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The relationship of science and religion concerning the theory of evolution

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1 Introduction

In history science and religion have often acted as antagonists, as two different world views without much common ground. They seem to be two irreconcilable answers to the same set of questions.

Whenever a new scientific principle had been found consistent with observation and thus confirmed, religion was likely to be among the first to disfavour and deny it. The condemnation of Galileo Galilei and many other examples illustrate this point. One of the most prominent issues of conflict is the ongoing debate about evolution.

Looking at history, the relationship of science and religion seems to be one of continuous conquest. Was not once all nature described and explained by myths, by stories one could not proof but just believe? But at some point of time, the old answers were not good enough any more. Beginning with the first philosophers that left their marks on history around 500BC, a new way of viewing nature gradually developed. Men looking more closely at the world surrounding them, started to see certain recurring patterns that could be described by laws of nature. Thus physics emerged and later on chemistry, biology, psychology and all the other disciplines of mainstream science. Step by step other answers than religion were found to explain various phenomena. The mechanics of the solar system, the origin of species, the cause of disease, even the workings of the human mind can now be more or less described by science. Once it was God who let the sun shine, who created the different species, who punished men by death and disease. Now there are new answers, not based on believe, but based on evidence.

But it is really justified to favour science and disclaim religion in general? Are there not many regions and realms of life that cannot be made a matter of science and must be left to religion? Are not both principles valid in different spheres of reality?

There are some philosophers who claim that science is nothing more than just another myth. In his book "Against Method" Paul Feyerabend describes something like epistemological anarchy[1], stating that there were no clear difference between myths and scientific theories, calling science a fairy tale, lamenting over the modern education system that favours science above other myths and even demanding a separation of state and science[2].

This is quite extreme, but still: is there not the possibility of science and religion working together, namely in interpreting the theory of evolution? After centuries of competition

1 cf. Paul Feyerabend. *Wider den Methodenzwang.* Frankfurt am Main: Suhrkamp Verlag, 1986, S. 249f.
2 cf. op. cit., S. 385ff.

many people seem to think that there recently seems to be a new found harmony between the two antagonistic principles. This new perception might be due to the scientific engagement of the intelligent design (ID) movement. Can ID be viewed as a new convergence, a reconciliation of science an religion? After all it fills some gaps that mainstream science apparently – according to the claims of the ID advocates – seems not to be able to explain.

In this paper I want to indicate the following:

1. There are some fundamental differences between science and religion. The two are based on opposing concepts making any collaboration quite futile. Science is more than just another myth.
2. ID is not a science. Instead it is not much more than creationism in disguise and shows many inconsistencies.

The first assumption will be treated in Chapter 2, the second in Chapter 3 where I will also focus on some statements of Christoph Schönborn, the Roman Catholic cardinal archbishop of Vienna, who ignited quite some controversy with his article in the New York Times in July 2005.

In Chapter 4 I will give some examples which illustrate the claims of the previous chapters.

2 Fundamental differences between science and religion

2.1 Believe

Religion and ideology has – as it seems to me – always a certain component that is absolutely irrefutable – at least in the eye of the faithful adherent. No matter how strong the evidence is against it, he (or she) will not move away from a certain assumption, because he (or she) *believes* it. And something one believes in, is almost insensitive to doubt. It is a sacred truth.

There are many examples to illustrate this point. As a young-earth creationist, I know that the Earth is a few thousand years old. It does not matter if the fossil record says differently, it does not matter if the fusion processes of the sun seem to work since 4,6 billion[3] years. All that might be mere illusion, or a trick of God to test us if we still believe in the revelation despite of the evidence against it. I *believe* and that is where discussion ends.

In his New York times article, Schönborn alludes to a document of the International Theological Commission issued in year 2004 which states that an unguided evolutionary process – one that falls outside the bounds of divine providence – simply could not exist.[4] No proof is presented. It simply cannot exist and that ends the argument.

The same structure of irrefutability can also be found in the arguments of proponents of intelligent design as of the mathematician William Dembski. This is shown by the physicist Mark Perakh according to whom Dembski once asserted that the ID advocates would never capitulate to their detractors.[5]

This is something a serious scientist would never dare to claim, because the essence of science is not believe, it is doubt.

2.2 Doubt

How did science develop at first? At the beginning there was always doubt. Doubt of given explanations led to the first formulation of physical laws. Doubt in old theories always leads to new theories. As a scientist it is my job to doubt every theory I have, even if it has been valid since centuries. I always have to assume that everything I know might be wrong, might be overruled by new observation, might be disproved by a certain measurement.

3 Throughout this essay the world „billion“ is used in the American meaning of one thousand millions and not a million millions as in Great Britain.

4 cf. Christoph Schönborn. „Finding Design in Nature“ in *The New York Times.* July 7, 2005. <http://www.nytimes.com/2005/07/07/opinion/07schonborn.html> (29.12.2008).

5 cf. Mark Perakh. “There Is a Free Lunch after All: William Dembski's Wrong Answers to Irrelevant Questions”. *Why Intelligent Design Fails: A Scientific Critique of the New Creationism.* Ed. Matt Young and Taner Edis. Rutgers, The State University of New Jersey, 2004, S. 170.

As Mark Perakh says, "Scientists normally admit that, no matter what theories are commonly accepted at any time, there is always a chance they may be overturned by new evidence."[6]

In 1905 the theory of Newton's mechanics had been valid for more than two hundred years. Many correct predictions had been made by it, many phenomena had been explained, but not all. Then Einstein came along and Newton was reduced to a mere approximation of relativistic theories at low speed with low masses. Suddenly the whole picture had changed. It might happen again. Most scientist do not think that Einstein's special and general relativity theories are final ultimate answers. In ideal science no theory claims to be *true* in an ultimate sense.

The astrophysicist Carl Sagan described this fundamental openness of science for change in the following sentences:

> There are no forbidden questions in science, no matters too sensitive or delicate to be probed, no sacred truths.[7]
>
> We give our highest rewards to those who convincingly disprove established believes.[8]

Is there anything more desirable for a young scientist as to disprove a theory that has been valid for a long time? Science has in itself an ongoing mechanism of self-criticism and self-renewal. Religion does not.[9]

2.3 Certainty

Religion often accuses science that it cannot provide certainty. Whereas religion offers absolute truths and definite answers, science often ends in a question mark without liable answers. But indeed, this uncertainty should not be viewed as science's weakness but as its virtue. Richard Dawkins wrote:

> It is an essential part of the scientific enterprise to admit ignorance, even to exult in ignorance as a challenge to future conquests. [...] Mystics exult in mystery and want it to stay mysterious. Scientists exult in mystery for a different reason: it gives them something to do.[10]

In science, nothing is certain. But that is exactly what makes it so interesting.

Right now a great part of the scientific world is looking at Geneva, where the newly completed Large Hadron Collider (LHC) will soon give us new fascinating insights in the smallest components of nature. The experiment will focus on finding the so-called Higgs

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6 op. cit., S. 170.

7 Carl Sagan. *The Demon-Haunted World: Science as a Candle in the Dark.* New York: Ballantine Books, 1996, S. 31.

8 op. cit., S. 33.

9 It is certainly true that religion has changed dramatically during the last centuries, but this is probably due to its reaction to science and not caused by itself.

10 Richard Dawkins. *The God Delusion.* London: Transworld Publishers, 2007, S. 151f.

boson which is predicted by the standard-model of elementary particle physics. If it should not be found, the whole model would be in danger of being falsified. As it is, many scientists – perhaps the majority – would not be very unhappy about that. Quite the contrary: They would rejoice at a new open field of uncertainty, that might be filled by a completely new theory. It is uncertainty that drives scientists on and leads to new discoveries.

2.4 Intersubjectivity

There is an important difference whether I believe the words of a prophet or the words of a scientist. In the former case the “revelation” is always indirectly transmitted through the words and acts of the prophet. I cannot share his (or her) experience. I cannot feel the same as he (or she) feels. I just have to *believe*. (Maybe I am told that I am in principle also capable of getting in touch with higher powers, but the prophet almost certainly also has some explanation if I cannot.)

If I accept the claims of a scientist, I know that I am – at least in principle – always capable of sharing his (or her) experience. If a quantum theorist tells me that certain particles of light called photons are able to exist in some ominous state called entanglement that connects them, no matter how far they are apart, I can readily believe him as I believe a prophet. But I can also sit down, get some books about differential equations, linear algebra and quantum mechanics and study them. After four or five years or so I should be able to see what the scientist sees, if I want to. Science is intersubjective. Accepting it is not like believing in the words of holy books, prophets and hallucinations, it is relying on my own senses and my conscious mind – or at least the possibility to use them. More convincing still, scientist in general *agree* in what they see, prophets, holy books and religious leaders do not.

2.5 Ideal science

The properties of science illustrated in this chapter are not always the case. After all scientists are just human and oftentimes affected by dogmatism, prejudice and other "vices" in respect to ideal science. There certainly are many scientists who would not just let go of an established theory, even when new evidence spoke against it. This was the case at the beginning of the twentieth century when the era of so called "classical physics" ended. The new concepts of quantum theory and relativity were not always met with joy

and appraisal. This is illustrated in Max Planck's cynic statement that a new scientific truth did not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually died and a new generation grew up that is familiar with it.[11] In ideal science it should be differently and if we believe authors like Carl Sagan or Richard Dawkins, it is differently. Dawkins, for example, recounts in at least two of his books the story of an elder statesman of the Zoology Department at Oxford who had passionately believed and taught since years that some microscopic feature of the interior of cells was not real. When at a lecture of an American colleague he was confronted with completely convincing evidence that this feature was indeed real, he neither stuck to his believe nor did he deny the evidence.[12] Dawkins recounts:

> At the end of the lecture, the old man strode to the front of the hall, shook the American by the hand and said – with passion – 'My dear fellow, I wish to thank you. I have been wrong these fifteen years.' We clapped our hands red.[13]

This quite moving story tells how science should be and often is. From personal experience I know that also in some physics courses at the University of Innsbruck this spirit of uncertainty and the virtue of continuous doubt is being conveyed to the students. They are often inspired to ask further questions and never be satisfied with given explanations. When the lecturer writes Newton's F=m*a on the bord, the student should not readily swallow an believe it, but temporarily accept it as quite handy approximation to the behavior of some phenomena, that might be improved still. A good physicist should always doubt what he learns and never fully *believe* it.

I think this illustration suffices to show that science is indeed quite different from any myth or religion.

11 cf. <http://scienceworld.wolfram.com/biography/Planck.html> (29.12.2008)
12 cf. Dawkins. op. cit., S. 320f.
13 op. cit., S.321.

3 Science and Intelligent Design

The ID-movement claims to be scientific. It tries to find scientific proof for the work a designer in nature and spreads the opinion that it has already done so. Pretending to be scientific and not religious it also strives to be taught at schools. But is it really science?

3.1 Finding Design in Nature

According to cardinal archbishop Schönborn it is. In his notorious article of the year 2005 "Finding Design in Nature" he not only claims that ID is scientific, he assumes that everything opposing it, is not.

> Any system of thought that denies or seeks to explain away the overwhelming evidence for design in biology is ideology, not science.[14]

In his lecture at the 55th annual conference of the Austrian Physical Society (ÖPG) in Krems 2007 Schönborn once again alluded to his Times-article and repeated that nature was something that had to be based on design. He goes on comparing scientific research to a flickering candle in the dark whereas revelation were a stronger source of light.[15]
So Schönborn is convinced about design in nature and thinks that every scientist should be the same since there is overwhelming evidence. But what is this evidence he speaks of?

3.2 Overwhelming evidence

In their highly interesting book "Why Intelligent Design fails" the editors Matt Young and Taner Edis along with other physicians, biologists and mathematicians who contributed with various articles, clearly and convincingly show that ID cannot be conceived as science. In their preface the editors already state their final conclusions:

> *What is intelligent-design (ID) creationism?* A conservative religious agenda masquerading as a scientific alternative to evolution.
> *Why is it universally rejected by mainstream science?* Because it makes no real predictions and lacks explanatory power.
> *What are the specific errors in intelligent design arguments?* They ignore how modern science has already solved the questions they raise about complexity.[16]

These accusation are soundly based on argument and evidence. In various chapters of the book different experts analyse the major claims and findings of ID like the biochemist Michael Behe's theory of irreducible complex systems or the mathematician William Dembski's constructs of specified complexity and the explanatory filter. To all these

14 Schönborn, op. cit.
15 cf. Christoph Schönborn. “Naturwissenschaft und Theologie”. *Mitteilungsblatt der Österreichischen Physikalischen Gesellschaft.* 4 (2007), S. 13ff.
16 Matt Young and Taner Edis. “Preface” to *Why Intelligent Design Fails: A Scientific Critique of the New Creationism.* Ed. Matt Young and Taner Edis. Rutgers, The State University of New Jersey, 2004, S. ix.

questions raised by ID-advocates other more reasonble answers are found that do not involve a supernatural designer. Furthermore it is shown quite convincingly that ID is often inconsistent and also quite intolerant against its opponents.
Examples will be given in the next chapter.

3.3 Naturalism and the scientific method

ID-advocats like Michael Behe have accused mainstream science of ignoring ID because of its theological ramifications and not because there was scientific evidence against it, or because it violated some flaw of logic. As it seems the opposite is the case.[17]
It is important not to equalize science and materialism. Science uses materialistic methods not because they are its essence, but because they work. That means, they lead to predictions which coincide with observation. As Mark Perakh and Matt Young state:

> Methodological naturalism has indeed been a feature of science, but only as a practical matter and not as a fundamental principle. Methodological naturalism has so far worked and enabled science to achieve great success. In fact, however, science differentiates between known and unknown, or between explained and unexplained, not between natural and supernatural. Every phenomenon that can be studied using methods of inquiry based on evidence is legitimate in science.[18]

This is an important statement. The authors try to make clear that ID is not rejected by science because of its supernatural implications, but because of the lack of evidence and the flaws of its logic.[19]
If science stays true to its principles it would have to accept even supernatural explanations, once there is evidence for it. But there is none. Even Richard Dawkins admits:

> On the other hand, we on the science side must not be too dogmatically confident. Maybe there is something out there in nature that does preclude, by its *genuinely* irreducible complexity, the smooth gradient of Mount Improbable. The creationists are right that, if genuinely irreducible complexity could be properly demonstrated, it would wreck Darwin's theory.[20]

ID seems to be "immune to contradictory evidence"[21], Darwin's theory of evolution is not. It could be easily disproved if prove were found. Richard Dawkins recounts an episode with biologist J.B.S. Haldane who, when asked how evolution could ever be falsified,

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17 cf. David Ussery. “Darwin's Transparent Box: The Biochemical Evidence for Evolution”. *Why Intelligent Design Fails: A Scientific Critique of the New Creationism.* Ed. Matt Young and Taner Edis. Rutgers, The State University of New Jersey, 2004, S. 48f.
18 Mark Perakh and Matt Young. “Is Intelligent Design Science?”. *Why Intelligent Design Fails: A Scientific Critique of the New Creationism.* Ed. Matt Young and Taner Edis. Rutgers, The State University of New Jersey, 2004, S. 189.
19 confer also: Ussery . op. cit., S. 48 and Matt Young and Taner Edis. “Preface” to *Why Intelligent Design Fails: A Scientific Critique of the New Creationism.* Ed. Matt Young and Taner Edis. Rutgers, The State University of New Jersey, 2004, S. x.
20 Dawkins. op.cit., S. 150f.
21 Perakh, Young. op.cit., S. 185.

answered: 'Fossil rabbits in the Precambrian'.[22]

However, just a gap in the fossil record can never suffice to disprove evolution. That would be, as Dawkins ironically states, demanding a complete cinematic record of every step leading to a crime, before convicting somebody for murder.[23]

3.4 An abdication of human intelligence

In his article Schönborn further claims scientific theories that try to explain away the appearance of design as the result of chance and necessity were not scientific at all, but an *abdication of human intelligence*.[24]

This statement, as I understand it, is exactly the reverse of the actual truth. It is by assuming design that intelligence actually surrenders. Because at the moment I accept that a certain phenomenon – and be it the universe as whole – has been caused by a supernatural designer, I give up the perspective of any further inquiry. Chance and necessity however, are no final halt, they are a path leading to further knowledge, because they are something I can calculate with. If we accept, for example, that earth as a habitable planet has been formed by chance, we can further ask the question how probable it is, that such a planet forms. How probable is it, that the temperature is just right for life to evolve? How probable is life anyway? It is by calculating these probabilities that we get further, that our knowledge is enhanced and that scientific progress is made. What progress should there be, if we just assume design in every open question?

As Perakh and Young put it, "if we accept Michael Behe's concept of irreducible complexity, we might as well throw in the towel and not even try to understand [...]"[25].

More ironically Dawkins writes:

> Here is the message that an imaginary 'intelligent design theorist' might broadcast to scientists: 'If you don't understand how something works, never mind: just give up and say God did it. You don't know how the nerve impulse works? Good! You don't understand how memories are laid down in the brain? Excellent! Is photosynthesis a bafflingly complex process? Wonderful! Please don't go to work on the problem, just give up, and appeal to God. Dear scientist, don't *work* on your mysteries. Bring us your mysteries, for we can use them. Don't squander precious gaps as a last refuge for God.'[26]

It seems to be exactly the other way around as Schönborn claims. ID teaches us to stop, to give up searching for an answer and accept a divine cause. Following this advice in earlier ages, man might as well have abandoned any research at all and remained a hunter-gatherer

22 cf. Dawkins. op.cit., S. 154.
23 cf. Dawkins. op.cit., S. 153f.
24 cf. Christoph Schönborn. „Finding Design in Nature“ in *The New York Times.* July 7, 2005. <http://www.nytimes.com/2005/07/07/opinion/07schonborn.html> (29.12.2008).
25 Perakh, Young. op.cit., S. 196.
26 Dawkins. op.cit., S. 159.

of the forest.

The principles of chance and necessity have indeed been very successful scientific concepts that led to many new insights in nature. As physicist Taner Edis says:

> We can say, very confidently, that cause and necessity can be genuinely creative. We can even say that in all likelihood our own creativity, our own intelligent designs, can be traced to chance and necessity.[27]

3.5 The claim that religion stimulates science

It is interesting that many theologians and spiritual leaders seem to think that religion indeed enhances and stimulates scientific progress.

Schönborn, for example, said in his ÖPG lecture 2007 that believe could provide something that had always been the fundamental motor of science: the ability of awe and the strength not to despair in face of the difficulties of the human quest for knowledge.[28]

In an essay about creation and evolution in the paper "Kirche und Gesellschaft" (church and society) published by the catholic center of social studies Mönchengladbach (Katholische Sozialwissenschaftliche Zentralstelle Mönchengladbach) the theologian Eberhard Schockenhoff says something similar. He claims that the light, which makes us see with the eyes of believe, were neither obscuring nor stopping our reason. It actually were a special ability of sight, that helped reason to conceive reality in all its heights and depths.[29]

Concerning the first statement, it seems to me that author like Dawkins or Carl Sagan have shown in some of their books very clearly that the ability of awe in science has nothing to do with religion.[30] Furthermore the claim that religion stimulates and supports science is simply not true. In my reading of many scientific books, as well as my conversations with various scientists, most notably professor Ronald Weinberger of the institue of Astro- and Particle Physics Innsbruck, I have gained the opinion that religion almost never supports science but rather hinders its progress wherever it can.

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27 Taner Edis. “Chance and Necessity – and Intelligent Design?”. *Why Intelligent Design Fails: A Scientific Critique of the New Creationism.* Ed. Matt Young and Taner Edis. Rutgers, The State University of New Jersey, 2004, S. 147.

28 cf. Christoph Schönborn. “Naturwissenschaft und Theologie”. *Mitteilungsblatt der Österreichischen Physikalischen Gesellschaft.* 4 (2007), S. 15.

29 cf. Eberhard Schockenhoff. “Schöpfung und Evolution: Ist das biblische Weltbild in Gefahr?”. *Kirche und Gesellschaft*. Nr. 336, S. 15 <htttp://www.freidok.uni-freiburg.de/volltexte/5337/pdf/Schockenhoff_Schoepfung_und_Evolution.pdf> (25.12.2008)

30 cf. Richard Dawkins. *Unweaving the Rainbow: Science, Delusion and The Appetite for Wonder.* London: Penguin Books, 1996, S. xii.

Take this quote, as an extreme example:

> In 1993, the supreme religious authority of Saudi Arabia, Sheik Abdel-Aziz Ibn Baaz, issued an edict, or fatwa, declaring that the world is flat. Anyone of the round persuasion does not believe in God and should be punished.[31]

As it seems, sciences like astrophysics cannot be very popular in Saudi Arabia, despite that fact that the country probably has very good environmental conditions for building new telescopes that might further enhance our understanding of nature. But if in a country even the idea of a round earth is controversial, a science that removes our planet from the center of existence in the outer regions of one out of a hundred billion galaxies cannot be very popular. Neither is evolution. The physicist Taner Edis states “that the Islamic world harbors what may be the strongest popular creationism in the world and that the homegrown intellectual culture in Muslim countries generally considers Darwinian evolution to be unacceptable."[32]

The irony of history has it that the Arabic culture was among the first to systematically observe the night-sky and to label many of the bright stars. This is still apparent today in many of the stars' names like Aldebaran, Rastaban and many others, as well as in common scientific expressions used in astronomy. However, all this Arabic astronomic progress was made at a time when the stars were mere dots in the sky instead of other worlds like ours where unknown life might indeed be possible.

3.6 New harmony

The scientific aspirations of intelligent design advocates as well as the claim that religion can contribute to science which was made by various theologians have recently contributed to the perception that science and religion approach something like new-gained unity after centuries of conflict. This, as far as I can see, is simply not the case. There actually is no convergence.

By this I do not want to speak against certain attempts to find common ground of physics and eastern philosophy as attempted by Fritjof Capra in his famous book "The Tao of Physics" which offers indeed many interesting parallels between the two fields and shows that some philosophical ideas of Taoism or Buddhism can indeed contribute to science, for instance in finding new approaches to interpret quantum theory.[33]

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31 Sagan, op.cit., S. 325.

32 Taner Edis. “Grand Themes, Narrow Constituency”. *Why Intelligent Design Fails: A Scientific Critique of the New Creationism.* Ed. Matt Young and Taner Edis. Rutgers, The State University of New Jersey, 2004, S. 10.

33 cf. Fritjof Capra. *Das Tao der Physik: Die Konvergenz von westlicher Wissenschaft und östlicher Philosophie.* Bern, Munich, Vienna: Scherz Verlag, 2000

4 Examples

In this chapter I will try to give some examples that illustrate some of the statements made above. The intention is to summarize some arguments against certain concepts of intelligent design.

4.1 Common descent

In his essay "Common Descent: It's All or Nothing" the biologist Gert Korthof describes the so-called dynamic-creation model that is proposed by several creationists or people that are considered part of the ID movement. In this model an evolution-like process is accepted only within certain animal groups called basic types which themselves were created by a creator. All dogs, for example, descended from a common ancestor, which itself has no ancestor.[34]

Apart from listing many inconsistencies of this model, Korthof shows that the proponents of ID seem to have no common opinion about common descent. Whereas some prominent advocats of intelligent design like Paul Nelson and Phillip Johnson think that God created basic kinds (of which the human species is one) that gradually *diversified*, others like Michael Behe claim to accept common descent of all life. Still others like William Dembski do not give a definite answer.[35]

It is important to note that the dynamic creation-model is not rejected by mainstream science because of its supernatural implications but because it lacks evidence and shows many inconsistencies. As Gert Korthof says:

> The dynamic-creation model, with its created types and mini-trees, breaks the living world into arbitrary fragments, whereas common descent unifies all life. In fact, common descent unifies all disciplines of biology. The creation model does not explain the similarities between the basic types (dogs an cats), and that is a serious deficiency [...]. Creation restricts natural selection and mutation in an arbitrary way. Therefore, the dynamic-creation model fails to be a consistent and complete framework for dealing with biological data. It cannot replace common descent.[36]

Neither can it explain why hundreds to thousands of genes are found in the same order as in both mouse and human.[37] Korthof's conclusion about the dynamic-creation model:

> It can be understood only as an attempt to reintroduce the Genesis kinds and not as the result of a genuine attempt to capture the diversity and unity of life.[38]

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34 cf. Gert Korthof. “Common Descent: It's All or Nothing”. *Why Intelligent Design Fails: A Scientific Critique of the New Creationism.* Ed. Matt Young and Taner Edis. Rutgers, The State University of New Jersey, 2004, S. 32ff.

35 cf. loc.cit.

36 op.cit., S. 47.

37 cf. op.cit., S. 42.

38 op.cit., S. 47.

Two things are illustrated by this example:

1. ID-proponents seem to disagree in fundamental questions such as common descent.
2. Science rejects claims of ID not because it is supernatural but because of its lack of evidence.

4.2 Irreducible Complexity

Michael Behe seems to be one of the most important and most prominent proponents of the intelligent design movement. As the index of the book "Why Intelligent Design fails" plainly shows, he and William Dembski are the two ID-advocates that are predominately mentioned within. Typing Behe's full name along with the phrase "intelligent design" in an internet search engine gives more hits than any other ID-proponent's name except Dembski's. Behe's concept of irreducible complexity that he also describes on his homepage[39] seems to be one of the most important arguments for intelligent design in nature. It is excessively treated in "Why Intellegent Design fails" and also described in Dawkins' "The God Delusion"

> 'Irreducible complexity' is not a new idea, but the phrase itself was invented by the creationist Michael Behe in 1996. He is credited (if credited is the word) with moving creationism into a new area of biology: biochemistry and cell biology [...][40]

Unlike William Dembski who is a mathematician and philosopher, Behe is a biologist. All this makes it quite reasonable to assume that it is indeed Michael Behe's model of irreducible complexity that cardinal archbishop Schönborn has in mind when he speaks of the "overwhelming evidence for design in biology"[41]

A few quotes to explain the notion of irreducible complexity:

> ID advocates argue that an irreducibly complex system could not have evolved – or is extremely unlikely to have evolved – by natural selection because, before an irreducibly complex system has its function, natural selection could not have favoured that function.[42]

> Irreducibly complex systems appear to me to be very difficult to explain within a traditional gradualistic Darwinian framework, because the function of the system only appears when the system is essentially complete. [...] I have proposed that a better explanation is that such systems were deliberately designed by an intelligent agent.[43]

The most popular example for an irreducible complex system is the bacterial flagellum, an organelle that looks strikingly similar to a machine constructed by humans, which has

39 cf. <http://www.lehigh.edu/~inbios/faculty/behe.html> (30.12.2008).
40 Richard Dawkins. *The God Delusion.* London: Transworld Publishers, 2007, S. 156.
41 Christoph Schönborn. „Finding Design in Nature“ in *The New York Times.* July 7, 2005. <http://www.nytimes.com/2005/07/07/opinion/07schonborn.html> (29.12.2008).
42 Alan C. Gishlick. “Evolutionary Paths to Irreducible Systems: The Avian Flight Apparatus”. *Why Intelligent Design Fails: A Scientific Critique of the New Creationism.* Ed. Matt Young and Taner Edis. Rutgers, The State University of New Jersey, 2004, S. 58.
43 Behe, Michael J. <http://www.lehigh.edu/~inbios/faculty/behe.html> (30.12.2008).

become a mascot of the intelligent design movement. ID-advocats claim that it could not be a product of evolution[44].

In the book "Why Intelligent Design fails" the paleontologist Alan D. Gishlick tries to falsify Behe's theories by looking at a macroscopic system which also fulfills the definition of irreducible complexity: the avian flight system. Behe did not focus on systems like those, since according to him there were not enough knowledge of all the parts of a complex organismal system. Thus irreducible complexity could only be shown on small biochemical systems. According to Gishlick we do know all the parts of a system at the organismal level at least as well as those at the biochemical level. Analysing the avian flight systems he convincingly shows that irreducible complexity does not imply inevolvability. And that might be also true for the bacterial flagellum. The author supposes that ID-advocates focus on the microscopic world only because it is advantageous to their argument being unfamiliar to many people and thus easy to use to impress and secondly being rarely preserved during fossilization.[45]

In another approach the molecular pharmacologist Ian Musgrave illustrates a way how the bacterial flagellum could indeed have evolved without assuming a designer.[46]

And even if there were no such scientific way fully to describe the evolution of the bacterial flagellum, would this indeed be a proof of intelligent design in nature? It is always possible to assume that final explanations cannot be made because we just lack the evidence, which might have been destroyed in course of time and can thus not be found in the fossil record. How reasonable is it to assume something like fundamental irreducibility that can only be explained by a designer?

As Ian Musgrave says,

> Given our finite state of knowledge, there is always the possibility that if we currently do not have an explanation due to natural laws, we may find one in the future.[47]

And Richard Dawkins states,

> The speedy resort to a dramatic proclamation of 'irreducible complexity' represents a failure of the imagination.[48]

Apart from these apparent difficulties of Behe's theory of irreducible complexity there is also some reason to doubt the sincerity of his scientific methods. According to Mark

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44 cf. Ian Musgrave. "Evolution of the Bacterial Flagellum". *Why Intelligent Design Fails: A Scientific Critique of the New Creationism.* Ed. Matt Young and Taner Edis. Rutgers, The State University of New Jersey, 2004, S. 72.

45 cf. Gishlick. op.cit., S. 58ff.

46 cf. Musgrave. op.cit., S. 72ff.

47 Musgrave. op.cit., S. 73.

48 Dawkins. op.cit., S. 154.

Perakh and Matt Young Behe esteems his own theory as one of the greatest achievements in the history of science on one level with the findings of Newton and Einstein[49]. If we believe Richard Dawkin's court room episode which he recounts in "The God Delusion", Behe once claimed that science would never find an evolutionary explanation for the immune system. When presented with fifty-eight pre-reviewed publications about this very topic, he simply insisted that this was not enough evidence of evolution and eventually had to admit that he hadn't read most of those fifty-eight pre-reviewed papers.[50]
In respect to all this, the theory of irreducible complexity can be met with some doubt.
Is this the "overwhelming evidence for design in biology"[51] that Schönborn has in mind?

4.3 The anthropic principle

In his Times-article Schönborn also mentions the multiverse hypothesis in cosmology. Therefore I will write about it here and indicate its connections to the dispute about ID.
If you ask a physicist or even a just student of physics after the first few semesters he will readily tell you that the speed of light is about $2.9979*10^{8}$ m/s, that Planck's constant is something like $6.626*10^{-34}$ Joules per second and that neutrons are slightly heavier than protons. Why does it have to be this way? Where do these values come from? And how would the world look like if they would be slightly different? It is clear that the world would not be as we know it. Already in the first few semesters students of physics learn that if the balance of the mass of neutrons and protons would be reversed, an important reaction – the neutron decay – could not freely occur and nuclear physics and therefore almost all there is, would be dramatically different. Other variations like changing the Gravitational constant and thus the relative strength of the fundamental forces could also change everything. Isn't it a striking coincidence that we happen to live in a universe that exactly has the right physicals laws and constants for stars to form, for carbon to be produced and life to evolve?
Advocates for the existence of a creator deduce from this that there must some purposeful, intelligent designer who fine-tuned the universe so that life could evolve. Some even say that God were now required by scientific data.[52]
In his essay "Is the Universe Fine-Tuned for Us?" the physicist and astronomer Victor J.

49 cf. Perakh,Young. op.cit., S. 188.
50 cf. Dawkins. op.cit., S. 159f.
51 Schönborn. op.cit.
52 cf. Victor J. Stenger. "Is the Universe Fine-Tuned for Us?". *Why Intelligent Design Fails: A Scientific Critique of the New Creationism.* Ed. Matt Young and Taner Edis. Rutgers, The State University of New Jersey, 2004, S. 172f.

Stenger shows that this line of thought is based on some unjustified assumptions, like the one that life could only exist on the basis of carbon and in conditions like ours. Also other sets of fundamental constants might lead to the development of life.[53]

Furthermore science can offer some quite plausible explanations for the apparent "fine-tuning" of the universe that do not involve a creator. Maybe there are still some underlying principles of physics that are yet undiscovered and might show that the constants have to have their values by necessity. There are other explanations still and one of them is the multiverse-hypothesis Schönborn speaks of.

Before I come to that I want to mention an interesting inconsistency in ID-argumentation that Victor J. Steiner indicates. He writes:

> [...] on the one hand, the creationists and God-of-the-gaps evolutionists argue that nature is too uncongenial for life to have developed totally naturally; therefore, supernatural input must have occured. On the other hand, the fine-tuners (often the same people) argue that the constants and laws of nature are exquisitely *congenial* to life; therefore, they must have been supernaturally created. They can't have it both ways.[54]

Concerning the muliverse-hypothesis one first has to ask how it would resolve the question why the universe appears to be fine-tuned for us. Consider not one, but many universes that differ in physical laws and constants (these universes might be separated in time or in space or both, it makes no difference). If their number be great enough, a universe like ours could arise by mere chance. There are theories which assume many parallel existing universes[55]. Others, like the big crunch theory, predict that the universe will collapse eventually and be formed again, with other conditions than before.[56]

Schönborn claims that the multiverse-hypothesis in cosmology was invented to avoid the overwhelming evidence for purpose and design found in modern science and assures that the Catholic Church will again defend human reason by proclaiming that the immanent design evident in nature is real.[57] I do not think that the multiverse-hypothesis is unreasonable. After all, why should there be only one universe? Is this assumption not just the repetition of a recurring error in human understanding of nature? Not many centuries ago almost everyone still believed that the Earth was the only possible world surrounded by spheres of fire and water. Some still do. But now science knows that Earth is just one of many planets in space, orbiting around a common kind of star somewhere in the outskirts

53 cf. op.cit., S. 177f.
54 op.cit., S. 178.
55 cf. op.cit., S. 183.
56 In a paper I wrote for a seminar concerning the philosophy of Friedrich Nietzsche, I compared this notion of a pulsating universe with Nietzsche's principle of eternal recurrence which has many common characteristics, see http://www.klausreitberger.wordpress.com/sachtexte/
57 cf. Schönborn. op.cit.

of a galaxy. In the 1920s many scientists still thought that our galaxy was the only one of its kind. Now we now that it is one out of a hundred billions. Observation made it possible. We will probably never be able to "see" or to measure the existence of other universes. But does that suffice to conclude that they do not exist? As Victor J. Stenger states in his essay,

> The theory of a multiverse composed of many universes with different laws and physical properties is actually more parsimonious, more consistent with Occam's razor, than a single universe.[58]

58 Stenger, op.cit., S. 184.

5 Conclusion

After the work of centuries, science has created something like a consistent set of theories that explain us and the world surrounding us. From the big bang to the early nucleo-synthesis to the forming of stars to the origin of life and intelligence, step by step a puzzle is being completed.[59] Of course there are gaps. Some of them may never be filled. It would be surprising if they ever would. Yet these theories have been able to explain why the world is as we experience and how it did evolve. Science even tells us how we evolved. It ventures even further and tries to understand how we think and if there is something like free will. Before the dawn of science all the answers to all these questions had to be found in religion. But now there are alternatives which are not based on revelation, on mystical insight and mere belief. They are based on evidence, intersubjective and reproducible. It is clear that religion struggles to defend its ancient ground. It is clear that it tries to fill all the gaps that science still has to offer. If some question is unsolved by scientists, it must be God or an intelligent designer who is at work. This is exactly the predominant essence of ID – to fill the gaps. But as this essay and many other papers and books try show, most of the gaps desperately occupied by ID-proponents are not really gaps any more. There are various scientific explanations. And even if a gap stays open, it would not disprove evolution, or other scientific principles. In discouraging further research in the fields it occupies, ID seems to be counterproductive. It slows down scientific progress. But this might be what it intends, the desperate venture to defend religious realms from the naturalistic method of science.

It seems to be the case, that religion has no justification any more to explain nature. If it still has valid grounds for its existence in ethics and other aspects of human society is a questions that is not topic of this paper. The reality is, however, that religious concepts still are very popular in the interpretation of nature, especially in evolution. Carl Sagan wrote in the year 1996:

> Only 9 percent of Americans accept the central finding of modern biology that human beings (and all the other species) have slowly evolved by natural processes from a succession of more ancient beings with no divine intervention needed along the way. (When asked merely if they accept evolution, 45 percent of Amercians say yes. The figure is 70 percent in China.)[60]

It is important to learn how to spread the notions and motives of science more successfully.

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59 There are books of popular-science like „Das Jahrmillionen Buch“ (published my the ADAC Verlag, München and Wissen Media Verlag, Gütersloh/München) that gives a detailed and coherent picture of all history starting with the Big Bang and ending with the Neanderthals. In this book the sciences of physics, chemistry, geology, biology and even psychology work together to give a fascinating account of the evolution of life, earth and the universe without having to fall back on the idea of a designer.

60 Sagan, op.cit., S. 325.

If science seems to have one fatal deficiency, then it is its apparent inability to reach most of the non-scientific public which – being mostly ignorant about the true importance and essence of science as well as of its critical method and sceptical spirit – is vulnerable to pseudo-science and dubious New-Age-believes.

But still, one has to admit that there is one question that cannot be answered by science and probably never will – the question of the very beginning. Even if all the other gaps can be filled, the question of the origin of all there is, will be unsolvable, will be a place where God still fits in. In present science the Big Bang is just a name for something that is not understood. The physicist (and atheist) Stephen Weinberg writes in his famous book "The First Three Minutes: A Modern View Of The Origin Of The Universe" that no matter how many secrets might have been unveiled, at the temperature of 10^{32}K – which corresponds to a time of 10^{-34} seconds after the singularity of the Big Bang – a veil remains that hides the earliest beginnings from our view.[61] It might be that a unification of the theory of gravity with those of the other fundamental forces lets us look further. It might be that even one day some sort of evidence can be found for the existence of other universes. Who knows? But all that would still not answer the question of the absolute beginning. God would – in opinion of people like Richard Dawkins – also be an insufficient answer, since there is always the possibility to further ask who made God and what was before God. Being a student of physics I am often asked by people what was *before* the Big Bang. At this I usually answer by quoting a remark of Bertrand Russel in his critical essay "Why I am not a Christian" that solves the problem of the absolute beginning in an interesting and elegant way. And with this quote I want to end this essay:

> The idea that things must have a beginning is really due to the poverty of our imagination.[62]

61 cf. Steven Weinberg. *Die ersten drei Minuten: Der Ursprung des Universums.* München, Piper Verlag, 2006, S. 154

62 Bertrand Russel. *Why I Am Not A Christian*. <http://users.drew.edu/~jlenz/whynot.html> (31.12.2008).

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