidity is it accumulating its store of facts and of principles! What a study is its interesting variety of doctrines, - the combined wisdom and experience of only half a century! What new and unexplained recesses of science has it penetrated! What mysterious operations it has revealed! What hidden and important laws it has established to explain the best secrets of nature, and illuminate the labours of art! Will any man have the audacity to maintain that such wonders would have been accomplished by the pupils of dialectic philosophy? Could such discoveries have issued from the schools of Aristotle? No; the logicians of old might have wrangled for ages - they might have heaped syllogism on syllogism - they might have constructed system after system, and attempted to demonstrate the constitution
of the universe by their categories of logic: they could never have restored science from that sink of degradation to which the ignorance and barbarity of the schools had condemned it.

"The establishment of a class for chemistry must be considered as highly appropriate in the present circumstances of the country, when the applications of theory to the purposes of utility are daily extending - when the progress of commerce, of navigation and manufactures, calls aloud for the improvement and multiplication of the practical arts - and when the lamp of science is held up to illuminate the lowest walks of business and industry.

"Chemistry teems with the happiest applications to art and manufacture, and it will therefore contribute in a most essential degree to the progressive amelioration of society. Art is antecedent to philosophy. When philosophy first arose, it saw art enriched by a variety of useful, but inexplicable methods - the accumulated treasures of ages, the results of accident, or perhaps the inventions of the ingenious man who lived in obscurity and died in forgetfulness, when no memorial has recorded, and of whom there is not a tongue to tell the name or the history. I must say that it is one of the best exercises of philosophy to illuminate the processes of art - to give the dignity of science to the lowest offices of mechanical drudgery; when turning the laws of nature to applications of practical utility, and facilitating the labours of the workshop, she administers to the sweets of human life, and to the substantial comforts of human society. Philosophy is not merely useful in the explanation of what is already established. It suggests new methods, and facilitates the execution of old. It retrenches all that is useless. It substitutes machinery in the place of human labour; and though many have declaimed against its introduction as ruinous to the subsistence of the poor, yet it discovers the grossest ignorance of political economy to deny, that mechanical improvements will ultimately diffuse additional comfort through all orders of the community - will support a greater population - will give wealth and independence to a more numerous class of society; and by affording leisure for the exercises of the mind, will ultimately extend the triumph of sentiment and virtue. * * *

"I am anxious to remove two misconceptions from the mind of those who mean to honour me with their attendance. The first is, that a class of chemistry is a mere class of entertainment; that the sole object of the class is to present you with a series of amusing exhibitions; that it is to dazzle the public eye by the glare of experiment, or to stun the public ear by the noise of chemical explosions.

204
If your sole object is amusement, I will certainly advise you not to repair within the limit of these walls. I spurn at the low and despicable artifices of literary imposture. I blush at the ostentation of a gaudy and theatrical parade. I am anxious to sustain the purity of science. I am anxious to support its expiring cause in this neighbourhood; it will amply console my feelings amid the cares and perplexities of my situation, if what I have said or done can operate as a barrier against the degeneracy of an indolent and superficial public. I look forward with horror to that gloomy and disastrous day, when the last remnants of philosophy shall be extinguished — when our schools of science shall be polluted by the insignificance of a flippant or superficial literature — when the votaries of science shall be denounced and persecuted, and every dunce will pass philosopher, because his birth, or his fortune, or his accommodating servility, have rendered him the nursling of academical patronage. A class of chemistry is not a mere class of amusement; it is a class in which there ought to be delivered the connected and systematic view of a science — a science distinguished by the importance of its doctrines, and the copious fertility of its applications to the various departments of business and industry. Experiments must be regarded as indispensable. I will regard no efforts of attention to be unprofitable which are employed in the perfection of my chemical apparatus, or on the success of my chemical experiments. Experiments must ever be appealed to as the proofs of each doctrine in chemistry. There is nothing that I am more anxious to accomplish than a series of judicious and well-conducted experiments. But let these experiments always be instructive; let them never be brought forward but for the establishment of some doctrine, or the confirmation of some principle. You must not imagine yourselves chemists because you have admired the rich colouring of a chemical tinge, or laughed at the noise of a chemical explosion. You have all heard of quacks in medicine; but quackery is by no means peculiar to the gentlemen of the healing art. The world has long been pestered with a race of beings whom we may rightly denominate the quack doctors of philosophy. They are the more insufferable that they are often invested with all the pageantry of official importance; they tower in the pride of academical distinctions, and are often surrounded with the admiration of an ignorant and deluded public. The instituting of a mere class of amusement I would feel to be a wretched prostitution of character. I would feel it to be a disgraceful accommodation to the indolence and frivolity of the prevailing taste. I would feel it to be a degrading attempt to catch the acclamations of the multitude. I would as soon consent to entertain the public by being the leader of a puppet-show, by the exploits of a Merry Andrew, or by the legerdemain of an itinerant exhibition, as I would
consent to entertain you by that silly parade of toys and
gimcracks which have been dignified with the title of
philosophical experiments. An experiment in chemistry is
interesting, not because it is calculated to amuse
children, or excite the astonishment of a gaping populace -
not because fitted to gratify the senses, fill a multitude
with wonder, or give delight and entertainment to the
fancy. It is only interesting in the eye of a true
philosopher, when it awakens his intellectual exercise,
conducts to the establishment of a principle, gives
solidity to a doctrine, and light and explanation to a
mystery. When we exhibit a stationary temperature of
melting ice or of boiling water, it is apt to be considered
as a dull and insipid experiment, though the very
experiment which lead to a new and important revolution in
the science of chemistry, an experiment that has
immortalized the genius of Black, and given him fairer
pretensions to a seat in the temple of glory than any
disciple of chemistry in modern Europe has to boast of.
Farewell to the substantial interests of philosophy, when a
class of instruction is degraded by a servile accommodation
to the indolence and frivolity of the prevailing taste,
when an experiment is brought forward as one of the many
miracles in the art of jugglery, and when a lecture
degenerates into a dish of entertainment for the evening.
Science blushes for her prostituted dignity; she weeps over
her expiring interests, and trembles in the prospect of
that day when her sanctuary shall be invaded by the
usurpations of a mountebank. Let it be uttered with shame
and regret, that the literacy character of Britain is fast
hastening to degradation and decay; that the mercantile
spirit of its people has engendered a contempt for what are
called the useless and abstruse investigations of theory;
that even the science of our universities is deserted for
the cabals of interest and the low jockeyship of
competition; and that, at this moment, the malignity of a
vitiating politics is employed in damping the finer
energies of the mind, and in blasting the efforts of
independent genius.

"Science is something more than an elegant relaxation - an
ornamental accomplishment - a luxury to soothe and
exhilarate the mind, when it withdraws from the more
important occupations of business. What I wish to impress
is its usefulness - its intimate connexion with the
political importance of the country - its high and urgent
claims upon the patronage of the State - a patronage far
more liberal and encouraging than the present mercantile
spirit of the age is disposed to award it. Science is of no
account among the political arithmeticians of the day. Our
profound calculators on finance never acknowledge it. A
hale of merchandise that will yield a goodly return to the
revenue is of higher estimation in their eyes than all the
literature and philosophy of the country. I am much afraid that there is a gross infatuation in this low and beggarly mode of reckoning. It may land us in the lowest stage of political degradation; and posterity may curse the day when the mercantile spirit banished sentiment and philosophy from the land. Let us cease to confound enlightened philosophy with the vain and unprofitable jargon of the schools; let us cease to think that it is composed wholly of visionary speculations, or that it is to be laid by with indifference and contempt. This is not the day for such an error — when the deadliest foe of Britain acknowledges the importance of philosophy, and avails himself of it as an engine of political influence; when he calls in its aid to throw a splendour over his government, and to add to the physical strength and resources of his country; when he admits philosophers into his councils, carries with him to the field their profoundest speculations, and makes them the instruments of his haughty and malignant ambition. To oppose Bonaparte with his own weapons, it is not enough that we stand before him in the armour and with the intrepidity of soldiers: we must oppose to him the armour of the mind — the skill and science of the country. The strength of Britain does not lie in her money or in her commodities. It lies in the heart and understanding of her people — in their affectionate patriotism. In vain will you say that this is idle and declamatory raving. It has the sober and unquestionable sanction of history. In the commencement of the last war, it was the chemistry of France that saved her from destruction; and in the present war, it is her military science that has convulsed and overthrown all the politics of Europe. This is an unprecedented era in the history of the world. The spirit of Bonaparte is a spirit of endless and unprincipled ambition. He now riots in all the pride of victory and success. He has nearly half the physical strength, and more than half the philosophy of Europe to uphold him. * * *

"The second misconception I am anxious to remove, is the false and unfounded impression that chemistry is a difficult science. I know no science where more useful and important knowledge may be acquired with less expense of painful or laborious reflection. It is the language of some, that chemistry is so exceedingly obscure, that there can be no understanding it; that it involves such a variety of facts and principles, such a parade of technicals, such a load of dry and philosophical discussion, as to be the study of a lifetime. Such representations evince the folly of that precipitate confidence that the humiliating sense of its own absurdity can never restrain. The field of chemical science is extensive, but the instructions of an ordinary course will suffice to impress its leading facts and principles. The language of chemistry is peculiar, but the explanation of a single hour will suffice to
demonstrate the principles of the chemical nomenclature. The philosophy of chemistry is sound, and may be supported by the best of arguments; but I maintain that it is luminous, and may be addressed with facility to the conceptions of an ordinary mind. I know no science which requires less of previous preparation - no science more accessible to all the varieties of human genius - no science which demands fewer efforts of painful and fatiguing attention. To represent any science to the youthful mind in a forbidding aspect, is to discourage the efforts of that mind at the very outset of its literary career. This conduct is what I would call an enormity of the second order. It is to bast the intellectual progress of the young - it is to wither the rising energies of his character - it is to depress the fire of youthful ambition - it is to condemn them to drivel the remainder of their days in the disgrace and obscurity of ignorance. Yet I say it is only an enormity of the second order. There is still a higher enormity in the awful catalogue of human guilt - the corruption of youthful virtue. Did you never observe men who, in serving their own petty purposes, made the young the instruments of their low and wheedling policy - taught them to desert their friendships, to renounce their independence, to disown their engagements, to smother the native and independent aspirations of the heart, to surrender their affections at the cold and polluting touch of interest, &c. &c. ?

The following exquisite passage on the character of Rousseau was prepared for some one of the lectures, chemical or mathematical, delivered at this period:

"It has been said of philosophy, that it affords a sovereign remedy against the numerous ills and perplexities of life - that it relieves the mind from the languor of discontent and the miseries of disappointment - that it steals an hour from disquietude, and composes the agitations of the heart when it is torn asunder by the most gloomy and distressing anxieties. It were reaching the sublimest of all independence if a man could curb in the motions of his own spirit - if he could shake off the melancholy which encumbers him - if, surrounded as he is by a thousand cares and a thousand sorrows, he could retire within the solitude of his bosom, and wrap himself up in the armour of patience - if he could rise to the lofty attitude of intrepidity and defiance - if he could assume the sovereignty of his own heart, and chase away the gloom and anxiety which torment it - if he could walk in triumph through the changing paths of this world - if, amid the diverse and tempestuous senses of human life, he could maintain the serenity of a tranquil mind and the gaiety of an unruffled countenance. This is what I am afraid that philosophy, with all its abstractions, can never confer,
and what mind, with all its boasted omnipotence, will never arrive at. The omnipotence of mind is an empty speculation; it is a dream which can only be enjoyed in the retirement of a calm and contemplative philosophy; it is the vapouring pretension of schoolmen who strut along in visionary importance untried in the sad agitations of the human heart, or by the affecting lessons of human experience. It is not by the force of thought that you are to quiet the agony of a wounded spirit; it is by the force of time and of patience; it is by the exercises of an active employment; it is by the slow operation of habit upon the physical constitution of the mind, which conducts us from a state of torture to a state of indifference through all the intermediate gradations of pain and anxiety. Rousseau is a melancholy example of the impotence of philosophy. He was surrounded with admiration. He was hailed as the amiable enthusiast, whose every impulse was benevolence, and whose was the voice of an impressive eloquence that could never die. But, O philosophy! how poor and how impotent their pretensions! Rousseau was unhappy. Pursue him to solitude, and you will witness the most affecting of all spectacles - the apostle of independence, with a heart consumed by a thousand disquietudes, and a countenance shrouded in the blackness of despair. Yes, there was misery within which haunted him, a wound which philosophy could not cure - the voice of a tormenting spirit which robbed him of his peace, and stirred up in his agitated bosom the wild war of turbulence and disorder. True, he had his moments of rapture, but it was like a glare of lightning in the midst of a vast howling wilderness; it was a tumultuous enthusiasm which left behind it a deeper and a deadlier melancholy; it was a frenzy of the soul, which soon left him to the undivided dominion of agony and despair. The irregulated mind of Rousseau was the victim of a thousand infirmities which all the wisdom of philosophy could not heal - a gloomy and suspicious temper - a restless anxiety which any trifle could alarm, and every idle whisper could agitate and distress - an unhappy imagination, which conceived that every friend looked on him with an altered countenance - a diseased sensibility which preyed upon his comfort, and cut short the weary remainder of his days. The admirers of his eloquence visit his tomb, and hail him as the child of nature and enthusiasm. The best lesson they can carry away is, that the triumphs of genius can never compensate for the loss of tranquillity; that the sobriety of prudence is better than the splendour of original talent; that the noblest gifts which reason can bestow are contentment and common sense - a mind that can maintain its vivacity amid the cares and disappointments of the world - a home where every eye beams kindness, and every heart is animated with that sacred confidence which feels no fear and harbours no suspicion. O how I hate that philosophy which destroys the man, which sours him at the world, and
unfits him for the enjoyments of society - which nourishes malignity of temper, and scatters misery around it by the terrors of a rigid and unbending severity. Philosophy is most exalted when she is most amiable - when she descends from her lofty abstractions to partake in the family scenes and entertainments of the world - when her eye assumes the mild lustre of benevolence, and her footsteps are directed to the humble recesses of poverty and disease. The character commonly ascribed to a philosopher is a character of austerity - an uncomplying obstinacy of temper - a proud and contemptuous feeling of his own superiority - a rude independence of mind, which leads him to trample on the established forms of society, and to neglect all those minuter proprieties which gave a charm and a delicacy to the enjoyments of social intercourse. These may at times be the accompaniments, but they are by no means the effects of philosophy. It is only a little learning that is dangerous. The vices and the affectations of philosophy are only to be met with him who is led away by the vanity of superficial acquirements. The highest finish that philosophy can give to the character is, to bring it back to the simplicity of nature, and to recall it from all that is wild and extravagant to the sobriety of common experience, and the home-bred virtues of private and domestic society."

BIBLIOGRAPHY


Holy Bible, NIV Version.


Chalmers, T., Works, vols. 6, 7 & 12, (William Collins, Glasgow), (Collected works printed 1835-1842).


*Eclectic Review*, Nov. 1817.


*Holy Bible*, NIV Version.


*Monthly Review*, vol. 84, 1817.


*Transactions Royal Society Edinburgh*, vol. 22, 1861.


Young, D., *Christianity and the Age of the Earth*, (Academic Books, Michigan, 1982).