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SCIENCE AND SCIENTISTS IN *HIS DARK MATERIALS*

BY PHILIP PULLMAN

One of the first impressions we have while reading *Northern Lights*, the first volume of *His Dark Materials* trilogy, is the difficulty to determine where and when the story takes place. On the one hand, the world in which Lyra Belacqua grew up is confusingly similar to England, with Oxford as the place where the action begins. On the other hand, it is a world full of daemons, anachronistic social relations and devices which are either peculiar, like alethiometer, or obsolete, like zeppelins. When we finally discover that the book shows neither the past nor future, but an alternative world, these differences become even more evident, especially when comparing it to William Parry's world. This one, described in the second novel, *The Subtle Knife*, can be identified as our own world.

Although the presence of daemons significantly differentiates Lyra's world from the world in which Will lives, the stages of scientific and technological development are also important factors enabling readers to distinguish worlds of the multiverse created by Philip Pullman. In four main worlds in which the action of the trilogy takes place – Will's world, Lyra's world, mulefa's world, and the world of Cittàgazze – the difference between the stages of scientific advancement is evident. Lyra's world resembles the European nineteenth century, mulefa's world is in the primitive stage of development with a wheel as the main scientific invention, while in the technologically advanced world of Cittàgazze the philosophers created the most sophisticated device of the whole multiverse – the Subtle Knife that can rip through the fabric between worlds and hereby enable inhabitants of Cittàgazze to steal scientific inventions from other worlds, especially that of Will's.

What is more, many episodes of the trilogy directly relate to science. Lyra grew up in an environment of scholars at Jordan College in Oxford, and at the end of the last novel she chooses an academic career. Dr. Mary Malone, one of the main characters of the trilogy, who helps Lyra understand the phenomenon of Dust,

is also a scientist. Even Dust itself, the central theme of the book, has also a scientific association as its concept is inspired by the dark matter, the hypothetical matter known by the modern physics. Therefore science in *His Dark Materials* seems to have more important function than to be only a literary background of the basic story about Lyra as the new Eve. The topic of this chapter is to analyse the image of science in the trilogy, especially concentrating on the relations between science and the Church, main scientists and the idea of the multiverse and Dust. The main aim of the analysis is to indicate the function of science described by Philip Pullman's in his trilogy.

SCIENCE AND CHURCH IN *HIS DARK MATERIALS*

The characteristic feature of *Northern Lights* is the steampunk background¹. Lyra's world resembles Europe in the Victorian era, described in similar way in the adventure and science fiction novels by Jules Verne and Herbert George Wells². In *Northern Lights* people travel in balloons and zeppelins instead of aeroplanes. Electricity is already known and called anbaricity (from English *amber* instead of Greek *elektron*) but it is mostly used for lamps. Similarly to the social relations in the nineteenth century people are divided into different social classes which are difficult to change as the position in the society is symbolized by the form of the daemon. For example, all servants' daemons have a canine form, and even among them there are superior and inferior breeds symbolizing the hierarchy among servants³.

On the contrary, the technological development of Will's universe corresponds with our own world in the 90s, when the trilogy was firstly published. With the exception of the research on the dark matter, Philip Pullman endowed Will's universe with the stage of knowledge of our own world. In fact no other universe described in *His Dark Materials* has higher level of science (although it does not mean that more developed worlds do not exist). It is clearly indicated that the universes of Lyra and Will are very similar in geographical and biological way, but taking into account the scientific development, Lyra's world is obsolete.

It could be assigned to a mere literary convention, but other features of Lyra's universe suggest additional interpretation. *Northern Lights* describes a world that is kept in order by a church known as the Magisterium. In Lyra's universe science is not practised freely, what makes this world less developed than the one of Will'. As we can learn from the first book of the trilogy, "since Pope John Calvin

¹ See e.g. S. Barfield, M. Colebrook, *Revitalizing the Old Machines of a Neo-Victorian London: Reading the Cultural Transformations of Steampunk and Victoriana* [in:] *Critical Perspectives on Philip Pullman's His Dark Materials: Essays on the Novels, the Film and the Stage Productions*, ed. S. Barfield, K. Cox, London 2011, p. 75 ff.

² M. Rogoż, *Fantastycznie obecne. Anglojęzyczne bestsellerowe cykle powieściowe dla dzieci i młodzieży we współczesnej polskiej przestrzeni medialnej*, Kraków 2015, p. 196.

³ M. Hines, *Second Nature: Daemons and Ideology in The Golden Compass* [in:] *His Dark Materials Illuminated: Critical Essays on Philip Pullman's Trilogy*, ed. M. Lenz, C. Scott, Detroit 2005, p. 39.

had moved the seat of the Papacy to Geneva (...) the Church's power over every aspect of life had been absolute"⁴. It means that in Lyra's world it is the Church that decides what kind of research can be done, as "every philosophical research establishment (...) had to include on its staff a representative of the Magisterium, to act as a censor and suppress the news of any heretical discoveries"⁵. The influence of the Church in Lyra's world can be clearly seen in the name of main scientific discipline, comparable to our physics, which is called 'experimental theology'. The philosophers and scientists who do research perceived by the Church as heretical (for example on parallel universes) are "silenced"⁶ or "excommunicated"⁷. The study on the mysterious matter called Dust is not an exception. Once its existence had been proved, the Magisterium "decided that Dust was the physical evidence for original sin"⁸ and began the research on its own in order to eliminate this matter.

UNETHICAL SCIENTISTS – MARISA COULTER AND LORD ASRIEL

One of the most influential scientists in *His Dark Materials* is Lyra's mother, Marisa Coulter. While working at Oxford (St. Sophia's College) she leads the experimental tests on children in Bolvagar on behalf of Church institution called the General Oblation Board. The climate of Bolvagar, with its sterile nature and torpid staff, brings to mind the experimentations in Nazi concentration camps⁹, with the ideological aim to eliminate Dust as an original sin. Mrs. Coulter's dependence on the Church is mirrored even in her surname. As one of the most influential personalities in the Church, she has the name that puns on the term "culture"¹⁰. It indicates the distorted culture based on the religious hidebound conservatism rather than science.

The opposite to Mrs. Coulter is Lord Asriel, who, as observes Anne-Marie Bird,

represents the new enlightened man, he is an intellectual and a pioneer; in fact, he appears to be "Mr. Modernity" himself, who, rather than being an upholder of tradition, believes that enlightenment can be achieved only by means of humanity's own exertions¹¹.

⁴ P. Pullman, *Northern Lights*, London 1998, p. 31.

⁵ Idem, *The Subtle Knife*, London 1998, p. 130.

⁶ P. Pullman, *Northern Lights*, p. 32.

⁷ Ibidem, p. 376.

⁸ Ibidem, p. 371.

⁹ P. Duggan, *Taging the Impossible: Severance and Separation in the National Theatre's Adaptation* [in:] *Critical Perspectives on Philip Pullman's His Dark Materials...*, p. 230.

¹⁰ S. Matthews, *Rouzing the Faculties to Act: Pullman's Blake for Children* [in:] *His Dark Materials Illuminated...*, p. 125. However, it is not the only meaning of Marisa Coulter's surname. The term "coulter" means the vertical blade segment of a plow which refers to Lyra's mother's involvement in the intercision project (S. King, "Without Lyra we would understand neither the New nor the Old Testament": *Exegesis, Allegory, and Reading The Golden Compass* [in:] *His Dark Materials Illuminated...*, p. 111).

¹¹ A. M. Bird, *Circumventing the Grand Narrative: Dust as an Alternative Theological Vision in Pullman's His Dark Materials* [in:] *His Dark Materials Illuminated...*, p. 188.

Lord Asriel is not a scholar but he does what in Lyra's world scientists do: explore. It is him who ventures into the farthest regions of the world and makes the passage between universes. It is him who figuratively and literally challenges the Church and God himself to "end of all those centuries of darkness"¹². However, his acting, like in case of Dr. Frankenstein, is not entirely acceptable, as he does not hesitate to kill a child in order to make the transition between universes¹³. Finally, both Marisa Coulter and Lord Asriel end their lives in an abyss for their obstinacy: the first one because of her conservative fanaticism, the second – as a result of ambition and curiosity that led him beyond the barriers he should not have been overstepped.

Compared to Lord Asriel, other scientists and explorers from his world seem to be indolent. As Allison Waller observes, they offer "an alternative cliché of ivory-tower academia, out of touch with reality"¹⁴. When Lord Asriel showed them the proof of the existence of other worlds, "there was a stir of excitement among some of the Scholars, as if, having written treatises on the existence of the unicorn without ever having seen one, they'd been presented with a living example newly captured"¹⁵. Their dependence on the Church and the fear of new discoveries is well illustrated by the Master of Jordan College's attempt to poison Lord Asriel to prevent his exploratory expedition to the North.

Lyra as a child treated Oxford scholars, especially female scientists, with disdain: "poor things, they could never be taken more seriously than animals dressed up and acting a play"¹⁶. At the end of the story, however, when she finally understood Dust, she decided to become a scholar herself, as it would be the best opportunity to improve her abilities of reading alethiometer and learning more about Dust. Such conclusion of Lyra's exploration on the matter of Dust may be interpreted as the tribute to academic science as the ultimate source of knowledge, but it should be also remembered that Philip Pullman, like John R. R. Tolkien and Clive S. Lewis, is personally associated with the University of Oxford and it may be the main reason why this university plays such important role in the story¹⁷.

THE NOBLE SCHOLARS – JOHN PARRY AND MARY MALONE

Even if in *His Dark Materials* religion with its power and influence is seen as one of the major factors of scientific and technological stagnation, Pullman is not an advocate of modernity. As Anne-Marie Bird observes,

¹² P. Pullman, *Northern Lights*, op. cit., p. 394.

¹³ A. Waller, *The Pursuit of Knowledge: Scientific Enquiry in His Dark Materials* [in:] *Philip Pullman: His Dark Materials* [EPUB], ed. C. Butler, T. Halsdorf, Basingstoke 2014, p. 73.

¹⁴ *Ibidem*, p. 77.

¹⁵ P. Pullman, *Northern Lights...*, p. 24.

¹⁶ *Ibidem*, p. 67.

¹⁷ M. Rogoż, op. cit., p. 195.

modernity is often seen as responsible for a general disenchantment with the world – a calculating rationalism that invades all areas of life – whereas Pullman believes not only in the realities of the here and now but also in the joy and enchantment of everyday life. In fact, his Republic is a world open to wonder, to the nonrational, such as the supernatural, and indeed, all forms of “Otherness” that had, on the whole, been rejected by modernity¹⁸.

Pullman’s attitude to science is also illustrated by the characteristics of two main scientists of the trilogy – Dr. Mary Malone and John Parry (Stanislaus Grumman in Lyra’s world). As Alison Waller states, both Malone and Parry can be seen as the representatives of “noble scientists” using categories described by critic Roslynn Haynes as commonly occurring in the European literature¹⁹, in contrast with Prometeian-Frankenstein figures of Lord Asriel and Marisa Coulter²⁰. It is emphasized that Asriel’s exploration comes directly from his ambition and Coulter’s experiments – from religious fanaticism, whereas John Parry’s research bases on the most important feature for every scientist – curiosity, which in his case was “as powerful as a wolf’s jaws”²¹. However, both Parry and Malone are not conventional scholars. John Parry represents a scientist with a mystic personality enhanced by the mysterious story of his life. He starts his career as a soldier and an amateur explorer (in Will’s world), continues it as a professional scholar (in Lyra’s world), and ends as a shaman. As he explained himself, he spent a lot of time “among academicians, and among spirits. [He] found folly everywhere, but there were grains of wisdom in every stream of it”²².

Mary Malone resembles John Parry not only in her flexibility but also in the openness to the spirituality. Not only does she do research on the dark matter but she also deals with I Ching and is able to fall in shamanistic trance. As her methodology she employs Negative Capability of the poet John Keats: “capable of being in uncertainties, mysteries, doubts, without any irritable reaching after fact and reason”²³. As Millicent Lenz suggested, Mary is “a physicist of the Fritjof Capra variety – a scientist-mystic”²⁴. Even if she at first tries to avoid valuating the problem she deals with in the categories of good and evil, she soon understands

¹⁸ A. M. Bird, op. cit., p. 189.

¹⁹ R. Haynes, *From Alchemy to Artificial Intelligence: Stereotypes of the Scientist in Western Literature*, “Public Understanding of Science” 2003, vol. 12 [after:] A. Waller, op. cit., p. 74.

²⁰ A. Waller, op. cit., p. 74.

²¹ P. Pullman, *The Subtle Knife...*, p. 123.

²² Ibidem, p. 293.

²³ Ibidem, p. 152. Cf. J. Keats, *The complete poetical works and letters of John Keats*, Houghton 1899, p. 277. See also: A. Weller, op. cit., p. 84.

²⁴ M. Lenz, *Philip Pullman [in:] Alternative Worlds in Fantasy Fiction*, ed. P. Hunt, M. Lenz, London 2001, p. 151.

that the value-free scientific investigation is not possible²⁵. What is more, if Asriel resembles the “Victorian adventurer-explorer-scientist”, then Mary evokes the figure of “Neo-Victorian female traveller-anthropologist in the tradition of Mary Kingsley”²⁶ because of her profound study of mulefa society, which in result led her to understanding the mystery of Dust. As Weller observes,

compared with [...] Lord Asriel and Mrs Coulter, Mary Malone and John Parry temper their desire for knowledge with rigour, openness and breadth of understanding, as well as an ethical intention for their work to do good²⁷.

THE IDEA OF MULTIVERSE

One of the most important elements of *His Dark Materials*'s background is the idea of parallel universes. The concept of multiverse exists also in modern physics as a hypothesis, firstly proposed by Erwin Schrödinger and followed by many other scientists – including Stephen Hawking – in several variations. It also occurs in classical children literature, such as *The Chronicles of Narnia* by Clive S. Lewis or *Alice in Wonderland* by Lewis Carrol. Philip Pullman tries to make his story as plausible as possible. Not only does he describe in detail how his characters travel between these universes and the problems they encounter but he also introduces the scientific devices helping them during these journeys.

The most significant device is undoubtedly the subtle knife. It was invented by Cittàgazze's scholars, philosophers-chemists from the Guild of the Torre degli Angeli. As Giacomo Paradisi explains in the second volume of the trilogy, they “were making an inquiry into the deepest nature of things. They became curious about the bonds that held the smallest particles of matter together”²⁸. This curiosity led Cittàgazze's philosophers to the invention of the most powerful device of all described in the trilogy: a knife that can cut through every substance and make a window to a parallel world. In the idea of the subtle knife science is also mixed with nonrationality, as the knife has only one bearer, chosen in a peculiar way (the new owner has to kill the former bearer), and, similarly to alethiometer, the usage of this device requires a proper state of mind. Without this device, Lyra would not be able to make her journey to the Land of the Dead and free the spirits. However, according to Yorek Byrnisson's predictions, the knife turns out to be a dangerous device, as each new window opened by it gives birth to a horrible Specter and makes Dust leap from the universe to the abyss. Thus the subtle knife symbolizes the dark side of scientific inventions which may always lead to the unpredictable dangerous consequences.

²⁵ S. Colás, *Telling True Stories, or The Immanent Ethics of Material Spirit (and Spiritual Matter) in Philip Pullman's His Dark Materials*, “Discourse: Journal for Theoretical Studies in Media and Culture” 2005, vol. 27, p. 45.

²⁶ A. Weller, op. cit., p. 83.

²⁷ Ibidem, p. 87.

²⁸ P. Pullman, *The Subtle Knife...*, p. 196.

Another apparatus invented by Pullman is the lodestone resonator, used by the Gallivespian spy named Chevalier Tialys. Pullman describes it as follows:

The instrument looked like a short length of pencil made of dull grayblack stone, resting on a stand of wood, and the Chevalier swept a tiny bow like a violinist's across the end while he pressed his fingers at various points along the surface. The places weren't marked, so he seemed to be touching it at random, but from the intensity of his expression and the certain fluency of his movements, Lyra knew it was as skillful and demanding a process as her own reading of the alethiometer. After several minutes the spy put the bow away and took up a pair of headphones, (...) and wrapped one end of the wire tightly around a peg in the end of the stone, leading the rest along to another peg at the other end and wrapping it around that. By manipulating the two pegs and the tension on the wire between them, he could obviously hear a response to his own message²⁹.

Lyra learned that this device enable to transmit messages instantly between universes. As the name of the device suggests, it is based on the magnetic features of lodestone. The whole device, as Chevalier Tialys explains to Lyra, relies on quantum entanglement:

It means that two particles can exist that only have properties in common, so that whatever happens to one happens to the other at the same moment, no matter how far apart they are. Well, in our world there is a way of taking a common lodestone and entangling all its particles, and then splitting it in two so that both parts resonate together. The counterpart to this is with Lord Roke, our commander. When I play on this one with my bow, the other one reproduces the sounds exactly, and so we communicate³⁰.

The idea of quantum entanglement is based on modern physics – the observations firstly made by Albert Einstein (in a joint paper with Boris Podolsky and Nathan Rosen) and Erwin Schrödinger. Nowadays, entanglement has applications in quantum information theory and it can be one day used in quantum computing. However, the device itself is fictional, as it is based on the unknown lodestone features (and the hypothesis of parallel universes)³¹.

THE VISION OF DUST (DARK MATTER)

The specific compound of science and the supernatural can be seen also in Pullman's concept of Dust. Although the plot of *His Dark Materials* focuses on Lyra's adventures (on the wider perspective – her role as a new Eve, and the narrower one – her maturation), it is Dust that appears to be the central theme of the trilogy. It can be treated as a challenge to Christianity and the alternative theological

²⁹ P. Pullman, *The Amber Spyglass*, London 2001, p. 184.

³⁰ Ibidem, p. 185.

³¹ For more information about lodestone resonator and the possibility of its usage, see: L. H. Gresh, *Exploring Philip Pullman's His Dark Materials: An Unauthorized Adventure Through The Golden Compass, The Subtle Knife, and The Amber Spyglass* [EPUB], New York 2007, p. 178 ff.

vision³², but Dust finds its place as well among scientific speculation. In fact, in the concept of Dust Pullman tries to unite both perspectives, talking about theological issues in the language of science and about science in the language of religion.

In Lyra's world Dust is also described as an "elementary particle" discovered by an experimental theologian Boris Rusakov. For people from Lyra's and Will's worlds Dust becomes visible only by means of advanced technological devices. Lord Asriel describes this matter to Lyra in following words:

You've heard of electrons, photons, neutrinos, and the rest? They're called elementary particles because you can't break them down any further: there's nothing inside them but themselves. Well, this new kind of particle was elementary all right, but it was very hard to measure because it didn't react in any of the usual ways. The hardest thing for Rusakov to understand was why the new particle seemed to cluster where human beings were, as if it were attracted to us. And especially to adults. Children too, but not nearly so much until their dæmons have taken a fixed form. During the years of puberty they begin to attract Dust more strongly, and it settles on them as it settles on adults³³.

The idea of elementary particle refers to the philosophy of Democritus which laid the basis for modern science. The second part of the description, however, resembles rather religious than scientific perspective. Also the name of Dust refers to the fragment of the Bible: "for dust thou art, and unto dust shalt thou return"³⁴. For the Church from Lyra's world Dust is an original sin and "a physical proof that something happened when innocence changed into experience"³⁵. However, as Lyra gradually learns, Dust is in fact a conscious matter which intervened in human evolution. It is also identified with angels, perceived – in the light of works of St. Augustine³⁶ – as a spirit: "From what we are, spirit; from what we do, matter. Matter and spirit are one"³⁷, as Dust explains itself to Mary. Pullman's philosophy of spirit and matter in this context is similar to renaissance philosophy of nature by Baruch Spinoza³⁸.

The title of Pullman's trilogy – *His Dark Materials* – is a quotation from John Milton's *Paradise Lost* and refers to the matter from which God would create

³² A.-M. Bird, op. cit., passim.

³³ P. Pullman, *Northern Lights...*, p. 370.

³⁴ Genesis 3:19 [in:] *The Bible. New International Version (NIV)* [on-line:] www.biblegateway.com [30.05.2016].

³⁵ P. Pullman, *Northern Lights...*, p. 373.

³⁶ Pullman in *The Subtle Knife* cites St. Augustine: "Angel is the name of their office, not of their nature. If you seek the name of their nature, it is spirit; if you seek the name of their office, it is angel; from what they are, spirit, from what they do, angel" (p. 260; cf. *Catechism of the Catholic Church*, 329 [on-line:] http://www.vatican.va/archive/ccc_css/archive/catechism/p1s2c1p5.htm [30.05.2016]).

³⁷ P. Pullman, *The Subtle Knife...*, p. 260.

³⁸ S. Colás, op. cit., p. 48 f.

more worlds³⁹, what suggests theological interpretation of this motif. However, the title refers also to the dark matter, unidentified matter in the universe, which is a hypothesis in contemporary physics. In *His Dark Materials* the dark matter is identified with Dust and the most developed research on it is done by the scientists from Will's universe (identified with our world) such as Dr. Mary Malone. Hereby Pullman connects his fictional vision of Dust with hypothetical but still possible idea existing in modern science.

It should be noted that the idea of dark matter appeared in literature long before Pullman's trilogy. In fact, this unidentified and mysterious matter is present in numerous science fiction novels and dramas. For example, a shadow matter – the one which can only interact with normal matter by weak forces – is featured in Michael Karageorge's *In the Shadow* (1967)⁴⁰. Also in Will's world Dust is sometimes called “shadow particles, Shadows”⁴¹ which resembles both the idea of shadow matter and shadows from Plato's Allegory of the Cave described in his *Republic*⁴². The second reference is evident in the name of Dr. Malone computer: “We call it the Cave. Shadows on the walls of the Cave, you see, from Plato”⁴³, as explains Mary to Lyra.

The computer called Cave is one of the few devices used in the trilogy to contact Dust. In comparison with other two tools – I Ching and alethiometer – the Cave is characterized by accuracy and precision while giving the answers to Mary's questions. On the contrary, answers given by alethiometer are enigmatic and prone to several, often contradictory, interpretations. Dr. Lanselius explains to Lyra the history and function of alethiometers as follows:

They are said to originate in the city of Prague. [...] The Scholar who invented the first alethiometer was apparently trying to discover a way of measuring the influences of the planets, according to the ideas of astrology. He intended to make a device that would respond to the idea of Mars or Venus as a compass responds to the idea of North. In that he failed, but the mechanism he invented was clearly responding to something, even if no one knew what it was⁴⁴.

³⁹ “Into this wilde Abyss, / The Womb of nature and perhaps her Grave, / Of neither Sea, nor Shore, nor Air, nor Fire, / But all these in their pregnant causes mixt / Confus'dly, and which thus must ever fight, / Unless th' Almighty Maker them ordain / **His dark materials** to create more Worlds, / Into this wilde Abyss the warie fiend / Stood on the brink of Hell and look'd a while, / Pondering his Voyage; for no narrow frith / He had to cross” (J. Milton, *Paradise Lost*, London 1996, 2.910–920).

⁴⁰ B. M. Stableford, *Science Fact and Science Fiction: An Encyclopedia*, Abingdon 2006, p. 290.

⁴¹ P. Pullman, *The Subtle Knife*..., p. 92.

⁴² Plato, *Republic*, trans. P. Shorey, Cambridge, MA., 1969, 514a–520a. See also: K. Kleczkowska, *Greek and Roman Elements in His Dark Materials by Philip Pullman* [in:] *Światy alternatywne*, ed. M. Błaszczowska et al., Kraków 2015, p. 127.

⁴³ P. Pullman, *The Subtle Knife*..., p. 92.

⁴⁴ P. Pullman, *Northern Lights*..., p. 173.

Alethiometer is a small device with thirty-six little pictures around the dial, resembling a compass⁴⁵. Once somebody asks a question, the needle moves and points several pictures what suggests the right answer. To give additional details about the origins of these symbols, Dr. Lanselius continues:

Symbols and emblems were everywhere. Buildings and pictures were designed to be read like books. Everything stood for something else; if you had the right dictionary, you could read Nature itself. It was hardly surprising to find philosophers using the symbolism of their time to interpret knowledge that came from a mysterious source⁴⁶.

The concept of reading signs from Nature resembles the idea of the Book of Nature known from the Middle Ages Christian philosophy. The term alethiometer, as Farder Coram explains in *Northern Lights*, means “a truth measure”⁴⁷, because it refers to the Greek word *aletheia*, truth. In *His Dark Materials* the truth comes from Dust and is reflected by the imperfect system of pictures on the disk of alethiometer, therefore according to Santiago Colás, this concept may also refer to Plato’s Allegory of the Cave⁴⁸.

Usage of both the Cave and alethiometer requires the proper state of mind, which is described by Mary Malone in aforementioned words of the poet John Keats. In Lyra’s world the proper interpretation of alethiometer requires long-lasting studies on several possible meanings of each of thirty-six pictures, their collocations, and precedences in their interpretation, but sometimes the answers are unclear even to qualified alethiometer-readers. Only Lyra as a child was able to read the compass properly, but to do this she had to fall in a trance which resembles the shamanistic one⁴⁹. Therefore, not only Dust itself unites elements of scientific and religious character, but also alethiometer does it in a similar way. As Alison Waller points out:

The world Pullman has created thus unifies disciplines that have become disparate and often contradictory in the reader’s own experience. While on one hand

⁴⁵ The first Pullman’s suggestion for the title of the opening book of the trilogy was *The Golden Compasses* (plural form), which was a reference to the fragment of Milton’s *Paradise Lost*: “Then staid the fervid wheels, and in his hand / He took **the golden compasses**, prepared / In God’s eternal store, to circumscribe / This universe, and all created things.” (J. Milton, op. cit., 7.224–227). The motif of God wielding the golden compasses to draw a circle with is known also from the famous picture by William Blake. The US editors of the first book of the trilogy mistakenly took the phrase (in singular form, *The Golden Compass*) as a reference to alethiometer (a compass which helps to find a direction, not circle-drawing) and published the book in USA under this title (*Why is the trilogy called His Dark Materials? Why are there two different titles for the first book?* [in:] *Bridge to the Stars.net: His Dark Materials, Philip Pullman, and other ideas* [on-line:] [http://www.bridgetothestars.net/index.php?p=FAQ#1\[30.05.2016\]](http://www.bridgetothestars.net/index.php?p=FAQ#1[30.05.2016])).

⁴⁶ P. Pullman, *Northern Lights...*, p. 173.

⁴⁷ *Ibidem*, p. 126.

⁴⁸ S. Colás, op. cit., p. 36 ff.

⁴⁹ K. Kleczkowska, *Shamanic elements in “His Dark Materials” by Philip Pullman* [in:] *Literatura na granicach*, ed. K. Kuchowicz et al., Kraków 2015, pp. 35 ff.

he draws attention to the potential problems inherent in a Church-funded model of research, on the other, by tying together empirical experiment and the study of divinity he indicates an alternative path that the Church might have taken if the scientific method that was worked out in Europe during the seventeenth century had not emerge from the broader domain of natural philosophy⁵⁰.

It should be noted that even if the problem of Dust extends beyond the issue of science, it is comprehensible by reason. The knowledge of Dust makes the multiverse harmony possible. Therefore Pullman's vision eventually seems to be optimistic and it is the main difference between his critique of modernity and philosophical postmodernism, known from the works of Richard Rorty, Jean-François Lyotard or Zygmunt Bauman. Even if the vision of Dust presented in *His Dark Materials*, as Bird observes, seems to be "particularly attuned to the secular humanistic climate of the twenty-first century"⁵¹ it is not entirely postmodernistic.

CONCLUSION

Philip Pullman claims that it was not his intention to write a book about science. All scientific devices and ideas described in *His Dark Materials* were only a background, "a sort of stage set" to his trilogy⁵². However, to make his story plausible, he employed the modern scientific hypothesis, such as the idea of dark matter or multiverse. In fact, we cannot imagine how the plot of his trilogy would develop without the idea of parallel worlds and the conscious matter called Dust. Therefore, even if science is not the main theme of the trilogy, it is a significant element of the books, both as a background to the main story and the source of several references.

The essential role of the book is played by scientists. Firstly, they create academic (based at Oxford background) climate of the trilogy. Secondly, Lord Asriel and Marisa Coulter embody the figure of scientists whose explorations result from personal ambitions with no respect to the ethics. But Pullman also introduces the "noble scientists" represented by Mary Malone and John Parry.

What is more, it is science that enables Pullman to deal with religion. At the beginning, when we learn about the vision of the Church in *His Dark Materials*, we may have an illusion that the author perceives science and religion as dichotomic areas. However, with the development of the story, we find out that in fact Pullman is only against the institutional religion, not against every kind of spirituality. In fact he tries to show that real science (and real scientists) should be open to supernatural and non-rational. According to *His Dark Materials*, conservatism in science, as well as in religion, may retard the process of development.

⁵⁰ A. Waller, op. cit., p. 78.

⁵¹ A. M. Bird, op. cit., p. 189.

⁵² P. Pullman, *Introduction* [in:] M. Gribbin, J. Gribbin, *The Science of Philip Pullman's His Dark Materials*, New York 2005 [after:] A. Waller, op. cit., p. 74.

However, the vision of science in Pullman's trilogy is best represented by the idea of multiverse and dark matter (Dust). In fact both these hypotheses have long tradition not only in modern physics, but also in literature. However Pullman used them in the innovatory way, mixing scientific hypothesis with issues of philosophical and theological nature. He suggests that the possibility of existence of dark matter or parallel worlds is not only a scientific issue for scholars. In fact it is the problem that all of us may deal with some day.

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ABSTRACT

SCIENCE AND SCIENTISTS IN *HIS DARK MATERIALS* BY PHILIP PULLMAN

The aim of this article is to analyse the vision of science and scientists presented in *His Dark Materials* by Philip Pullman. In the first part of the text, the author concerns on the relations between science and the Church in the mentioned trilogy, focusing on the difference in technological development between Lyra's and Will's worlds. The second part of the paper focuses on the scientists themselves and the explorers described in *His Dark Materials*: unethical characters represented by Marisa Coulter and Lord Asriel, who are portrayed in contrary to 'noble scientists'—John Parry and Dr. Mary Malone. In the last part of the text the ideas of multiverse and Dust are analysed. The whole article focuses especially on the topic of how Pullman unites the typical scientific issues with the elements of philosophical and theological nature.

TITLE:

Science and scientists in *His Dark Materials* by Philip Pullman

AUTHOR:

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PUBLISHED AS A CHAPTER OF THE MONOGRAPH:

Dyskurs oswojony. Nauka w zwierciadle (pop)kultury, red. M. Błaszowska, A. Kuchta, J. Malita-Król, I. Pisarek, Kraków 2016, pp. 77–90.

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KEYWORDS:

Philip Pullman, *His Dark Materials*, science, scientists, Church, technology, Lyra, Will, Coulter, Asriel, John Parry, Mary Malone, Dust, multiverse, explorer, character, world

How to cite this paper?

- in APA:

Kleczkowska, K. (2016). Science and scientists in *His Dark Materials* by Philip Pullman. In *Dyskurs oswojony. Nauka w zwierciadle (pop)kultury* (pp. 77–90). Kraków.

- in MLA:

Kleczkowska, Katarzyna. "Science and scientists in *His Dark Materials* by Philip Pullman." *Dyskurs oswojony. Nauka w zwierciadle (pop)kultury*. Kraków, 2016. 77–90.

- in Polish:

Kleczkowska K., Science and scientists in *His Dark Materials* by Philip Pullman, [w:] *Dyskurs oswojony. Nauka w zwierciadle (pop)kultury*, red. M. Błaszowska, A. Kuchta, J. Malita-Król, I. Pisarek, Kraków 2016, pp. 77–90.