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THE ROLE OF PROTESTANTISM IN THE EMERGENCE OF MODERN SCIENCE: CRITIQUES OF HARRISON'S HYPOTHESIS

Abstract: *According to Peter Harrison's book The Bible, Protestantism and the Rise of Natural Science (1998) modern science came into existence as a result of the emphasis of Protestants on the literal sense of the Scripture, their refusal of the earlier symbolic or allegorical interpretation, and their efforts at fixing the meaning of the biblical text in which each passage was to be ascribed a single and unique meaning. This article tries to summarize the most significant critiques of Harrison's hypothesis (by Kenneth Howell, Jitse van der Meer and Richard Oosterhoff) and to acknowledge their legitimacy. However, the alternative explanation of the emergence of modern science as a result of disputes over the biblical interpretation and the subsequent discovery of the ambiguous character of the ordinary verbal language is not fully satisfactory either.*

Keywords: *Harrison; Howell; van der Meer; Oosterhoff; literalism; Bible; exegesis; allegory; natural symbolism; early modern science*

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Role protestantismu při vzniku moderní vědy: kritiky Harrisonovy hypotézy

Abstrakt: *Podle knihy Petera Harrisona The Bible, Protestantism and the Rise of Natural Science z roku 1998 vznikla moderní věda jako výsledek důrazu protestantů na doslovný smysl Písma, jejich odmítnutí dřívějšího symbolického či alegorického výkladu a jejich snahy o fixaci významu biblického textu, v němž každá pasáž měla mít jediný a jedinečný význam. Tento článek se pokouší o shrnutí nejvýznamnějších kritik Harrisonovy hypotézy (od Kennetha Howella, Jitse van der Meera a Richarda Oosterhoffa) a uznává jejich oprávněnost. Nicméně ani alternativní vysvětlení vzstupu moderní vědy jakožto výsledku neshod ve výkladu Písma a následného objevu nejednoznačné povahy běžného verbálního jazyka není zcela uspokojujivé.*

Klíčová slova: *Harrison; Howell; van der Meer; Oosterhoff; literalismus; Bible; exegeze; alegorie; přírodní symbolismus; raně novověká věda*

Introduction

Several methods of inquiry can be employed to explore the roots of modern science. First of all, we should ask: *When* did modern science emerge? The answer is clearly in the 16th and 17th centuries, that is, in early modern times. In order to find out *how* it emerged, we can consult plentiful historiographic resources and numerous specialised studies which describe the manner and history of this transformation. However, the question about the cause as to *why* modern science came into existence poses a major issue. Even if we avoid the teleological concept of a final cause, its efficient cause, or rather the concept into which it evolved under the influence of modern rationality, remains unclear. Mechanical causality created an important reduction.¹ For example, Galileo Galilei redefined the concept of cause outside the Aristotelian frame, thereby reducing its meaning. In Galileo's own words, "only that may be properly called a cause which is always followed by the effect, and which when removed takes away the effect."² It seems that he believed that only a necessary and sufficient condition for the occurrence of an event could be considered a cause.

This article also approaches the concept of a "cause" from this above-defined modern perspective. The question may arise whether such a definition of a "cause" is adequate. The answer is that, at least in natural science, this conception proved to be especially fruitful. It may also be reasonable to ask whether the humanities, such as historiography, should really provide causal explanations (*erklären* – as Dilthey put it) instead of trying to understand (*verstehen*) them. The fact is that historians of science, in spite of declaring war on "monocausal" explanations (i.e. explanations of historical phenomena on the basis of their single cause), have so far tried – despite Dilthey's theories – to explain historical events with reference to their cause.

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¹ For more on the topic: Tomáš MACHULA, *Causa efficiens: příčina účinná a princip kauzality mezi realismem a redukcionismem* [*Causa efficiens: Efficient Cause and the Principle of Causality between Realism and Reductionism*]. České Budějovice: Jihočeská univerzita v Českých Budějovicích 2009.

² Galileo GALILEI, "Il Saggiatore." In: FAVARO, A. (ed.), *Le Opere di Galileo Galilei: Volume VI*. Firenze: G. Barbèra 1896, p. 265 (213–372): "Se è vero che quella, e non altra, si debba propriamente stimar causa, la qual posta segue sempre l'effetto, e rimossa si rimuove..." Translation in: Stillman DRAKE – Charles O'MALLEY, *The Controversy on the Comets of 1618*. Philadelphia: University of Pennsylvania Press 1960, p. 219.

The fact that causes are sometimes called differently, for example, “decisive impulses” or “most substantial stimuli” plays a marginal role.

Harrison’s hypothesis

Renowned historian of science and religion Peter Harrison in his work *The Bible, Protestantism and the Rise of Natural Science* sees the Protestant literalist interpretation of texts (principally of the Bible) as a “catalyst” and the “most important factor” in the emergence of modern science.³ Harrison believes that from Christian Antiquity, i.e. from the time of the early Church Fathers until the turn of the 16th into the 17th century, natural history (*historia naturalis*) was actually a human science: “Animals had a ‘story’, they were allocated meanings, they were emblems of important moral and theological truths, and like the hieroglyphics of ancient Egypt they were to be thought of as the characters of an intelligible language.”⁴ The literary context of animals (legends about animals, traditional stories, fables, proverbs, folk sayings, emblems, allegories in the Bible and classical literature, their usage in heraldry and numismatics, etc.) was more important than their physical environment. This also applied to plants, minerals and other objects of nature – natural signs that were the symbols and allegories of spiritual and material facts.

For example, Basil the Great and Augustine believed that poisonous animals represented bad movements of the soul.⁵ The transformation of a silkworm into a butterfly symbolised resurrection and an alleged sexless reproduction of birds was likened to a virgin birth. According to Augustine, birds were believers who were versed in the Christian faith and therefore able to fly up to the heavens. Unlike Ambrose of Milan, who saw fish as a symbol of vice in society, Augustine considered fish to be an emblem of the first sacraments and whales to represent miracles.⁶ According to the late antique

³ Peter HARRISON, *The Bible, Protestantism and the Rise of Natural Science*. Cambridge: Cambridge University Press 1998, p. 8: “The specific agent which I wish to identify as having been a major catalyst in the emergence of science [...] is the Protestant approach to the interpretation of texts [...]. While I do not wish to be seen as setting out a monocausal thesis for the rise of modern science, for there is no reason why a range of factors should not play some role, yet I shall argue that of these factors by far the most significant was the literalist mentality initiated by the Protestant reformers, and sponsored by their successors.”

⁴ HARRISON, *The Bible, Protestantism and the Rise of Natural Science*, p. 2.

⁵ AUGUSTINUS, “Confessiones.” XIII.21. In: MIGNE, J.-P. (ed.), *Patrologiae Latinae cursus completus: Tomus 32*. Paris: Migne 1841, pp. 856–858 (659–868).

⁶ AUGUSTINUS, “Confessiones,” XIII.27, p. 863.

encyclopaedia, *Physiologus*, which remained influential throughout the Middle Ages, the pelican symbolised Christ and the snake that shed its skin represented the believer who shed, through fasting and austerity, his or her old self.⁷ Aside from being the symbol of the devil, the snake also symbolised Christ, both hung on wood (a bronze snake hung by Moses on a stick in the desert; Christ nailed to the cross by the Jews). The lion symbolises Christ since they share a kingly nature, yet it also symbolises Satan since both are predators. Natural phenomena may have given various allegorical meanings: for example, a lion covering his traces symbolised Christ hiding His divine nature by assuming human form (an allegory of Christ's incarnation). A lion sleeping with open eyes symbolises the sleeping body of Christ who remains vigilant in His divinity throughout (an allegory of Christ's death). And just like the lion father wakes his lion cub with a roar, the almighty Father brings Christ back to life (an allegory of Christ's resurrection).⁸

According to Harrison, from Augustine up until around the 12th century, the Book of Nature had semantics, but lacked syntax. Based on vertical analogy, things refer to eternal truths.⁹ According to Harrison, however, nature is "discovered" in the 12th century as a coherent system, or more precisely – similarities not only between physical objects and theological and moral truths are revealed, but also between physical objects themselves.¹⁰ Vertical analogy is gradually complemented by horizontal analogy based primarily on the relations between microcosm-macrocosm and sympathy-antipathy. This gradually leads, for example, to the boom of physiognomics, chiromancy and the doctrine of signatures. The doctrine of signatures, to provide an illustrative example, was the belief that, for instance, a walnut could cure illnesses of the head simply because it resembled a brain. The Renaissance doctrine of signatures was closely related to Renaissance medicine, alchemy, astrology and magic, but not to modern science.

According to Harrison, after the arrival of Galileo Galilei and his contemporaries (who are now primarily considered scientists, but not philosophers or theologians), the semantics of the Book of Nature was rejected. The theory that things could serve as signs was deemed unacceptable. Hence, the

⁷ HARRISON, *The Bible, Protestantism and the Rise of Natural Science*, pp. 21–25.

⁸ Jitse VAN DER MEER – Richard OOSTERHOFF, "God, Scripture, and the Rise of Modern Science (1200–1700): Notes in the Margin of Harrison's Hypothesis." In: VAN DER MEER, J. – MANDELBROTE, S. (eds.), *Nature and Scripture in Abrahamic Religions: Volume 2*. Leiden – Boston: Brill 2008, pp. 378–379 (363–396).

⁹ HARRISON, *The Bible, Protestantism and the Rise of Natural Science*, pp. 32–33.

¹⁰ *Ibid.*, pp. 42–44.

study of nature was freed from the specific theological bias of biblical exegesis – in relation to which, natural symbolism in particular played a crucial role – and the sphere of nature was opened to new structuring principles, i.e. mathematics and taxonomy. This claim, inspired by Foucault,¹¹ is not only asserted by Harrison, but also by Umberto Eco, James Joseph Bono, William Ashworth Jr. and others.¹² And yet this author believes that Eco was right in going all the way back to Thomas Aquinas – calling him a “cultural policeman”, who cut away natural phenomena from their meanings and tried to eliminate natural symbolism. Each of the aforementioned historians refer to the symbolist mentality in different ways: Harrison speaks about integrated hermeneutic practice, Bono about symbolic exegesis, Ashworth refers to an emblematic worldview and, finally, Eco invokes universal allegorism. For the purposes of this author’s study, the term “natural symbolism” will be used. In the Middle Ages, it was not important how things worked but what they signified. The modern era has, in turn, been dominated by mathematical principles and taxonomy, or rather, “the syntax of the Book of Nature”.

According to Harrison – and this is where his theory becomes most problematic – modern science came into existence as a result of the emphasis of Protestants on the literal sense of the Scripture, their refusal of the symbolic or allegorical interpretation, and their efforts at fixing the meaning of the biblical text in which each passage was to be ascribed a single and unique meaning.

Protestant literalism allegedly had far-reaching consequences for the Book of Nature. Natural objects were no longer linked through sets of similar qualities and nature lost its meaning. This loss of intelligibility in relation to nature was gradually compensated for by alternative descriptions of natural phenomena – explanations that are nowadays considered scientific. In this new scheme of affairs, objects were related to one another according to mathematical, mechanical or causal principles, or they were arranged and

¹¹ Cf. Michel FOUCAULT, *Slova a věci [Words and Things]*. Brno: Computer Press 2007, pp. 61–64.

¹² Cf. Umberto ECO, *O zrcadlech a jiné eseje [On Mirrors and Other Essays]*. Praha: Mladá fronta 2002, p. 293ff.; Umberto ECO, *Umění a krása ve středověké estetice [Art and Beauty in the Middle Ages]*. Praha: Argo 1998, pp. 76–110; James Joseph BONO, *The Word of God and the Languages of Man: Interpreting Nature in Early Modern Science and Medicine*. Wisconsin: University of Wisconsin Press 1995; William ASHWORTH, “Emblematic Natural History of the Renaissance.” In: JARDINE, N. – SECORD, J. – SPARY, E. (eds.), *Cultures of Natural History*. Cambridge: Cambridge University Press 1996, pp. 17–37; William ASHWORTH, “Natural History and the Emblematic Worldview.” In: LINDBERG, D. (ed.), *Reappraisals of the Scientific Revolution*. Cambridge: Cambridge University Press 1990, pp. 303–332.

classified according to categories other than similarity. Things had lost their referential capacity and references became restricted to the domain of words.

Thus far, Harrison's hypothesis may apply: By emphasising the literal meaning and fixation of the biblical text, Protestants caused the end of natural symbolism in which things marked theological and moral truths and material facts. This enabled the development of modern science, the introduction of new ordering principles (which Foucault called *mathésis* and *taxinomia*) and the study of natural objects for their own sake.

Critique by counterexamples

However, Harrison's hypothesis, formulated 17 years ago, shows significant cracks. One problem has already been mentioned – in one of his essays, Eco asserts that the first thinker to have “eliminated universal allegorism, the delusive world of natural hermeneutics typical for the preceding Middle Ages”, was Thomas Aquinas.¹³

Harrison's theory has also been successfully critiqued by Kenneth Howell who has proven that Protestant scientists (who should have served as a typical example of opponents of natural symbolism) in fact employed very brave allegories in their works.¹⁴ To the personalities listed by Howell, such as German Lutheran Kepler and Dutch Calvinist Lansbergen, we can add the Bishop of the Unity of the Brethren, John Amos Comenius (Jan Amos Komenský).

Let us first focus on Kepler, whose Trinitarian symbolism consists of the idea that the centre of its cosmological system, i.e. the Sun, is the image of God the Father, the surface of the external cosmic sphere is the representation of God the Son and, finally, the ether between the centre and the surface represents the Holy Spirit. God the Father must be in the centre, being the origin of the whole sphere and the “fount of divinity” that gives life to the entire system. Just like God the Father gives birth to His Son, each point on the surface of the sphere emanates from the centre. And just as Christ is the image of the Father, each point on the spherical surface is the representation of its centre.¹⁵ And just as the Creed of the Western Church maintained that the Holy Spirit proceeds from the Father and the Son, the space between the

¹³ ECO, *O zrcadlech a jiné eseje*, p. 301.

¹⁴ Cf. Kenneth HOWELL, *God's Two Books: Copernican Cosmology and Biblical Interpretation in Early Modern Science*. Notre Dame: University of Notre Dame Press 2002.

¹⁵ *Ibid.*, p. 128.

surface of the sphere and the solar centre “results from a comparison of the centre with the surface and proceeds from both”.¹⁶ According to Kepler, the whole world is a sacrament and a material image of God. Kepler, a Lutheran thinker, is not a typical example of the literalist mentality of Protestants, to which Harrison refers as being one of the crucial factors in the emergence of modern science.

The Trinitarian symbolism can also be found in the work of Dutch astronomer and Calvinist Philip Lansbergen, a follower of Copernicus’ theory of the solar system. In accordance with Kepler, he claimed that the Sun was the image of God the Father, with the Moon being the image of God the Son and the earth’s atmosphere (the air enveloping the Earth) being the representation of the Holy Spirit. He wrote that

as the Father has light from himself, the Son from the Father, and the Holy Spirit from the Father and the Son, so the light of the sun comes from itself, that of the moon from the sun, and that of the air from the sun and moon at the same time. So there are in fact three different lights but the light itself clearly shows a unity: the light of the moon is the sun’s own light and the light of the air is that of the sun and moon together. In fact, there is only one light and the same proceeds from one sun as its source.¹⁷

We may again see how Lansbergen’s allegoric or symbolic concept – just like that of Kepler – supports not only the doctrine of a Trinitarian God, but also the Nicene-Constantinopolitan Creed and doctrine of the *filioque*.

And finally, the Trinitarian allegory was also used by another Protestant author – John Amos Comenius. It is not an exaggeration to say that the “teacher of the nations” saw *vestigia Trinitatis* almost everywhere. The visible macrocosm consists of matter, light and spirit. The rainbow is composed of green, yellow and red. Time is comprised of the past, the present and the future. Space is made up of length, width and depth. A proposition is composed of a subject, predicate and copula. A more comprehensive account of trinities is presented in Comenius’ *De rerum humanarum emendatione*

¹⁶ Johannes KEPLER, “Epitome Copernicanae Astronomiae.” I.2. In: CASPAR, M. (ed.), *Johannes Kepler Gesammelte Werke: Band 7*. München: Beck 1953, p. 51: “Intervallum resultat ex comparatione Centri cum superficie, et sic procedit ab vtroque...” Translation in: HOWELL, *God’s Two Books*, p. 129.

¹⁷ As cited in HOWELL, *God’s Two Books*, p. 152. Cf. Philippus LANSBERGIUS, *Commentationes in motvm terrae, diurnum et annum*. Middelbvrge: Apud Zachariam Romanum 1630, p. 39.

consultatio catholica.¹⁸ In the spirit of the Augustinian tradition, they all attest to the existence of the Holy Trinity.

Comenius' symbolic concept of the world is documented in other chapters of his pivotal philosophical writings. In his *Via lucis*, Comenius says that created entities convey the real meaning of the respective parts of the Scripture:

In the Old Testament, God wished that all that is offered as a sacrifice is to be burnt with a flame. Why so? Explore the nature of the fire and you will learn the intent of God's order. [...] God also refused to accept sacrifices that would not contain salt. Why so? If you know the natural qualities of salt, you will know the mystical meaning.¹⁹

The following excerpt from Comenius' *De rerum humanarum emendatione consultatio catholica*, which provides examples of signs that God gave us to remind us of events in the Old Testament, may serve as another example of his symbolic reading of the Book of Nature:

God blessed us with many examples of such signs. The day of Saturday refers to Creation, clothes symbolise the Fall, rainbow signifies the Flood, circumcision stands for rebirth, putrid lake is the sign of Sodom, the Feast of the Lamb marks the departure from Egypt, the Feast of the Booths commemorates the issue of the Laws, and the Feast of Tabernacles recalls of dwelling in the desert.²⁰

Protestant authors of the 16th and 17th centuries across denominations and scientific fields found allegories and symbols of theological truths

¹⁸ Cf. Jan Amos KOMENSKÝ, *De rerum humanarum emendatione consultatio catholica: Tomus I*. Praha: Academia 1966, pp. 242–245. Cf. also Erwin SCHADEL, "Einführung in die antisozinianische Kontroverse des Comenius." In: KOMENSKÝ, J. A., *Wiederholte Ansprache an Baron Wolzogen / Iteratus ad Baronem Wolzogenium sermo*. Frankfurt am Main: Peter Lang 2002, p. 221ff. (179–487).

¹⁹ Jan Amos KOMENSKÝ, "Via Lucis." In: SVOBODA, L. – BORSKÁ, J. – NOVÁKOVÁ, J. (eds.), *Johannis Amos Comenii Opera Omnia 14*. Praha: Academia 1974, p. 332: "Ex gr. quod quicquid Deus in Veteri testamento sacrificiis offerri voluit, igne cremari voluit, quid hoc? Examina ignis naturam, et quo mandatum Dei tendat intelliges. [...] Noluit item Deus sacrificia offerri sine sale; quid hoc? Salis proprietates naturales si scias, sensus mysticus fugere te non poterit."

²⁰ Jan Amos KOMENSKÝ, *De rerum humanarum emendatione consultatio catholica: Tomus I*, p. 498: "Taliū signorū Deus multa exempla dedit. Ut Sabbathum Creationis: Vestem Lapsus: Iridem Diluvij. Circumcisionem regenerationis: Subversionis Sodomaē lacum faetidum: Eductionis ex Aegypto Pascha: Legis lationis festum Scenopogiorum: Commorationis in deserto, festum tabernaculourum."

in the great Book of Nature. This fact should clearly indicate that Protestant literalism could not have been the cause of the decline of natural symbolism.

Van der Meer's and Oosterhoff's critique

Another, and so far the most serious and complex critique to delve into the very root of Harrison's argument is raised by two Dutch authors, Jitse van der Meer and Richard Oosterhoff.²¹ Above all, they claim that the Protestant literal sense also included allegory – in cases where it was justified and intended by God. What the Protestants rejected was sheer allegoresis and speculation – they wanted to reduce the number of allegorical interpretations. Albert the Great and Thomas Aquinas had already determined that things, events and persons in nature – to which the Bible clearly and indisputably refers – have allegorical meanings, but only those intended by the divine author. Things, events and persons that are not discussed in scripture do not have a symbolic meaning, which significantly diverges from the previous practice of the Middle Ages. Eco draws attention to this transformation, calling Thomas a “cultural policeman”.

The “new literal sense” of the Bible, as referred to by van der Meer and Oosterhoff, was inferred before the Protestant Reformation and did not entail the rejection of natural symbolism, except for symbols that had not been authorised by God. How and where then did God enshrine symbolic meaning in nature? Lefèvre d'Étaples, Martin Luther, Philip Melanchthon and John Calvin believed that this knowledge was revealed through the guidance of the Holy Spirit. Calvin saw, for example, the burning bush as the symbol of the tests imposed on Israel. However, this meaning is not defined in the text itself. Nevertheless, it is intended by God, which is apparent from the comparison with other passages in the Bible, and by the fact that this symbolism is included in the literal sense of another biblical text.²²

In short, Zwingli, Luther, Melanchthon, Tyndale, Calvin and other thinkers unscrupulously continued to use allegory, albeit without revealing its real nature to avoid associations with speculative thought. In

²¹ The following paragraphs paraphrase and summarise the articles: VAN DER MEER – OOSTERHOFF, “God, Scripture, and the Rise of Modern Science (1200–1700),” pp. 363–396; Jitse VAN DER MEER – Richard OOSTERHOFF, “The Bible, Protestantism and the Rise of Natural Science: A Response to Harrison's Thesis.” *Science and Christian Belief*, vol. 21, 2009, no. 2, pp. 133–153.

²² Cf. *Judges* 9:15.

Calvin's terms, the wrong reading produced allegory, whereas the right reading resulted in typology or "literal anagogy". Harrison's bold assertion that Protestant reformers rejected allegoric or symbolic meanings is incorrect.

Harrison claims that in order to face a double interpretation of the Scripture, reformers refused allegorical meaning, which depended on the polysemy of things that once existed within natural symbolism. However, van der Meer and Oosterhoff note that the meaning of the symbols, for example, in the treatise *Physiologus* and bestiaries, is not uncertain or undetermined: some animals bear a single and unique meaning (the fabled phoenix is the symbol of death and resurrection of Christ), while others are associated with multiple meanings, although clearly explained (mostly in the special section *Significacio*). Based on these features, a tradition of a clear moral and allegorical meaning pertaining to each animal is established. Homiletic history confirms that these meanings were broadly distributed and deeply engrained (also thanks to preaching manuals) from the sources of *Physiologus*, bestiaries and other encyclopaedias.

Reformers realised that ambiguousness was the result of speculation, not of natural symbolism. The cure was the rejection of speculation, not of natural symbolism. The interpretation of the Bible according to van der Meer and Oosterhoff could not actually directly affect the origination of a modern science independent of the development of natural symbolism. The strategy of authorial intent of the text and the fight against speculation went hand in hand with the discovery of the ambiguous nature of ordinary language. Linguistic ambiguity was apparent in many inconsistencies regarding the meaning of the texts in the Bible. As one of the reasons for these discrepancies, natural philosophers stated a violation of the original divine language of creation, the language of Adam. This explains why many turned to the study of nature as a source of knowledge about God, which prevails over the text of the Bible.

Protestants failed to agree with Catholics and with one another on important theological issues although both sides could argue with reference to the Church Fathers. This is not surprising since the Fathers too failed to reach a consensus. However, this Protestant failure to impose a fixed meaning on the interpretation of the Bible was very sensitively perceived by natural philosophers. Therefore, Galilei – who believed that the language of the Bible corresponded to ordinary human language and that it was imperfect – is able to say that the passages in the Bible "may have some different meaning beneath their words," but "Nature, on the other hand, is inexorable

and immutable.” He further believed that the “very notion of literal interpretation is problematic, for verbal language is ambiguous by its very nature.”²³

Van der Meer and Oosterhoff thus propose a more daring argument than Harrison. Harrison merely claims that a different reading of the Bible caused a different reading of nature. They go even further by stating that the Bible was questioned (or at least its authority was shattered) as a result of its ambiguity and that further attention turned to the Book of Nature as a more obvious revelation of God.

“There are two different phenomena to explain: the decline of nature symbolism and the rise of modern science,” as van der Meer and Oosterhoff put it.²⁴ Their cause does not have to be identical and it is certainly not the result of the Protestant Reformation. Protestantism was not the main driving force of modern science. Moreover, a literal interpretation of the Bible, applied either by the Protestants or the Catholics at some point, obstructed the development of science, as illustrated by the examples of Cardinal Bellarmine and Giovanni Battista Riccioli. And on the other hand, natural symbolism was often present as part of the theories of emerging modern scientists. According to Newton, just as theology had to be reformed by eliminating Medieval violations against the Bible and returning to sources drawing on the tradition of Abraham and Moses, natural philosophy also had to be purified and restored. This restoration of natural philosophy entailed a return to the secret knowledge of symbolic relations between things and words as revealed to Adam, passed on to Plato via Moses and rediscovered in mosaic philosophy and Christian cabbalism.

The rise of science preceded the Reformation or at least it occurred shortly thereafter, so the Reformation could not have caused it. The development of science in Roman Catholic countries attests to the fact that science did indeed make progress without the contribution of the Protestant Reformation. Nevertheless, van der Meer and Oosterhoff believe that the Protestant Reformation contributed to the advancement of science, but that its cause lies in the disputes over the interpretation of the Bible. Hence, natural philosophers started to prefer nature over the Bible – as it is the most definite revelation of God. Only in this negative sense was the progress of science stimulated by the development of biblical hermeneutics. Natural philoso-

²³ As cited in VAN DER MEER – OOSTERHOFF, “The Bible, Protestantism and the Rise of Natural Science,” p. 146.

²⁴ VAN DER MEER – OOSTERHOFF, “God, Scripture, and the Rise of Modern Science (1200–1700),” p. 391.

phers thought that biblical exegesis was problematic due to the ambiguous nature of its language, not in terms of its natural symbolism. The ambiguous character of language was also the reason why many attempts were made to replace verbal language with an artificial version. These attempts eventually gave rise to modern logic and mathematics.

Conclusion

Van der Meer's and Oosterhoff's critique of Harrison's hypothesis is convincing. However, I do not find this alternative explanation of scientific revolution fully satisfactory. In conclusion, this author will attempt to show shortly why not even their explanation can be read as a valid description of the "cause" of scientific revolution.

They believe that it is not surprising that not only Protestants and Catholics, but even Protestants themselves were unable to agree on the meaning of biblical passages – effectively as a result of an earlier disagreement of the Church Fathers.²⁵ And this statement is what actually renders their hypothesis invalid. Why did scientific revolution not occur halfway through the Middle Ages? Why did philosophers not realise the imperfection of language many centuries earlier?

The fact is that medieval thinkers were already aware of the imperfection and defectiveness of language. If nothing else, they were able to draw on the story of Adam, who called animals by their names and thus, in collaboration with God, created a natural language, which would unfortunately disappear after his Fall. Another corruption of language occurred after the Babylonian *confusio linguarum*.²⁶ Why did the awareness of the imperfection of an ordinary verbal language not draw attention to the Book of Nature and its "perfect language", i.e. mathematics, earlier than in the 16th and 17th centuries?

The realisation of the imperfection of ordinary language and the turn to nature apparently formed necessary conditions, but not sufficient conditions for the emergence of modern science. But what was the key factor in the emergence of modern science in the 16th and 17th centuries? What impetus caused the origination of modern science at that very moment and not

²⁵ VAN DER MEER – OOSTERHOFF, "The Bible, Protestantism and the Rise of Natural Science," p. 144.

²⁶ Cf. *Genesis* 2:19–20a, *Genesis* 11:6–7.

hundred years earlier or later? This question remains open and, if historical science sees it as its duty to clarify history, it needs to be answered.