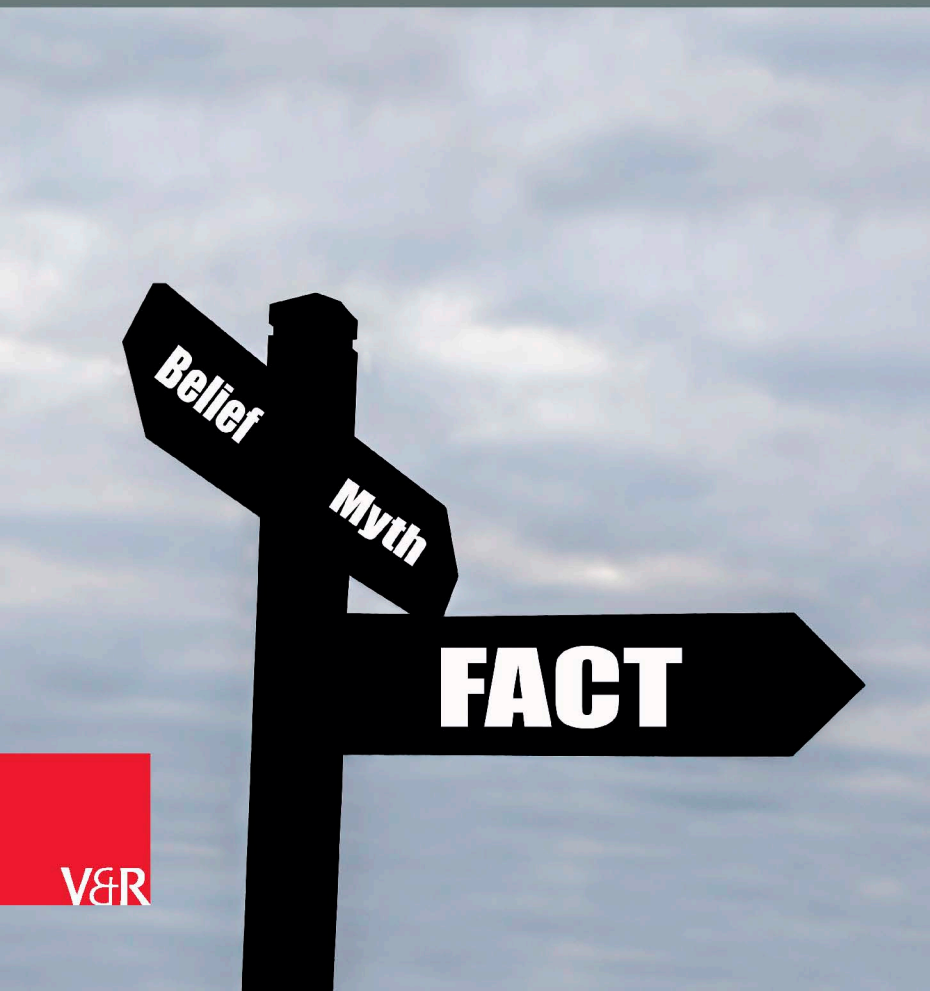
Hans Schwarz

Vying for Truth – Theology and the Natural Sciences

From the 17th Century to the Present



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Preface

The philosopher and natural scientist Carl Friedrich von Weizsäcker (1912–2007) entitled his Gifford Lectures (1959–1961) *The Relevance of Science*. In the first sentence of this lecture series he emphasized: "Our age is an age of science."[1] This estimate is still true today. Then von Weizsäcker put forth two theses: "1. Faith in science plays the role of the dominating religion of our time. 2. The relevance of science for our time can, in this moment of history, only be evaluated in terms that express an ambiguity."[2]

The American systematic theologian Langdon Gilkey (1919–2004) described the religious dimension of science by reminding us of the contradictory image of humanity "as helpless patients in the backless hospital shift and yet as mighty doctor in the sacral white coat" from whom the patients expect "redemption" from their disease.[3] Indeed we expect from science in its applied form as technology the solution to all problems whether with regard to medicine or the environment. It is telling that the so-called Green Party in Germany condemns certain forms of applied science while it advocates other forms, for instance renewable forms of energy instead of atomic energy. The philosopher Karl Jaspers (1883–1969) warned a long time ago not to indulge in a so-called superstition of science. By that he

[1] Carl Friedrich von Weizsäcker, *The Relevance of Science: Creation and Cosmogony* (New York: Harper & Row, 1964), 1.

[2] von Weizsäcker, *The Relevance of Science*, 3.

[3] Langdon Gilkey, *Religion and the Scientific Future: Reflections on Myth, Science, and Theology* (New York: Harper & Row, 1970), 85.

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meant an unlimited trust in science and that we even elevate it to the rank of a religion. Yet do the natural sciences deserve this high esteem?

In the 19th century the sciences established a solidly built and seemingly unassailable edifice of knowledge. Many people are still convinced today that the sciences, by which one understands primarily the natural sciences, give us undeniable facts which we can trust, whereas the Christian faith contains only convictions which largely cannot stand up to careful examination. Since our economic industrial progress has become more and more halting and its success is largely owed to the applied sciences, more and more people doubt at the same time whether one can blindly trust the natural sciences. In this situation it makes sense to evaluate the relationship between theology, which is the reflective faith, and the natural sciences to detect how far our trust in these is justified and how they actually relate to each other. In so doing we will first depict in bold strokes the history of the dialogue between the two and then we will turn to the most important dialogue partners today. In conclusion we will sketch out some of the present-day areas where important problems seem to arise.

Delineating the dialogue we will present it with primary focus on names and (geographical) areas. While ideas are important they are always associated with certain names, e.g., evolution and Darwin, or dialogue and Barbour. Therefore emphasis will be given on what these persons contributed to the conversation.[4] In approaching the issue of the interface between theology and science, we will naturally focus on the geographical areas in which this interface started and where it still has its center of gravity, Europe and North America. Of course, there are now also other dialogue partners in the Islamic and Buddhist world, and many other regions. Yet space did not permit to dwell on these

[4] Willem B. Drees, *Religion and Science in Context. A Guide to the Debates* (London: Routledge, 2010), 3, rightly observes: "Reflections on 'religion and science' take place in a cultural, social context." While these contexts dare not be neglected since they certainly shape the debates, dialogue is carried out by individual persons.

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voices, important as they are.[5] Another point needs mentioning. Until very recently there has been a paucity of women represented in the dialogue. One of the first to make a real change was Antje Jackelén about whom we hear more later. This means with few exceptions the participation of women in this dialogue has not started until the 21st century and therefore women are only gradually occupying influential positions in this conversation.

The focus on the interface between theology and science has also allowed me to draw on portions of some of my earlier publications (*Creation* [Eerdmans, 2002] and *Theology in a Global Context: The Last two Hundred Years* [Eerdmans, 2005]), and to use some material from there and update and expound on it for this specific topic. I want to thank my doctoral student Mona Lisa Siacor for typing the manuscript and Dr. Terry Dohm for improving on my style. Of course, I take full responsibility for any and all omissions or infelicities in style or content.

Hans Schwarz

[5] For different faith traditions cf. "Part I. Religion and Science across the World's Traditions" in *The Oxford Handbook of Religion and Science*, ed. Philip Clayton, assoc. ed. Zachary Simpson (Oxford: University Press, 2006), 5-135. Another important source for the dialogue in other faith traditions is the journal *Zygon* which devotes considerable space to this dialogue.

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Introduction

In October 1975 twenty-seven Nobel laureates and six theologians met at Gustavus Adolphus College in St. Peter, Minnesota to discuss before an audience of approximately 4,000 people "the future of science." Because of its Swedish roots this college has a special relationship to the Swedish committee of the Nobel Prize and stages an annual Nobel Conference for which at least one Nobel laureate is invited as the main speaker. This meeting in 1975 was especially remarkable because of the number of Nobel laureates present and also because of the topic, *The Future of Science*. Already then there was a shortage of money for research. Since in the English language science is usually understood as natural science, it was clear for the three natural scientists who presented papers that they had a special expertise in allocating the financial means and also in the use of these funds which were largely advanced by the government. Therefore they demanded that they should have a free hand. Langdon Gilkey, a theology professor from the University of Chicago Divinity School and the only theologian who presented a paper, interjected however, that the natural sciences are threatened by a similar fate as that which has already been confronted by theology.[1]

Once, he said, theology was the queen of the sciences. Though it considers an essential aspect of human life it was pushed off its pedestal. The reason for this was its apodictic behavior. It claimed

[1] For the following cf. Langdon Gilkey, "The Future of Science," in Timothy C. L. Robinson, ed., *The Future of Science: 1975 Nobel Conference* (New York: John Wiley, 1977), 113.

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that it must rule over all other aspects of human life and that it is the sole source of knowledge and salvation. In a similar way the natural sciences today face this confrontation, because they ascended to the throne, which prior was occupied by theology. The natural sciences, too, are indispensable and contribute essentially to life. Yet they also surround themselves with an aura of absoluteness and infallibility. Then Gilkey asked whether their claim is true, that their methods alone allow access to reality, that it is only through their research one can grasp an object completely, suggesting that the applied sciences can offer humanity affluence and security.

Most of the Nobel laureates did not like these questions posed by the theologian Gilkey. Yet he did not want to challenge the natural sciences as such because though they now threaten our survival he emphasized they are "utterly necessary for that survival."[2] We see this turnaround today, with the discussion about atomic energy. In the 1960's nuclear energy was considered the miraculous source of unlimited and cheap energy. But today more and more people have doubts about this. This change in mentality was not caused by the natural sciences but by quite different circles in the general population. This means when the future of humanity is at stake, neither the voice of the natural sciences nor that of theology has the rank of absolute validity. Both must learn that they are societal forces which are concerned with shaping and securing the future of life. Yet both of them are indispensable to the human enterprise. The natural sciences deal with the concrete shaping of the world and theology accompanies this venture in a reflective manner and connects it with the origin, meaning, and goal of this world.

In the applied sciences ethics is not an ingredient in shaping of future of the world. Similarly, faith does not figure in researching the world. Conversely, in theology the actual world receives often too little consideration while faith and conduct (ethics) are given absolute priority. Yet our societal problems, whether in technology or in the health services, can neither be solved by scientific intervention nor by ethics and faith alone. Therefore the

[2] Gilkey, "The Future of Science," 119.

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dialogue between theology and the natural sciences gains more and more urgency. Moreover, the discoveries in physics, astrophysics, biology, brain research, and human cognition demand that the relationship between the natural sciences and faith be reconsidered. They imply questions of value and possibly also of metaphysics. On the subsequent pages we will trace this dialogue as it has evolved over the last two centuries and also point to some present-day areas where this dialogue is most urgent.

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1. The Beginning of a New Age

Three figures stand out exemplifying the beginning of a new age: Johannes Kepler (1571 – 1630) who discovered the laws that bear his name to calculate the planetary orbits around the sun, Galileo Galilei (1564 – 1642) who came into conflict with the Inquisition of the Roman Catholic Church because of his insistence on the Copernican and heliocentric worldview, and René Descartes (1595 – 1650) who introduced for the first time radical doubt into philosophy.

This start of a new age in which the earth lost its central place in the world and the sun emerged as the new center of the universe is often called the 'Copernican Turn'. Yet Nicolaus Copernicus (1473 – 1543), an Augustinian canon from Frombork (German: Frauenburg) then part of Prussia, now of Poland, was not interested in a "Copernican Turn" but in the development of a system which would advance the classical concept of harmony to new splendor. As the American theologian Harold Nebelsick (1925 – 1989) emphasized: Copernicus "clearly had no intention of abstracting his geometry from the actual motions of the heavens as such."[1] He was still too much oriented toward the Greek notion of a harmony of spheres so that he even sacrificed the accuracy of his observations for the desired elegancy of his calculations. The church, too, represented the leading opinion at that time and admonished Galilei to teach the heliocentric theory

[1] Harold P. Nebelsick, *Circles of God: Theology and Science from the Greeks to Copernicus* (Edinburgh: Scottish Academic Press, 1985), 237.

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as a hypothesis only and not as fact.[2] It was just Johannes Kepler, who allowed his sense of harmony to be reformed by observation. He followed his mathematics and revolutionized astronomy.

According to the traditional understanding which Copernicus still represented, Kepler's planetary orbits, since they had two foci rather than one, were considered "defective" and even monstrosities. Only after a long struggle was it understood that the heavens praise the glory of God because of their creatureliness, and not because of their godlike perfection (cf. Psalm 19:1). This meant that creation does not consist of divine material but of an earthly reality which has a contingent and rational order of its own. By abandoning the idea of a Greek world harmony and emphasizing the Jewish Christian concept of the created, one could understand the material world as creation. If divine qualities could not be traced in nature then this could lead to the notion that the material world has nothing to do with God. Already in the 13th century Aristotelian philosophy had paved the way for this bifurcation or even separation of God and the world. The Islamic philosopher Ibn Rushd (Latin: Averroes; 1126–1198) wrote commentaries to virtually every work of Aristotle and exerted in the Middle Ages considerable influence on Christian scholasticism. For him it was important that through philosophy and logic a harmony was maintained between the Koran and revelation. To that effect he developed the doctrine of the twofold truth, one for the philosopher in philosophy and the other one for the masses in religion. The images and parables of the revelation of Allah in the Koran show one way to find the truth while another one is opened through timeless philosophical speculation. Though both truths seem to contradict each other the philosophic truth agrees with the religious one if correctly applied.[3] With this procedure human

[2] Cf. Nebelsick, *Circles of God,* 243.

[3] Cf. Karl Heim, "Zur Geschichte des Satzes von der doppelten Wahrheit," in Heim, *Glaube und Leben: Gesammelte Aufsätze und Vorträge* (Berlin: Furche Verlag, 1926), 82 ff.; cf. also R. Arnaldez, "Ibn Rushd," in *Encyclopedia of Islam. New Edition,* 3:911, in his interpretation of Averroes' "exposition of the convergence which exists between the religious law and philosophy."

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reason was granted a certain freedom. This is also evident at the Reformation in the 16th century.

In the time of the Reformation the main concern was with the justifying word of God which met the individual human person in an existential way. In the subsequent century Orthodoxy endeavored to pronounce the old faith in a comprehensive and insightful way. This was not the proper time to ponder the relationship between knowledge by faith and knowledge by reason. Moreover, Martin Luther (1483 – 1546) had emphasized the ambivalence of reason and therefore reason ultimately could not really be supportive of faith. As the Lutheran theologian Werner Elert (1885 – 1954) noted: "The church has no interest in the different worldviews because it derives its mission from the Gospel and knows that its mission is exhausted in the proclamation of the Gospel."[4] Elert then elaborates that *"It is a manifest lie of history that Luther's authority would have hindered the advancement of the new worldview."* Unencumbered by any possible theological interests at the time of the Reformation natural scientists who advocated the Copernican worldview taught at Wittenberg University. Even Giordano Bruno (1548 – 1600) was welcomed to Wittenberg and taught there from 1586 – 1588.

The natural sciences, too, had no interest to seek out theology as a dialogue partner because they were occupied with describing the contingent rational order of nature which they discovered in ever more exact details. If natural scientists, however, discussed their results in public, theology was often surprised about those results and attempted to combat these "wild theories" especially when the argument was derived from scientific insights and not just from the Bible. For this reason Galilei, Bruno, and Kepler had problems with their churches, which were intensified in the case of Galilei and Kepler since for them the natural sciences had ultimate authority in scientific matters. Yet with Bruno there were also theological problems because he wanted to limit the sole

[4] Werner Elert, *Morphologie des Luthertums.* Vol. 1: *Theologie und Weltanschauung des Luthertums hauptsächlich im 16. und 17. Jahrhundert* (Munich: C. H. Beck, 1965 [1931]), 371 f., for this and the following quotation.

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activity of God. Even Kepler could not agree to the recognition of the omnipresence of the body of Christ as demanded by the Stuttgart church consistory. Therefore the consistory admonished him: "Do not trust your own ingenuity too much and see to it that your faith is not founded on human wisdom but on God's power."[5] As a consequence of this discord Kepler did not receive the position in Württemberg which he had desired. Galilei put the acquisition of knowledge through nature above the knowledge obtained through the Bible. He did so because he was convinced by his scientific observations that the earth is moving. When he did not change his mind in spite of several admonitions by the Church to renounce what was then considered an erroneous opinion, he was finally confined to his home and had to adjure in 1633 "his error."[6] We see here already a bifurcation of knowledge through revelation and knowledge through nature whereby knowledge through revelation is divorced from nature.

It was only in the late 17th century that theologians showed an increased interest in nature, a fact which led to the emergence of so-called physico-theology. At that point mathematization of the natural sciences had made considerable progress. René Descartes, for instance, wanted to explain the world in purely mechanical terms. Final causes should be totally excluded so that mathematical physics could be introduced as the foundational science. Yet even he could not reach the complete mechanization of nature, as becomes clear from his admission: "But to demand from me a geometric demonstration in a manner which depends on physics means to ask from me the impossible."[7]

Isaac Newton (1642 – 1727) succeeded for the first time in his *Mathematical Principles of the Doctrine of Nature* (*Philosophia naturalis principia mathematica*), begun in 1684 and published

[5] "Konsistorium in Stuttgart an Kepler in Linz," in Johannes Kepler, *Gesammelte Werke,* vol. 17: *Letters 1612 – 1620* (Munich: C. H. Beck, 1955), 32.

[6] Cf. Hans-Werner Schütt, "Galilei, Galileo (1564 – 1642)," in *TRE* 12:15.

[7] René Descartes, "Letter to Mersenne, May 27, 1638," in *Oeuvres de Descartes: Correspondence*, ed. Charles Adam and Paul Tannery, vol. 2: *March 1638 – December 1639* (Paris: J. Vrin, 1969), 142.

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in 1687, to explain with a single mathematical law the phenomena of the heavens, of the tides, and the movements of objects on earth. His mathematical insights considerably helped astronomers and scientists to understand relationships in nature. Yet for Newton himself the ability to understand nature in mathematical terms revealed the greatness of God. Therefore he concluded his *Principles* with the confession:

> If the fixed stars are the centers of other like systems, these, being formed by the likewise counsel, must be all subject to the dominion of One. … This Being governs all things, not as the soul of the world, but as Lord over all. … It is allowed by all that the Supreme God exists necessarily; and by the same necessity he exists *always* and *everywhere*.[8]

Though Newton is known to most people as a natural scientist, most of his writings are in theology. Yet for his contemporaries these writings were not very convincing.

> To the eighteenth and much of the nineteenth centuries, Newton himself became idealized as the perfect scientist: cool, objective, and never going beyond what the facts warrant to speculative hypotheses. The *Principia* became the model of scientific knowledge, a synthesis expressing the Enlightenment conception of the universe as a rationally ordered machine governed by simple mathematical laws.[9]

For some, such as Immanuel Kant (1724–1804), even the fundamental principles from which the system of the world was derived seemed to be *a priori* truths, which are accessible only to reason. Yet in the natural sciences still the optimistic idea prevailed that one could simply connect the discoveries in the natural sciences with the Christian faith. It was believed that the scientific penetration of nature would even more clearly reveal the greatness of God. The Dutch scholar, theologian, and mayor

[8] Isaac Newton, *Mathematical Principles*, trans. Florian Cajori (New York: Greenwood, 1969), 2:544 f.

[9] Dudley Shapere, "Isaac Newton," in: *Encyclopedia of Philosophy*, 5:491.

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Bernhard Nieuwentyt (1654 – 1718) wrote in his *Proper Use of the Understanding of the World* (1715): "From all that has been already said, it may be inferred that the exact and experimental observations of what we see in the world, is a demonstrative means, not only to obviate so many causes and inducements to *atheism,* but likewise to attain to the knowledge of a God and his perfections by his works."[10] Similarly, the Swiss natural scientist and philosopher Charles Bonnet (1720 – 1793) concluded in his voluminous *Contemplation of Nature* (1764 – 1765):

> But this contemplation would prove fruitless, did it not lead us to aspire incessantly after this adorable Being, by endeavoring to acquire knowledge of him from the immense chain of various productions where in his power and wisdom are displayed with such distinguished truth and undiminished lustre. He does not impart to us the knowledge of himself immediately; that is not the plan he has chosen; but he has commanded the heavens and the earth to proclaim his existence, to make himself known to us. He has endued us with faculties susceptible of this divine language, and has raised up men whose sublime genius explores their beauties, and who become his interpreters.[11]

The exuberance concerning these new insights from the "book of nature" was not only a boon for theology. One could now also deepen with the help of scientific knowledge the insights concerning the existence and the essence of God gained from Scripture. When Johannes Kepler emphasized that this knowledge from nature was "of the same kind as the divine knowledge" and when the scientist was elevated to become the "priest of the highest God in the book of nature," these estimates were potentially dangerous for theology.[12] We remember that Galilei had already asserted that, when in doubt, insights derived from na-

[10] Bernhard Nieuwentyt, *The Religious Philosopher* or, *The Right Use of Contemplating the Works of the Creator,* trans. John Chamberlayne, 2nd ed. (London, 1721), Preface, Sect. XXVII, xlii.

[11] Charles Bonnet, *The Contemplation of Nature,* trans. from the French (London: T. Longman, 1766), 2:229.

[12] Johannes Kepler, *Gesammelte Werke,* vol. 13 (Munich: C. H. Beck, 1945), 309 and 193.

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ture have priority over insights from the Bible. Yet initially physico-theology still demonstrated the unity of God and nature. The reason for this was that many theologians were active in the natural sciences. For instance the British theologian and botanist John Ray wrote in 1691 a work with the telling title *The Wisdom of God Manifested in the Works of Creation*. William Derham (1657 – 1735), an English parson and philosopher of nature, calculated the speed of sound with relatively high exactitude. In 1713 he published a *Physico-theology* which did not just present physico-theological arguments but also in a compendium-like fashion presented the reader the then existent knowledge in the natural sciences. Two years later he published an *Astro-theology* in which he devoted himself to celestial objects.

In Germany, too, there was this union of theology and the natural sciences in one person, for instance in Jakob Christian Gottlieb Schäffer (1718 – 1790). Schäffer was superintendent of the Protestant congregation in Regensburg but also had made himself a name as a botanist, mycologist—he published research on Bavarian and Palatine sponges—and as an entomologist. Three volumes alone with more than 3,000 drawings of insects in the Regensburg region bear witness to his scholarly interests. His collection of objects from nature was so famous that even Johann Wolfgang von Goethe came to see it in 1786. Schäffer intended to raise the living standard of the people, for instance by building a washing machine and demonstrating how paper could be produced by using plant fiber. But for his intensive research in nature there was a typically physico-theological reason: "Without excuse the first and ultimate reason for all human considerations, actions, and works should be the knowledge and veneration of the Creator and the Highest Being from his works and in them. This must also be the same with regard to insects," so the argument of Schäffer in his work *Zweifel und Schwierigkeiten welche in der Insektenlehre noch vorwalten* (*Doubts and Difficulties Which Still Prevail in the Knowledge of Insects*) of 1766.[13]

[13] As quoted in Markus Tanne, "Jakob Christian Schaeffer – der Superintendent als Naturforscher (1718 – 1790)," in Karlheinz Dietz/Gerhard H.

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One could also mention here the Hamburg polyhistorian Johann Albert Fabricius (1668 – 1736) who translated the works of Derham into German and also wrote several physico-theological works. The leading thought for his scientific investigations was the "application for respectful thanks and praise to the great Creator."[14] – Since in Königsberg there was a physico-theological society to which, among others, young Immanuel Kant belonged, it is no surprise that he engaged extensively with physico-theology. With regard to recognize "God from his works", he affirmed that the "endeavors of Derham, Nieuwentyt and many others have … done honor to human reason.[15] When he mentions in conclusion: "It is absolutely necessary to convince one's self of the existence of God; but it is not just so necessary that it should be demonstrated," he has accurately characterized the intention of most physico-theologians.[16]

But all these different theologies which were related to nature and developed in the course of natural scientific discoveries could not hide the fact that God had gradually lost an appropriate place in nature. Nature was largely understood as an arrangement of

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Waldherr, eds., *Berühmte Regensburger: Lebensbilder aus zwei Jahrtausenden* (Regensburg: Universitätsverlag, 1997), 178.

[14] Johann Albert Fabricius, *Hydro-Theologie, oder Versuch, durch aufmerksame Betrachtung der Eigenschaften, reichen Austheilung und Bewegung der Wasser die Menschen zur Liebe und Bewunderung Ihres Gütigsten, Weisesten, Mächtigsten Schöpfers zu ermuntern. […]* (Hamburg: König and Richter, 1734), I,2.

[15] Udo Krolzik, "Physikotheologie," in *TRE* 26:594, writes: "The most important teacher of Kant, the philosopher Martin Knutzen (1713 – 1751) founded at Königsberg in 1748 a physico-theological society to which besides young Kant also belonged J. G. Hamann." For the quotation Immanuel Kant, *Der einzig mögliche Beweisgrund von einer Demonstration des Daseins Gottes* (1763), in Kant, *Werke in zehn Bänden,* Wilhelm Weischedel, ed., (Darmstadt: Wissenschaftliche Buchgesellschaft , 1968), 2:734 (A 199); and the English translation *The Only Possible Argument for the Demonstration of the Existence of God*, in Kant, *Essays and Treatises on Moral, Political, Religious and Various Philosophical Subjects*, vol. 2 (London: William Richardson, 1799), 362.

[16] Kant, *Der einzig mögliche Beweisgrund*, 2:738 (A 205), and Kant, *The Only Possible Argument,* 366.

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geometric figures and numbers. Newton still needed God so that under the influence of gravitation the stars would not collapse and that in the face of planetary changes the stability of the solar system was maintained. Yet the progress in scientific discoveries continuously diminished the necessity for such a "God of the gaps." Very quickly physico-theology was pushed to the side by the Enlightenment. God was removed from nature and its innate laws were emphasized. The Swiss polyhistorian Albrecht von Haller (1708 – 1777) had already to defend his physico-theology against deism and skepticism being disseminated by French thinkers especially by Voltaire and La Mettrie.[17] Within less than a hundred years the situation had completely changed.

When the French mathematician and astronomer Pierre Laplace (1749 – 1827) presented to Napoleon the first two volumes of his five-volume work *Mécanique céleste* (*Celestial Mechanics*, 1799 – 1825) he allegedly replied to Napoleon's question where the proper place for God was in his system: "Sir, I do not need this hypothesis." The world made sense without reference to God. Even the hypothesis of the creator seemed no longer necessary. In 1842 the German physicist Julius Robert Mayer (1814 – 1878) formulated the First Law of Thermodynamics or the Law of Conservation of Energy. This states that within an energetically isolated system the amount of energy neither increases nor decreases. This law seemed to make it possible that the world could be accorded the attribute of eternity. Given the presupposition that it is an energetically closed system it has neither a beginning nor an end. It is eternal and neither needs a creation nor a creator.

This kind of materialism was especially pronounced by the French physician and philosopher Julien Offray de La Mettrie (1709 – 1751). In his book *Man as Machine* (*L'homme machine*, 1748), he presented a naturalistic view of humanity and explained spiritual processes through physiological causes. The soul, for instance, originates from the organization of the body,

[17] Cf. Wolfgang Wiegrebe, *Albrecht von Haller als apologetischer Physikotheologe Physikotheologie: Erkenntnis Gottes aus der Natur?* (Frankfurt am Main: Peter Lang, 2009), esp. 522 ff.

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and the higher development of the reasonable human soul is due to the larger and more intricate arrangement of the brain. According to La Mettrie, this thoroughgoing naturalism necessarily leads to atheism. Already in 1745 in his *History of the Soul* (*Histoire naturelle de l'âme*) he rejected a metaphysical dualism and explained the faculties of the human mind through a motor-like power which resides in matter. The German baron Paul Heinrich Dietrich von Holbach (1723 – 1789) pursued a similar approach in his book *System of Nature* (*Système de la nature*, 1770). He described humanity as a product of nature which is subjected to the laws of the physical universe and beyond these there are no further ultimate principles or powers. According to von Holbach, it is an illusion to consider the soul as a spiritual substance. The moral and intellectual attributes of humanity can best be explained in a mechanistic way caused by physical, biological, and social interactions. The empirical and rational exploration of matter provides for von Holbach the only possibility to understand a human being. Nature is the sum total of all matter and of its movement. Matter is actually—or at least potentially—in movement, since energy or power is a property innate in matter. The material universe is simply there and therefore we need not pose the question how matter was created. Nothing is accidental or disorderly in nature since everything occurs by necessity and in an order which is determined by the universal chain of cause and effect. The world in which we live is not only interpreted in a mechanistic way, but von Holbach also believed it was subjected to a stringent causal determinism. – This was for the most part the general mood which prevailed among many intellectuals at the beginning of the 19th century. Therefore it was no accident that in November 1793, in the wake of the French Revolution, God was officially abolished and in God's place the goddess of reason was enthroned.

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2. Theology in Retreat (19th Century)

From his materialistic conviction Friedrich Engels (1810–1895), the co-founder of Marxism, emphasized: "We have the certainty that matter remains eternally the same in all its transformations, that none of its attributes can ever be lost, and therefore, also, with the same iron necessity that it will exterminate on earth its highest creation, the thinking mind, it must somewhere else and at another time again produce it."[1] Nature moves in an eternal circle without beginning and end and matter is endowed with the attribute of eternity. In such a worldview there is no longer a place for theology. It came as no surprise that as a consequence theology withdrew to its innermost expertise, on the one hand in pietism to the interiority and on the other hand to a new confessionalism which expected orientation in life from Scripture and the denominational confessions. With the exception of social problems, the world was surrendered to the natural sciences. In Germany theologians were confronted with the dissemination of a materialistic and ultimately monistic worldview which was advocated in an especially influential manner by Ludwig Büchner, Carl Vogt, and Jacob Moleschott. Ludwig Büchner's book *Kraft und Stoff* (*Force and Matter*)[2] al-

[1] Friedrich Engels, *Dialectics of Nature* (1873–83), trans. and ed. Clemens Dutt, pref. and notes J.B.S. Haldane (New York: International Publishers, 1940), 24 f.

[2] Ludwig Büchner, *Force and Matter or Principles of the Natural Order of the Universe with a System of Morality Based Thereon: A Popular Exposi-*

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ready in its title points to the two main components of materialism, force and matter. In the second half of the 19th century Büchner's book was the publication that had the widest circulation of any popular philosophical writing. In 1904 it had already gone through twenty-one editions and had been translated into all the major languages.[3]

2.1 The Materialistic Attack

Ludwig Büchner (1824 – 1899), a medical doctor from Darmstadt, advanced a "homogeneous theory of the world" and claimed that the "conquest of science … makes the old theistic theory of the universe, which originated in the days when mankind was still in its first childhood, appear as a mere fable."[4] He observed that there is a certain relationship between the environmental conditions and the existence of certain forms of organic life.[5] Earlier forms disappear and new ones come up as soon as the external conditions are changed.

While Büchner assumed that occasionally still today some forms of life originate spontaneously, he vacillated with regard to the origin of life itself.[6] On account of fossil findings he knew that usually lower forms of life date earlier than higher ones and that from these the ascent to further evolution occurs. When he noticed that different species resemble each other so much in their embryonic developmental state that this could only be explained by a common history of origin he anticipated what Ernst Haeckel later called the biogenetic law. Büchner rejected any thought of development by intentional planning when he declared: "Form is not a *principle* but a *result;* it is not the execution of a predesigned

tion, trans. from the 5th German ed., 4th Engl. ed. (London: Asher, 1884), xxv.

[3] According to Emanuel Hirsch, *Geschichte der neuern evangelischen Theologie im Zusammenhang mit den allgemeinen Bewegungen des europäischen Denkens*, 3rd ed. (Gütersloh: Gerd Mohn, 1964), 5:585 f.

[4] Büchner, *Force and Matter,* Pref. to the 15th ed., xxiv f.

[5] Cf. Büchner, *Force and Matter,* 125.

[6] Cf. Büchner, *Force and Matter,*181.

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plan, but the necessary product of the interaction of a large number of causes, contingencies or energies, [even though] blind and unconscious in themselves, [continue working] everywhere and at all times without cessation, and cannot but produce an apparently perfect and graduated order and succession."[7] Büchner replaced the idea of a goal-giving force external to nature with a self-contained system. "The secret of Nature lies in an eternal and self-sustained circle, wherein cause and effect are united without beginning and without end. That which is eternal only can be from eternity, and cannot be created or made."[8] In their bodily and spiritual existence humans are a product of nature. "Man with all his eminent qualities and faculties is not a work of God but a product of Nature, like all his fellow-creatures, and has proceeded from natural and gradual evolution and self-education."[9] If nature determines everything, it is not surprising that matter is immortal, without beginning and end in space, and that force is immortal too. Büchner concludes: "Today the indestructibility or permanence of matter is a scientific fact firmly established and is no longer to be denied."[10]

It is not surprising that in Büchner's system there is hardly any space left for God. If God is eternal, so Büchner, then this is just another expression for the eternity of the world.[11] Büchner rejected especially a planned purposiveness in nature and therewith denied the idea of a creator God. In analogy to Kant, Büchner argued that the idea of teleology is derived from our own mind and cannot be deduced from nature.[12] For instance, a deer does not have its long legs to run fast, but it can run fast because it has long legs. As soon as Darwin's thesis of non-directed "mutations" became known Büchner readily accepted it to undergird his assertions. The world

[7] Büchner, *Force and Matter*, 91 f.
[8] Büchner, *Force and Matter*, 37.
[9] Büchner, *Force and Matter*, 248.
[10] Büchner, *Force and Matter*, 24.
[11] Cf. Ludwig Büchner, *Der Gottes-Begriff und dessen Bedeutung in der Gegenwart: Ein allgemein-verständlicher Vortrag* (Leipzig: Theodor Thomas Verlag, 1874), 18.
[12] Cf. Büchner, *Der Gottes-Begriff*, 25 f.

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The emancipation of the natural sciences from religion during the last four centuries was a gradual affair. Initially many of the leading scientists came from the clergy indicating a symbiosis between faith and reason. Due to the increasing specialization in the sciences this close connection came to an end often leading to antagonism and mutual suspicion. Hans Schwarz traces the gradual emancipation of the natural sciences from religion in Europe and North America and the recent intensification of the dialogue. In his book he depicts the major players and outlines their specific contributions. Schwarz also presents important issues in the present-day dialogue between theology and the natural sciences.

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