CHAPTER 27

Leonhard Euler (1707–1783)

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Leonhard Euler (1707–1783)

Every man may rest assured that, from all eternity, he entered into the plan of the universe. [...] How ought this consideration to increase our confidence and our joy in the providence of God, on which all religion is founded!

Leonhard Euler, *Letters to a German Princess*, January 3, 1761.¹

1. **Historical background**

The Enlightenment changed the established ways of living. This movement of thought and belief was concerned with concepts of God and reason. It was convinced that every problem could be settled by the proper use of reason and therefore everything was “dragged” before the court of pure reason. The established ways of thinking and believing were also under attack because of the rise of modern science; and as a by-product of science anti-Christian rationalism arose. It is often assumed that the essential developments in the Age of Reason took place in philosophy (and it is then named after Voltaire, Locke or some other philosopher). It was, however, also a great time for the natural sciences, a time in which a new framework of scientific thinking was established. The new mechanics of Isaac Newton (1643–1727) are a beautiful example. Newton’s theory offered an impressive explanation of the way the universe functions. It was the progress of the natural sciences that influenced the rise of industry and, as a consequence, increasingly determined the conditions of human life up to this day.

What about Christian faith under the rule of the sharp sword of pure reason? Did the spirit of the time, which contrasted sharply with religion, allow for any Christian belief or any “enlightened religion”? The life of Leonhard Euler is an interesting example in this respect. He was without doubt the leading natural scientist of the 18th century. A century after Euler’s death the German historian Hermann Hankel (1839–1873) correctly remarked that Euler was the best representative of the scientific consciousness in the middle of the 18th century.² In our day, Clifford Truesdell (1919–2000) has estimated that in the 18th century Euler alone wrote about one third of all the mathematical works (including mathematical physics) that appeared in that period. It seems interesting to investigate Euler’s religious belief, the belief of an outstanding natural scientist of the day. Indeed, the relationship of the Christian religion and the natural sciences during the Enlightenment determined the entire life of Leonhard Euler.

2. **Life**

Euler’s father, Paul Euler (1670–1745) was a protestant minister. His mother, Margaretha Brucker (1677–1761), was the daughter of a minister. Euler was born in Basel in 1707, but in 1708 the family moved to Riehen. In this little village, a place two or three miles

¹Chaque homme peut être assuré, que de toute éternité il est entré dans le plan du monde. [...] Combien cette considération doit-elle augmenter notre confiance et notre amour pour la providence Divine, sur laquelle est fondée toute la religion.

from Basel with about one thousand inhabitants, Leonhard Euler grew up with his parents and later with his two younger sisters in the two rooms of the parsonage. He was surrounded by educated people, most whom were both ministers of religion and mathematicians. His learned father, who had been a pupil of the famous mathematician Jakob Bernoulli (1645–1705), gave Leonhard his first instruction, including mathematics. Later, when the young Leonhard moved to Basel to attend a grammar school in which mathematics was not taught, he received private instruction in mathematics from a Calvinist minister, Johann Burckhardt (1691–1743).

Among the mathematicians and theologians Euler encountered in his youth, it seems that, in addition to his father, it was above all Burckhardt who played an important role in Euler’s education and in forming Euler’s beliefs. The young Leonhard had intensive, liberal discussions on the modern views of the planetary system (Copernican theory) and of the biblical account of creation, and more generally of the relationship of scientific knowledge and religious belief. On the other hand, the Calvinist clergy—even its most pious members—strongly advocated “law and order”, mainly for political reasons. This created an ambiguous religious situation, and it is this spirit of submission to religious discipline in which Leonhard Euler grew up and that he upheld later in Berlin and St. Petersburg. He remained a devout Calvinist all his life. The doctrines he held throughout his life were those of Calvinism: he was pious and full of devotion. Every evening Euler conducted family prayers for his whole household, usually finishing with a sermon. He handled parish affairs in the same spirit to the very end. In Berlin he was a member of
the parish council (Gemeindeältester) and it was in the spirit of his father that he reformed certain affairs like the instruction given to candidates for confirmation and that he promoted the printing and distribution of sermons. When Euler gave the example of “a man who, on hearing a beautiful sermon, is affected by it, repents, and is converted [...]”\(^3\) in the Letters to a German Princess, January 6, 1761, he stressed the value of a good sermon. He was convinced that man can do nothing by himself; everything depends on divine grace. Therefore Euler advocated prayer (letter of January 3, 1761). Although the human will is free, by supplying motives God can influence human decisions.

Paul Euler wanted his son to follow him into the church. In October 1720, at the age of 13, as was quite usual then, Leonhard Euler enrolled in the University of Basel, which had been founded in 1460 as the first university in Switzerland. The famous Dutch scholar Erasmus of Rotterdam (1469?–1536) had taught at this university, making the city a centre of humanism in the 16th century. A central purpose of humanism was to serve religion. At this traditional university Euler started to study theology. Although the glorious days of Erasmus were long past, under Johann Bernoulli (1667–1748), a younger brother of Jakob Bernoulli, the University of Basel again became a centre of learning in Europe, this time with the main focus on mathematics. At this small university, then one of the smallest in Europe with 19 professors and only about 100 students, it was inevitable that the student Leonhard Euler and the leading mathematician, Johann Bernoulli, would meet each other. Indeed, Euler’s mathematical abilities soon earned him the esteem of Bernoulli who advised him to study mathematics. Leonhard Euler’s passion for mathematics grew stronger and stronger, so that his father finally gave in and allowed him to follow the bent of his genius. In 1723 Euler, now a Master of Arts, left the Faculty of Theology and began the study of mathematics under the supervision of Bernoulli. In 1727 Euler moved to St. Petersburg. First he became an associate of the St. Petersburg Academy of Sciences, but in 1733 he succeeded Daniel Bernoulli (1700–1782) to the chair of mathematics.

Theology remained one of Euler’s favorite interests, and it would be wrong to regard Euler’s transition from theology to mathematics as implying that he lost interest in theology. On the contrary, theology remained very important for him. It was Galileo Galilei (1564–1642) who had spoken of the two books that God had given mankind: Holy Writ and Nature. The language of the book of nature, the language of a world well-ordered by the Creator, was mathematics, the science of order. The study of mathematics would lead necessarily to an insight into the Creator’s construction programme. However, the rise of natural science had actually led to a serious problem: the success of the scientific method pressed in the direction of the autonomy of science, free from religious influence, and in the direction of Deism or even Atheism. Later, above all in the environment of the liberal deïst, King Frederick II (1712–1786), in his Berlin period (1741–1766), Leonhard Euler defended the Christian faith against freethinkers and atheists. He also strongly opposed the rationalism (monadology) of Leibniz and Wolff,\(^4\) and he took part in several

\(^{3}\)“Si, par exemple, un pécheur en entendant un beau sermon, en est frappé, rentre en soi même et se convertit [...]”.

\(^{4}\)The monadology is Leibniz’s metaphysics which is expressed in its mature form in the correspondence with Burcher de Vorder (professor of philosophy at the University of Leyden). Monads are the basic individuals, they are immaterial entities without spatial parts. Each monad is unique and indestructible, distinguished from other monads by its degree of consciousness. God created the universe in such a way that the monads are perfectly
fierce philosophical–theological debates, the most sensational of which was the ill-famed controversy on Maupertuis’ celebrated Principle of Least Action. The debate became intense and turned into an outright conflict. Voltaire (1694–1778) and even King Frederick II were involved. On this occasion Leonhard Euler supported the President of the Prussian Academy, Pierre-Louis Moreau de Maupertuis (1698–1759). Euler’s physico-teleological attitude was rather ambiguous: because he interpreted the principle as a theological one, he was compelled to defend religion against the hated ideology of free-thought; on the other hand, he correctly formulated the principle for some cases in dynamics, and he strongly believed that nature generally operates in such a teleological way. This belief is expressed early on in his book “Methodus inveniendi” (A method for discovering curved lines, 1744), a book on the calculus of variations:

“For, since the fabric of the Universe is most perfect and the work of a most wise Creator, nothing at all takes place in the Universe in which some rule of maximum or minimum does not appear”.5

Although the King of Prussia often employed Euler to perform calculations with respect to money, the fountains of Sans Souci (the summer residence of the king), the Finow canal, salt mines, calendars, maps, and other practical problems, Euler was unpopular at Frederick’s court, mainly because Frederick preferred French culture and its representatives: the deist Voltaire, and the Roman Catholic Maupertuis. King Frederick, but also many others, in Berlin were put off by Euler’s penetrating attacks against free-thought (“the rabble of freethinkers (die Rotte der Freygeister), these wretched people (diese elenden Leute”) 7

The situation in Berlin finally led to Euler’s return to Russia, where he had started his career and where he was to end it. Blind, but active to the end, Leonhard Euler died in St. Petersburg on September 18, 1783, at the age of 76 years, 5 months, and 3 days. 22 3/4 years earlier, on January 13, 1761, in his “Letters on different subjects in natural philosophy addressed to a German Princess”, he had written on the subject of death:

“It is also the influence of the soul upon the body which constitutes its life, which continues as long as this union subsists. […] Death, then, is nothing but the dissolution of this union, and the soul has no need to be transported elsewhere; for as it resides in no place, all places must be indifferent to it. […] This supplies us with a clear elucidation of the omnipresence of God: his power extends to all bodies contained in the universe. […] God is everywhere present. […] It is only bodies that cannot be in two places at the same time; but there is nothing to prevent spirit, which has no relation to place. […] We can form some idea of the state of the soul after death. As the soul, during life, acquires all its knowledge by means of the senses, being deprived by death of the information communicated through the senses, it no longer knows what is happening in the material world; this state is more or less similar to that of a man who suddenly becomes blind, deaf, dumb, and deprived of the use of all the other senses. […] Sleep likewise furnishes

synchronised in preestablished harmony (illustrated by two well-synchronised clocks). In the 18th century harmony is often understood in the sense of action (effort). Euler rejected the monadology because in the system of preestablished harmony no freedom of the will would be possible (no spirit can act on bodies). Freedom, however, is a condition of spirits, just as extension is one of bodies (see Letters December 9 & 13, 1760; January 3, 1761).

5The principle of the least action is based on the idea that whenever something moves in nature, this happens in the most efficient way, i.e. some quantity assumes a minimum value. Maupertuis was in fact accused of having taken this principle from Leibniz, which he had not.

6Cum enim Mundi universi fabrica sit perfectissima atque a Creatore sapientissimo absoluta, nihil omnino in mundo contingit, in quo non maximis minimiae ratio quaeepam eluceat. (Methodus inveniendi. Additamentum I. Opera omnia I/24, p. 231)  

7Rettung der göttlichen Offenbarung, §53; also in: Opera omnia III/12.
us with something like an example of this state. [...] Thus, after death, we will find ourselves in a more perfect state of dreaming, which nothing shall be able to discompose. [...] And this, in my opinion, is just about all we can say of it, at least with any appearance of reason”.

3. Euler on religion

During Euler’s lifetime the role of Christianity became problematic: atheism and unorthodox religious attitudes such as natural theology and deism appeared, and conflicts arose between them and traditional Christianity. Euler took part in these religious discussions and conflicts. His religious belief is expressed chiefly in two publications: the celebrated “Letters to a German Princess” (1760–1762) and the “Rettung der göttlichen Offenbarung gegen die Einwürfe der Freygeister” (The Deliverance of Divine Revelation from the Censures of the Freethinkers, 1747), and it is touched on in some philosophical controversies, especially in the debate on Maupertuis’ famous principle of least action (1744–1759). (Incidentally, the flagship publication of the Age of Enlightenment, the French “Encyclopédie” in 17 volumes, was published between 1751 and 1772.) While atheists and deists attacked the literal interpretation of the Scriptures as divine revelation, Euler defended the trustworthiness of the Bible by comparing it with that of science. There are contradictions and paradoxes in science too, even in mathematics, and yet no sane person will ever doubt the trustworthiness of science. The same approach is found in the critique of the calculus by George Berkeley (1685–1753): “Whether mysteries may not with better right be allowed of in Divine faith than in Human Science?” (The Analyst, Question 62).

For Euler there are three fundamentally different classes of knowledge: there is the truth of the senses (experience), that of understanding (reasoning), and that of belief (history), and the true foundation of human knowledge is different for each of them. Each class of knowledge requires its own type of proof of its trustworthiness:

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8C’est aussi l’influence de l’âme sur le corps qui en constitue la vie, qui dure aussi longtemps que cette liaison subsiste. [...] La mort n’est donc autre chose que la destruction de cette liaison: ensuite l’âme n’a pas besoin d’être transportée autre part; car puisqu’elle n’est nulle part, elle est indifférente à tous les lieux. [...] Cela nous fournit un bel éclaircissement pour concevoir comment Dieu est partout; c’est que son pouvoir s’étend à tout l’univers et à tous les corps qui s’y trouvent. [...] Dieu est présent par tout. [...] Ce ne sont que les corps qui ne peuvent être en même temps en deux endroits, mais pour les esprits qui n’ont aucun rapport aux lieux en vertu de leur nature. [...] On peut se former quelque idée de l’état de l’âme après la mort. Comme l’âme pendant la vie tire toutes ses connaissances par le moyen des sens, étant dépouillée par la mort de ce rapport des sens, elle n’apprend plus rien de ce qui se passe dans le monde matériel; elle parvient à peu près dans le même état, où se trouverait un homme, qui serait devenu tout d’un coup aveugle, sourd, muet, et privé de l’usage de tous les autres sens. [...] Le Sommeil nous fournit aussi un bel échantillon de cet état. [...] Ainsi après la mort nous nous trouverons dans un état des songes les plus parfaits, que rien ne sera plus capable de troubler. [...] Et c’est à mon avis à peu près tout ce que nous saurions en dire de positif.

9Natural theology in the 18th century bases itself on knowledge of God drawn from nature and can be characterized as establishing religious truth (existence of God, immortality of the soul, God’s providential control of the world, etc.) by rational arguments and without referring to God’s revelations. Natural theology is distinguished from revealed theology as well as is contrasted with it (no access to the existence of Jesus Christ).
"I have seen or felt, is the proof of the first class; I can demonstrate it, is that of the second: we likewise say, I know it is so. Finally, I receive it on the testimony of persons worthy of credit, or I believe it on solid grounds, is the proof of the third class". (April 4, 1761)

These three different species of knowledge, which comprehend all human knowledge, must be considered equally certain. They correspond to the only sources of human knowledge, derivation from our own experience, reasoning, and reports of others. Religious belief belongs to the third kind of knowledge. But, how to handle the different kinds of knowledge? Euler remarked:

"The three sources from which our knowledge is derived all require certain precautions, which must be carefully observed, in order to acquire assurance of the truth; but it is possible, in each, to carry matters too far, and one should always steer a middle course. The third source clearly proves this". (April 18, 1761)

"Therefore, as logic prescribes rules for correct reasoning, where intellectual truth is concerned, there are equally certain rules for the first source, that of our senses, and for the third, that of belief". (April 11, 1761)

The theology of revelation explains the articles of faith in that it rests upon the Bible as the only source of religious truth (**saecra doctrina**); on the other hand, natural theology approaches God and his creation with the help of pure reason. It is exactly this difference that Euler had discussed earlier with his father and the professors of theology in Basel: Did God in the Bible reveal the physical structure of our world? Euler rejected any literal interpretation of biblical texts as scientific explanations, and in his “Rettung” he gave reasons why God has not supplied us with a revelation of the fabric of the universe. The opening line reads: “Our mental powers manifest themselves in two capacities, one of which is called the understanding (Verstand), the other the will (Wille). Because all supreme happiness consists in perfection, the supreme happiness of the soul can only be promoted by the perfection of the understanding and the perfection of the will”. The understanding serves to find truth, and by the will our duties are then deduced from truth. The aim of life is bliss or complete happiness and both powers serve to complete our bliss. This means that to increase our bliss we have to perfect both powers. But God’s revelation is concerned

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10*Je l’ai vu ou senti, est la preuve de la premiere classe: Je puis le démontrer, est la preuve de la seconde classe, de laquelle on dit aussi, qu’on sait les choses: Enfin, Je le tiens par le témoignage de personnes dignes de foi: ou je le crois par des raisons solides; c’est la preuve de la troisieme classe.*

11*With a similar intention to distinguish knowledge and faith Immanuel Kant (1742–1804) noted in his “Critique of Pure Reason” (second edition 1787): “I have therefore found it necessary to abolish knowledge in order to make room for faith”. (Ich mußte also das Wissen aufheben, um zum Glauben Platz zu bekommen. In: Kritik der reinen Vernunft, 1787. Vorrede zur 2. Auflage, B XXX.)*

12*Toutes les trois sources d’où nous tisons nos connoissances, exigent chacune certaines précautions, qu’on doit bien observer pour être assuré de la vérité, mais dans chacune on peut pousser la chose trop loin, et il faut toujours tenir un certain milieu. La troisième source ne prouve cela que trop ouvertement.—Donc comme la Logique prescrit les regles des raisonnemens justes qui nous mettent à l’abri de l’erreur à l’égard des vérités intellectuelles, il y a aussi des regles également certaines, tant pour la première source, de nos sens, que pour la troisieme, de la foi.—Euler used rigorous demonstrations in his philosophical (or theological) expositions. Because Kant’s work is so well known Euler’s role and importance are overshadowed.*

13§1. Die Kräfte der Seele äussern sich in einem gedoppelten Vermögen, davon man eines den Verstand, das andere den Willen nennet. Da nun alle Glückseligkeit in der Vollkommenheit besteht, so kann die Glückseligkeit einer Seele nicht anders als durch die Vollkommheit des Verstandes, und durch die Vollkommheit des Willens befördert werden. (Rettung, §1; Opera omnia, III/12, p. 268.)
with our will only, not with our understanding. Why is this? Our complete happiness rests upon the complete submission of our will to God’s will. However, the more we extend our knowledge, the more we extend our duties which depend on the state of our knowledge. A revealed knowledge, i.e. an absolute knowledge, would involve an infinite set of duties which would make complete acquiescence impossible. To prevent this dilemma, in his infinite goodness God has taken our limited mental capacities into account. In addition, the biblical revelation not only proscribes duties but also supplies advice.

Euler’s rejection of metaphysics rests on this insight: our ability to acquire knowledge is too limited to supply a sufficient theory of cognition. However, we can admire the eternal works of God.\[14\]

While the Prussian Kant said that the majesty of duty has nothing to do with enjoyment of life (Critique of Practical Reason), according to the Swiss Euler we will taste enjoyment, but not before there is a complete correspondence of human and divine will. In Euler we find Descartes’ dualism of body and soul, but in an extended form. In a letter concerning the nature of spirit we read:

“To think, to judge, to reason, to feel, and to will, are qualities incompatible with the nature of bodies; and beings invested with them must be of a different nature. Such are souls and spirits; and He who possesses these qualities in the highest degree is God. There is, then, an infinite difference between body and spirit. Extension, inertia, and impenetrability—qualities which exclude all thought—are the properties of body; but spirits are endowed with the faculty of thinking, of judging, of reasoning, of feeling, of reflecting, of willing, or of determining in favour of one object over another. There is here neither extension, nor inertia, nor impenetrability; these material qualities are infinitely remote from spirit. […] It is asked, What is spirit? I acknowledge my ignorance in this respect; and I reply, that we cannot tell what it is, as we know nothing of the nature of spirit. […] This union of the soul with the body undoubtedly is, and ever will be, the greatest mystery of the Divine Omnipotence—a mystery which we shall never be able to unfold. […] These two species of beings are nevertheless most intimately united; and upon their union principally depend all the wonders of the world, which are the delight of intelligent beings, and lead them to glorify their Creator. It is certain that spirits constitute the principal part of the world, and that bodies are introduced into it merely to serve them”. (November 29, 1760)\[15\]

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\[14\]It is precisely this attitude that is expressed by Kant (Critique of Practical Reason, 1787): “Two things fill the mind with ever new and increasing admiration and awe: the starry heaven above me and the moral law within me”. (Zwei Dinge erfüllen das Gemüt mit immer neuer und zunehmender Bewunderung und Ehrfurcht, je öfter und anhaltender sich das Nachdenken damit beschäftigt: Der bestimmte Himmel über mir, und das moralische Gesetz in mir; Kritik der Urteilskraft, Beschluß, S. 191.)

\[15\]Penser, juger, raisonner, sentir, réfléchir et vouloir sont des qualités incompatibles avec la nature des corps; et les êtres, qui en sont revêtus, doivent avoir une nature tout-à-fait différente. Ce sont des âmes et des esprits, dont celui qui possède ces qualités au plus haut degré, est Dieu. Il y a donc une différence infinie entre les corps et les esprits. Aux corps il ne convient que l’étendue, l’inertie, et l’impénétrabilité, qui sont des qualités, qui excluent tout sentiment: pendant que les esprits sont doués de la faculté de penser, de juger, de raisonner, de sentir, de réfléchir, de vouloir ou de se décider pour un objet plutôt que pour un autre. Ici il n’y a ni étendue, ni inertie, ni impénétrabilité; ces qualités corporelles sont infiniment éloignées des esprits. […] Mais on demande ce que c’est qu’un esprit? sur cela j’aime mieux avouer mon ignorance et répondre que nous ne saurions dire ce que c’est qu’un esprit, puisque nous ne connoissions rien du tout de la nature des esprits. […] Or cette même union de chaque âme avec son corps est sans doute et restera toujours le plus grand mystère de la Toutepuissance Divine, que nous ne saurions jamais pénétrer. […] Cependant ces deux espèces d’êtres sont liées ensemble de la manière la plus étroite, et c’est principalement de ce lien que dépendent toutes les merveilles du monde, qui ravissent les êtres intelligens et les portent à glorifier la Créateur. Il n’y a aucun doute que les esprits ne constituent la principale partie du monde et que les corps n’y soient introduits que pour leur service.
Elucidating the nature of spirits Euler continued:

“To ask, In what place does a spirit reside? would be for the same reason an absurd question, for to connect spirit with place is to ascribe extension to it. No more can I say in what place an hour is; though assuredly an hour is something; something, therefore, may exist without being attached to a certain place. […] Just as it may be with truth affirmed of the hour now passing, that it exists neither in my head nor outside of my head. A spirit exists, then, though not in a certain place; but if our reflection turns on the power which a spirit has of acting upon a body, the action is most undoubtedly performed in a certain place”. (January 10, 1761)\footnote{16}

Euler dealt with the liberty of spirits, “a stumbling-block in philosophy” (Euler):\footnote{17}

“But [in comparison with bodies] spirits are of a very different nature, and their actions depend on principles directly opposite. Liberty, entirely excluded from the nature of body, is the essential portion of spirit to such a degree that without liberty a spirit could not exist; and this it is which renders it responsible for its actions. This property is as essential to spirit as extension or impenetrability is to body; and as it would be impossible for the Divine Omnipotence itself to divest body of these qualities, it would be equally impossible for it to divest spirits of liberty. A spirit without liberty would no longer be a spirit, as a body without extension would no longer be a body”. (December 16, 1760)

“It is accordingly of importance to remark, that God acts in a manner totally different towards bodies and spirits. God has established for bodies laws of rest and motion, conformably to which all changes necessarily take place; as bodies are merely passive beings, whereas spirits are susceptible of no force or constraint, but are governed of by God through precepts and prohibitions. […] When it is said to be the will of God that men should love one another, we mean by that expression a commandment which men ought to obey; but this is very far from being the case. God does not force men to it, this would be contrary to the liberty which is essential to them. […] It always depends on the will of man whether he is to obey or not. In this sense we are to understand the will of God, when it refers to free actions of spiritual beings”. (December 27, 1760)\footnote{18}
From this point of view Euler deduced the existence of evil and sin:

“The origin and permission of evil in the world is an article which has in all ages greatly perplexed theologians and philosophers. To believe that God, a supremely good Being, should have created this world, and to see it overwhelmed with such a variety of evil appears so contradictory, that some found themselves reduced to the necessity of admitting two principles, the one supremely good, the other supremely evil. This was the opinion entertained by the ancient heretics known in history by the name of Manicheans. […] Though the question be extremely complicated, this single remark, that liberty is a quality essential to spirits, dispels at once a great part of the difficulties which would otherwise be insurmountable. […] In this respect, therefore, the government of God over spirits, or rational beings, is infinitely different from that which men exercise over men like themselves, and we greatly err if we imagine that a government which appears the best in the eyes of men is really so in the judgment of God. This is a reflection of which we ought never to lose sight”.

(March 14, 1761)\(^{19}\)

For Euler it is “an established truth that Christ has risen from the dead” and that “the Divinity of Christ’s mission in this world cannot possibly be called into question”. From this he argues that “we can absolutely trust in all the promises given in the Gospel”.\(^{20}\)

4. Physico-theological arguments in Euler

Euler, one of the most distinguished scientists of the 18th century, deduced his philosophical and theological statements with the help of then modern arguments, i.e. he evaluated the astronomical, physical, chemical, and biological progress in view of (physico-)theological deductions. An example: because of the nature of the ether which produced friction, Euler regarded it as a matter of fact that the present state of the planetary system could not be in existence from eternity to eternity and in this way found confirmation of the biblical statement of the finiteness of our world, which lasts from the creation to doomsday (Rettung, §50). Euler’s physico-theological view was manifest in his defense of Maupertuis’ principle which stated that in all the changes which occur in nature, the cause will be the smallest that can produce the effect. Maupertuis proclaimed his economy principle to be a
general law of nature, most worthy of the creator, whereas critics who mocked Maupertuis, claimed that the principle turned the almighty God into a stingy, or at least a parsimonious, creator.

Euler expounded the Principle as perfectly founded in the very nature of body, and he had the strong belief that basic physical principles can always be expressed by certain minimal or maximal properties. But mathematically, in his paper “On the motion of bodies in a non-resisting medium, determined by the method of maxima and minima” (Appendix II in the “Methodus inveniendi”), he limited himself to a few special applications in dynamics. He said explicitly that he would leave the general case to the Philosophers, and he did not use the principle at all to prove the existence of God mathematically. Here he differs from other celebrated physico-theological writers like William Derham (1657–1735), the author of “Physico-theology or a demonstration of the Being and Attribute of God from his Works of Creation” (1713), John Ray (1628–1705, “Three physico-theological discourses”, 1692, and “The Wisdom of God Manifested in the Works of Creation”, 1691), Johan Swammerdam (1637–1680, “Bybel der natuur”, The bible of nature or the history of insects, ed. by Boerhave 1737), Bernard Nieuwentyt (1654–1718, “Het regt gebruik der werelt beschouwingen, ter overtuiginge van ongodisten en ongelovigen aangetoont”, The correct use of the world views, demonstrated in order to convince atheists and unbelievers, 1714). Most of them showed more industry in collecting examples for anthropomorphic justification of Divine Providence than in providing a sound theoretical foundation.

It is the self-confidence of the rising bourgeoisie that interpreted the Creator like an ideal human being (where there is order, there is mind). The optimistic physico-theological view can also be regarded as a reaction to baroque nihilism. It failed to see any misfortune and sorrow in the world because almost everything served to demonstrate the glory of God. Although Euler was guided throughout by general teleological principles (by a priori conviction) his realistic view (the a posteriori corroboration of the principles by true and sound dynamic methods) appears in the following lines taken from his “Methodus inveniendi”:

“Although this conclusion does not seem sufficiently confirmed, nevertheless, if I show that it agrees with a truth known a priori, so much weight will result that all doubts which could originate on this subject will completely vanish. Even better, when its truth will have been shown, it will be very easy to undertake studies in the profound laws of Nature and their final causes, and to corroborate this with the firmest arguments”.

References

I. Original works


21 Quod negotium aliis, qui Metaphysicam profitentur, relinquo. (Methodus inveniendi, Additamentum I, Opera omnia I/24, p. 308.)

22 Quae conclusio etsi non satis confirmata videatur, tamen, si eam cum veritate iam a priori nota consentire ostendero, tantum consequetur pondus, ut omnia dubia, quae circa eam suboriri queant, penitus evanescant. Quin-etiam, facilius erit in intimas Naturae leges atque causas finales inquirere hocque assertum firmissimis rationibus corroborare. (Methodus inveniendi, Additamentum II, Opera omnia I/24, p. 298.)
Leonhard Euler (1707–1783)


II. Biographies


III. Secondary literature


