
```

    +-+
    | |
    | |          SCIENCE AND FAITH
+-----+ +-----+
+-----+ +-----+          Vol 6, No. 1   April 2000
    | |
    | |          A publication of
    | |          The Gospel and Information Network
    | |
    +-+          ~    --

                                O---
+-----+
| through |
|| Col   | Him  ||
|| 1:16  | and  ||
||       | for  ||
||       | Him  ||
|+-----+ +-----+|
|-----+ +-----+|
                                O-- /
                                // - \
                                \O/
                                !
                                / \

```

Article archive available at www.mikelanderson.com

Unless otherwise indicated, copyright is held by the individual authors of the articles. This e-zine may be freely copied on condition it is done so in its entirety without alteration and free of charge.

To subscribe to Science & Faith put subscribe science_and_faith in the subject line of an e-mail message to scienceandfaith@mikelanderson.com

To unsubscribe to Science & Faith put unsubscribe science_and_faith in the subject line of an e-mail message to scienceandfaith@mikelanderson.com

Co-editors: Andy D Potts, Mike L Anderson

CONTENTS

Reflections of Heaven in the mirror of Nature:
 THE PLOUGHED FURROW.....(Frank Opie)

"The leader cracked the long whip and the chain
 connecting to the four dark oxen tightened suddenly."

Dr. Frank Opie is a retired Environmental Educationist
 from the Cape Town College of Education. Here he continues
 his series from his personal journal.

Wisdom from the Past
 THE PRESBYTERIAN CHURCHMAN'S RESPONSE TO THE TAUNG SKULL
 (1925)

"The discovery of an uncommon skull at Taungs made a considerable stir last month in many quarters. It seems to be the skull of a creature who was something less than man and something more than ape."

While the South African Journal of Science reports on yet another hominid find from the Magaliesberg, we thought it would be appropriate to look back at the response of the Presbyterian Church in South Africa to the original Australopithecine.

FUNNIES FROM THE WORLD OF MEDICINE ... (From the Internet)

NEWS BRIEFS..... (From the Internet)

- * Celebrated bird-dinosaur fossil a fake
- * Prepare for the end of the world - again.
- * New pyramid discovered
- * Astrophysicists want to see dark matter
- * Most Americans believe that religion is the answer
- * New evidence that sexual orientation may be partly biological
- * Snake fossil with vestigial legs named and described
- * Theological seminaries in the USA reject Young-Earth Creationism
- * Japan may make human cloning a crime
- * Men are generally better than women at solving mazes
- * 'Men are rapists for evolutionary reasons' view takes a beating

Fallacies and Fabrications in the Name of God and Science
WHEN IS CABBAGE NOT CABBAGE?: THE REDUCTIVE FALLACY
.....(Mike L Anderson)

***** Feature Article *****

RELIGION AND SCIENCE(Alfred North Whitehead)

"When we consider what religion is for mankind, and what science is, it is no exaggeration to say that the future course of history depends upon the decision of this generation as to the relations between them. We have here the two strongest general forces (apart from the mere impulse of the various senses) which influence men, and they seem to be set one against the other - the force of our religions intuitions, and the force of our impulse to accurate observation and logical deduction."

Alfred North Whitehead, the famous philosopher, needs no introduction. It is with pleasure that we reproduce this often quoted and reprinted essay. Co-incidentally, the essay was written in the same year as the Taung discovery.

=====

Frank Opie

The leader cracked the long whip and the chain connecting to the four dark oxen tightened suddenly. The rusted plough came to life in my hands with a mind of its own. The share dug down into the unfolding earth.

I remembered then the importance of a straight furrow but the four beasts were walking to the right of my plough line. I turned the plough towards the oxen to find I had next to no control of it. The share had found a deep groove hidden below the top soil and was gliding in it like a needle follows the groove in a Gramophone record.

It is only as the rains fall that the deep earth is softened and the stony clay becomes malleable to the hand held plough. Till then it is hardened to the form of customary practise and the oxen and ploughman labour in vain to change anything. It is the same with His work too. We pick up the plough with good intention and energy, fixing our eye on some predetermined point to find that we are deflected from our course by iron hard grooves of tradition which resist the plough, oxen and ploughman alike. The effort is invested but in vain. Only as the rains of heaven fall can the new purposes be superimposed on the unyielding clay and a fresh harvest be prepared.

Till then we may look like we are ploughing, but nothing changes. Until He works our labours are all in vain. Our dependence on the rains is complete. Now I know why farmers wait and pray for rains before ploughing - it is completely futile to plough before the rain or fail to plough once the rain starts to fall.

Wisdom from the Past

THE PRESBYTERIAN CHURCHMAN'S RESPONSE TO THE TAUNG SKULL

The discovery of an uncommon skull at Taungs made a considerable stir last month in many quarters. It seems to be the skull of a creature who was something less than man and something more than ape. Three or four other skulls of this description have been unearthed in various parts of the world. One was found in Java, one in the Neanderthal in Central Europe, one in England, one, perhaps in Rhodesia. It is a meagre enough showing, but scientific opinion tends to the belief that these are not so much freaks of nature as types of a class of being which bridges the gulf between man and the lower animals. They are thought to add to the evidence in favour of the theory of the low evolution of mankind from lower creatures, and to supply a needed link in the chain which unites the highest product of creative

energy to its first crude beginnings. Much of the talk that has been aroused by this find at Taungs has been foolish in the extreme. Some scientific men have spoken as if it would bring about a profound and beneficent revolution in religious thinking. Some religious people have felt called on to belittle the discovery, and have been roused to the attempt to throw doubt on the theory of evolution altogether. The fact is that for the last fifty years at least responsible teachers in the Church have seen clearly that the theory of evolution made the story of creation far more wonderful and impressive than the idea that everything was made off-hand in a day or two. They have taught us that the truth of the great proclamation that stands at the very threshold of the Bible, God created man in His own image, shines out all the more clearly when we think of the millions of years during which our earth was first formed out of the combinations of fiery molecules, or the whirling of electrons in the ether, and of how the mystery of life entered on possession of the slowly cooling ball so formed, and how the creatures of the slime were raised to higher levels, until at last there was something that could hold and reveal a spark of the Divine Glory. Of course we should expect that the way to the production of man would be strewn with the wrecks of creatures that fell out, that could not maintain themselves in the struggle for existence, or that were discarded as leading nowhere. Just as in our own bodies there are abortive organs for which we have no use, so in the record of creation we are prepared to find signs of experiments that did not succeed, or forms that were outgrown. That is what such skulls as that found at Taungs are thought to be. They are like chips from the workshop of creation, fragments of tentative constructions, or pieces of scaffolding that lost their usefulness when the structure they served was completed. They do not cast any doubt on the proclamation that God created man in His own image. They rather show with what pains and patience God wrought in order to have a creature made out of the dust that could take the impress of His mind and enter into partnership with His purposes. There is no need to ask whether the Genesis story or the evolutionary theory is true. Both are true. The one tells what God did. The other tells how He did it. The one records for all ages the eternal fact, the truth that matters most for the understanding of our human life. The other unfolds the marvellous story of the way by which our nature was framed that we might become sons of God. Both show us God. Both make human nature a great and sacred thing. Both should make it impossible to think meanly of humanity, or live in contempt of God's will.

The Presbyterian Churchman (1925) Vol XXIII No. 266:37-38.

FUNNIES FROM THE WORLD OF MEDICINE
..... (From the Internet)

I was performing a complete physical, including the visual acuity test. I placed the patient twenty feet from the chart and began, "Cover your right eye with your hand." He read the 20/20 line perfectly. "Now your left." Again, a flawless read. "Now both," I requested. There was silence. He couldn't even read the large E on the top line. I turned and discovered that he had done exactly what I had asked; he was standing there with both his eyes covered. I was laughing too hard to finish the exam.

A nurses' aide was helping a patient into the bathroom when the patient exclaimed, "You're not coming in here with me. This is a one-seater!"

During a patient's two week follow-up appointment with his cardiologist, he informed his doctor that he was having trouble with one of his medications. "Which one?", asked the doctor.

"The patch. The nurse told me to put on a new one every six hours and now I'm running out of places to put it!"

The doctor had him quickly undress and discovered what he hoped he wouldn't see....Yes, the man had over fifty patches on his body!

Now the instructions include removal of the old patch before applying a new one.

A nurse caring for a woman from Kentucky asked, "So how's your breakfast this morning?"

"It's very good, except for the Kentucky Jelly. I can't seem to get used to the taste," the patient replied. The nurse asked to see the jelly and the woman produced a foil packet labeled "KY Jelly."

Posted by Kim Driggers.

NEWS BRIEFS (From the Internet)

- * Celebrated bird-dinosaur fossil a fake
- * Prepare for the end of the world - again.
- * New pyramid discovered
- * Astrophysicists want to see dark matter
- * Most Americans believe that religion is the answer
- * New evidence that sexual orientation may be partly biological
- * Snake fossil with vestigial legs named and described
- * Theological seminaries in the USA reject Young-Earth Creationism
- * Japan may make human cloning a crime
- * Men are generally better than women at solving mazes
- * 'Men are rapists for evolutionary reasons' view takes a beating

* Celebrated bird-dinosaur fossil a fake

The National Geographic Society has announced that Archaeoraptor, a fossil celebrated last year as important evidence of a link between birds and dinosaurs, is actually a hoax. Chinese paleontologist Xu Xing raised questions about the fossil's authenticity culminating in an investigation by the Royal Ontario Museum which established that it is a composite of at least two different animals.

* Prepare for the end of the world - again.

Every twenty years or so a conspicuous planetary alignment takes place sending doomsayers into an end-of-the-world predictive frenzy. It happened in 1982, is due again next month (15-16 May) and again in 2020. The planets aligning with the sun are Mercury, Venus, Earth, Mars, Jupiter and Saturn. Astronomers predict that the event will be somewhat less callamitous than Y2K.

* New pyramid discovered

The 4 000 year old pyramid of Queen Ankh-sn-Pepi, the wife of King Pepi I, has been discovered along with scrolls of special prayers for the dead. The discovery was made in Sakkara, south of Cairo, by a French team led by Jean Leclant. If the prayers were for protection from tomb-raiders they were not answered.

* Astrophysicists want to see dark matter

Scientists believe that 90% of the universe is made up dark matter that has yet to be directly detected. This could change soon. Dark matter is believed to emit weakly interacting massive particles (WIMPS). There is a scramble to build devices capable of detecting the particles which may only exist in the mind of physicists. The research could help determine whether the universe will end in a Big Crunch or continue expanding.

* Most Americans believe that religion is the answer

A recent Gallup poll shows that two-thirds of Americans believe that religion can answer all or most of today's problems. Most Americans also say that religion is "very" important to them and that they attend church regularly. This belief is lower in college-educated and high-income groups, but still quite likely.

* New evidence that sexual orientation may be partly biological

It has known for some time that men tend to have shorter index fingers than ring fingers while for women they tend to be the same length. A study has found that homosexuals are more likely than heterosexuals to have

the "masculine" trait. The evidence supports the view that higher levels of male hormone in the foetus may lead to homosexuality.

* Snake fossil with vestigial legs named and described

The fossil was found in a museum drawer at Hebrew University in Jerusalem. A team led by Olivier Rieppel of the Field Museum in Chicago has described and given it the name *Haasiophis terrasanctus*. It appears that the only function the small legs could have is as indicators of its lizard ancestry.

* Theological seminaries in the USA reject Young-Earth Creationism

A survey of among deans at theological seminaries in the in the Association of Theological Schools in the USA reveals that less than 10% of their seminaries teach a strict young-earth creation, 25% teach a mixture of young-earth creation and progressive creation while 66% teach theistic evolution or progressive creation.

* Japan may make human cloning a crime

The Japanese government following several European countries, is preparing legislation that would make human cloning a crime. The penalty could be a seven-year prison term. The bill would outlaw cloning for reproductive or hybridisation purposes, but would allow it for research purposes under strict limits.

* Men are generally better than women at solving mazes

A virtual 3D maze experiment has revealed that on average men are 28% faster than women in getting out of the maze. The study complements a previous study that showed that men use different parts of the brain to navigate. Given this and the fact that women are better drivers, why is that men tend to do the driving while women do the navigating?

* 'Men are rapists for evolutionary reasons' hypothesis takes a beating

Two prominent evolutionary biologists, Jerry Coyne of the University of Chicago and Andrew Berry of Harvard's Museum of Comparative Zoology have attacked Thornhill and Palmer's book "A Natural History of Rape" in a recent review. The book argues that rape is a byproduct of evolution and claims that all men could be rapists. Coyne and Berry's reply: "The authors' evidence either fails to support their case, is presented in a misleading or biased way, or equally supports alternative explanations."

Fallacies and Fabrications in the name of God and Science
WHEN IS CABBAGE NOT CABBAGE?: THE REDUCTIVE FALLACY

Mike L Anderson

To me, the best way to eat cabbage is raw, shredded and with mayonnaise. The caterers at my old boarding school did not share my view. Their approach was to boil away its entire colour, taste and nutrients. The result was something that had the transparency, texture and nutritional value of fly wings and hardly deserved to be called cabbage. I can understand them wanting to make the vegetable easier to digest, but I think they overdid it.

The question 'what is life?', like cabbage, is hard to digest. The question generates lots of discussion, but there is no single answer. The problem is that the question is too simple. If you try to boil life down to one single thing, you end up with a residue that is no longer living! Life is too complex, too rich, and too deep to have an essence or simple definition. So, dictionaries, instead of vainly trying to get to the heart of the matter, give answers such as "the state of an organism in which it is capable of performing its natural functions." The functions are not listed, presumably because there are too many.

Where dictionaries fear to tread, others jump in boots and all, and reduce a complex entity to one of its aspects. This is called the reductive fallacy. Examples are, "humans are nothing but a stage in the life-cycle of the sperm" or "humans are just animals." Words like "just," "nothing but," "only" and "merely," very often hint of the fallacy. At other times one level of explanation is emphasised at the expense of another. For example, Richard Dawkins says, "[W]hat lies at the heart of every living thing is not a fire, not warm breath, not a 'spark of life'. It is information, words, instructions ... If you want to understand life, don't think about vibrant, throbbing gels and oozes, think about information technology" (1). It is one thing to say that information technology can help us understand life; it is quite another to set it against other ways of knowing. Getting one's hands messy with animal juices also helps one's understanding - as the zoologically trained Dawkins should know.

What is true about physical life is also true of spiritual life. How does one define spirituality? It is not easy to do because it is made up of so many elements. Ryrie surely understates it when he says that "the concept includes several factors, and it is not easy to weave these into a balanced definition" (2). The scriptures do not attempt an overarching definition but instead provide lists of spiritual qualities. "But the fruit of the Spirit is love, joy, peace, patience, kindness, goodness, faithfulness, gentleness and self-control ..." (Galatians 5:22 NIV). "For this very reason, make every effort to add to your faith goodness;

and to goodness, knowledge, and to knowledge self-control; and to self-control, perseverance; and to perseverance, godliness and to godliness, brotherly kindness; and to brotherly kindness, love" (2 Peter 1:5-7).

While Peter adds these qualities on to each other, some writers appear to want to set them against each other. One newsletter had this comment, "God does not need astute people; he needs humble people." I suspect Jesus would have said, "Be as shrewd as a serpent and as humble as pie" (3). While God needs neither, he can certainly use both. Another writes in a book entitled Money, Possessions and Eternity that, "[S]tewardship is not a subcategory of the Christian Life. Stewardship is the Christian Life." How convenient that the essence of the Christian life happens to be something in which he is an expert. Ryrie warns of the dangers of simple formulas for the spiritual life, "I have the suspicion ... that the "formulas" and "secrets" contribute to the problems people have rather than reveal solutions. Try this," says one; "Try that," says another" (4).

Imagine if we tried this oversimplified thinking in our physical lives. We might emphasise breathing at the expense of eating, or exercise at the expense of sleep. The result would be an unhealthy and unbalanced lifestyle. Similarly, the reductive fallacy, when applied to the Christian life must produce reduced Christians - Christians who do not try to integrate all the qualities and virtues that God is giving them. This is hard work. Combining shrewdness and innocence is a challenge because shrewdness can so easily stray into guile, and innocence into dullness but spiritual maturity is the rich reward.

Oversimplification has been called pre-digested thinking (5). It is like over-boiling cabbage. The product may be easier to digest, but far removed from the real thing.

NOTES

1. Dawkins, R. (1987) The Blind Watchmaker Norton, New York, p. 112.

2. Ryrie, C. C. (1969) Balancing the Christian Life Moody Press, Chicago, p. 12.

3. Jesus actually said, "Therefore be as shrewd as snakes, and as innocent as doves" (Matthew 10:16 NIV).

4. Ryrie, p. 182.

5. Thouless, R. H. (1930) Straight and Crooked Thinking Pan Books, Ltd, p. 130.

***** Feature Article *****

RELIGION AND SCIENCE (1925)

By Alfred North Whitehead

The difficulty in approaching the question of the relations between Religion and Science is, that its elucidation requires that we have in our minds some clear idea of what we mean by either of the terms, 'religion' and 'science.' Also I wish to speak in the most general way possible, and to keep in the background any comparison of particular creeds, scientific or religious. We have got to understand the type of connection which exists between the two spheres, and then to draw some definite conclusions respecting the existing situation which at present confronts the world.

The conflict between religion and Science is what naturally occurs to our minds when we think of this subject. It seems as though, during the last half-century, the results of science and the beliefs of religion had come into a position of frank disagreement, from which there can be no escape, except by abandoning either the clear teaching of science, or the clear teaching of religion. This conclusion has been urged by controversialists on either side. Not by all controversialists, of course, but by those trenchant intellects which every controversy calls out into the open.

The distress of sensitive minds, and the zeal for truth, and the sense of the importance of the issues, must command our sincerest sympathy. When we consider what religion is for mankind, and what science is, it is no exaggeration to say that the future course of history depends upon the decision of this generation as to the relations between them. We have here the two strongest general forces (apart from the mere impulse of the various senses) which influence men, and they seem to be set one against the other - the force of our religions intuitions, and the force of our impulse to accurate observation and logical deduction.

A great English statesman once advised his countrymen to use large-scale maps, as a preservative against alarm, panics, and general misunderstanding of the true relations between nations. In the same way in dealing with the clash between permanent elements of human nature, it is well to map our history on a large scale, and to disengage ourselves from our immediate absorption in the present conflicts. When we do this, we immediately discover two great facts. In the first place, there has always been a conflict between religion and science; and in the second place, both religion and science have always been in a state of continual development. In the early days of Christianity, there was a general belief among Christians that the world was coming to an end in the lifetime of people then living. We can make only indirect inferences as to how far this belief was authoritatively proclaimed; but it is certain that it was widely held, and that it formed an impressive part of the popular religious doctrine. The

belief proved itself to be mistaken, and Christian doctrine adjusted itself to the change. Again in the early Church individual theologians very confidently deduced from the Bible opinions concerning the nature of the physical universe. In the year A. D. 535, a monk named Cosmas wrote a book which he entitled, Christian Topography. He was a travelled man who had visited India and Ethiopia; and finally he lived in a monastery at Alexandria, which was then a great centre of culture. In this book, basing himself upon the direct meaning of Biblical texts as construed by him in a literal fashion, he denied the existence of the antipodes, and asserted that the world is a flat parallelogram whose length is double' its breadth.

In the seventeenth century the doctrine of the motion of the earth was condemned by a Catholic tribunal. A hundred years ago the extension of time demanded by geological science distressed religious people, Protestant and Catholic. And today the doctrine of evolution is an equal stumbling-block. These are only a few instances illustrating a general fact.

But all our ideas will be in a wrong perspective if we think that this recurring perplexity was confined to contradictions between religion and science; and that in these controversies religion was always wrong, and that science was always right. The true facts of the case are very much more complex and refuse to be summarised in these simple terms.

Theology itself exhibits exactly the same character of gradual development, arising from an aspect of conflict between its own proper ideas. This fact is a commonplace to theologians, but is often obscured in the stress of controversy. I do not wish to overstate my case; so I will confine myself to Roman Catholic writers. In the seventeenth century a learned Jesuit, Father Petavius, showed that the theologians of the first three centuries of Christianity made use of phrases and statements which since the fifth century would be condemned as heretical. Also Cardinal Newman devoted a treatise to the discussion of the development of doctrine. He wrote it before he became a great Roman Catholic ecclesiastic, but throughout his life, it was never retracted and continually reissued.

Science is even more changeable than theology. No man of science could subscribe without qualification to Galileo's beliefs, or to Newton's beliefs, or to all his own scientific beliefs of ten years ago.

In both regions of thought, additions, distinctions, and modifications have been introduced. So that now, even when the same assertion is made today as was made a thousand, or fifteen hundred years ago, it is made subject to limitations or expansions of meaning, which were not contemplated at the earlier epoch. We are told by logicians that a proposition must be either true or false, and that there is no middle term. But in practice, we may know that a proposition expresses an

important truth, but that it is subject to limitations and qualifications which at present remain undiscovered. It is a general feature of our knowledge, that we are insistently aware of important truth; and yet that the only formulations of these truths which we are able to make presuppose a general standpoint of conceptions which may have to be modified. I will give you two illustrations, both from science: Galileo said that the earth moves and that the sun is fixed; the Inquisition said that the earth is fixed and the sun moves; and Newtonian astronomers, adopting an absolute theory of space, said that both the Sun and the earth move. But now we say that any one of these three statements is equally true, provided that you have fixed your sense of 'rest' and 'motion' in the way required by the statement adopted. At the date of Galileo's controversy with the Inquisition, Galileo's way of stating the facts was, beyond question, the fruitful procedure for the sake of scientific research. But in itself it was not more true than the formulation of the Inquisition. But at that time the modern concepts of relative motion were in nobody's mind, so that the statements were made in ignorance of the qualifications required for their more perfect truth. Yet this question of the motions of the earth and the sun expresses a real fact in the universe; and all sides had got hold of important truths concerning it. But with the knowledge of those times, the truths appeared to be inconsistent.

Again I will give you another example taken from the state of modern physical science. Since the time of Newton and Huyghens in the seventeenth century there have been two theories as to the physical nature of light. Newton's theory was that a beam of light consists of a stream of very minute particles, or corpuscles, and that we have the sensation of light when these corpuscles strike the retinas of our eyes. Huyghens' theory was that light consists of very minute waves of trembling in an all-pervading ether, and that these waves are travelling along a beam of light. The two theories are contradictory. In the eighteenth century Newton's theory was believed, in the nineteenth century Huyghens' theory was believed. To-day there is one large group of phenomena which can be explained only on the wave theory, and another large group which can be explained only on the corpuscular theory. Scientists have to leave it at that, and wait for the future, in the hope of attaining some wider vision which reconciles both.

We should apply these same principles to the questions in which there is a variance between science and religion. We would believe nothing in either sphere of thought which does not appear to us to be certified by solid reasons based upon the critical research either of ourselves or of competent authorities. But granting that we have honestly taken this precaution, a clash between the two on points of detail where they overlap should not lead us hastily to abandon doctrines for which we have solid evidence. It may be that we are more interested in one set of doctrines than in the other.

But, if we have any sense of perspective and of the history of thought, we shall wait and refrain from mutual anathemas.

We should wait: but we should not wait passively, or in despair. The clash is a sign that there are wider truths and finer perspectives within which a reconciliation of a deeper religion and a more subtle science will be found.

In one sense, therefore, the conflict between science and religion is a slight matter which has been unduly emphasised. A mere logical contradiction cannot in itself point to more than the necessity of some readjustments, possibly of a very minor character on both sides. Remember the widely different aspects of events which are dealt with in science and in religion respectively. Science is concerned with the general conditions which are observed to regulate physical phenomena; whereas religion is wholly wrapped up in the contemplation of moral and aesthetic values. On the one side there is the law of gravitation, and on the other the contemplation of the beauty of holiness. What one side sees, the other misses; and vice versa.

Consider, for example, the lives of John Wesley and of Saint Francis of Assisi. For physical science you have in these lives merely ordinary examples of the operation of the principles of physiological chemistry, and of the dynamics of nervous reactions: for religion you have lives of the most profound significance in the history of the world. Can you be surprised that, in the absence of a perfect and complete phrasing of the principles of science and of the principles of religion which apply to these specific cases, the accounts of these lives from these divergent standpoints should involve discrepancies? It would be a miracle if it were not so.

It would, however, be missing the point to think that we need not trouble ourselves about the conflict between science and religion. In an intellectual age there can be no active interest which puts aside all hope of a vision of the harmony of truth. To acquiesce in discrepancy is destructive of candour, and of moral cleanliness. It belongs to the self-respect of intellect to pursue every tangle of thought to its final unravelment. If you check that impulse, you will get no religion and no science from an awakened thoughtfulness. The important question is, in what spirit are we going to face the issue? There we come to something absolutely vital.

A clash of doctrines is not a disaster - it is an opportunity. I will explain my meaning by some illustrations from science. The weight of an atom of nitrogen was well known. Also it was an established scientific doctrine that the average weight of such atoms in any considerable mass will be always the same. Two experimenters, the late Lord Rayleigh and the late Sir William Ramsay, found that if they obtained nitrogen

by two different methods, each equally effective for that purpose, they always observed a persistent slight difference between the average weights of the atoms in the two cases. Now I ask you, would it have been rational of these men to have despaired because of this conflict between chemical theory and scientific observation? Suppose that for some reason the chemical doctrine had been highly prized throughout some district as the foundation of its social order:-would it have been wise, would it have been candid, would it have been moral, to forbid the 'disclosure of the fact that the experiments produced discordant results? Or, on the 'other hand, should Sir William Ramsay and Lord Rayleigh have proclaimed that chemical theory was now a detected delusion? We see at once that either of these ways would have been a method of facing the issue in an entirely wrong spirit. What Rayleigh and Ramsay did was this: They at once perceived that they had hit upon a line of investigation which would disclose some subtlety of chemical theory that had hitherto eluded observation. The discrepancy was not a disaster: it was an opportunity to increase the sweep of chemical knowledge. You all know the end of the story: finally argon was discovered, a new chemical element which had lurked undetected, mixed with the nitrogen. But the story has a sequel which forms my second illustration. This discovery drew attention to the importance of observing accurately minute differences in chemical substances as obtained by different methods. Further researches of the most careful accuracy were undertaken. Finally another physicist, F. W. Aston, working in the Cavendish Laboratory at Cambridge in England, discovered that even the same element might assume two or more distinct forms, termed isotopes, and that the law of the constancy of average atomic weight holds for each of these forms, but as between the different isotopes differs slightly. The research has effected a great stride in the power of chemical theory, far transcending in importance the discovery of argon from which it originated. The moral of these stories lies on the surface, and I will leave to you their application to the case of religion and science.

In formal logic, a contradiction is the signal of a defeat: but in the evolution of real knowledge it marks the first step in progress towards a victory. This is one great reason for the utmost toleration of variety of opinion. Once and forever, this duty of toleration has been summed up in the words, 'Let both grow together until the harvest. The failure of Christians to act up to this precept, of the highest authority, is one of the curiosities of religious history. But we have not yet exhausted the discussion of the moral temper required for the pursuit of truth. There are short cuts leading merely to an illusory success. It is easy enough to find a theory, logically harmonious and with important applications in the region of fact, provided that you are content to disregard half your evidence. Every age produces people with clear logical intellects, and with the most praiseworthy grasp of the importance of some sphere of human experience, who have elaborated, or

inherited, a scheme of thought which exactly fits those experiences which claim their interest. Such people are apt resolutely to ignore, or to explain away, all evidence which confuses their scheme with contradictory instances; what they cannot fit in is for them nonsense. An unflinching determination to take the whole evidence into account is the only method of preservation against the fluctuating extremes of fashionable opinion. This advice seems so easy, and is in fact so difficult to follow.

One reason for this difficulty is that we cannot think first and act afterwards. From the moment of birth we are immersed in action, and can only fitfully guide it by taking thought. We have, therefore, in various spheres of experience to adopt those ideas which seem to work within those spheres. It is absolutely necessary to trust to ideas which are generally adequate, even though we know that there are subtleties and distinctions beyond our ken. Also apart from the necessities of action, we cannot even keep before our minds the whole evidence except under the guise of doctrines which are in-completely harmonised. We cannot think in terms of an indefinite multiplicity of detail; our evidence can acquire its proper importance only if it comes before us marshalled by general ideas. These ideas we inherit—they form the tradition of our civilisation. Such traditional ideas are never static. They are either fading into meaningless formulae, or are gaining power by the new lights thrown by a more delicate apprehension. They are transformed by the urge of critical reason, by the vivid evidence of emotional experience, and by the cold certainties of scientific perception. One fact is certain, you cannot keep them still. No generation can merely reproduce its ancestors. You may preserve the life in a flux of form, or preserve the form amid an ebb of life. But you cannot permanently enclose the same life in the same mould.

The present state of religion among the European races illustrates the statements which I have been making. The phenomena are mixed. There have been reactions and revivals. But on the whole, during many generations, there has been a gradual decay of religious influence in European civilisation. Each revival touches a lower peak than its predecessor, and each period of slackness a lower depth. The average curve marks a steady fall in religious tone. In some countries the interest in religion is higher than in others. But in those countries where the interest is relatively high, it still falls as the generations pass. Religion is tending to degenerate into a decent formula wherewith to embellish a comfortable life. A great historical movement on this scale results from the convergence of many causes. I wish to suggest two of them which lie within the scope of this chapter for consideration.

In the first place for over two centuries religion has been on the defensive, and on a weak defensive. The period has been one of unprecedented intellectual progress. In this way a series of novel situations have

been produced for thought. Each such occasion has found the religious thinkers unprepared. Something, which has been proclaimed to be vital, has finally, after struggle, distress, and anathema, been modified and otherwise interpreted. The next generation of religious apologists then congratulates the religious world on the deeper insight which has been gained. The result of the continued repetition of this undignified retreat, during many generations, has at last almost entirely destroyed the intellectual authority of religious thinkers. Consider this contrast: when Darwin or Einstein proclaim theories which modify our ideas, it is a triumph for science. We do not go about saying that there is another defeat for science, because its old ideas have been abandoned. We know that another step of scientific insight has been gained.

Religion will not regain its old power until it can face change in the same spirit as does science. Its principles may be eternal, but the expression of those principles requires continual development. This evolution of religion is in the main a disengagement of its own proper ideas from the adventitious notions which have crept into it by reason of the expression of its own ideas in terms of the imaginative picture of the world entertained in previous ages. Such a release of religion from the bonds of imperfect science is all to the good. It stresses its own genuine message. The great point to be kept in mind is that normally an advance in science will show that statements of various religious beliefs require some sort of modification. It may be that they have to be expanded or explained, or indeed entirely restated. If the religion is a sound expression of truth, this modification will only exhibit more adequately the exact point which is of importance. This process is a gain. In so far, therefore, as any religion has any contact with physical facts, it is to be expected that the point of view of those facts must be continually modified as scientific knowledge advances. In this way, the exact relevance of these facts for religious thought will grow more and more clear. The progress of science must result in the unceasing codification of religious thought, to the great advantage of religion.

The religious controversies of the sixteenth and seventeenth centuries put theologians into a most unfortunate state of mind. They were always attacking and defending. They pictured themselves as the garrison of a fort surrounded by hostile forces. All such pictures express half-truths. That is why they are so popular. But they are dangerous. This particular picture fostered a pugnacious party spirit which really expresses an ultimate lack of faith. They dared not modify, because they shirked the task of disengaging their spiritual message from the associations of a particular imagery.

Let me explain myself by an example. In the early medieval times, Heaven was in the sky, and Hell was underground; volcanoes were the laws of Hell. I do not

assert that these beliefs entered into the official formulations: but they did enter into the popular understanding of the general doctrines of Heaven and Hell. These notions were what every-one thought to be implied by the doctrine of the future state. They entered into the explanations of the influential exponents of Christian belief. For example, they occur in the Dialogues of Pope Gregory, the Great, a man whose high official position is surpassed only by the magnitude of his services to humanity. I am not saying what we ought to believe about the future state. But whatever be the right doctrine, in this instance the clash between religion and science, which has relegated the earth to the position of a second-rate planet attached to a second-rate sun, has been greatly to the benefit of the spirituality of religion by dispersing these medieval fancies.

Another way of looking at this question of the evolution of religious thought is to note that any verbal form of statement which has been before the world for some time discloses ambiguities; and that often such ambiguities strike at the very heart of the meaning. The effective sense in which a doctrine has been held in the past cannot be determined by the mere logical analysis of verbal statements, made in ignorance of the logical trap. You have to take into account the whole reaction of human nature to the scheme of thought. This reaction is of a mixed character, including elements of emotion derived from our lower natures. It is here that the impersonal criticism of science and of philosophy comes to the aid of religious evolution. Example after example can be given of this motive force in development. For example, the logical difficulties inherent in the doctrine of the moral cleansing of human nature by the power of religion rent Christianity in the days of Pelagius and Augustine--that is to say, at the beginning of the fifth century. Echoes of that controversy still linger in theology.

So far, my point has been this: that religion is the expression of one type of fundamental experiences of mankind: that religious thought develops into an increasing accuracy of expression, disengaged from adventitious imagery: that the interaction between religion and science is one great factor in promoting this development.

I now come to my second reason for the modern fading of interest in religion. This involves the ultimate question which I stated in my opening sentences. We have to know what we mean by religion. The churches, in their presentation of their answers to this query, have put forward aspects of religion which are expressed in terms either suited to the emotional reactions of bygone times or directed to excite modern emotional interest: of nonreligious character. What I mean under the first heading is that religious appeal is directed partly to excite that instinctive fear of the wrath of a tyrant which was inbred in the unhappy populations of the arbitrary empires of the ancient world, and in

particular to excite that fear of an all-powerful arbitrary tyrant behind the unknown forces of nature. This appeal to the ready instinct of brute fear is losing its force. It lacks any directness of response, because modern science and modern condition: of life have taught us to meet occasions of apprehension by a critical analysis of their causes and conditions. Religion is the reaction of human nature to it: search for God. The presentation of God under the aspect of power awakens every modern instinct of critical reaction. This is fatal; for religion collapses unless its main positions command immediacy of assent. In this respect the old phraseology is at variance with the psychology of modern civilisations. This change in psychology is largely due to science, and is one of the chief ways in which the advance of science has weakened the hold of the old religious forms of expression. The non-religious motive which has entered into modern religious thought is the desire for a comfortable organisation of modern society. Religion has been presented as valuable for the ordering of life. Its claims have been rested upon its function as a sanction to right conduct. Also the purpose of right conduct quickly degenerates into the formation of pleasing social relations. We have here a subtle degradation of religious ideas, following upon their gradual purification under the influence of keener ethical intuitions. Conduct is a by-product of religion -an inevitable by-product, but not the main point. Every great religious teacher has revolted against the presentation of religion as a mere sanction of rules of conduct. Saint Paul denounced the Law, and Puritan divines spoke of the filthy rags of righteousness. The insistence upon rules of conduct marks the ebb of religious fervour. Above and beyond all things, the religious life is not a research after comfort. I must now state, in all diffidence, what I conceive to be the essential character of the religious spirit.

Religion is the vision of something which stands beyond, behind, and within the passing flux of immediate things; something which is real, and yet waiting to be realised; something which is a remote possibility, and yet the greatest of present facts; something that gives meaning to all that passes and yet eludes apprehension; something whose possession is the final good, and yet is beyond all reach; something which is the ultimate ideal, and the hopeless quest.

The immediate reaction of human nature to the religious vision is worship. Religion has emerged into human experience mixed with the crudest fancies of barbaric imagination. Gradually, slowly, steadily the vision recurs in history under nobler form and with clearer expression. It is the one element in human experience which persistently shows an upward trend. It fades and then recurs. But when it renews its force, it recurs with an added richness and purity of content. The fact of the religious vision, and its history of persistent expansion, is our one ground for optimism. Apart from it, human life is a flash of occasional enjoyments

lighting up a mass of pain and misery, a bagatelle of transient experience.

The vision claims nothing but worship; and worship is a surrender to the claim for assimilation, urged with the motive force of mutual love. The vision never overrules. It is always there, and it has the power of love presenting the one purpose whose fulfilment is eternal harmony. Such order as we find in nature is never force - it presents itself as the one harmonious adjustment of complex detail. Evil is the brute motive force of fragmentary purpose, disregarding the eternal vision. Evil is overruling, retarding, hurting. The power of God is the worship He inspires. That religion is strong which in its ritual and its modes of thought evokes an apprehension of the commanding vision. The worship of God is not a rule of safety-it is an adventure of the spirit, a flight after the unattainable. The death of religion comes with the repression of the high hope of adventure.

Religion and Science is taken from "Science & the Modern World" (1938) Penguin Books, Ltd., England.