THE RELATION BETWEEN SCIENCE AND RELIGION

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THE MEANING OF LIFE

What is our lives' meaning, what meaning is their at all for living creatures? To be able to give an answer to these questions is to be religious. You ask: Is there then any point in asking that question? I answer: A person that does not consider his own, and his fellow human beings life as meaningful, is not only unhappy, he is hardly alive.

Albert Einstein, Mein Weltbild-1934

1 Introduction

This report is a part of a B-level course in the History of Christianity, given in the autumn of 2004. The report is scheduled to three weeks of work, and it should be about 7-9 pages long. I have chosen the topic "The relation between science and religion", because i) it is a topic that has great interest for me, and that is of great interest for the current age, and ii) because I think my background in theoretical physics and systems biology gives me valuable insights to some of the questions. Now follows a summary of the main questions posed in this work, and a short description of how the rest of the report is structured.

1.1 Basic questions

The questions I have posed naturally divide in two groups i) questions about the historical development and ii) questions about the contemporary status.

i) In the early stages of science, the scientists where writing about their theological and scientific thoughts as one continuous text. Now this does almost never happen anymore, and at least in the scientific world, anything that is considered spiritual is almost automatically denoted un-scientific. When did this change occur, and what have been the major turning points and mechanisms leading to it? How has this trend affected peoples relation to spiritual things in general, and to Christianity, more specific?

ii) The latest developments within e.g. modern physics and complexity theory has also led to an opposite trend: that the results within science have provided new arguments *for* the ancient truths contained in religions like Christianity. This has led to new interpretations of Christianity, like e.g. Systems Theology. What are the results they have used? What is the relation between the new interpretations and the old ones and can this opposite trend be understood in its historical context?

1.2 Structure of report

The first set of questions are approached in Section 2. The section is structured as an historical review, but the focus is kept on the questions above. Section 3 deals with the second set of questions, but also provides a short review to some basic results in modern science. Finally Section 4 contains a summary of the conclusions, and some final reflections.

2 Historical review

The study starts with the period that is usually denoted as the start of the modern science, i.e. with the works of Galileo, Kepler and Newton. We will study why there was a conflict between these new developments and the church. We will also study how this conflict has changed character of both the church and of science and how the spreading of science eventually lead to the Age of

Reason in the late eighteenth century. We will end this section with a closer look of the conflicts regarding evolutionary theories presented in the second half of the nineteenth century. All information is taken from [2] except where especially mentioned.

2.1 The first threats from modern science

Modern science is usually acknowledged to have begun with the works regarding the solar system, i.e. with the works of N. Copernicus (1473-1543), J. Kepler (1571-1630) and G. Galilei (1564-1642). These new thoughts were initially strongly condemned by the church, and Galileos trial, condemnation and life-long house arrest is one of the earliest examples of a severe conflict between modern science and Christianity. Why was it that these new thoughts posed such a threat to the church?

To understand this it must be remembered that the Christian teaching had been so mixed up with the Aristotelian thought system during a process of over 1000 years that one did no longer see the difference between them. One of the most influential thinkers, T. Aquinas (1225-1274), had formulated a synthesis that had been prevailing for over 300 years, and it was this thought system that was taught by the Catholic church. An attack on anything in this thought system was therefore perceived as an attack at Christianity itself. At this point the reformation had taken place, but also Luther's followers, e.g. Melanchton, made extensive usage of Aristotle in his educational reforms. It must further be remembered that many representatives of the church claimed that they were teaching eternal truths, that it was same truths they had always been teaching, and that the Bible had been dictated by God. The church also had a completely different position in the society than it has today. In the seventeenth century the church possessed the only authorised source of knowledge, and was in general an institution of great power, and this was a position it did not want to loose. Let us now look at the major conflicting thoughts between the Thomistic school and the emerging new science.

The most obvious conflict at this stage was of course the question whether the heavenly bodies revolved around the earth (as in the Ptolemaic system, which the church defended) or if they revolved around the sun (as in the Copernican system). There are, however, some other conflicts that might have been less obvious, but that actually were more important for the future development. In the medieval scientific methods most focus was laid on qualitative reasonings. These were deductive reasonings where purpose decides where processes ends, and where the end state (*terminus*) was more important than the process leading to it. In the new works by Galileo the quantitative agreement was instead in focus, and his reasonings were more interested in *how* things move, than in *why* they move. In this he has started to ask completely new kinds of questions. It is these questions that have been carried further on by science, and it is these questions that would completely alter the idea of what it means to understand something. These questions was then carried further by many people, with Newton as the maybe most important of them, and it is these line of thoughts

that gradually leads to the idea of excluding God from science completely.

2.2 God becomes an unnecessary hypothesis

All the three scientists mentioned above where religious, and they all thought of their science as an alternative way of achieving knowledge about God. Galileo said that the Book of Nature, and the Book of Scripture cannot conflict since they come from the same author, and in his letter to the Duchess Christina in 1615 he explains how to deal with the possible conflicts that might occur between upcoming scientific results and what is said in the Bible. He argues that one should believe what the Bible says unless science has good evidence of something else, when one should believe the scientific point of view. That the Bible might have errors regarding scientific questions is not a problem since "the Holy Ghost did not intend to teach us whether heaven moves or stands still". He says that the Holy Ghost is only interested in teaching us about our salvation[3].

However, with the development of the new mathematics, and especially with the formulation of Newton's Laws of Motion, the role of God in science gradually become more and more affected. The success of these laws was so impressive, that the idea come up whether these laws are all that govern the universe. Now the idea of nature as a law-abiding machine, and God as the intelligent clock-maker, is formulated for the first time. Humans and the human mind were, however, usually excluded from these laws, and it was still believed that God can sometimes intervene through special miracles. This line of thoughts was defended by e.g. some English scientists that referred to themselves as "natural scientists", or "virtuosi". This kind of "rational religion" was originally intended as a support for the essentials of Christianity - like the existence of a Supreme Being, the immortality of the soul and the obligation to moral conduct - and they had great faith that it would be a religion that could be discovered by any culture, independent of historical revelations.

As time goes by, natural sciences evolve, the witness of its increasing successes becomes more and more known to the masses, and this eventually leads to the Age of Reason. This has its peak in the second half of the eighteenth century with a number of French philosophers as front figures. During this period the previous estrangement between orthodox Christianity and science was taken even further. One front figure was P. Laplace (1749-1827) and he showed a number of cases where there were natural explanations behind phenomena that Newton had thought required divine interventions. It was also Laplace that gave the famous answer to the question from Napoleon about why he had written a whole book about the system of the universe without even once mentioning its Creator: "I had no need of that hypothesis!"[4]. Laplace and his fellow philosophers also drove the ideas of reductionism, materialism and determinism all the way. This meant that for them even the human mind was considered a part of matter. They also argued that holes in a scientific theory should never be filled by introducing a *deus ex machina*, but by further search for physical explanations.

The idea of God as an intelligent clock-maker, but which does not continually interact with the world, is denoted Deism, and during this time the conflict between the Deists and the traditional Christianity became more and more bitter, and especially so in France. England and the United States is believed to have had a friendlier dialogue. However, the general attitude in the age was generally very positive. It was believed that the Reason in man would lead to inevitable progress. So far its success had mainly been witnessed in the natural sciences, but it would most assuredly spread to the social sciences as well. Another result of this development was the new demands of freedom of thoughts and faith.

During the Enlightenment the faith in, and adoration of Nature (usually capitalised) was steadily increasing, and this adoration became even more pronounced during the romantic era. During this era the faith in man was extended beyond Reason, and the mysticism of Nature and spiritualism grew stronger. This reaction also affected the Christian traditions. Examples of this are the emerging pietist and methodist movements, that both put a strong emphasis on the personal experience. All in all religious beliefs still were wide-spread in the society, even though the strong hold of the medieval Church had been replaced by a rationally based natural religion. The next serious threat to the authority of Christian beliefs, with many similarities to Newton's threat 200 years earlier, was the Darwinistic theories of evolution.

2.3 Evolutionary fights

C. Darwin (1809-1882) is one of the most influential scientists in our age, and his idea of the "survival of the fittest" has affected more parts of our social constructions than we are often willing to acknowledge. What he said was basically just that the species that are best at surviving are the ones that are most likely to survive, and hence the ones that statistically will give the most off-spring. This seems like a fairly obvious statement (although we will actually attack it later in this report) but yet its formulation gave an enormous reaction in the whole society - in the scientific world, but especially on the interplay between science and Christianity. Why did it give such a strong reaction?

First it should be said that the impact of the formulation should never have been that great if it had not been backed up by such a big amount of data, supporting the theory. The idea that one could understand the world by observing it was now generally acknowledged. The major conflict with the theory and the prevailing notion of how nature was constructed, was instead that the new theory implied that nature was continually changing. That meant that the Deistic argument of design, as it had been formulated up until then - i.e. that nature could only have been so cleverly designed by a Divine Designer - was no longer valid; nature could adapt itself to a clever design. The second major conflict arose since humans where included among the animals, and the special position that humanity had seen itself in was therefore threatened. This was acknowledged also by the inheritors from the Age of Reason, since they put a special faith in the human Reason. The third source of conflict was that

this theory was in direct conflict between the story of creation included in the Genesis, and since this story is the basis of the fall into the sins, the whole basis for the traditional Christianity was threatened.

Although there were also discussions within the scientific communities, the relationship between science and traditional Christianity were more severely damaged. The conflict was, however, not as bitter in all parts of the world, and this time it seems like England and especially the United States had the most heated debates. It seems like this debate was the catalyzator that finally brought the masses, and the public opinion, on the scientists side, instead of on the side of traditional Christianity. Maybe the reason why the conflict was not as severe in France and other parts of Europe was that there this change had already been done. It also seems like this debate lead to the second major trend of disregarding spiritual things altogether. The first climax had been the Enlightenment during the late seventeenth century. To my opinion the church and even the general acceptance of spiritual aspects of life is still recovering from this second climax, the one originating from the Darwinistic theories, but that is a question for the next section.

3 Contemporary status

Darwin published his first book, *On the Origin of Species*, in 1859, and the debates that broke out almost immediately after the publishing were hard and long. The masses were won over to the side of the scientists around the Scope's "monkey" trial in 1925, although Europe seems to have followed that trial in a more humorous fashion.[1]. This process has led to the wide-spread belief that science is the only way to knowledge, and that all other sources are just beliefs. That such an equating of science with a complete world-view is not necessary, or even advisable, will be one of the main conclusions of this section. We first look at what science does, and especially *does not*, claim, before we go on to different ways of relating to this, both from a general point of view, and in a Christian terminology.

3.1 What does science really claim?

To achieve a sound relation towards science it is necessary to understand what claims of truth science does in itself. We start by looking on some of the limitations of science, i.e at what it does not claim. Then we go on to look at some of the new results that were mentioned in the introduction, i.e. such results that are used as arguments for a spiritually based belief system mentioned above.

[1]Another sign of the big difference between the States and Europe is that as late as in 1981 a new law was passed in Arkansaw that required that a scientific theory arguing for creationism had to be taught in the schools. The law was, however, lifted again in 1982.

3.1.1 What science does not claim

To understand which boundaries science works within, it is necessary to first understand the basic methodology of science. All scientific theories starts with a number of postulates. These postulates becomes the 'base level' of the theory, and all statements contained within the theory are derived, directly or indirectly, from the basic postulates. There are different postulates for different sub-disciplines, but since a basic assumption usually is that the world is reductionistic (this could actually also be a postulate), let us look at the postulates of physics. In this report we do not have space to look at them in detail, but it will suffice for our purposes to notice that the postulates typically contain a requirement of measurability, or that they deal with the laws of mechanics and electromagnetics([5],[6],[7]). That means that physics deals with things that can be measured, and that follows laws. It is usually also added that these laws should be independent of where and when the laws are tested, and who is doing it. From these basic postulates one can then derive logical conclusions about what the laws must be, and how the theory should be formulated. These laws can then be used to make predictions about the outcome of various experiments, and these experiments can then be used as support for the theory (and therefore also of the postulates), or be used to reject the theory. If the latter is the case, one has to look at the basic postulates, and see how they can be reformulated so that the new theory becomes consistent with the known experiments. It should finally be said that a theory is considered scientific only if there exists experiments that can be used as a basis for falsification, and that the longer a theory survives without falsifications, the more it is approved of as a useful theory.

It is well known that this method has been highly successful. However, it is less often pointed out that this method does not work beyond the limits set by the postulates. That means that if the postulates of a theory is requiring that its objects are measurable, the theory will only deal with measurable objects. This does not mean that the theory claims that there are no things that can not be measured, it simply means that such un-measurable things are not dealt with in this theory. On the other hand it, of course, does not mean that there must exists things that can not be measured, but only that if there were, they would be outside of the scope of this theory. The postulates in this way puts *limits* for how general the theory is, and other common limits are the requirements of reproducibility, law-obedience etc. Such requirements does not mean that all events are reproducible, (or law-obedient etc) - strictly speaking, no experiment is reproducible - but simply that events that are not sufficiently reproducible, are not covered by the theory.

Another important distinction to point out is that the world does not necessarily obey the laws included in our present theories. The world behaves the way it does, independent of how our theories says that it functions (apart from maybe theories of economics, and other theories that involve the decisions of humans). Therefore all statements of the type "This can not happen because according to the laws of Darwin (or Einstein)..." are logical errors. Even though this should be an obvious point, the mistake is easy to do, and it occurs a lot,

also in scientific circuits. The best a scientific theory can hope for is that it is an isomorphic image[2] of the world, which means that the theoretical model behaves exactly like the world in all aspects of interest. If such a theory could be found, no experiments would falsify the theory, i.e. show an inconstancy between the world and the theory. The hopes of finding such a theory is still existing within the scientific community. That, however, is to me a bit strange since it has actually been proven already in 1931 that it is impossible to prove even the consistency within a scientific theory[8]; and it does not become easier when one should also prove consistency with the world!

3.1.2 The holistic trends

Apart from the above mentioned limits of the scientific range, which means that other methods *must* be applied outside these limits, there are also results within the scientific development that are used as arguments *for* truths claimed within the world-religions. Let us now look at some of these trends.

Let us start by looking at the development from Newtonian mechanics to quantum mechanics. The mechanics that Newton describes is that of isolated particles that are interacting through forces. For such isolated entities he is able to derive his famous laws of motion, that describe mechanical motions to a very good approximation. As science developed it was then shown that one could end up with the same equations, but in a simpler and much more elegant way. This theory has its crown in Hamilton-Jacobi theory, and then one no longer considers the system is constituted of isolated particles, but instead as a whole, represented by something denoted a Hamiltonian[9]. At that point (in the end of the nineteenth century), the two theories were only two different ways of achieving the same equations, and one could therefore not distinguish between the validity of the two ideas. However, with the breakdown of classical mechanics it turned out that the new theory, quantum mechanics, could only be formulated in a theory that resembles the Hamilton-Jacobi theory. The whole is now represented by a quantum-wave[3], and one consequence of the new theory is that no particle never ends, i.e. that the whole world is connected[5]. This is an early example of the trend towards holistic thinking[4], but we also see similar trends in other areas.

One example of this is the recent developments in the interplay between biology and mathematics, a development that has led to the emergence of a field called systems biology. Within this field there has been put more and more emphasis on the aspects of the system (usually the cell), instead of studying its isolated parts (e.g. the individual enzymes)[10]. Another part of biology that is slowly changing is the theory of evolution. The Darwinistic theory is

[2]An isomorphic image of an object is a mapping that preserves all the structure of the original object in the image

[3]The name Hamiltonian is still used, but it now represents the energy operator of that quantum wave.

[4]With the word holistic I here mean the consideration of a system as a whole, instead of as a collection of interacting, but isolated, subunits.

actually conceptually very similar to the Newton theory; it studies the world as consisting of isolated entities that sometimes interact with each other. In the earliest formulations it was argued that evolution only was governed by the survival of each individual, and that each strived after reaching the best survival skills. As the theory has evolved, however, it has also been shown that cooperativity is another important factor for evolution[2], and I strongly believe that we will see a stronger and stronger emphasis that it is the survival of the whole (ecology) that is important. Todays versions of Darwin's mechanisms will probably be more or less preserved, but I think that the intended function of these mechanisms will change. The same process of changing towards a more system-based thinking is happening also in the social sciences, like history, and cultural history.

Apart from the above mentioned trend towards a more holistic thinking, there are also some other results I would like to briefly mention. One of these is the new insights regarding time. Within the theories of relativity, and those of many parallel worlds, the classical (Newtonian) concept of time has been fundamentally altered. From both these theories it follows that time is merely a matter of perspective. From the relativistic theory it follows that if you pass a black hole, you will see the whole future of the universe evolve behind you before you reach the border of the hole, even though seen from a point far away it will seem like you pass the hole with the speed of light[7]. In the theory of many worlds all things has already occurred, and there we are only choosing which of the already existing futures to experience. Another result that opens up for theological interpretations is that the measurable energy that we know of does not seem to be enough to make the universe behave as it does, and it has been suggested that there also exists other kinds of matter[7]. I would finally like to mention that there are also being done research whose validity has not yet been decided[11]. These results include e.g. the possibility of the mind to affect matter[12] and although the results might seem convincing there are still many sceptics[13], and the impact of the results in the ordinary scientific world is still very small.

3.2 New interpretations of Christianity

Let us now look at some of the later trends in religion. These trends are not in conflict with the developments in science, but on the contrary, they consider the scientific development to be a part of the religious development.

As a natural extension of the development in the previous centuries, and much inspired by the latest developments within science, the modernist movement emerged. It started around the end of the nineteenth century, and they considered the Bible as a purely human record, witnessing only of the religious development of man. They usually considered God to be an impersonal force permeating the universe. They recognised that this faith did not rely specifically on Jesus as being the one saviour (in the conventional meaning), but that this was a universal religion that eventually would be discovered by all cultures in the world[2]. Einstein had a belief of this kind, and he was very inspired by the

writings of Schopenhauer, who in turn was greatly inspired by Buddhism[1].

Another theory that has also had successful interactions with physicists is denoted Systems Philosophy, and with slight variations it also goes under the names Systems Theology or Systems Theism. It has been developed a little bit later in the last century. One of the core thoughts of this framework is the introduction of a continuous change between human decisions and mechanistic developments. It therefore assigns at least *rudimentary forms of experience* to all unified entities, and gives each level of entity (atom, cell, organ etc) the possibility to decide what to do at each step in time (quantum collapse), based on the inputs from both higher level, and lower level entities[2]. In some of these constructions God is then considered as the highest-level organism, in which everything else is a part. I personally like this idea of metaphysical continuity, and the centrality of the free will, and the idea of a God being everything is a part of the Christian tradition as well ("for it is in Him that we move and live").

An even more recent theological framework, that has grown very popular over the last decade, is presented e.g. in the Conversation with God books. These books are mainly expressing themselves in Christian terms, even though they also point out that the same basic truths are formulated also in most of the other religious traditions. The teaching is generally very inclusive towards previous God concepts. God is e.g. considered not only as the First Cause, but also as the Final Goal, and not only as one with everything, but also a personal God. The latter is possible because some parts of the whole *remember* that they are one with everything, and that is the choice that we also will make one day. However, the reasonings are also very clear about which parts of the old theologies that it does not keep, and which leads to inconstencies. These rejected parts include the idea of a punishing God (why would God punish Herself?), the idea of original sin, and the idea of a God that only speaks sometimes, and to some. The conversations are written in a very humouristic manner, but are nevertheless dealing with the latest developments within science; and I personally consider their description of the role of free will and of time, the best I have seen[14]. However, with this said, I want to emphasize that neither of these books are written within a scientific context, or using a scientific language [14, 15].

There are also other modern teachings that has a clear conviction that science and religion all point towards the same truths. One of them is Martinus[15], but even though his texts has been written as a new interpretation of the Bible, it has not been so much spread within the traditional Christians, and it has therefore remained a teaching of its own. Finally I would also like to mention that there have been quite a number of books that try to link the new results in physics to other religions, often Buddhism or Hinduism([16],[17]). Many of these books new books also point out the ecological and sociological importance of their new thought systems[18].

All of these are books, and religious frameworks, that do not consider themselves in conflict with science, but in harmony, and it is my experience that they have often succeeded with the important task of creating a framework that is attractive both to people with a religious background, and to those with a

non-religious.

4 Summary and personal reflections

We have seen that the church was in conflict with the development of science almost from its birth, i.e. with the works Galilei. All the early scientists were themselves highly religious, and initially it was therefore only a matter of re-adjusting the teachings, and for the church to let go of some of its authority. The discoveries of Newton, however, led to the concept of God as the divine clock-maker, and nature as His handiwork. This remote God became more and more irrelevant, and in the Age of Reason the first thoughts of God as an unnecessary hypothesis, and the human mind as nothing more than an illusion of purely mechanical and deterministic processes, was formulated for the first time. This was the first peak of materialism, and the counter-reaction was the turning to personal experiences, often of Nature, in the Romantic Age. The second peak of materialism was initiated by the evolutionary fights, and it was probably within these fights that everything spiritual became totally banned from scientific writings. I think that this happened for two major reasons: i) the success of the scientific method was so enormous that one thought that it would eventually solve all problems ii) in the bitter fights with the church, scientists started to define themselves in negation to the church. Such a development from a conflict around details to the thought "We are everything they are not", is a common theme in history, and it has happened e.g. when the Christians separated themselves from the Judaic tradition.

In most parts of the world the scientists has since long won the fight, but unfortunately this has often led to an over-belief in the scientific methods. One could actually almost say that the previous blind faith in the Bible, has been replaced by a blind faith in the scientific statements. However, as we have argued in the second half of this report, the scientific statements are only valid within the limits that science has set to itself (e.g. only to deal with measurable, repeatable processes), and its validity is dependent on the postulates consistency with the world (and we learned that it is not even possible to prove whether postulates are consistent within themselves). That means that with the present postulates of physics *it is not possible to discover a free will*. The postulates say that they study the laws of the world, and the free will is - by definition - not following laws. This does not mean that science has proven there is no will, but only that science cannot study it. There is also a clear trend within science itself to move away from the study of isolated parts, and to study phenomenon more on the system level. This process was completed within physics already in the beginning of the previous century, but it is now taking place also within the biological sciences, as well as in those describing social phenomena.

The maybe most important conclusion of these arguments is that a *a scientific world-view is not the same as a personal world-view*. Science is one input on which one can construct ones world-view, but one should really include all experiences, of all kinds, when constructing it.

All of these facts has led to a renewed integration between a common core of the world religions, and their search for Eternal Truths, with the scientific methods, and their searches for the same truths. Most of these new formations has recognised that the teaching about Love is the central issue, that this is a Love that includes all parts of the Nature, and that it therefore is identical to the new understanding of God. It has also been underlined that the goal of religion is the same as the goal of science, or as Martinus so elegantly has put it:

"Love that is not science is not love, and science that is not love, is not ultimate science"

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