CZASOPISMO INTERNETOWE/ONLINE JOURNAL
ISSN 2299-0356

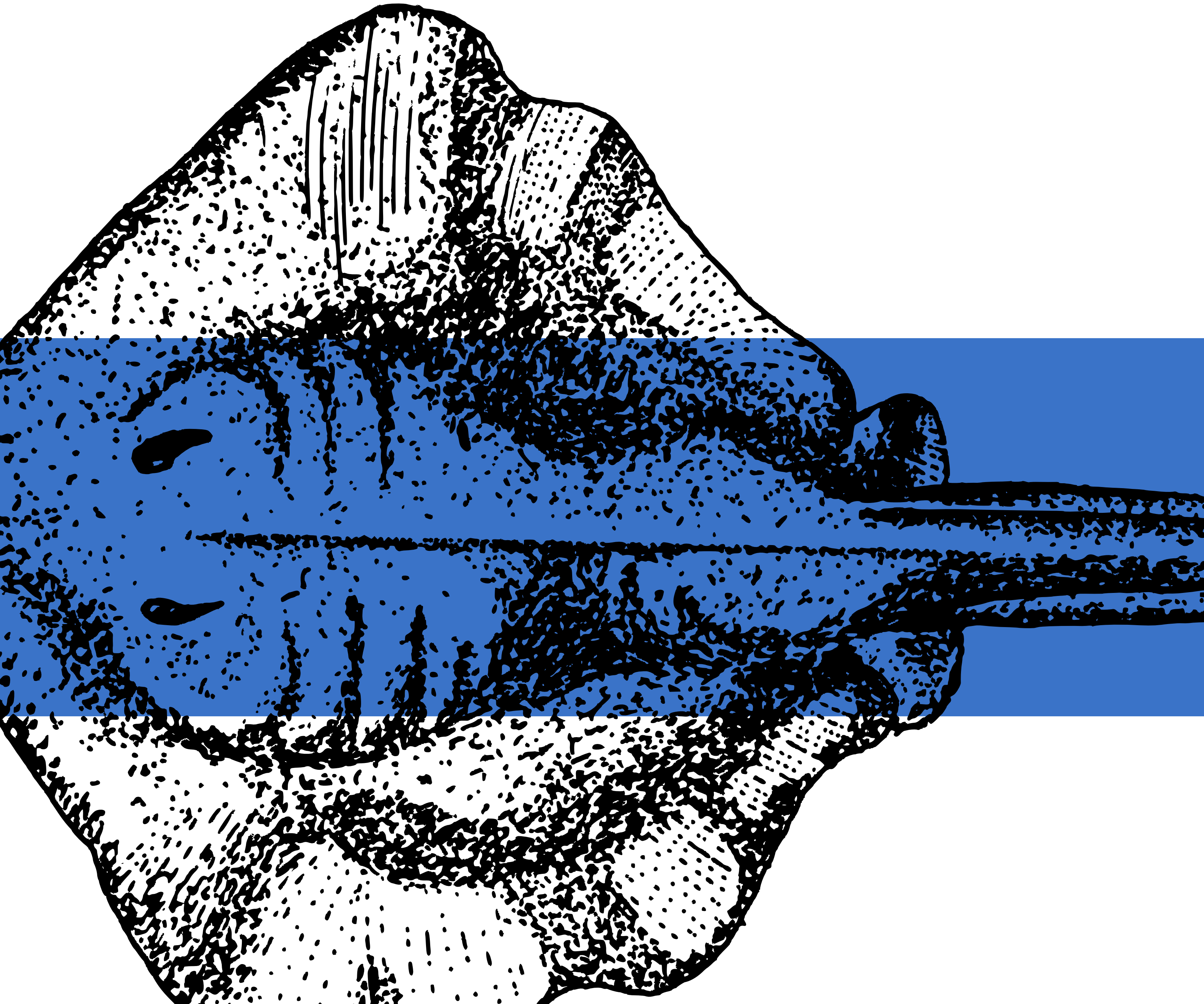
Filozoficzne Aspekty Genezy

Philosophical Aspects of Origin

PÓŁROCZNIK/BIANNUAL

2022

tom vol. 19(2)



CZASOPISMO INTERNETOWE/ONLINE JOURNAL
ISSN 2299-0356

Filozoficzne Aspekty Genezy

Philosophical Aspects of Origin

PÓŁROCZNIK/BIANNUAL

2022

tom
vol. 19(2)

Instytut Filozofii
Uniwersytet Zielonogórski
Zielona Góra 2022

www.fag.ifil.uz.zgora.pl

PÓŁROCZNIK/BIANNUAL
2022
tom
vol. 19(2)

Adres redakcji/ Editorial Office
Filozoficzne Aspekty Genezy
Instytut Filozofii Uniwersytetu Zielonogórskiego
Al. Wojska Polskiego 71A
65-762 Zielona Góra

Philosophical Aspects of Origin
Institute of Philosophy, University of Zielona Góra
Al. Wojska Polskiego 71A
65-762 Zielona Góra, POLAND

EN ARCHE
wszechświat człowiek nauka

Tom powstał dzięki wsparciu finansowemu Fundacji En Arche/
This volume was produced with financial support from the En Arche Foundation

Spis treści / Contents

t. 19, nr 2 **2022** **Vol. 19, No. 2**

Spis treści / Contents

ISSN 2299-0356

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**
Philosophical Aspects of Origin s. 5–6
https://fag.ifil.uz.zgora.pl/index.php/fag/issue/view/22/52

O czasopiśmie

Published online: February 2, 2023.

Czasopismo *Filozoficzne Aspekty Genezy* (tytuł angielski: *Philosophical Aspects of Origin*) (ISSN 2299-0356) funkcjonuje nieprzerwanie od 2004 roku. Od 2022 roku czasopismo funkcjonuje jako półrocznik. Jest to wąskotematyczne, specjalistyczne internetowe czasopismo filozoficzne. Od samego początku *Filozoficzne Aspekty Genezy* zapewniają wolny dostęp do wszystkich opublikowanych na stronie czasopisma tekstów. Publikowane teksty dotyczą problematyki genezy — Wszechświata, pierwszego życia, późniejszych form życia, człowieka, psychiki, świadomości, języka, teorii naukowych, religii i tym podobnych. Profil czasopisma obejmuje również filozoficzne bądź metodologiczne rozważania nad teoriami lub poglądami dotyczącymi problemu genezy.

Filozofia genezy obejmuje szereg ważnych i ciekawych zagadnień. Czasopismo zainteresowane jest zwłaszcza kontrowersjami na styku naturalizm-antynaturalizm, ewolucjonizm-teoria inteligentnego projektu, ewolucjonizm-kreacjonizm oraz wszelkimi innymi kontrowersjami pojawiającymi się na przecięciu sfer nauki, religii, poglądów na świat czy ideologii, jak również rolą faktów i przekonań pozaempirycznych w powstawaniu teorii naukowych. W *Filozoficznych Aspektach Genezy* ukazują się również teksty podejmujące zagadnienia wchodzące w zakres badań nauk przyrodniczych, społecznych i humanistycznych, ale tylko jeżeli w tekstach tych poruszane są jednocześnie problemy filozoficzne, wliczając w to rozważania metanaukowe, lub dyskutowane są tematy przydatne w analizach filozoficznych. Czasopismo o charakterze filozoficznym nie może bowiem stanowić platformy dla rozstrzygnięć dotyczących empirycznej adekwatności tej czy innej teorii naukowej.

Istotną częścią czasopisma są przekłady wartościowych obcojęzycznych tekstów, które dotyczą wspomnianych wyżej zagadnień. Część z nich opublikowana została dość dawno i właśnie dlatego zasługują na przypomnienie, inne, bardziej współczesne podejmują istotne dla konkretnego numeru czasopisma zagadnienia i to jest również dobry powód do ich zaprezentowania Czytelnikowi.

Redaktorzy *Filozoficznych Aspektów Genezy* przyjmują pluralistyczne, feyerabendowskie podejście do wiedzy. Uważamy, że żaden pogląd nie powinien być z góry wykluczony z dyskusji, a jeśli nawet jest błędny, może przynieść korzyści, przyspieszając rozwój wiedzy dzięki ścieraniu się przeciwstawnych poglądów i udoskonalaniu argumentacji. Naszym celem jest umożliwienie otwartej dyskusji uwzględniającej głosy różnych stron. Jeśli artykuł jest dobrze napisany, a założenia zawarte w nim dobrze uargumentowane (co nie znaczy, że redaktorzy zgadzają się z zaprezentowanymi tezami), może być opublikowany w *Filozoficznych Aspektach Genezy*, o ile pozytywnie przejdzie proces recenzji.

Krzysztof J. Kilian

ISSN 2299-0356

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**

Philosophical Aspects of Origin s. 7–8

https://fag.ifil.uz.zgora.pl/index.php/fag/issue/view/22/59

About the Journal

Published online: February 2, 2023.

Philosophical Aspects of Origin (Polish title: *Filozoficzne Aspekty Genezy*) (ISSN 2299-0356) has been published continuously since 2004. In 2022, the journal became a biannual. It is a highly specialized online philosophical journal which, since its inception, has provided free access to all of its contents. The main focus of the journal is examining the concept of *origin* in its broad sense: i.e. the origins of the Universe, of early and advanced life forms, humans, mind, consciousness, language, scientific theories, religion, etc. The contents of the journal also include reflections of a philosophical and methodological nature that concern theories and perspectives relevant to this topic.

While this field of philosophy covers a wide variety of important and interesting issues, the journal particularly concerns itself with the following: controversies stemming from such opposing world views as naturalism and anti-naturalism, evolutionary theory and the theory of intelligent design, or evolutionary theory and creationism, together with controversies that arise on the fringes of science, religion, ideology and world views, and also issues connected with the role of facts and non-empirical convictions in the formulation of scientific theories. *Philosophical Aspects of Origin* also publishes texts dealing with issues that fall within the scope of the natural and social sciences and the humanities. However, there is one caveat: these should also address philosophical problems (including meta-scientific reflections), and discuss topics useful to philosophical analyses. After all, a journal that is philosophical in nature is not supposed to serve as an open-ended platform for attempts to determine the empirical adequacy of some theory or other.

An important part of the journal consists of translations of valuable foreign-language texts that deal with the aforementioned issues. Some of these were published quite a long time ago, and that is why they deserve to be recalled; others, that are more contemporary, take up issues relevant to a particular issue of the journal, and this is also a good reason to present them to the Reader.

The editorial board of *Philosophical Aspects of Origin* subscribe to a pluralistic, Feyerabendian approach to the pursuit of knowledge. We believe that each and every view has a right to be taken into account in discussion. Even if erroneous, it can still advance scientific progress through the clash of opposing views, which often brings about refinements in argumentation. Our goal is to create a space for open debate, in which many different voices can be heard. If an article is well-argued and well-written (which does not imply that the editorial board must agree with its premises), then it can be published on the pages of *Philosophical Aspects of Origin* — providing that it passes our peer-review process.

Krzysztof J. Kilian

ISSN 2299-0356

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**
Philosophical Aspects of Origin s. 9–12

https://fag.ifil.uz.zgora.pl/index.php/fag/issue/view/22/53

Od redakcji

Published online: February 2, 2023.

Niniejszy tom składa się z sześciu uporządkowanych tematycznie artykułów, trzech listów do redakcji i dwóch recenzji.

W części pierwszej poświęconej interpretacjom darwinizmu zamieszczono cztery artykuły.

Michael Ruse w artykule „Darwin and Design" [Darwin i projekt] twierdzi, że Darwin w pełni akceptował tezę, w myśl której organizmy wyglądają tak, jakby były zaprojektowane. Innymi słowy, że da się w nich odnaleźć „przyczyny sprawcze". Zdaniem Darwina można to wyjaśnić za pomocą hipotezy doboru naturalnego. Ruse twierdzi, że zaprzeczał on jednak, że wyjaśnienia cech organizmów wymagają hipotezy o świadomym zaprojektowaniu.

J. Scott Turner w artykule „Do Species *Want* to Evolve?" [Czy gatunki *chcą* ewoluować?] udziela pozytywnej odpowiedzi na to pytanie. Jego zdaniem zasadnicza teza darwinizmu, że tylko niekierowany proces doboru naturalnego może wytwarzać nowe gatunki, jest błędna. Autor twierdzi, że adaptacja i pamięć dziedziczna są zjawiskami celowymi, a to, jego zdaniem, podważa ideę niekierowanego doboru naturalnego.

Stephen Dilley w artykule „Rola teologii w książce Karola Darwina **O powstawaniu gatunków**" uzasadnia tezę, że teologia odgrywała istotną rolę w formułowaniu naukowych poglądów Darwina przedstawionych w jego dziele. Tezę tę uzasadnia za pomocą analiz teologicznego języka, jakim posługiwał się Darwin. Zdaniem autora, Darwin użył teologii pozytywnej, aby uzasadnić teorię dziedziczenia z modyfikacjami i podważyć ideę specjalnego stworzenia.

Michał Jakub Wagner w artykule „The Liminal Nature of the »Eclipse of Darwinism« as a Critical Phase in the History of Evolutionary Biology" ["Liminalny charakter "zaćmienia darwinizmu" jako krytycznego etapu w historii biologii ewolucyjnej"] twierdzi, że dotychczasowe interpretacje „zaćmienia darwinizmu" mają poważny problem z wyjaśnieniem takiego rozwoju paradygmatu darwinowskiego, w ramach którego najpierw Darwin zmienia kierunek rozwoju biologii, następnie jego ujęcie zostaje odrzucone na rzecz teorii niedarwinowskich, a w końcu powstaje nowoczesna synteza. Zdaniem autora za taki stan rzeczy odpowiedzialne jest powszechnie podzielane przekonanie, że zawsze istniała jedna główna linia rozwoju naukowego, w której nie było miejsca na okres nieokreśloności — czyli taki, w którym nauka nie była zdominowana przez jedną perspektywę badawczą.

Część druga, poświęcona podstawom nowożytnej nauki, zawiera dwa artykuły.

Michael Esfeld w artykule „The Metaphysics of Cartesian Science" [Metafizyka nauki kartezjańskiej] omawia kwestię, w jaki sposób nauka kartezjańska osiąga obiektywizm. Następnie autor koncentruje się na zagadnieniu rozwoju nowożytnej nauki. W drugiej części artykułu Esfeld przedstawia argumentację, wyjaśniającą dlaczego nauka kartezjańska napotyka na przeszkodę, jaką jest ludzka myśl i działanie. Pozwala mu to na dokonanie oceny kartezjańskiego dualizmu.

Gonzalo Munévar w artykule „The Origin of Modern Physical Science: Some Passages from **A Theory of Wonder**" [Pochodzenie współczesnych nauk przyrodniczych. Wybrane fragmenty z **Teorii zdziwienia**] przedstawia główne argumenty swojej najnowszej książki **A Theory of Wonder: Evolution, Brain, and the Radical Nature of Science** [Teoria zdziwienia. Ewolucja, mózg i radykalna natura nauki] oraz zarys, rozwijanej we wspomnianej książce, teorii, nazwanej przez niego ewolucyjnym relatywizmem. Artykuł ten jest rzadką w dzisiejszych czasach próbą obrony relatywizmu epistemologicznego na bazie Feyerabendowskiej zasady proliferacji. Ta ostatnia zaleca wymyślanie alternatywnych punktów widzenia i na ich podstawie badanie tego, co uznawane jest za istotne świadectwa.

Tom kończą trzy listy do redakcji i dwie recenzje.

Bradley Monton w liście do redakcji zatytułowanym „How Can an Atheist Defend Intelligent Design?" [Jak ateista może bronić teorii inteligentnego projektu?] wspomina swoje intelektualne utarczki z ludźmi ze środowiska naukowego, którzy nie byli w stanie zrozumieć, że można poważnie traktować teorię inteligentnego projektu nie będąc jej zwolennikiem.

W liście do redakcji zatytułowanym „The Inference to Intelligent Design is Independent of Any Religious Claim: The Wonder of Water" [Wnioskowanie o projekcie jest niezależne od jakichkolwiek twierdzeń religijnych. Zadziwiające właściwości wody] Michael Denton wyjaśnia, dlaczego nawet dla agnostyka, biorąc pod uwagę świadectwa na dostrojenie środowiska do życia istniejącego na Ziemi, odrzucenie tezy o zaprojektowaniu jest sprawą bardzo trudną. Argumenty swoje opiera na różnych własnościach wody, te ostatnie zaś pozwalają autorowi twierdzić, że woda została dostrojona do życia istniejącego na Ziemi.

Cornelius Hunter w liście do redakcji zatytułowanym „What Monton Seems to Miss?" [Czego nie zauważa Monton?] twierdzi, że Bradley Monton apeluje do teistów i ateistów, by zgodzili się na jego stwierdzenie, że nauka może w zasadzie dostarczyć świadectw na rzecz istnienia projektu w przyrodzie. Jednakże, zdaniem Huntera, Monton zdaje się nie zauważać, że dwie kluczowe dla jego argumentacji kwestie: powstawania gatunków i kontrowersja przypadek versus projekt są mocno obciążone teologicznie i metafizycznie, a to teologiczne i metafizyczne obciążenie kształtuje treść przekonań naukowych.

Hicham Jakha w recenzji książki Janet Levin **The Metaphysics of Mind** [Metafizyka umysłu] (Cambridge University Press, Cambridge — New York 2022), zatytułowanej „From Mind to Body and Back" [Tam i z powrotem, czyli od umysłu do ciała] nie tylko przedstawia czytelnikowi obszerne i ciekawe omówienie tej książki, ale zauważa też, że Levin nie przebadała kilku ważnych teorii umysłu. Mimo tego, jak podkreśla autor recenzji, książka cechuje się „filozoficznym rygorem i głębią", co pozwala polecić ją każdemu zainteresowanemu tą problematyką czytelnikowi.

Albert Łukasik w recenzji książki Jacka Neckara **Ewolucyjna psychologia osobowości. O psychologicznej naturze człowieka w ujęciu darwinowskim** (Wydawnictwo Akademickie SEDNO, Warszawa 2018) zatytułowanej „Człowiek zwierzęciem zróżnicowanym" najpierw wskazuje na trzy zasadnicze cele jakie przyświecały Neckarowi przy pisaniu jego monografii. Następnie autor recenzji dokładnie omawia treść sześciu rozdziałów książki. Pozwala mu to na stwierdzenie, że monografia Neckara nie tylko porusza najistotniejsze zagadnienia z psychologii ewolucyjnej i psychologii osobowości, ale książka ta jest oryginalną próbą syntezy licznych teorii osobowości z wyjaśnieniami ewolucjonistycznymi.

Krzysztof J. Kilian

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**
Philosophical Aspects of Origin s. 13–15
https://fag.ifil.uz.zgora.pl/index.php/fag/issue/view/22/54
ISSN 2299-0356

Editorial

Published online: February 2, 2023.

This volume consists of six articles, three letters to the editor and two book reviews. The articles are arranged thematically.

Part One, which focuses on the interpretations of Darwinism, includes four articles.

Michael Ruse, in his paper “Darwin and Design”, argues that Darwin accepted fully that organisms are design-like — that, in other words, they exhibit “final causes”. According to Darwin, natural selection explains why this happens. He denied, in Ruse’s view, that this feature demands the hypothesis of a designing consciousness.

J. Scott Turner, in his article “Do Species *Want* to Evolve?”, gives a positive answer to the question posed in its title. In his view, the fundamental thesis of Darwinism, to the effect that only purposeless natural selection can generate new species, is wrong. The author argues that adaptation and hereditary memory are purposeful phenomena, and this, in his opinion, undermines the idea of undirected natural selection.

Stephen Dilley, in his article „Charles Darwin’s Use of Theology in the **Origin of Species**”, argues for the thesis that theology played an important role in the formulation of Darwin’s scientific views as presented in his *magnum opus*. He justifies this claim by appealing to analyses of the theological language employed by Darwin. According to the author, Darwin made use of *positiva* theology to justify the theory of inheritance with modifications, and to undermine the idea of special creation.

Michal Jakub Wagner, in his article "The Liminal Nature of the «Eclipse of Darwinism» as a Critical Phase in the History of Evolutionary Biology", argues that previous interpretations of the so-called "eclipse of Darwinism" have a serious problem explaining how the development of the Darwinian paradigm has unfolded, insofar as this is taken to consist firstly in Darwin's changing the direction of the development of biology, then in the rejection of his approach in favor of non-Darwinian theories, and finally in the emergence of a modern synthesis. According to the author, the widely shared belief that there has always been one main line of scientific development, with no room for a period of indeterminacy (in the sense of one in which science was not dominated by a single research perspective) is responsible for such a state of affairs.

Part Two, concerning the roots of modern science, contains two articles.

Michael Esfeld, in his article "The Metaphysics of Cartesian Science", discusses the question of how Cartesian science achieves its objectivist stance; he subsequently focuses on the issue of the development of modern science. In the second part, the author presents an argument for why Cartesian science faces a significant obstacle in the form of human thought and action — one which then allows him to evaluate Cartesian dualism.

Gonzalo Munévar, in his article "The Origin of Modern Physical Science: Some Passages from **A Theory of Wonder**", presents the main arguments of his latest book, **A Theory of Wonder: Evolution, Brain, and the Radical Nature of Science**, and outlines the theory developed there, which he calls "evolutionary relativism". This article is an attempt — of a kind that is rare these days — to defend epistemological relativism on the basis of Feyerabend's principle of proliferation. The latter recommends inventing alternative viewpoints and, based on them, examining what is considered relevant evidence.

The volume closes with three letters to the editor and two reviews.

Bradley Monton, in a letter to the Editor entitled "How Can an Atheist Defend Intelligent Design?", recalls his intellectual melees with people from the academic world who could not understand that one could take the theory of intelligent design seriously without being a proponent of it.

In his letter to the editor entitled "The Inference to Intelligent Design is Independent of Any Religious Claim: The Wonder of Water", Michael Denton explains why, even for an agnostic, the evidence of the environment's having been fine-tuned to the existence of life on Earth makes rejecting the design thesis a very difficult matter. Denton bases his arguments on various properties of water that allow him to claim that this has been fine-tuned in just this kind of way.

Cornelius Hunter, in the letter to the editor titled "What Monton Seems to Miss?" notes that Bradley Monton is appealing to theists and atheists to agree with his statement that science can, in principle, provide evidence for design in nature. However, according to Hunter, Monton seems to have overlooked that the two key issues in his argument: the origin of species and the random-chance-versus-design controversy are heavily theologically and metaphysically laden. And this theological and metaphysical ladenness shapes the content of scientific beliefs.

Hicham Jakha, in his review of Janet Levin's book **The Metaphysics of Mind** (Cambridge University Press, Cambridge — New York 2022), entitled "From Mind to Body and Back", not only provides the reader with an extensive and interesting discussion of the book. Jakha also notes that Levin has not examined several important theories of mind. Nevertheless, Jakha notes, the book has "philosophical rigor and depth", which allows him to recommend this book to any reader interested in this issue.

Albert Lukasik, in his review of Jacek Neckar's book **Ewolucyjna psychologia osobowości. O psychologicznej naturze człowieka w ujęciu darwinowskim** [The Evolutionary Psychology of Personality: A Darwinian Perspective on the Psychological Nature of Man] (Wydawnictwo Akademickie SEDNO, Warszawa 2018) entitled "Człowiek zwierzęciem zróżnicowanym" [Man, the Differentiated Animal], begins by pointing out the three main goals that guided Neckar in writing his monograph. The author of the review then goes on to carefully discuss the contents of the book's six chapters. This leads him not only to conclude that Neckar's monograph addresses the most relevant issues in evolutionary psychology and the psychology of personality, but also to note that the book represents an original attempt to achieve some syntheses of various theories of personality with evolutionary explanations.

Krzysztof J. Kilian

Interpretacje darwinizmu

Interpretations of Darwinism

ISSN 2299-0356

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**
Philosophical Aspects of Origin s. 19–62

https://doi.org/10.53763/fag.2022.19.2.204

ARTYKUŁ ORYGINALNY / ORIGINAL ARTICLE

Michael Ruse
Florida State University

Darwin and Design

Received: January 30, 2022. Accepted: April 4, 2022. Published online: October 27, 2022.

Abstract: The argument from design, the proof of the existence of God from the design-like nature of the world, especially organisms, dates back to Plato in the **Phaedo**. Despite problems, namely the existence of evil, thanks particularly to archdeacon William Paley's **Natural Theology**, the argument was highly influential in British thought at the beginning of the nineteenth century. Charles Darwin's theory of evolution through natural selection, as given in his **Origin of Species**, challenged this hegemony. It is important to note what Darwin did and did not challenge. He accepted fully that organisms are design-like; that, in the language of Aristotle, they show "final causes". Natural selection explains why this is so. He denied that this feature demands the hypothesis of a designing consciousness, namely God. Darwin was an agnostic, so did not want to deny the existence of God as such. Rather, he thought that the argument failed to prove this. Darwin's conclusion has led to much subsequent discussion. Generally, however, the world — including Christians — agrees with him. In the words of the English theologian John Henry Newman, as a Christian one can accept that God explains design, one cannot accept that design proves God.

Keywords:

Plato; **Phaedo**; argument from design; William Paley; **Natural Theology**; Charles Darwin; **Origin of Species**; natural selection; final cause; agnosticism; John Henry Newman

> Let us recognize Darwin's great service to Natural Science in bringing back to it Teleology: so that, instead of Morphology *versus* Teleology, we shall have Morphology wedded to Teleology. [1]

> What you say about teleology pleases me especially, and I do not think anyone else has ever noticed the point. I have always said you were the man to hit the nail on the head. [2]

The Design Argument

The Argument from Design, or the Teleological Argument, is one of the oldest and best-known — often taken to be the most compelling — arguments for the existence of God. [3] Not just God, but the God of Christianity, who is All-Powerful, All-Knowing, and All-Loving. It is to be found in Plato's **Phaedo**, the dialogue supposedly reporting on Socrates' last day on Earth. "One day I heard someone reading, as he said, from a book of Anaxagoras, and saying that it is Mind that directs and is the cause of everything. I was delighted with this cause, and it seemed to me to be good, in a way, that Mind should be the cause of all. I thought that if this were so, the directing Mind would direct everything and arrange each thing in the way that was best". [4] So, now one has a guide to understanding and, as a bonus, a guide to discovery. "Then if one wished to know the cause of each thing, why it comes to be or perishes or exists, one had to find what the best way was for it to be, or to be acted upon, or to act". [5] Aristotle, Plato's successor, did not have anything akin to the Christian God. His ultimate cause, the Unmoved Mover, spent it time doing the only thing open to a truly perfect being, contemplating its own perfection! It had no knowledge of the physical world, including us. [6] Aristotle, however, followed

[1] Asa Gray, "Scientific Worthies", *Nature* 1874, Vol. 10, No. 240, pp. 79–81, https://doi.org/10.1038/010079a0.

[2] Letter from Charles Darwin to Asa Gray, 5 June 1874, *Darwin Correspondence Project*, University of Cambridge, https://tiny.pl/w73vj [10.10.2022].

[3] See Michael Ruse, **On Purpose**, Princeton University Press, Princeton 2017.

[4] Plato, **Phaedo**, trans. G.M.A Grube, in: John M. Cooper (ed.), **Plato: Complete Works**, Hackett Publishing Co., Indianapolis 1997, p. 84 (97 c–d) [49–100].

[5] Plato, **Phaedo...**, p. 84 (97 c–d).

[6] See David Sedley, **Creationism and its Critics in Antiquity**, University of California Press, Berkeley 2008.

Plato in seeing our world as deeply purposeful — the hand exists to grasp things, the rain exists in order to fertilize the ground. For Plato, if the ultimate reason for the purpose was the Form of the Good, the proximate reason was that he — and others, including Aristotle and then the Christians — was that the world in some sense is an organism. Plato's **Timaeus** was on this very topic, with the Designer being the "Demiurge", also known as the Form of the Good. First, that the Designer worked for the good. "Now surely it's clear to all that it was the eternal model he looked at, for, of all the things that have come to be, our universe is the most beautiful, and of causes the craftsman is the most excellent. This, then, is how it has come to be: it is a work of craft, modeled after that which is changeless and is grasped by a rational account, that is, by wisdom". [7] Plato does not regard this creation — the universe — to be some dead, lifeless entity. It is a living being with a soul. "Now why did he who framed this whole universe of becoming frame it? Let us state the reason why: He was good, and one who is good can never become jealous of anything". [8] Clearly, the God being himself good had to model things on the best, the Form of the Good. And this brings in intelligence. And so straight off we get a world soul. "Guided by this reasoning, he put intelligence in soul, and soul in body, and so he constructed the universe. He wanted to produce a piece of work that would be as excellent and supreme as its nature would allow. This, then, in keeping with our likely account, is how we must say divine providence brought our world into being as a truly living thing, endowed with soul and intelligence". [9] Aristotle likewise bought into this picture of the world as an organism. He distinguished proximate causes, i.e. those that make things happen, from final causes, i.e. the reason for things to happen. In the case of the organism, for instance, the proximate cause is the rain bringing the seed to life. The final cause, i.e. the reason for the proximate cause, is the flowering plant attracting insects to fertilize it. Not having a designer, or Designer, in the sense of Plato, Aristotle inclined rather to see the whole world as alive, in some sense, within itself. Hence, there is a kind of vital force directing things towards perfection, which is the Unknown Mover. In more recent times, people spoke of an entelechy or *élan vital*.

Of course, living four hundred years before Jesus, neither Plato nor Aristotle

[7] Plato, **Timaeus**, trans. Donald J. Zeyl, in: Cooper (ed.), **Plato: Complete Works...**, p. 1235 (29 a) [1224–1291].

[8] Plato, **Timaeus...**, p. 1236 (29 d–e).

[9] Plato, **Timaeus...**, p. 1236 (30 b–c).

were Christians. However, Plato's "Mind" or God was the Form of the Good, the source of all knowledge and that which is of value. Christians, particularly the greatest theologian of all, St. Augustine, identified this Form with their God, noting that as for the Christian God, the Form of the Good was not merely all powerful and knowing, as well as all good, but outside the physical world — eternal and never changing. Note that the organism is not to be identified with the Creator/Designer. That would be an unacceptable pantheism. The organism is the result of the efforts of the Creator/Designer. As it is in Genesis One. With this organic metaphor as the background, the Christians took up the argument from design with fervor. St. Thomas Aquinas gave the classic exposition. Note that, although he was much influenced by Aristotle's thinking on final causes — bodies "act for an end" — ultimately, he, as a Christian, is forced back to a kind of Platonic Great Designer in the Sky.

> The fifth way is taken from the governance of the world. We see that things which lack intelligence, such as natural bodies, act for an end, and this is evident from their acting always, or nearly always, in the same way, so as to obtain the best result. Hence, it is plain that not fortuitously, but designedly, do they achieve their end. Now, whatever lacks intelligence cannot move towards an end, unless it be directed by some being endowed with knowledge and intelligence; as the arrow is shot to its mark by the archer. Therefore, some intelligent being exists by whom all natural things are directed to their end; and this being we call God. [10]

Generations of undergraduates, who have read Aquinas only in extracts such as this one, come away with the belief that this is the end of things. Not true! As a Christian, Aquinas always thought faith took precedence over reason, as used in the Fifth Way. Jesus made that very clear. Remember the encounter with the disciple Thomas who doubted that Jesus had been resurrected.

> Then he said to Thomas, "Put your finger here; see my hands. Reach out your hand and put it into my side. Stop doubting and believe".
>
> Thomas said to him, "My Lord and my God!"
>
> Then Jesus told him, "Because you have seen me, you have believed; blessed are those who have not seen and yet have believed". [11]

---

[10] Thomas Aquinas, **Summa Theologica**, trans. Fathers of the English Dominican Province, Christian Classics, London 1981, Question 2, Article 3 [Ia].

[11] John 20: 27–29.

Aquinas pointed out that, without the supremacy of faith, the lazy and the ignorant would never get to know God. [12] However, the overall tenor was certainly that reason and evidence are high on the list of things acceptable to God and that therefore the organicist approach to understanding, of the world and of God, was very well taken.

Changing Root Metaphors

What changed this? The three Rs! *Renaissance, Reformation, Revolution*. The *Renaissance*, going back to the wisdom of the Ancients, soon showed that not everyone was enamored by design. The Roman poet Lucretius, putting older beliefs of the atomists and others into verse, gave a vivid alternative picture:

> At that time the earth tried to create many monsters with weird appearance and anatomy — androgynous, of neither one sex nor the other but somewhere in between; some footless, or handless; many even without mouths, or without eyes and blind; some with their limbs stuck together all along their body, and thus disabled from doing harm or obtaining anything they needed. These and other monsters the earth created. But to no avail, since nature prohibited their development. They were unable to reach the goal of their maturity, to find sustenance or to copulate. [13]

At first, nothing works; it is all a dysfunctional mess. Then, given infinite time, there is a functional success.

> First, the fierce and savage lion species has been protected by its courage, foxes by cunning, deer by speed of flight. But as for the light-sleeping minds of dogs, with their faithful heart, and every kind born of the seed of beasts of burden, and along with them the wool-bearing flocks and the horned tribes, they have all been entrusted to the care of the human race […]. [14]

No design. Just a chance and lots of time. Even if this seems implausible at first, it lodges in the mind and is worrisome.

The *Reformation*, with its emphasis on *sola scriptura*, obviously downplayed reason in favor of faith. Luther even went as far as to refer to reason as a "whore"!

---

[12] See Thomas Aquinas, **Summa Theologica**, Vol. I, Burns, Oates and Washbourne, London 1952.

[13] Lucretius, **De rerum natura**, v. 837–848, citation from: Sedley, **Creationism and Its Critics…**, pp. 150–151.

[14] Lucretius, **De rerum natura**, v. 862–867, citation from: Sedley, **Creationism and Its Critics…**, p. 151.

There were some responses. Some passages of the Bible seem best interpreted in terms of design. There was King David's contribution, the opening of Psalm 19: "The heavens declare the glory of God; and the firmament sheweth his handiwork". [15] Saint Paul also rushed briefly over the idea: "For the invisible things of him from the creation of the world are clearly seen, being understood by the things that are made, even his eternal power and Godhead; so that they are without excuse". [16] However, this is indeed slim pickings given the overall length and scope of the Holy Scripture. Another, more sociological response, was that of the English. The second half of the sixteenth century saw the long reign of Elizabeth the First, and — much desired after the short reign of Bloody Mary, who tried to enforce Catholicism on her reluctant subjects — the consolidation of Britain as a Protestant nation. England's initial break from Rome was done more for political than theological reasons. Henry wanted to divorce his Catholic wife so he could marry Anne Boleyn on the hope of getting a male heir. When the Pope refused, Henry picked up his country and went home — less metaphorically, took Britain out of the Catholic realm and into the Protestant. Truly, then, *sola scriptura* never had the hold on the English that it had on the Protestant countries of Europe. (Scotland as well, given the influence of the Calvin follower, John Knox). Something theologically distinctive and convincing was needed for the English, and the gap was filled with a distinctively English form of natural theology, one that emphasized the analogy between nature and the many efficient machines that the English were now inventing and using. [17]

Overall, however, notwithstanding the English, *sola scriptura* was a strong clarion call. Moreover, this fit nicely with the (Scientific) Revolution, usually dated from 1543 and the publication of Copernicus' heliocentric picture of the universe — **De Revolutionibus Orbium Coelestium** — to 1687 and the publication of Newton's causal theory, **Philosophiae Naturalis Principia Mathematica**. As historians stress, above all the revolution was one of the change of metaphors, from the already — encountered "world as an organism", to the new comer: "world as a machine".

[15] Psalm 19:1.

[16] Romans 1:20.

[17] See Michael Ruse, **Darwin and Design: Does Evolution Have a Purpose?**, Harvard University Press, Cambridge 2003.

> At all times there used to be a strong tendency among physicists, particularly in England, to form as concrete a picture as possible of the physical reality behind the phenomena, the not directly perceptible cause of that which can be perceived by the senses; they were always looking for hidden mechanisms, and in so doing supposed, without being concerned about this assumption, that these would be essentially the same kind as the simple instruments which men had used from time immemorial to relieve their work […]. [18]

Robert Boyle (1627–91), physicist and philosopher, was explicit: the world is "like a rare clock, such as may be that at Strasbourg, where all things are so skillfully contrived that the engine being once set a-moving, all things proceed according to the artificer's first design, and the motions of the little statues that as such hours perform these or those motions do not require (like those of puppets) the peculiar interposing of the artificer or any intelligent agent employed by him, but perform their functions on particular occasions by virtue of the general and primitive contrivance of the whole engine". [19] The world now was seen simply as a contraption, governed by eternal, unchanging laws, simply going through the motions, without rhyme or reason. Of course, you might say that machines have purposes. A guillotine is hardly for slicing tomatoes. However, within the context of science, this part of the metaphor was dropped. There were to be no ends, no final causes, things that the philosopher Francis Bacon likened to Vestal Virgins, beautiful but barren. And this means that the world is value free. It is just a dead substance in motion, and any values we find are values we ascribe to it. The heart has no value as such, but a value in the sense that we humans think it of a value (because of its results). To the organicist, it is just silly to say the heart has no intrinsic value. Of course, it does — the value to be found out there in the world. A value put there by a benevolent Creator (Plato), or part of the very fabric of the world (Aristotle). Since the root metaphor is the organism, the world is usually seen as developing, increasing in value. Few, if any organicists, would pull back from the inference that we humans are of the greatest value. The mechanists would undoubtedly agree with this conclusion; but, think the value we put on humans is

[18] Eduard Jan Dijksterhuis, **The Mechanization of the World Picture**, trans. Carry Dikshoorn, Oxford University Press, Oxford 1961.

[19] Robert Boyle, "A Disquisition About the Final Causes of Natural Things", pp. 12–13 (first edition 1688), in: Thomas Birch (ed.), **The Works of Robert Boyle**, Vol. 5, Georg Olms, Hildesheim 1966, pp. 392–444.

the value we put on humans, not something we find ready-made. [20]

The Problem of Organisms

Mechanism triumphant! There was, however, a rather large fly in the ointment. Organisms. The traditional argument from design covers both the organic and the inorganic. The hand exists in order to grasp; the rain exists in order to fertilize. However, it had always been recognized that the appearance of design is far less in the inorganic than the organic. This said, Aristotle was not naive. He was fully aware that it is at times proper to speak of things as being accidental or contingent. He didn't think that an eclipse of the moon is necessarily for any great purpose. Is this just an exception to final cause thinking? Not really. The eclipse as an eclipse is not a substance. Heavenly beings move in circles because that is the perfect figure, and that is part of their nature. However, the effects are not substances, and thus not necessarily explicable in terms of final cause. "Nor does matter belong to those things which exist by nature but are not substances; their substratum is the substance. E.g. what is the cause of eclipse? What is its matter? There is none; the moon is that which suffers eclipse. What is the moving cause which extinguished the light? The earth. The final cause perhaps does not exist". [21] Whatever. No one felt much worry about dropping final cause talk about the inorganic world. Organisms were different. They apparently continued to demand final-cause talk. The eye is really for seeing! The eye exists in order to see. The final cause of the eye is sight.

Faced with this problem, Robert Boyle played the philosophical equivalent of the three-card trick. He distinguished between acknowledging the use of final causes qua science and the inference qua theology, from final causes to designing a god. First: "In the bodies of animals it is oftentimes allowable for a naturalist, from the manifest and apposite uses of the parts, to collect some of the particular ends, to which nature destinated them. And in some cases we may, from the known natures, as well as from the structure, of the parts, ground probable con-

[20] See Michael Ruse, **A Philosopher Looks at Human Beings**, Cambridge University Press, Cambridge 2021.

[21] Aristotle, **Metaphysics**, Book VIII (H), w: Jonathan Barnes (ed.), **The Complete Works of Aristotle**, Vol II, Princeton University Press, Princeton 1984, p. 120 [115–122] 1044b4–1044b12 [1042a3–1045b27].

jectures (both affirmative and negative) about the particular offices of the parts”. [22] Then, with the science finished, one can switch to theology: “It is rational, from the manifest fitness of some things to cosmical or animal ends or uses, to infer, that they were framed or ordained in reference thereunto by an intelligent and designing agent”. [23] From a study in the realm of science, of what Boyle would call “contrivance,” to an inference about design — or rather Design — in the realm of theology.

Organisms were booted out of science into the realm of religion. A solution, but hardly a satisfactory solution, for all that, over the following century or more, some good biological science was done thanks to this uneasy compromise: naturalistic mechanistic thinking in the physical sciences, and religion-entwined organismic thinking in the biological sciences. As a result of this, the argument from design for the existence of God continued to flourish, particularly in Britain, dependent, as its religion was, on natural theology. (The state-sponsored Anglican religion. By the middle of the eighteenth century, more faith-centered religions were starting to appear in numbers. The Methodists particularly). It is little surprise then that the classic exposition of the argument should appear at the beginning of the nineteenth century — Archdeacon Paley’s **Natural Theology**.

> In crossing a heath, suppose I pitched my foot against a stone, and were asked how the stone came to be there; I might possibly answer, that, for anything I knew to the contrary, it had lain there forever: nor would it perhaps be very easy to show the absurdity of this answer. But suppose I had found a watch upon the ground, and it should be inquired how the watch happened to be in that place; I should hardly think of the answer which I had before given, that, for anything I knew, the watch might have always been there. [24]

The watch shows organization, marks of design. The stone does not. Shall we simply say that the watch has just happened? “Or shall it, instead of this, all at once turn us round to an opposite conclusion, viz. that no art or skill whatever has been concerned in the business, although all other evidences of art and skill remain as they were, and this last and supreme piece of art be now added to the

[22] Boyle, “A Disquisition About the Final Causes…”, p. 18.

[23] Boyle, “A Disquisition About the Final Causes…”, p. 19.

[24] William Paley, **Natural Theology; Or, Evidences of the Existence and Attributes of the Deity**, R. Faulder — John Morgan, London — Philadelphia 1802, p. 1.

rest? Can this be maintained without absurdity? Yet this is atheism". [25] Paley continues:

> This is atheism: for every indication of contrivance, every manifestation of design, which existed in the watch, exists in the works of nature; with the difference, on the side of nature, of being greater and more, and that in a degree which exceeds all computation. I mean that the contrivances of nature surpass the contrivances of art, in the complexity, subtility, and curiosity of the mechanism; and still more, if possible, do they go beyond them in number and variety; yet, in a multitude of cases, are not less evidently mechanical, not less evidently contrivances, not less evidently accommodated to their end, or suited to their office, than are the most perfect productions of human ingenuity.
>
> I know no better method of introducing so large a subject, than that of comparing a single thing with a single thing; an eye, for example, with a telescope. As far as the examination of the instrument goes, there is precisely the same proof that the eye was made for vision, as there is that the telescope was made for assisting it. They are made upon the same principles; both being adjusted to the laws by which the transmission and refraction of rays of light are regulated. [26]

The watch is designed. The eye is just like the watch. Hence, the eye is designed; or rather, Designed — by God!

Hume and Kant

There were earlier criticisms of the argument, but ultimately these did not succeed. Apparently devastating were some of the arguments of David Hume, in his **Dialogues Concerning Natural Religion**, published some twenty years earlier than Paley's **Natural Theology**. He showed that the traditional argument from design — the argument of Plato and Augustine and Aquinas — is riddled with problems. On the one hand, who is to say that there is only one designer, and who moreover is to say that this designer got things right straight off? Our experience of complex entities is that usually this is a group effort, drawing on the experience of many attempts sometimes failures, sometimes successes — in the past. "But were this world ever so perfect a production, it must still remain uncertain, whether all the excellences of the work can justly be ascribed to the workman. If we survey a ship, what an exalted idea must we form of the ingenuity of the car-

[25] Paley, **Natural Theology...**, pp. 13–14.

[26] Paley, **Natural Theology...**, pp. 14–15.

penter who framed so complicated, useful, and beautiful a machine? And what surprise must we feel, when we find him a stupid mechanic, who imitated others, and copied an art, which, through a long succession of ages, after multiplied trials, mistakes, corrections, deliberations, and controversies, had been gradually improving?".[27] And was it just one workman? "And what shadow of an argument[…] can you produce, from your hypothesis, to prove the unity of the Deity? A great number of men join in building a house or ship, in rearing a city, in framing a commonwealth; why may not several deities combine in contriving and framing a world?".[28] The trouble is, of course, that you are reading in your conclusion — a unique, all-powerful deity — right into your premises and then thinking that you have discovered or proved something.

And yet, this said — and much more — in the end Hume equivocates. He may be a believer. And then again, he may not be.

> That the works of Nature bear a great analogy to the productions of art, is evident; and according to all the rules of good reasoning, we ought to infer, if we argue at all concerning them, that their causes have a proportional analogy. But as there are also considerable differences, we have reason to suppose a proportional difference in the causes; and in particular, ought to attribute a much higher degree of power and energy to the supreme cause, than any we have ever observed in mankind. Here then the existence of a *Deity* is plainly ascertained by reason: and if we make it a question, whether, on account of these analogies, we can properly call him a mind or intelligence, notwithstanding the vast difference which may reasonably be supposed between him and human minds; what is this but a mere verbal controversy?[29]

A general opinion, with which I concur, is that Hume is a classic case of someone caught on the problem of "inference to the best explanation". Sherlock Holmes gives the classic statement: "When you have eliminated all which is impossible, then whatever remains, however improbable, must be the truth". The trouble is that organisms do seem as if designed. It is impossible that they not be. So, improbable though it may be, there has to be something to the God hypothesis.

Immanuel Kant, in his **Third Critique, The Critique of Judgement** (1790), had a somewhat different take on things. As a good Newtonian, he was convinced

---

[27] David Hume, **Dialogues Concerning Natural Religion**, Second ed., Penguin Books, London 1779, p. 77.

[28] Hume, **Dialogues…**, pp. 107–108.

[29] Hume, **Dialogues…**, p. 130.

that the world is ruled by an unbroken law. The proper root metaphor for understanding is the machine metaphor. Yet, in organisms, there is the undeniable appearance of design. And you cannot really do biology without this assumption of design. You would not be able to ask about the use of anything. Hence, uneasily, Kant concluded that thoughts of the final cause had to be allowed, but they were purely heuristic and not part of the real science.

> The concept of a thing as in itself a natural end is therefore not a constitutive concept of the understanding or of reason, but it can still be a regulative concept for the reflecting power of judgment, for guiding research into objects of this kind and thinking over their highest ground in accordance with a remote analogy with our own causality in accordance with ends; not, of course, for the sake of knowledge of nature or of its original ground, but rather for the sake of the very same practical faculty of reason in us in analogy with which we consider the cause of that purposiveness. [30]

An answer, if not a terribly satisfactory answer. Perhaps, out of frustration at the thin solution he offered, Kant showed that sometimes he was more human than ethereal a philosopher, by turning bitterly on the source of this frustration, biology. Do you want to make the life sciences equal to the physical sciences? Good luck! "[We] can boldly say that it would be absurd for humans even to make such an attempt or to hope that there may yet arise a Newton who could make comprehensible even the generation of a blade of grass according to natural laws that no intention has ordered; rather, we must absolutely deny this insight to human beings". [31]

Problems with Design

We enter the nineteenth century and turn towards Darwin and his **Origin of Species**. [32] As we do so, it is well to remember an important point made by Thomas Kuhn in his **The Structure of Scientific Revolutions** (1962). Few, if any, accept Kuhn's extreme idealism according to which when (what he calls) "paradigms" change, the world itself changes — the before and after paradigms are "in-

---

[30] Immanuel Kant, **Critique of the Power of Judgment**, trans. Paul Guyer and Eric Matthews, *The Cambridge Edition of the Works of Immanuel Kant*, Cambridge University Press, Cambridge 2000, p. 247.

[31] Kant, **Critique of the Power…**, p. 271.

[32] See Michael Ruse, **The Darwinian Revolution: Science Red in Tooth and Claw**, Second Edition, University of Chicago Press, Chicago 1999.

commensurable". [33] To the contrary, as we shall see fully in the Darwinian case, there is clearly much continuity between the before and after paradigms. However, Kuhn is clearly right that revolutions do not just happen. There must be a reason for a change and the most obvious reason is that the older paradigm is no longer functioning that well. It is coming apart with increasing visible problems and the virtue of the new paradigm is either that it can explain and hence eliminate the problems, or it can do an end run around the problems, so they are no longer so very pressing. We can think of the pre-Darwinian paradigm, not so much as "Creationism" in the sense of today's American biblical literalists — the six-day creation, six thousand years ago, Adam and Eve in the Garden of Eden in their birthday suits — but Creationism in the sense of the design-like nature of the organic world precludes an explanation in terms of an unbroken law. Miracles, divine interventions in the natural order of things, are needed to create already-functioning organisms. In the words of a polymath, historian and philosopher of science, William Whewell:

> Geology and astronomy are, of themselves, incapable of giving us any distinct and satisfactory account of the origin of the universe, or of its parts. We need not wonder, then, at any particular instance of this incapacity; as for example, that of which we have been speaking, the impossibility of accounting by any natural means for the production of all the successive tribes of plants and animals which have peopled the world in the various stages of its progress, as geology teaches us. That they were, like our own animal and vegetable contemporaries, profoundly adapted to the condition in which they were placed, we have ample reason to believe; but when we inquire whence they came into this our world, geology is silent. The mystery of creation is not within the range of her legitimate territory; she says nothing, but she points upwards. [34]

Yet what if — quite independently of Darwin — the organic world is nothing like as design-like as these Creationists suppose? If someone, e.g. Charles Darwin, is going to offer an evolutionary account of the organic world, then the assumption is going to be that a blind law can explain organisms in their entirety. If it cannot do this, because of the design-like nature of organisms, then evolution — the "Evolutionism" paradigm — is impossible. Obviously, at one level, an evolutionist

---

[33] See Thomas KUHN, **The Structure of Scientific Revolutions**, University of Chicago Press, Chicago — New York 1962, p. 150.

[34] William WHEWELL, **The History of the Inductive Sciences: From the Earliest to the Present Time**, 3 Vols., John W. Parker, London 1837, Vol. 3, pp. 587–588.

like Darwin is going to have to explain that a blind law can do the job. However, if there is no job to be done, then the evolutionist can win by default, as it were. No barriers.

As it happens, this fear of the Creationists is only too well-placed. Even by the 1830s, people like Whewell were coming to realize that there are important aspects of organisms — not just ephemeral by-products — that seem to have no direct purpose.[35] Aspects for which final-cause explanations simply seem neither needed nor appropriate. Most obvious were what, in the next decade, the anatomist Richard Owen was to call "homologies," the isomorphisms between organisms of very different species.[36] The paradigm example is of the vertebrate forelimb. Very different organisms have the bone order and structure of their forelimbs — forelimbs whose uses are very different — in parallel. The arm of humans is used for grasping; the forelimb of the horse, for running; the wing of the bird for flying; the flipper of the porpoise for swimming; and more. There seems to be no purposeful reason for any of this.

This problem, as one might say, is internal to biology. Then, for a worry more external to biology, by the 1850, a decade before the **Origin of Species** was published, Whewell started to fret about extraterrestrials. In an anonymously authored book, **The Plurality of Worlds** (1853), Whewell posed the question of whether we, humans, are unique; or if there are many planets through the universe that carry living beings, including living human-like beings? Why was Whewell worried about this? Quite simply because his revealed religion — the religion of faith and the Bible — was under threat from his natural religion — the religion of reason. The evidence of design, of which he made so much in his stand against evolution, works only if you see a design out there. The less evidence of design, the less reason to invoke non-law bound causes. This rather suggests then that we should find the purpose — the final causes — everywhere, which means not only on our planet but throughout the universe. And the only point of other planets, the only possible purpose of them, is to support life. Hence, we expect to find life teeming everywhere. More than this, there is not much point in life if it does not lead, whether by evolutionary forces or otherwise, to intelligent beings

[35] See Whewell, **The History of the Inductive Sciences...**, Michael Ruse, "William Whewell and the Argument From Design", *The Monist* 1977, Vol. 60, No. 2, pp. 244–268, https://doi.org/10.5840/monist19776022.

[36] See Richard Owen, **On the Nature of Limbs**, John Van Voorst, London 1849.

of some form. Yet then comes the question of their relationship to the Creator. A multitude of Creators is hardly plausible. Unfortunately, if we do have intelligent beings elsewhere, this opens the possibility of their falling into sin as have we, humans. This means that God, presumably in the form of Jesus, has to come down to their planets in order to save them. We end with the theologically absurd — absurd and obnoxious — conclusion that perhaps Jesus is being crucified on Friday — every Friday — somewhere in the universe, to save souls. An implication like this must be stopped, and the obvious way is to argue that, despite a universal purpose, the existence of non-inhabited worlds, apparently pointless worlds, is nevertheless highly plausible.

In the course of his argument, Whewell brought several lines of fire to bear. He argued at some length that the geological record shows that, for much of the life of this Earth of ours, there was either no life or no intelligent life. Hence, concluded Whewell, there was no point to this world for much of its existence, at least, not in the sense of being designed for organisms in general and humans in particular. In a somewhat analogous manner, Whewell also pointed out that many aspects of organisms show no point, in the sense of being of any benefit to them. Thus, the nipples on the male are hardly of any value to anyone. Similarly, Whewell cited the homologous forms of the skeletons of man and sparrows, which hardly do anyone or anything very much good. And, in a passage anticipating Charles Darwin's discussion of the struggle for existence in the **Origin of Species**, Whewell drew attention to the fact that most organisms seem to have little point anyway, because they die before maturity: "to work in vain, in the sense of producing means of life which are not used, embryos which are never vivified, germs which are not developed, is so far from being contrary to the usual proceedings of nature, that it is an operation which is constantly going on, in every part of nature". [37]

There were other arguments brought to bear on the case. God does not always work for direct organic benefit, but for other ends such as similarity, symmetry, and beauty. Hence, analogous structures (homologies) in different organisms exist

[37] William Whewell, "Of the Plurality of Worlds: An Essay", in: Michael Ruse (ed.), **Of the Plurality of Worlds. A Facsimile of the First Edition of 1853: Plus Previously Unpublished Material Excised by the Author Just Before the Book Went to Press; and Whewell's Dialogue Rebutting His Critics, Reprinted from the Second Edition,** University of Chicago Press, Chicago — London 2001, p. 248 [33-322].

"for the sake of similarity".[38] Similarly, the different hexagonal forms of snowflakes have no end but symmetry and beauty. In addition to supplying different ends for God, Whewell made much play of a version of the Design Argument which he called the "Argument from Law". Even though we may see no direct ends, "the existence of Laws of Nature, governing and producing the phenomena of the universe, makes manifest to us the existence and operation of God".[39] Finally, in order to find some point to uninhabited other worlds, Whewell made a new suggestion — the most crucial of all for his revised position — namely that man's mind is in essential respects like God's Mind, and part of our task on Earth might be to bring ourselves closer to God by tracing His laws as manifested by the endless motions of the heavenly bodies.

> For if, on the earth, the Creator have placed a race who are not only endowed with a portion of the Divine Intellect, but who are placed there in order, (at least among other purposes,) that they may cultivate and develop this gift, and thus, rise nearer and nearer to the condition of the Divine Intellect, and be fitted, so far, for an immortal existence; we cannot have any ground to think that the scheme of creation is too narrow; or that it needs, in order to give it sufficient dignity and value, and a worthy object in our eyes, that other worlds should be stocked with races of creatures [...].[40]

On the Origin of Species

Let us turn now to Charles Darwin and his great work, **Origin of Species**, published in 1859. What did he try to do in that work? He tried to show that all organisms, living and dead, are descended from "a few forms or into one" by a slow, natural — meaning law-bound — process that he called "natural selection".[41] First, he talked about artificial selection, i.e. what the farmer practices on the stock and what fanciers do with their birds and dogs and other animals that they prize and want to improve. He shows that the secret is choosing and breeding from those that have the desired features, over and over, until those features are fixed in the line or group. He then moved to the natural world, arguing that natural popula-

---

[38] Whewell, "Of the Plurality of Worlds...", p. 248.

[39] Whewell, "Of the Plurality of Worlds...", p. 251.

[40] Whewell, "Of the Plurality of Worlds...", p. 309.

[41] Charles Darwin, **On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life**, John Murray, London 1859, p. 490.

tions always have lots of variation, a prerequisite for a selective process. Then, the two key chapters come. First, the struggle for existence, showing that not all organisms can survive and reproduce:

> A struggle for existence inevitably follows from the high rate at which all organic beings tend to increase. Every being, which during its natural lifetime produces several eggs or seeds, must suffer destruction during some period of its life, and during some season or occasional year, otherwise, on the principle of geometrical increase, its numbers would quickly become so inordinately great that no country could support the product. Hence, as more individuals are produced than can possibly survive, there must in every case be a struggle for existence, either one individual with another of the same species, or with the individuals of distinct species, or with the physical conditions of life. It is the doctrine of Malthus applied with manifold force to the whole animal and vegetable kingdoms; for in this case there can be no artificial increase of food, and no prudential restraint from marriage. Although some species may be now increasing, more or less rapidly, in numbers, all cannot do so, for the world would not hold them. [42]

Then, in the next chapter ("Natural Selection") he argued that the struggle within populations of organisms, with a range of variations, is going to lead to a natural selecting process:

> How will the struggle for existence, discussed too briefly in the last chapter, act in regard to variation? Can the principle of selection, which we have seen is so potent in the hands of man, apply in nature? I think we shall see that it can act most effectually. Let it be borne in mind in what an endless number of strange peculiarities our domestic productions, and, in a lesser degree, those under nature, vary; and how strong the hereditary tendency is. Under domestication, it may be truly said that the whole organization becomes in some degree plastic. Let it be borne in mind how infinitely complex and close-fitting are the mutual relations of all organic beings to each other and to their physical conditions of life. Can it, then, be thought improbable, seeing that variations useful to man have undoubtedly occurred, that other variations useful in some way to each being in the great and complex battle of life, should sometimes occur in the course of thousands of generations? If such do occur, can we doubt (remembering that many more individuals are born than can possibly survive) that individuals having any advantage, however slight, over others, would have the best chance of surviving and of procreating their kind? On the other hand, we may feel sure that any variation in the least degree injurious would be rigidly destroyed. This preservation of favourable variations and the rejection of injurious variations, I call Natural Selection. [43]

---

[42] Darwin, **On the Origin of Species...**, pp. 63–64.

The key point is that natural selection does not just lead to change. It leads to a change in the direction of features that help their possessors. A faster lion chasing after a prey is going to do better than a slower lion. A darker moth on a sooty tree is better camouflaged that a lighter one. A hardier plant in a rough environment is going to do better than a more delicate one. Organisms will develop features, adaptations, that help in the struggle for existence, or, more importantly, in the struggle for reproduction.

> How have all those exquisite adaptations of one part of the organisation to another part, and to the conditions of life, and of one distinct organic being to another being, been perfected? We see these beautiful co-adaptations most plainly in the woodpecker and mistletoe; and only a little less plainly in the humblest parasite which clings to the hairs of a quadruped or feathers of a bird; in the structure of the beetle which dives through the water; in the plumed seed which is wafted by the gentlest breeze; in short, we see beautiful adaptations everywhere and in every part of the organic world. [44]

Darwin answers his question:

> I have called this principle, by which each slight variation, if useful, is preserved, by the term of Natural Selection, in order to mark its relation to man's power of selection. We have seen that man by selection can certainly produce great results, and can adapt organic beings to his own uses, through the accumulation of slight but useful variations, given to him by the hand of Nature. But Natural Selection… is a power incessantly ready for action, and is as immeasurably superior to man's feeble efforts, as the works of Nature are to those of Art. [45]

Implications

Let us stop right here and make three important points. First, Darwin is offering a natural, law-bound, within-the-machine-metaphor explanation of those characteristics like the hand and the eye that supporters of the organic metaphor perspective — and this implies those that think there cannot be natural explanations and one must rely on non-natural interventions, miracles — are wrong. He says that the eye, for example, exists and works because those would be sighted

[43] Darwin, **On the Origin of Species…**, pp. 80–81.

[44] Darwin, **On the Origin of Species…**, pp. 60–61.

[45] Darwin, **On the Origin of Species…**, p. 61.

animals that had variations more efficient in the direction of sight survived and reproduced and those that did not, did not. A blind and unguided law all the way.

Second, as he and Asa Gray realized, Darwin was not eliminating teleological — final cause — explanations. He was giving an answer other than miracles, but he was giving an answer to the same problem — adaptive characteristics seem to refer to the future. However, for the Creationist, the Mind of God was responsible — He saw the intended future and planned for it. For the Evolutionist like Darwin, it was a case that this worked in the past, let us assume it will go on working. Kant pointed out that we have a kind of a repetitive cause-and-effect process. It is a matter of organization or even self-organization. "This principle, or its definition, states: An organized product of nature is that in which everything is an end and reciprocally a means as well. Nothing in it is in vain, purposeless, or to be ascribed to a blind mechanism of nature". [46] Darwin agrees, but he thinks that that is just the way things are. The eye leads to seeing, which leads to survival and reproduction leads to another eye, and… the process keeps repeating, over and over again. Of course, we might be mistaken. Darkness might envelop the Earth and no one can see again; but, the Designer has the same problem.

The point is that there is a genuine reference to the future. Darwin is given a naturalistic explanation of final cause. He is not denying it. Indeed, in the **Origin of Species**, he uses the notion of the final cause without a need of qualification. He asks why cuckoos lay their eggs in the nests of others.

> It is now commonly admitted that the more immediate and *final cause* of the cuckoo's instinct is, that she lays her eggs, not daily, but at intervals of two or three days; so that, if she were to make her own nest and sit on her own eggs, those first laid would have to be left for some time unincubated, or there would be eggs and young birds of different ages in the same nest. [47]

Continuing, supposing that this spaced-out laying would have disadvantages but that sometimes a cuckoo might lay its eggs in the nest of another bird:

> Now let us suppose that the ancient progenitor of our European cuckoo had the habits of the American cuckoo; but that occasionally she laid an egg in another bird's nest. If the old bird profited by this occasional habit, or if the young were made more vigorous by advantage having been taken of the mistaken maternal instinct of another bird,

[46] Kant, **Critique of the Power…**, pp. 247–248.

[47] Darwin, **On the Origin of Species…**, pp. 216–217, my italics.

> than by their own mother's care, encumbered as she can hardly fail to be by having eggs and young of different ages at the same time; then the old birds or the fostered young would gain an advantage. And analogy would lead me to believe that the young thus reared would be apt to follow by inheritance the occasional and aberrant habit of their mother, and, in their turn, they would be apt to lay their eggs in other birds' nests, and thus be successful in rearing their young. By a continued process of this nature, I believe that the strange instinct of our cuckoo could be, and has been, generated. [48]

The crucial point, however, is that, while Whewell appeals to divine intervention — "says nothing but points upwards" — Darwin offers a naturalistic law-bound explanation. Natural selection!

The third point is that, without effort or the need of ad hoc explanations, Darwin can answer those problems about seeming exceptions to the design-like nature of organisms, most especially homologies. They are a function of common ancestry. Evolution does not start each generation afresh. It very often modifies what it has according to new needs. Are there good reasons to go fast? Then, take the horse option? Out of the jungle and onto the plains. You need to be able to look around you for predators and prey. Go the bipedal option, opening up your forelimbs for new, or much improved, functions. The important point is that while Whewell is constantly playing catch up — God worked through laws to exercise our minds, sort of thing — the evolutionist, the Darwinian evolutionist in particular, has a ready explanation at hand. This is all very much in the tradition of Kuhn's analysis of scientific revolutions. The old paradigm gets into trouble — constantly coming up with ad hoc solutions to solve problems. The new paradigm deals with these problems briskly — they break down under the new modes of explanation — and the scientist can and does move on.

Let us move on, but note that the Darwinian agrees with the Creationist that it is a function and the final cause that comes first. Homologies and the like are explicable, but they are side effects.

> It is generally acknowledged that all organic beings have been formed on two great laws — Unity of Type, and the Conditions of Existence. By unity of type is meant that fundamental agreement in structure, which we see in organic beings of the same class, and which is quite independent of their habits of life. On my theory, unity of type is explained by unity of descent. The expression of conditions of existence, so often insisted on by the illustrious Cuvier, is fully embraced by the principle of natural selec-

[48] Darwin, **On the Origin of Species…**, pp. 217–218.

> tion. For natural selection acts by either now adapting the varying parts of each being to its organic and inorganic conditions of life; or by having adapted them during long-past periods of time: the adaptations being aided in some cases by use and disuse, being slightly affected by the direct action of the external conditions of life, and being in all cases subjected to the several laws of growth. Hence, in fact, the law of the Conditions of Existence is the higher law; as it includes, through the inheritance of former adaptations, that of Unity of Type. [49]

Darwin and Religion

So much for Darwin's **Origin of Species**. Teleology without tears. The final cause accepted and highlighted, but under the machine root metaphor. Before we move on, it would be ungracious not to acknowledge that all who write on the topic of Darwin and teleology are hugely indebted to a 1993 article, "Darwin Was a Teleologist," in *Biology and Philosophy* (a journal of which I was the founding editor), by James Lennox. He shows unambiguously that Darwin was a teleologist (for reasons given in the last section). Additionally, he refutes those — for example, the biologist Michael Ghiselin — who argued that there was no such teleology, that Darwin had taken it out of biology, and that Darwin was consciously aware of what he was doing. Ghiselin, for instance, referred to the underlying teleology of Darwin's next book after the **Origin of Species — The Various Contrivances by Which Orchids are Fertilised by Insects** (1862) — as a "metaphysical satire". [50] Lennox shows not only how mistaken an interpretation that is, but that back when Darwin became an evolutionist and discovered natural selection, he was already facing the fact that, although he had now taken God out of the equation, the same could not be said of the "final causes" teleology. In an unpublished comment (written in 1838) in the margin of a book he was then reading — **Proofs and Illustrations of the Attributes of God**, by John Macculloch — Darwin wrote: "The Final Cause of innumerable eggs is explained by Malthus — (is it anomaly in me to talk of Final Causes: consider this! —) consider these barren Virgins". [51] Remem-

[49] Darwin, **On the Origin of Species…**, p. 206.

[50] Michael T. Ghiselin, **The Triumph of the Darwinian Method**, University of California Press, Berkeley 1969, p. 135.

[51] "Darwin's Abstract of John Macculloch 1837", in: Paul H. Barrett, Peter J. Gautrey, Sandra Herbert, David Kohn, and Sydney Smith (eds.), **Charles Darwin's Notebooks, 1836–1844: Geology, Transmutation of Species, Metaphysical Enquiries**, Cornell University Press, Ithaca — London 1987, p. 637 [632–641].

ber that, in the **Origin of Species**, Darwin was still worrying about those eggs! The reference to "barren virgins" refers to the already-encountered description of final causes by Francis Bacon. Darwin would have picked it up from William Whewell's natural-theology-promoting *Bridgewater Treatise*.[52] Clearly, anomaly or not, Darwin decided that he could legitimately go on using the term.

Let us ask now some questions that arise from the discussion. First, what about religion? Does Darwinian evolutionary theory, with natural selection as its central mechanism, refute God, specifically the Christian God? If so, it would have been a surprise to Darwin! Towards the end of the **Origin of Species**, all six editions (last in 1872), Darwin affirms his belief in the possibility of religious acceptance. Indeed, his position makes it easier:

> Authors of the highest eminence seem to be fully satisfied with the view that each species has been independently created. To my mind it accords better with what we know of the laws impressed on matter by the Creator, that the production and extinction of the past and present inhabitants of the world should have been due to secondary causes, like those determining the birth and death of the individual. When I view all beings not as special creations, but as the lineal descendants of some few beings which lived long before the first bed of the Silurian system was deposited, they seem to me to become ennobled.[53]

It is true that Darwin is pushing one to the God of deism — He works through and only through unbroken law — rather than the God of theism — God works through miracles. Darwin was hardly the first to go this way. Privately, Newton was a deist. Moreover, by the nineteenth century, many, independently of science, were starting to make miracles law-bound. The Marriage at Cana, where Jesus turns water into wine, is best understood, not as conjuring, but as a tale in which Jesus so moved the party-giver that he voluntarily opened up his cellars and brought out his best wine. Many today, indeed, would say that calling for divine intervention is precisely to miss the meaning of the event. In the years of my childhood, the years after the Second World War, the British considered Dunkirk in 1940, when the British Army escaped across the Channel, to be a miracle. They were able to regroup and continue the fight against Hitler. God did not make it easy for them; He made it possible for them. If you had asked an average Brit

[52] See William Whewell, **Astronomy and General Physics Considered with Reference to Natural Theology. Treatise III**, William Pickering, London 1833, pp. 355–356.

[53] Darwin, **On the Origin of Species…**, pp. 488–489.

whether God did it through a special intervention or through a blind law, they would have looked at you as though you were queer in the head, or making a somewhat inappropriate joke. What mattered was the meaning, not the cause. [54]

Clearly, Darwin is aiding the cause of law-bound explanations, whether Christians like this or not. Is Darwin truly setting us on the road towards disbelief? After all, despite what he said in the **Origin of Species**, by about 1870 he had become what Thomas Henry Huxley called an "agnostic". Neither a believer nor a non-believer. However, in common with just about every Victorian agnostic, and as the nineteenth century drew to a close there were many of them, Darwin's chief gripe against Christianity was theological. In his autobiography written about 1876, he wrote:

> I gradually came to disbelieve in Christianity as a divine revelation. The fact that many false religions have spread over large portions of the earth like wild-fire had some weight with me. Beautiful as is the morality of the New Testament, it can hardly be denied that its perfection depends in part on the interpretation which we now put on metaphors and allegories.
>
> But I was very unwilling to give up my belief; I feel sure of this for I can well remember often and often inventing day-dreams of old letters between distinguished Romans and manuscripts being discovered at Pompeii or elsewhere which confirmed in the most striking manner all that was written in the Gospels. But I found it more and more difficult, with free scope given to my imagination, to invent evidence which would suffice to convince me. Thus disbelief crept over me at a very slow rate, but was at last complete. The rate was so slow that I felt no distress, and have never since doubted even for a single second that my conclusion was correct. I can indeed hardly see how anyone ought to wish Christianity to be true; for if so the plain language of the text seems to show that the men who do not believe, and this would include my Father, Brother and almost all my best friends, will be everlastingly punished.
>
> And this is a damnable doctrine. [55]

Darwin was an agnostic. Yet, an agnostic of a recognizable kind. For some, who call themselves "agnostic," this is really a way of saying: "I couldn't care less. I really find the whole topic rather boring". (My wife falls into this category. For

---

[54] See Michael Ruse, **Can a Darwinian be a Christian? The Relationship between Science and Religion**, Cambridge University Press, Cambridge 2001.

[55] Nora Barlow (ed.), **The Autobiography of Charles Darwin, 1809–1882**, Collins, London 1958, pp. 86–87, The punctuation is in accordance with Darwin's original text.

others, in its way, agnosticism is as dynamic as a full-blooded belief. I fall into this category!) The eminent population geneticist J. B. S. Haldane wrote: “Not only is the world queerer than we think it is. It is queerer than we could think it is”. This is not a man who has shelved the problem. The ultimate meaning of things is a challenging mystery. This was Darwin’s position. Traditional Christianity is false and morally offensive. Deism, the long-held position, is truly knocked sideways by the law-bound process of natural selection. And yet.....? Towards the end of his life, to a correspondent who had just sent him a book on issues to do with science and religion, Darwin wrote:

> You would not probably expect anyone fully to agree with you on so many abstruse subjects; and there are some points in your book which I cannot digest. The chief one is that the existence of so-called natural laws implies purpose. I cannot see this. Not to mention that many expect that the several great laws will some day be found to follow inevitably from some one single law, yet taking the laws as we now know them, and look at the moon, what the law of gravitation — and no doubt of the conservation of energy — of the atomic theory etc. etc., hold good, and I cannot see that there is then necessarily any purpose. Would there be purpose if the lowest organisms alone destitute of consciousness existed in the moon? [56]

Darwin continues:

> Nevertheless you have expressed my inward conviction, though far more vividly and clearly than I could have done, that the Universe is not the result of chance. But then with me the horrid doubt always arises whether the convictions of man’s mind, which has been developed from the mind of the lower animals, are of any value or at all trustworthy. Would any one trust in the convictions of a monkey’s mind, if there are any convictions in such a mind? [57]

An agnostic indeed!

Should Darwin have gone all the way to atheism? This seems to be the assumption of many. The title of Sam Harris’s book, **The End of Faith**, tells the tale. He states flatly that “the truth is that religious faith is simply unjustified belief in matters of ultimate concern — specifically in propositions that promise some mechanism by which human life can be spared the ravages of time and death. Faith is what credulity becomes when it finally achieves escape velocity from the

---

[56] Letter from Charles Darwin to William Graham, 3 July 1881, *Darwin Correspondence Project*, University of Cambridge, https://tiny.pl/wrf11 [10.10.2022].

[57] Letter from Darwin to Graham, 3 July 1881.

constraints of terrestrial discourse — constraints like reasonableness, internal coherence, civility, and candor".[58]

Let us now go back to Hume. He then was caught on the argument to the best explanation. Now, a law-bound explanation of design is no longer impossible. The way was open to Hume to declare for atheism. Whether he would have done it is another matter. Whether Darwin would have forced him to become an atheist is up for doubt. Richard Dawkins said "Darwin made it possible to be an intellectually fulfilled atheist".[59] There is certainly no compulsion to be an atheist. Indeed, you can go on believing fully as a Christian, although you might now be more inclined to put your money on revealed religion rather than natural religion. This is a stance taken independently by many Christians in the last two centuries. Inspired particularly by Søren Kierkegaard, the feeling is that faith is undercut if it is backed up by reason. Faith is no longer courageous, if it is no longer a leap into the absurd. Many would not go this far but would agree — with the traditional position of St. Thomas — that faith must come first. This was certainly the stance of the great nineteenth-century theologian John Henry Newman. "I believe in design because I believe in God; not in a God because I see design".[60] As a Christian, one believes in faith all about the Christian God, and then one fleshes this out by looking at the world and using reason. After all, that is what being made in the image of God is all about.

Whatever you may think about the argument from design, this does not exhaust natural theology. There are other proofs for the existence of God, and there are still arguments against the existence of God. We have seen reason to think that the argument from miracles is perhaps less convincing than formerly — Darwin's theory does not deny miracles, but it certainly starts to make a divine intervention less pressing. Other arguments — the ontological argument and the causal argument, for instance — have to be considered independently, on their merits. The biggest argument against God is the traditional argument from evil. An all-power-

---

[58] Sam Harris, **The End of Faith: Religion, Terror, and the Future of Reason**, Free Press, New York 2004, p. 65.

[59] Richard Dawkins, **The Blind Watchmaker: Why the Evidence of Evolution Reveals a Universe Without Design**, Norton, New York, p. 6.

[60] Charles Stephen Dessain and Thomas S.J. Gornall (eds.), **The Letters and Diaries of John Henry Cardinal Newman**, Vol. XXIV, Oxford University Press, Oxford 1973, p. 97.

ful, all-knowing and all-loving God would not let evil exist. This powerful passage is from **The Brothers Karamazov** (1879):

> "Tell me yourself, I challenge your answer. Imagine that you are creating a fabric of human destiny with the object of making men happy in the end, giving them peace and rest at last, but that it was essential and inevitable to torture to death only one tiny creature — that baby beating its breast with its fist, for instance — and to found that edifice on its unavenged tears, would you consent to be the architect on those conditions? Tell me, and tell the truth".
>
> "No, I wouldn't consent," said Alyosha softly. [61]

There are some things an all-loving God would not allow, not even for the eternal salvation of every human being, past and present. Moreover, we should remember that this was written before the Holocaust.

Traditionally, the response to the problem of evil divides it into two: natural evil and moral evil. [62] Natural evil focuses on natural mishaps like the Lisbon earthquake; less dramatic, like the painful, incurable cancer of a small child. [63] Moral evil focuses on free will. It is better that Heinrich Himmler had free will, than not, even though it did lead to the Final Solution and the death of six million Jews. Interestingly, Darwinism has been taken as relevant to both natural and moral evil. Even more interestingly — perhaps "paradoxically" is a better word — Darwin has been taken as supportive of the two approaches. In the case of the natural evil, it is Richard Dawkins of all people who made the point that natural selection clearly leads to pain and suffering. [64] This is what the struggle for existence is all about. Darwin wrote to Asa Gray on the subject: "I cannot persuade myself that a beneficent and omnipotent God would have designedly created the Ichneumonidæ with the express intention of their feeding within the living bodies of

---

[61] Fyodor Dostoevsky, **The Brothers Karamazov: A Novel in Four Parts and an Epilogue**, trans. David McDuff, *Penguin Classics*, Penguin Group, London 2003, p. 290.

[62] See Ruse, **Can a Darwinian be a Christian…**.

[63] See Brian Davies and Michael Ruse, **Taking God Seriously: Two Different Voices**, Cambridge University Press, Cambridge — New York — Port Melbourne — New Delhi — Singapore 2021.

[64] See Richard Dawkins, "Universal Darwinism", in: Derek S. Bendall (ed.), **Evolution from Molecules to Men**, Cambridge University Press, Cambridge — London — New York — New Rochelle — Sydney — Melbourne 1983, pp. 403–425.

caterpillars, or that a cat should play with mice".[65] Dawkins stresses what we have been stressing, namely the design-like nature of organisms, and he argues that the only way that such design-like organisms could have been created is through natural selection. Lamarckism, the inheritance of acquired characteristics, is empirically false, saltations (jumps from one form to another) are inadequate — they just lead to randomness — and there really is no other game in town. So, natural evil is an inevitable consequence of getting organisms naturally, and this includes humans.

Moral evil, depending on free will, raises the question of the plausibility of the free will. Darwinism stresses that nature is law-bound. Does this not preclude freedom of choice? Calvinists are right. Everything is predestined. Free will is only possible if we can escape law, and we cannot. In response, philosophers distinguish between two takes on the free will problem. Libertarianism, which has nothing to do with the political philosophy of Ayn Rand, says we can escape laws. Kant thought this possible. In compatibilism, free will can occur only with a law frame. Hume thought in this way, probably, reflecting the Calvinist background of Protestant Scots. In America, Jonathan Edwards endorsed it. In support of their position, compatibilists argue that the absence of laws does not imply freedom. It implies craziness. If the Queen took off all her clothes before she appeared on the balcony of the Buckingham Palace, we would not applaud her actions, but worry about her mental health. All training is designed, not to preclude freedom, but the very opposite: the freedom to make reasoned choices and not to act on blind prejudice.

Understood in this light, the Darwinian is clearly going to be a compatibilist. Now, let us add a nice point. Evolutionists distinguish between *r* reproductive strategies and *K* reproductive strategies.[66] The former, *r* strategies, put the emphasis on having lots of offspring but little parental care, which can be exemplified with herrings. The latter, *K* strategies, put the emphasis on few offspring but much parental care, like it is among primates. The former strategies make sense when conditions fluctuate, for example: famine or feast. The *r* strategies can take full advantage of good times and these more than balance bad times. The *K* strategies

[65] Letter from Charles Darwin to Asa Gray, 22 May 1860, in: Frederick Burkhardt (ed.), **The Correspondence of Charles Darwin**, Vol. 8, Cambridge University Press, Cambridge 1985, p. 224.

[66] See Robert H. MacArthur and Edward O. Wilson, **The Theory of Island Biogeography**, *Princeton Landmarks in Biology Series*, Princeton University Press, Princeton 1967.

make sense when conditions are stable. You can rely on a steady background and take time raising offspring. Humans, obviously, are the supreme *K* strategists. Think of the time it takes for our offspring to mature. The *r* strategist has little need of free will. If a rain shower washes away a crowd of ants, too bad. Rather than putting effort into raising far fewer who might react to the shower and try to escape, the queen is better off producing many more to take their place. Humans cannot afford to lose offspring every time it rains. So, we need to have a dimension of freedom. If it starts to rain, stop shopping and go to Starbucks for a latte, until it is over. We are like Mars Rover. [67] It is completely governed by law, but it does not have to wait for instructions from Earth every time it meets an obstacle. Is a rock in the way? Go around it, rather than come to grief trying to ride up the side. In other words, on both fronts, Darwinism is supportive of traditional answers to the problem of evil. This is not to say that they are now adequate. I doubt anything like this is going to move Dostoevsky's Alyosha. I suspect most people are supremely unworried as to whether Heinrich Himmler was or was not like Mars Rover. He was grotesquely inhumane and no excuse about the value of his free will is going to affect that judgment. Enough said.

Fine Tuning

Or is it enough? Have we, perhaps, sold design short? I want to conclude this essay by looking at two groups who think the discussion is ending too quickly. There is more to design that the eviscerated machine-metaphor analysis that Darwin offers us. Some think this opens the way back to the Christian God; others think, perhaps, God but not the traditional Christian version; and yet others think, maybe, no God at all. I shall look first at the group that strikes me as putting enthusiasm and wish fulfillment above critical thinking. Then, the group that offers a much more interesting challenge to the Darwinian position presented in this essay. They may or may not be right, but they should be taken seriously.

To start with the first group, its members champion design, not in biology, but in physics. This is the so-called "fine-tuning" argument which argues the basic constants of the universe are not random, but carefully thought out and chosen,

[67] See Daniel C. Dennett, **Elbow Room: The Varieties of Free Will Worth Wanting**, The MIT Press, Cambridge 1984.

otherwise life and much else would be impossible. [68] Hence, God makes a comeback. Why should we think the universe is fine-tuned? Several physical arguments are offered, all along the line of "if this had not been exactly as it is, that would not have happened, and so no life would have been possible". What would be an example? The carbon atom is a popular choice. [69] In the early stages of the universe, there were no carbon atoms. At that point, everything was just hydrogen and helium. For carbon to be produced, we need three helium nuclei. Normally, even with the right ingredients nothing happens because the energy of carbon is way below that of three helium nuclei — as things normally are, the nuclei could not come together and stay that way. They are too hyped up, as it were. Fortuitously, however, there is a variant, radio-active form of carbon. It has just the higher energy that is needed and so everything works out perfectly — this energy of the radio-active form is precisely that needed to make carbon. Anything a little more, it would not work. Anything a little less, it would not work. The actual energy level is right on target. Like Goldilocks' third try at the Three Bears dishes of porridge, it is just fine. However, before you get all excited and think that nature is not just fine but fine-tuned, the very skeptical physics Nobel Laureate Steven Weinberg asks us to keep questioning. How do you get the three helium nuclei in the first place? They come together in a two-part process. First, two of them combine to make beryllium. Only then is the third one added to make carbon. It turns out that looking at things from this perspective, there is a lot more room for flexibility — there is a wider range of energy levels that would let these processes move forward. There is thus no unique possible energy needed to make carbon. All in all, therefore, perhaps things are not so tightly designed.

The trouble with the arguments in favor of fine-tuning is that we are just working from ourselves — from the world we know — and putting probabilities on things is such guesswork. Think of a number, double it, and the answer you want is a half. The fine-tuning enthusiasts start from premises no one would deny. Of course, we, humans, could not function on a planet where, because it is bigger, the gravitational attraction is (let us say) twice as strong. As we are constituted

---

[68] See Simon Friederich, "Fine-Tuning", first published Aug 22, 2017; substantive revision Nov 12, 2021, "Stanford Encyclopedia of Philosophy Archive", Winter 2021 Edition, https://tiny.pl/w7vfm [09.10.2022].

[69] See Steven Weinberg, "A Designer Universe?", *New York Review of Books* 1999, Vol. 46, No. 16, pp. 46–48.

now, the strain on our limbs and our internal organs like the heart would lead to early death. Yet then the fine tuners go astray by assuming that this is all there is to be said on the subject. This is a mistake. If we were on a bigger planet, then natural selection would have made us so that we could live there. We might, for instance, have evolved with elephantine-sized legs. Or, more plausibly, perhaps, like whales, we could have spent most of our time in the water where we would weigh that much less, and so presumably we would have adaptations like dolphins for living an aquatic life, our hearts, and lungs and (obviously most important) brains could be very human-like. I am not sure that advanced civilization is beyond mermen and mermaids. Moreover, this is all before you start to think of the trendy new notion of "multiverses". [70] Perhaps, our universe is just one of an infinite number, some of which work, some of which do not, some of which support life, some of which do not. We are right back to winning the lottery without any fraud behind our success. We could not buy the Mercedes if we had not won it, but winning it was no miracle.

Romanticism

Let us turn now to the second, more-interesting challenge to the Darwinian analysis. By the end of the eighteenth century, with the failure of mechanism to explain organisms, there were those who started to champion the organicist metaphor, thinking that in the Scientific Revolution it had been discarded too quickly. [71] These "Romantics", as they were called, included the poet Johann Wolfgang von Goethe, the anatomist Lorenz Oken, and, above all, the philosopher Friedrich Schelling. [72]. As a teenager, Schelling had written a sixty-page essay on the **Timaeus**. It had a lasting influence. "The key to the explanation of the entirety of the Platonic philosophy is noticing that Plato everywhere carries the subjective

[70] See George F.R. Ellis, "Does the Multiverse Really Exist? Proof of Parallel Universes Radically Different From Our Own May Still Lie Beyond the Domain of Science", *Scientific American* 2011, Vol. 305, No. 2, pp. 38–43.

[71] See Andrew Cunningham and Nicholas Jardine (eds.), **Romanticism and the Sciences**, Cambridge University Press, Cambridge — New York — Port Chester — Melbourne — Sydney 1990; Robert J. Richards, **The Romantic Conception of Life: Science and Philosophy in the Age of Goethe**, University of Chicago Press, Chicago 2003.

[72] See David Knight, "Romanticism and the Sciences", in: Cunningham and Jardine (eds.), **Romanticism and the Sciences...**, pp. 13–24.

over to the objective". [73] Schelling saw the world in organic terms, meaning that he thought there is value to be found out in the world, it is not just ascribed by us to value-free machines:

> Even in mere organized matter there is life, but a life of a more restricted kind. This idea is so old, and has hitherto persisted so constantly in the most varied forms, right up to the present day — (already in the most ancient times it was believed that the whole world was pervaded by an animating principle, called the world-soul, and the later period of Leibniz gave every plant its soul) — that one may very well surmise from the beginning that there must be some reason latent in the human mind itself for this natural belief. [74]

The world is something that produces itself, has its developing powers inside, as an unfurling organism is driven by forces within, rather than without. One goes from the simple to the complex, from the undifferentiated to the highly differentiated. "Nature should be Mind made visible, Mind the invisible nature. Here then, in the absolute identity of Mind in us and Nature outside us, the problem of the possibility of a Nature external to us must be resolved. The final goal of our further research is, therefore, this idea of Nature; if we succeed in attaining this, we can also be certain to have dealt satisfactorily with that Problem". [75] Schelling saw the world in constant motion, and we, humans, come at the top. "It is One force, One interplay and weaving, One drive and impulsion to ever higher life". [76]

Note the relevance of all of this to the theme of this essay. For the Darwinian, design is a product of a blind law. It is brought on by the external force of natural selection. Design in itself has no absolute value. It is neither good nor bad. It is we who make the judgment. The eye of humans is a good thing for us. The fang of a snake is a bad thing for us, although it might well be a very good thing for the snake. Under the organicist model, the design flows naturally from within. The flower grows naturally: first, a bud, and then, an opening in all its splendor and

---

[73] Friedrich Wilhelm Joseph von Schelling, **On the History of Modern Philosophy,** trans. Andrew Bowie, Cambridge University Press, Cambridge 1833, p. 212.

[74] Friedrich Wilhelm Joseph von Schelling, **Ideas for a Philosophy of Nature — as Introduction to the Study of this Science 1797**, trans. Errol E. Harris and Peter Heath, Cambridge University Press, Cambridge 1988, p. 35.

[75] von Schelling, **Ideas for a Philosophy of Nature…**, p. 42.

[76] S.R. Morgan, "Schelling and the Origins of His *Naturphilosophie*" in: Cunningham and Jardine (eds.), **Romanticism and the Sciences…**, p. 35 [25–37].

functioning to attract pollinating insects. For the Platonist, the design is Design, produced by intelligence. For the Aristotelian it is something that emerges from the natural value-laden laws of nature. They are infused with soul in some sense.

Where this leaves someone like Schelling is a matter for inquiry. Someone like him could be a Christian, but equally they might be a non-believer, simply thinking that the value-laden world is the way things are. Certainly, for Schelling, God is within the organicism circle, developing and of great value. "God is himself bound to nature through freely willed love; he does not require her and yet will not exist without her. For love is not the result of two beings requiring one another, but it occurs when each could exist for itself,... yet where neither can exist morally without the other". [77] There is a shift from traditional Protestant theology. God traditionally is thought not to want anything from us. In the words of Martin Luther: "a Christian lives not in himself, but in Christ and in his neighbor. Otherwise he is not a Christian. He lives in Christ through faith, in his neighbor through love. By faith he is caught up beyond himself into God. By love he descends beneath himself into his neighbor". [78] Schelling's idealism, his organicism, implying his holism for the plant develops as a whole and not in parts, means that God is interacting with us. He is not the eternal, separate entity posited by St. Augustine and others.

Much influenced by Schelling was Darwin's contemporary Herbert Spencer. [79] As an evolutionist, he thought less in terms of natural selection and more in terms of the Lamarckian processes, the inheritance of acquired characteristics. [80] He was a holist, for whom thinking societies are like organisms. [81] Moreover, he was a fanatical progressionist:

> This law of organic progress is the law of all progress. Whether it be in the development of the Earth, in the development of Life upon its surface, in the development of Society, of Government, of Manufactures, of Commerce, of Language, Literature, Sci-

[77] Richards, **The Romantic Conception of Life...**, p. 146.

[78] Martin Luther, **Three Treatises**, Fortress Press, Minneapolis 1970, p. 309.

[79] See Ruse, **A Philosopher Looks at Human Beings...**.

[80] See Herbert Spencer, "A Theory of Population, Deduced from the General Law of Animal Fertility", *Westminster Review* 1852, Vol. 1, No. 2, pp. 468–501, Robert J. Richards, **Darwin and the Emergence of Evolutionary Theories of Mind and Behavior**, University of Chicago Press, Chicago 1987.

[81] See Herbert Spencer, "The Social Organism", *Westminster Review* 1860, Vol. LXXIII, pp. 90–121.

> ence, Art, this same evolution of the simple into the complex, through successive differentiations, holds throughout. [82]

He explained that the English language is more complex and hence above all others. Expanding on this, grabbing ideas from physics, Spencer suggested that external forces cause things get out of equilibrium, then, as they strive to reachieve equilibrium, they rise higher. History, therefore, is a series of stages, going from one stable level to another (higher) one — "Dynamic equilibrium". [83]

Following Spencer came the French philosopher Henri Bergson, the author of **L'évolution créatrice**, published in 1907 (English translation 1911), a champion of the neo-Aristotelian life force, the *élan vital* — hence, better known as a "vitalist", rather than a more comprehensive "organicist". The philosophy is the same and is derivative: deeply Aristotelian, including the importance of the final cause. "The 'vital principle' may indeed not explain much, but it is at least a sort of label affixed to our ignorance, so as to remind us of this occasionally, while mechanism invites us to ignore that ignorance". [84] Expectedly, vitalism speaks to "internal finality". With predictable conclusions: "not only does consciousness appear as the motive principle of evolution, but also, among conscious beings themselves, man comes to occupy a privileged place. Between him and the animals the difference is no longer one of degree, but of kind". [85] More than this even: "in the last analysis, man might be considered the reason for the existence of the entire organization of life on our planet". [86]

A little later, crossing the Atlantic, we encounter the transferred Englishman, Alfred North Whitehead. [87] The world has value, in some sense it is living, and so, naturally, one thinks of mind as being all-pervasive. "The doctrine that I am maintaining is that neither physical nature nor life can be understood unless we fuse

---

[82] Herbert Spencer, "Progress: Its Law and Cause", *Westminster Review* 1857, Vol. 67, No. 132, p. 245.

[83] See Herbert Spencer, **First Principles**, Williams and Norgate, London 1862.

[84] Henri Bergson, **Creative Evolution**, trans. Arthur Mitchell, Henry Holt and Company, New York 1911, p. 42.

[85] Bergson, **Creative Evolution…**, p. 34.

[86] Bergson, **Creative Evolution…**, p. 35.

[87] See Alfred North Whitehead, **Science and the Modern World: Lowell Lectures, 1925**, Cambridge University Press, Cambridge 1926.

them together as essential factors in the composition of 'really real' things whose interconnections and individual characters constitute the universe". [88] Continuing: "this sharp division between mentality and nature has no ground in our fundamental observation. We find ourselves living within nature". Hence: "I conclude that we should conceive mental operations as among the factors which make up the constitution of nature". [89] It is the perceived unacceptability of the traditional God of Christianity, eternal and unchanging, that is the raison d'être for Whitehead's approach to the God problem, developed as it was into the so-called "Process Theology". Whitehead and his followers wanted nothing to do with a God who is unmoved — could not be moved because He is eternal and unchanging — by the death of Anne Frank in Bergen-Belsen. In any case, as an out-and-out follower of Schelling, on the one hand, Whitehead took the inherent change of organicism as all-important, and, on the other hand, he was totally committed to a God in the world, rather than a God who is in some sense logically separate. Remember: "Nature should be Mind made visible, Mind the invisible nature. Here then, in the absolute identity of Mind in us and Nature outside us, the problem of the possibility of a Nature external to us must be resolved". [90] Whitehead writes:

> The vicious separation of the flux from the permanence leads to the concept of an entirely static God, with eminent reality, in relation to an entirely fluent world, with deficient reality. But if the opposites, static and fluent, have once been so explained as separately to characterize diverse actualities, the interplay between the thing which is static and the things which are fluent involves contradiction at every step in its explanation. [91]

Continuing:

> The final summary can only be expressed in terms of a group of antitheses, whose apparent self-contradictions depend on neglect of the diverse categories of existence. In each antithesis there is a shift of meaning which converts the opposition into a contrast. [92]

---

[88] Alfred North Whitehead (ed.), **Modes of Thought**, Macmillan Co., New York 1938, p. 205.

[89] Whitehead (ed.), **Modes of Thought...**, p. 214.

[90] von Schelling, **Ideas for a Philosophy of Nature...**, p. 42.

[91] Alfred North Whitehead, **Process and Reality: An Essay in Cosmology,** Free Press, New York 1978, p. 346.

[92] Whitehead, **Process and Reality...**, p. 356.

It is as true to say that God is permanent and the World fluent as it is that the World is permanent and God is fluent. Whitehead's God is a God who evolves with us, working with us to achieve progress, a better world.

Moving to the present and to science, through the mentors he had as a graduate student at Harvard, the eminent evolutionist Edward O. Wilson was deeply influenced by Spencer. In his major work on the evolution of social behavior, **Sociobiology: The New Synthesis**, Wilson tells us that of all animals: "Four groups occupy pinnacles high above the others: the colonial invertebrates, the social insects, the nonhuman mammals, and man". [93] He continues: "Human beings remain essentially vertebrate in their social structure. But they have carried it to a level of complexity so high as to constitute a distinct, fourth pinnacle of social evolution". [94] He concludes by speaking of humans as having "unique qualities of their own". [95] He now launches at length into showing us how humans have crossed over and mounted the "fourth pinnacle" — the "culminating mystery of all biology". [96] All this, as Wilson makes it clear in subsequent writings, is very much part of the general picture. "The overall average across the history of life has moved from the simple and few to the more complex and numerous. During the past billion years, animals as a whole evolved upward in body size, feeding and defensive techniques, brain and behavioral complexity, social organization, and precision of environmental control — in each case farther from the nonliving state than their simpler antecedents did". [97] Wilson talks of selection, but it is not the traditional selection of Darwinism, in which adaptations are always for an individual. Wilson sees selection acting for groups and hence there is a kind of integration, holism, about the nature of species. [98] If this is not an organicist picture of life's history, it

[93] Edward O. Wilson, **Sociobiology: The New Synthesis**, Harvard University Press, Cambridge 1975, p. 379.

[94] Wilson, **Sociobiology…**, p. 380.

[95] Wilson, **Sociobiology…**, p. 382.

[96] Wilson, **Sociobiology…**, p. 382.

[97] Edward O. Wilson, **The Diversity of Life**, Harvard University Press, Cambridge 1992, p. 187.

[98] See David Sloan Wilson and Edward O. Wilson, "Rethinking the Theoretical Foundation of Sociobiology, *Quarterly Review of Biology* 2007, Vol. 82, No. 4, pp. 327–348, https://doi.org/10.1086/522809.

is hard to know what would be. One doubts that Wilson has even heard of Friedrich Schelling, let alone read him, but the tradition lives on. [99]

There is today a vibrant group of evolutionary biologists who declare for organicism — the "New Biologists". [100] However, to conclude this brief survey, let us turn to the philosophers, for there too we find much enthusiasm. The British philosopher John Dupré is blunt. "There are powerful reasons for thinking that emancipation from the mechanistic paradigm is a precondition for true insight into the nature of biological processes". [101] We learn that, at best, natural selection does little. "Where does adaptive change come from? A trivial but sometimes obfuscated point is that it never comes from natural selection". [102] Continuing: "Selection cannot occur unless some other process provides alternatives to select from. It follows that any thesis about the power of natural selection to generate change implicitly presupposes a thesis about a process or processes that generate selectable change". [103] The reader will not be surprised to learn that "our forms of consciousness of which we are capable, are very different from those of other terrestrial animals". [104] Likewise it is with human culture. It "involves the articulation and synchronization of a variety of roles and functions that is different in kind from anything else in our experience". [105] Adding: "our forms of consciousness of

---

[99] See Abraham Gibson, "Edward O. Wilson and the Organicist Tradition", *Journal of the History of Biology* 2013, Vol. 46, No. 4, pp. 599–630, https://doi.org/10.1007/s10739-012-9347-3.

[100] See Kevin Laland, Tobias Uller, Mark W. Feldman, Kim Sterelny, Gerd B. Müller, Aarmin Moczek, Eva Jablonka, John Odling-Smee, Gregory A. Wray, Hopi E. Hoekstra, Douglas J. Futuyma, Richard E. Lenski, Trudy F.C. Mackay, Dolph Schluter, and Joan Strassmann, "Does Evolutionary Theory Need a Rethink?", *Nature* 2014, Vol. 514, No. 7521, pp. 161–164, https://doi.org/10.1038/514161a; Patrick Bateson, Nancy Cartwright, John Dupré, Kevin Laland, and Denis Noble, "New Trends in Evolutionary Biology: Biological, Philosophical and Social Science Perspectives", *Interface Focus* 2017, Vol. 7, No. 5, article number: 20170051, https://doi.org/10.1098/rsfs.2017.0051.

[101] John Dupré, **Processes of Life: Essays in the Philosophy of Biology**, Oxford University Press, Oxford 2012, p. 83.

[102] John Dupré, "The Metaphysics of Evolution", *Interface Focus* 2017, Vol. 7, No. 5, article number: 20160148, p. 5 [1–9], http://dx.doi.org/10.1098/rsfs.2016.0148.

[103] Dupré, "The Metaphysics of Evolution…", p. 103.

[104] John Dupré, **Darwin's Legacy: What Evolution Means Today**, Oxford University Press, Oxford 2003, p. 75.

[105] Dupré, **Darwin's Legacy…**, p. 75.

which we are capable, are very different from those of other terrestrial animals". [106]

A fellow (American) philosopher Jerry Fodor (2007) feels much the same way. Of the correct evolutionary picture, we learn: "The slogan is the evolution of ontogenies. In other words, the whole process of development, from the fertilized egg to the adult, modifies the phenotypic effects of genotypic changes, and thus 'filters' the genotypic options that ecological variables ever have a chance to select from". [107] This, of course, is precisely what the Romantics claim. Look at the development of the individual — the growth of the chimpanzee — you have the answer to the evolution of the group — the evolution of the primates.

Finally, a fellow American philosopher Thomas Nagel stresses that it is precisely the problem of design that makes him turn from the Darwinian, mechanical explanation. He speculates that, possibly, "there are natural teleological laws governing the development of organization over time, in addition to laws of the familiar kind governing the behavior of the elements". [108] He allows that: "[t]his is a throwback to the Aristotelian conception of nature, banished from the scene at the birth of modern science. But I have been persuaded that the idea of teleological laws is coherent, and quite different from the intentions of a purposive being who produces the means to his ends by choice. In spite of the exclusion of teleology from contemporary science, it certainly shouldn't be ruled out a priori". [109] One should add that Nagel is an avowed atheist, so a Platonic option is not really open. As he himself says, Nagel is looking more for "natural teleological laws".

Conclusion

As always, Hume had the measure of things. "In subjects adapted to the narrow compass of human reason, there is commonly but one determination, which carries probability or conviction with it; and to a man of sound judgement, all

[106] Dupré, **Darwin's Legacy…**, p. 75.

[107] Jerry Fodor and Massimo Piattelli-Palmarini, **What Darwin Got Wrong**, Farrar, Straus, and Giroux, New York 2010, p. 27.

[108] Thomas Nagel, **Mind and Cosmos: Why the Materialist Neo-Darwinian Conception of Nature Is Almost Certainly False**, Oxford University Press, New York 2012, p. 66.

[109] Nagel, **Mind and Cosmos…**, p. 66.

other suppositions, but that one, appear entirely absurd and chimerical". [110] The problem is that men of the "sound judgement" so often come to different conclusions. Whewell thought he was right. Darwin thought he was right. The Romantics, Schelling to Nagel, think that they are right. I am not sure that it is my job here to make a decision. I think we can fairly say that Darwin had the measure of the traditional organicists, from Plato to Whewell. He explained design as a matter of blind laws, eternally in motion. At the same time, he explained the problems for traditional design, such as the homologies between organisms. We have just seen, however, that organicism may have been floored. A vigorous group argue that it is not out. One should add that the Darwinians argue with no less vigor that organicism is still not adequate. Responding to Dupre's musings, a Chicago evolutionary biologist Jerry Coyne replies: "We do not need a new philosophical framework for evolution, much as Dupré wants one. Traditional reductionist views are still valid and yielding valid insights (what is microRNA other than a 'bottom-up' phenomenon that regulates genes?)". He adds: "As an evolutionary biologist — which Dupré is not — I think I'd know if my field was in crisis. Yet I haven't heard any recent lamentations from my colleagues". [111]

I will leave matters there. What comes next is an exercise for the reader!

Acknowledgments

I dedicate this essay to the memory of my dear friend of many years' standing, Edward O. Wilson (1929–2021). His writings on science, especially his magisterial "Sociobiology: The New Synthesis", have been a great inspiration. Equally so have been his writings on moral and social issues. I am incredibly proud to have been the coauthor of one of his seminal papers on the relationship between evolutionary biology and the foundations of ethics (Ruse and Wilson 1986). Ed and I always took great joy in the fact that, at first, we were ignored. Now, we are the subject of countless doctoral dissertations showing that what we claim could not possibly be true. Before long, we have predicted that people will be saying that what we claimed is true and they have known it all along! And that about sums up Ed Wil-

[110] Hume, **Dialogues...**, p. 81.

[111] Jerry A. Coyne, "Another Philosopher Proclaims a Nonexistent «Crisis» in Evolutionary Biology", *Why Evolution Is True* 2012, September 7, https://tiny.pl/w7ggg [14.06.2022].

son. He was brilliant, but he always kept a sense of humor and never took himself — or me! — too seriously. I was proud to be his friend.

Michael Ruse

References

ARISTOTLE, **Metaphysics**, Book VIII (H), w: BARNES (ed.), **The Complete Works of Aristotle…**, pp. 115–122, 1042a3–1045b27.

BARLOW Nora (ed.), **The Autobiography of Charles Darwin, 1809–1882**, Collins, London 1958.

BARNES Jonathan (ed.), **The Complete Works of Aristotle**, Vol II, Princeton University Press, Princeton 1984.

BARRETT Paul H., GAUTREY Peter J., HERBERT Sandra, KOHN David, and SMITH Sydney (eds.), **Charles Darwin's Notebooks, 1836–1844: Geology, Transmutation of Species, Metaphysical Enquiries**, Cornell University Press, Ithaca — London 1987.

BATESON Patrick, CARTWRIGHT Nancy, DUPRÉ John, LALAND Kevin, and NOBLE Denis, "New Trends in Evolutionary Biology: Biological, Philosophical and Social Science Perspectives", *Interface Focus* 2017, Vol. 7, No. 5, article number: 20170051, https://doi.org/10.1098/rsfs.2017.0051.

BENDALL Derek S. (ed.), **Evolution from Molecules to Men**, Cambridge University Press, Cambridge — London — New York — New Rochelle — Sydney — Melbourne 1983.

BERGSON Henri, **Creative Evolution**, trans. Arthur Mitchell, Henry Holt and Company, New York 1911.

BERGSON Henri, **L'évolution créatrice**, Félix Alcan, Paris 1907.

BIRCH Thomas (ed.), **The Works of Robert Boyle**, Vol. 5, Georg Olms, Hildesheim 1966.

BOYLE Robert, "A Disquisition About the Final Causes of Natural Things", in: BIRCH (ed.), **The Works of Robert Boyle…**, pp. 392–444.

BURKHARDT Frederick (ed.), **The Correspondence of Charles Darwin**, Vol. 8, Cambridge University Press, Cambridge 1985.

COOPER John M. (ed.), **Plato: Complete Works**, Hackett Publishing Co., Indianapolis 1997.

COYNE Jerry A., "Another Philosopher Proclaims a Nonexistent «Crisis» in Evolutionary Biology", *Why Evolution Is True* 2012, September 7, https://tiny.pl/w7ggg [14.06.2022].

Cunningham Andrew and Jardine Nicholas (eds.), **Romanticism and the Sciences**, Cambridge University Press, Cambridge — New York — Port Chester — Melbourne — Sydney 1990.

Darwin Charles, **On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life**, John Murray, London 1859.

Darwin Charles, **On the Various Contrivances by which British and Foreign Orchids are Fertilized by Insects, and On the Good Effects of Intercrossing**, John Murray, London 1862.

"Darwin's Abstract of John Macculloch 1837", in: Barrett, Gautrey, Herbert, Kohn, and Smith (eds.), **Charles Darwin's Notebooks, 1836–1844…**, pp. 632–641.

Davies Brian and Ruse Michael, **Taking God Seriously: Two Different Voices**, Cambridge University Press, Cambridge — New York — Port Melbourne — New Delhi — Singapore 2021.

Davis Edward B. and Hunter Michael (eds.), **Robert Boyle: A Free Enquiry into the Vulgarly Received Notion of Nature**, *Cambridge Texts in the History of Philosophy*, Cambridge University Press, Cambridge 1996.

Dawkins Richard, **The Blind Watchmaker: Why the Evidence of Evolution Reveals a Universe Without Design**, Norton, New York.

Dawkins Richard, "Universal Darwinism" in: Bendall (ed.), **Evolution from Molecules…**, pp. 403–425.

Dennett Daniel C., **Elbow Room: The Varieties of Free Will Worth Wanting**, The MIT Press, Cambridge 1984.

Dessain Charles Stephen and Gornall Thomas S.J. (eds.), **The Letters and Diaries of John Henry Cardinal Newman**, Vol. XXIV, Oxford University Press, Oxford 1973.

Dijksterhuis Eduard Jan, **The Mechanization of the World Picture**, trans. Carry Dikshoorn, Oxford University Press, Oxford 1961.

Dostoevsky Fyodor, **The Brothers Karamazov: A Novel in Four Parts and an Epilogue**, trans. David McDuff, *Penguin Classics*, Penguin Group, London 2003.

Dupré John, **Darwin's Legacy: What Evolution Means Today**, Oxford University Press, Oxford 2003.

Dupré John, **Processes of Life: Essays in the Philosophy of Biology**, Oxford University Press, Oxford 2012.

Dupré John, "The Metaphysics of Evolution", *Interface Focus* 2017, Vol. 7, No. 5, article number: 20160148, http://dx.doi.org/10.1098/rsfs.2016.0148.

ELLIS George F.R., "Does the Multiverse Really Exist? Proof of Parallel Universes Radically Different From Our Own May Still Lie Beyond the Domain of Science", *Scientific American* 2011, Vol. 305, No. 2, pp. 38–43.

FODOR Jerry, "Why Pigs Don't Have Wings. The Case Against Natural Selection", *London Review of Books* 2007, Vol. 29, No. 20, https://tiny.pl/w7vd8 [09.10.2022].

FODOR Jerry and PIATTELLI-PALMARINI Massimo, **What Darwin Got Wrong**, Farrar, Straus, and Giroux, New York 2010.

FRIEDERICH Simon, "Fine-Tuning", first published Aug 22, 2017; substantive revision Nov 12, 2021, "Stanford Encyclopedia of Philosophy Archive", Winter 2021 Edition, https://tiny.pl/w7vfm [09.10.2022].

GHISELIN Michael T., **The Triumph of the Darwinian Method**, University of California Press, Berkeley 1969.

GIBSON Abraham, "Edward O. Wilson and the Organicist Tradition", *Journal of the History of Biology* 2013, Vol. 46, No. 4, pp. 599–630, https://doi.org/10.1007/s10739-012-9347-3.

GRAY Asa, "Scientific Worthies", *Nature* 1874, Vol. 10, No. 240, pp. 79–81, https://doi.org/10.1038/010079a0.

HARRIS Sam, **The End of Faith: Religion, Terror, and the Future of Reason**, Free Press, New York 2004.

HUME David, **Dialogues Concerning Natural Religion**, Second ed., Penguin Books, London 1779.

KANT Immanuel, **Critique of the Power of Judgment**, trans. Paul Guyer and Eric Matthews, *The Cambridge Edition of the Works of Immanuel Kant*, Cambridge University Press, Cambridge 2000.

KNIGHT David, "Romanticism and the Sciences", in: CUNNINGHAM and JARDINE (eds.) **Romanticism and the Sciences…**, pp. 13–24.

KUHN Thomas, **The Structure of Scientific Revolutions**, University of Chicago Press, Chicago — New York 1962.

LALAND Kevin, ULLER Tobias, FELDMAN Mark W., STERELNY Kim, MÜLLER Gerd B., MOCZEK Aarmin, JABLONKA Eva, and ODLING-SMEE John, "The Extended Evolutionary Synthesis: Its Structure, Assumptions and Predictions", *Proceedings of the Royal Society* 2015, Vol. 282, No. 1813, https://doi.org/10.1098/rspb.2015.1019.

LALAND Kevin, ULLER Tobias, FELDMAN Mark W., STERELNY Kim, MÜLLER Gerd B., MOCZEK Aarmin, JABLONKA Eva, ODLING-SMEE John, WRAY Gregory A., HOEKSTRA Hopi E., FUTUYMA Douglas J., LENSKI Richard E., MACKAY Trudy F.C., SCHLUTER Dolph, and STRASSMANN Joan, "Does Evolutionary Theory Need a Rethink?", *Nature* 2014, Vol. 514, No. 7521, pp. 161–164, https://doi.org/10.1038/514161a.

Lennox James G., "Darwin *Was* a Teleologist", *Biology and Philosophy* 1993, Vol. 8, No. 4, pp. 409–421, https://doi.org/10.1007/BF00857687.

Letter from Charles Darwin to Asa Gray, 5 June 1874, *Darwin Correspondence Project*, University of Cambridge, https://tiny.pl/w73vj [10.10.2022].

Letter from Charles Darwin to William Graham, 3 July 1881, *Darwin Correspondence Project*, University of Cambridge, https://tiny.pl/wrf11 [10.10.2022].

Luther Martin, **Three Treatises**, Fortress Press, Minneapolis 1970.

MacArthur Robert H. and Wilson Edward O., **The Theory of Island Biogeography**, *Princeton Landmarks in Biology Series*, Princeton University Press, Princeton 1967.

Morgan S.R., "Schelling and the Origins of His *Naturphilosophie*" in: Cunningham and Jardine (eds.) **Romanticism and the Sciences…**, pp. 25–37.

Nagel Thomas, **Mind and Cosmos: Why the Materialist Neo-Darwinian Conception of Nature Is Almost Certainly False**, Oxford University Press, New York 2012.

Owen Richard, **On the Nature of Limbs**, John Van Voorst, London 1849.

Paley William, **Natural Theology; Or, Evidences of the Existence and Attributes of the Deity**, R. Faulder — John Morgan, London — Philadelphia 1802.

Plato, **Phaedo**, trans. G.M.A Grube, in: Cooper (ed.), **Plato: Complete Works…**, pp. 49–100.

Plato, **Timaeus**, trans. Donald J. Zeyl, in: Cooper (ed.), **Plato: Complete Works…**, pp. 1224–1291.

Richards Robert J., **Darwin and the Emergence of Evolutionary Theories of Mind and Behavior**, University of Chicago Press, Chicago 1987.

Richards Robert J., **The Romantic Conception of Life: Science and Philosophy in the Age of Goethe**, University of Chicago Press, Chicago 2003.

Ruse Michael, **A Philosopher Looks at Human Beings**, Cambridge University Press, Cambridge 2021.

Ruse Michael, **Can a Darwinian be a Christian? The Relationship between Science and Religion**, Cambridge University Press, Cambridge 2001.

Ruse Michael, **Darwin and Design: Does Evolution Have a Purpose?**, Harvard University Press, Cambridge 2003.

Ruse Michael (ed.), **Of the Plurality of Worlds. A Facsimile of the First Edition of 1853: Plus Previously Unpublished Material Excised by the Author Just Before the Book Went to Press; and Whewell's Dialogue Rebutting His Critics, Reprinted from the Second Edition,** University of Chicago Press, Chicago — London 2001.

Ruse Michael, **On Purpose**, Princeton University Press, Princeton 2017.

Ruse Michael, **The Darwinian Revolution: Science Red in Tooth and Claw**, Second Edition, University of Chicago Press, Chicago 1999.

Ruse Michael, "William Whewell and the Argument From Design", *The Monist* 1977, Vol. 60, No. 2, pp. 244–268, https://doi.org/10.5840/monist19776022.

Ruse Michael and Wilson Edward O., "Moral Philosophy as Applied Science", *Philosophy* 1986, Vol. 61, No. 236, pp. 173–192, https://doi.org/10.1515/9781400831296-041.

Sedley David, **Creationism and Its Critics in Antiquity**, University of California Press, Berkeley 2008.

Spencer Herbert, "A Theory of Population, Deduced from the General Law of Animal Fertility", *Westminster Review* 1852, Vol. 1, No. 2, pp. 468–501.

Spencer Herbert, **First Principles**, Williams and Norgate, London 1862.

Spencer Herbert, "Progress: Its Law and Cause", *Westminster Review* 1857, Vol. 67, No. 132, pp. 244–267.

Spencer Herbert, "The Social Organism", *Westminster Review* 1860, Vol. LXXIII, pp. 90–121.

Thomas Aquinas, *Summa Theologica*, trans. Fathers of the English Dominican Province, Christian Classics, London 1981.

Thomas Aquinas, *Summa Theologica*, Vol. I, Burns, Oates and Washbourne, London 1952.

von Schelling Friedrich Wilhelm Joseph, **Ideas for a Philosophy of Nature — as Introduction to the Study of this Science 1797**, trans. Errol E. Harris and Peter Heath, Cambridge University Press, Cambridge 1988.

von Schelling Friedrich Wilhelm Joseph, **On the History of Modern Philosophy,** trans. Andrew Bowie, Cambridge University Press, Cambridge 1833.

Weinberg Steven, "A Designer Universe?", *New York Review of Books* 1999, Vol. 46, No. 16, pp. 46–48.

Whewell William, **Astronomy and General Physics Considered with Reference to Natural Theology. Treatise III**, William Pickering, London 1833.

Whewell William, "Of the Plurality of Worlds: An Essay", in: Ruse (ed.), **Of the Plurality of Worlds…**, pp. 33–322.

Whewell William, **The History of the Inductive Sciences: From the Earliest to the Present Time**, Vol. 3, John W. Parker, London 1837.

Whitehead Alfred North (ed.), **Modes of Thought**, Macmillan Co., New York 1938.

Whitehead Alfred North, "Nature Alive", in: Whitehead (ed.), **Modes of Thought…**, pp. 202–232.

Whitehead Alfred North, **Process and Reality: An Essay in Cosmology** Free Press, New York 1978.

Whitehead Alfred North, **Science and the Modern World: Lowell Lectures, 1925**, Cambridge University Press, Cambridge 1926.

Wilson David Sloan and Wilson Edward O., "Rethinking the Theoretical Foundation of Sociobiology, *Quarterly Review of Biology* 2007, Vol. 82, No. 4, pp. 327–348, https://doi.org/10.1086/522809.

Wilson Edward O., **Sociobiology: The New Synthesis**, Harvard University Press, Cambridge 1975.

Wilson Edward O., **The Diversity of Life**, Harvard University Press, Cambridge 1992.

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**
Philosophical Aspects of Origin s. 63–85
https://doi.org/10.53763/fag.2022.19.2.203
ISSN 2299-0356
ARTYKUŁ ORYGINALNY / ORIGINAL ARTICLE

J. Scott Turner
SUNY College of Environmental Science and Forestry, Syracuse, New York

Do Species *Want* to Evolve?

Received: March 17, 2022. Accepted: June 17, 2022. Published online: October 6, 2022.

Abstract: Darwinism, in all its various forms, seeks to explain evolution without the intervention of intelligence, purposefulness or intentionality: in short, via the abolition of purpose. Yet life is arguably a profoundly purposeful phenomenon, most evident in the phenomenon of adaptation. Modern Darwinism fails because it has no coherent theory of adaptation, and hence no coherent theory of life. Without this, it cannot claim to be a coherent theory of evolution. Here, I argue that a coherent theory of evolution will arrive when the inherent purposefulness of life can be reincorporated into our evolutionary thinking. Life's fundamental property of homeostasis, coupled with the expanding conception of hereditary memory emerging from epigenetics and niche construction theory, can credibly restore purpose to our thinking about evolution. The evolution of lineages will no longer then be under the control of natural selection, but rather imbued with striving and intentionality: with "wanting" to evolve.

Keywords:
Darwinism; teleonomy; purposefulness; homeostasis; cognition; evolution; hereditary memory; niche construction theory

Introduction

Natural history prior to Darwin was frankly teleological, finding its most cogent expression in the famous argument from design, exemplified by William Paley's doctrines of natural theology. [1] One could not reflect upon nature's marve-

[1] See William Paley, **Natural Theology; Or, Evidences of the Existence and Attributes of the Deity**, John Morgan, Philadelphia 1802; Jonathan R. Topham, "Biology in the Service of Natural Theology: Paley, Darwin, and *Bridgewater Treatises*", in: Denis R. Alexander and Ronald L. Numbers (eds.), **Biology and Ideology From Descartes to Dawkins**, University of Chicago Press, Chicago 2010,

lous contrivances, so the argument went, without being led to reflections on the nature of the contriver. In turn, such reflections led inevitably, again according to the argument, to affirmation of the Platonic God.

For Charles Darwin, and later Alfred Russell Wallace, species were the most marvelous of nature's contrivances, so it was natural for them to ask the basic question: how did species come to be? The Linnaean species concept that then prevailed was little help. Rather, Linnaeus had sought to bring order to the taxonomic chaos that then prevailed: for example, there was no standard scheme for naming species, which were typically named with long Latin descriptions. Linnaeus pursued his task by asking nature to speak for itself. But Linnaeus was not an evolutionist, and the question Linnaeus wanted to ask was what the organization of living nature had to say about the mind of the Creator. [2] Linnaeus' concept of the species was thus frankly teleological and Platonic: species were a striving of living nature toward abstract and disembodied idea ls. If species could be defined logically by their physical characteristics, such as the number of stamens in the flower, this reflected something about the logical mind of the Creator.

Platonic idealism, no matter what its context, is inconsistent with the very idea of evolution: ideals are eternal, and therefore so should species be. By the early 19th century, this had become an unsustainable stance. The growing evidence of the fossil record was making it progressively clear that species were not eternal. They changed over time, and originated and became extinct at certain times. At the same time, a growing mountain of evidence was pointing to the Earth's long history and the transience of species, both working over time scales that were inconceivably vast. For Darwin, evolution was a real phenomenon that demanded explanation, which idealist conceptions of species like Linnaeus's could not provide.

When Darwin was a young man, evolution was "in the air", and was firmly implanted in his mind by his grandfather, Erasmus, who had been an early advocate of the newly emerging "transmutationism". [3] Natural history was revealing a re-

pp. 88–113.

[2] See Ernst Mayr, **The Growth of Biological Thought: Diversity, Evolution, and Inheritance**, The Belknap Press of Harvard University Press, Cambridge — London 1982.

[3] See Desmond King-Hele (ed.), **Charles Darwin's *The Life of Erasmus Darwin***, Cambridge University Press, New York 2003; Erasmus Darwin, **The Loves of the Plants**, J. Johnson, London 1806;

markable diversity of living forms that, if anything, signaled that living nature was continually pulling away from ideal forms, not striving toward them. Thus, by Darwin's time, the Platonic foundations of natural history had been thoroughly eroded. The challenge taken up by both Darwin and Wallace was to build a new foundation, which both Darwin and Wallace sought to construct by casting the origin of species as a process of natural law, akin to how Newton's law of universal gravitation explained the motions of the planets.

Darwin and Wallace both found their analogue to Newton's universal law of gravitation in Thomas Malthus' emerging macroeconomic theories. [4] Populations were governed by mathematical laws of increase, limited by complementary laws of resource limitations. An inevitable "struggle for existence" would ensue, in which some variants would be more fecund than others. Darwin's and Wallace's conception of natural selection followed inevitably from this Malthusian logic. The proliferation of species, and of Darwin's "endless forms most beautiful", would spin naturally from the clockwork mechanism of natural selection. No conception of teleology, of purposeful striving, was necessary, as it had been for Linnaeus. Indeed, purposefulness was contradictory to the Darwinian conception for how new species came to be.

Since its inception, the Darwinian idea has undergone several radical reinterpretations. By the end of the 19th century, for example, Darwinism was in "eclipse", battered by new theories of inheritance and embryonic development. [5] In the 1920s, it was revived by the genetic theory of natural selection, which reconceptualized it as the sorting of gene variants rather than success in the struggle for existence. [6] In more recent years, the so-called Extended Evolutionary Synthesis has sought to unite divergent strains of evolutionary thought under a common umbrella of Darwinian natural selection. [7]

Erasmus Darwin, **Zoonomia; Or, The Laws of Organic Life. In Three Parts**, Thomas & Andrews, Boston 1809.

[4] See Francis Darwin (ed.), **Charles Darwin: His Life Told in an Autobiographical Chapter and in a Selected Series of His Published Letters**, D. Appleton and Company, New York 1893.

[5] See Peter J. Bowler, **The Eclipse of Darwinism: Anti-Darwinian Evolution Theories in the Decades around 1900**, Johns Hopkins University Press, Baltimore — London 1983.

[6] See Ronald A. Fisher (ed.), **The Genetical Theory of Natural Selection: A Complete Variorum Edition**, Oxford Universisty Press, Oxford — New York 1999.

There has been a common theme through all the reinterpretations of the Darwinian idea, which I call the abolition of purpose. [8] I argue here and elsewhere that this has been Darwinism's fatal mistake. [9] Arguably, living things are distinguished from the non-living world by their purposeful striving toward aptness of form and function. The premise of the Darwinian idea dismisses life's fundamental distinctiveness from the non-living world as illusory. The question must be asked, whether any coherent theory of evolution can emerge that fences off life's purposeful nature, as the Darwinian idea has consistently sought to do.

My argument here is that it cannot. The challenge for evolutionism, I assert, is to build a scientifically credible theory of purpose into our thinking about evolution. What is to follow will be an argument for how this could be done. It is, admittedly, an idiosyncratic one, developed over several years and outlined in three books. [10]

The Problematic Nature of Adaptation

Life's purposeful nature finds its expression in the phenomenon of adaptation: that is to say, adjustment to an environment. Adaptation translates literally as a tendency to aptitude, the ability to adjust form and function to prevailing circumstance. Living things actively do this, so that they may persist through time. The non-living world, in contrast, simply degrades into chaos and entropy.

By the 19th century, natural historians had built up an impressive catalogue of "adaptation stories" all deeply rooted in what we may call the two purposeful philosophies of nature: Platonism and Aristotelianism. [11] The Linnaean concept of species was arguably the culmination of the Platonic natural history tradition (al-

---

[7] See Massimo Pigliucci, "Do We Need an Extended Evolutionary Synthesis?", *Evolution* 2007, Vol. 61, No. 12, pp. 2743–2749.

[8] See Bowler, **The Eclipse of Darwinism…**; Pigliucci, "Do We Need…", pp. 2743–2749; William B. Provine, "The R. A. Fisher — Sewall Wright Controversy" in: Sahotra Sarkar (ed.), **Boston Studies in the Philosophy of Science**, Vol. 142, Kluwer Academic Publishers, Boston 1992, pp. 201–229.

[9] See J. Scott Turner, **Purpose and Desire: What Makes Something "Alive" and Why Modern Darwinism Has Failed to Explain It,** HarperOne, San Francisco 2017.

[10] See Turner, **Purpose and Desire…**; J. Scott Turner, **The Extended Organism: The Physiology of Animal-Built Structures**, Harvard University Press, Cambridge 2000; J. Scott Turner, **The Tinkerer's Accomplice: How Design Emerges from Life Itself**, Harvard University Press, Cambridge — London 2007.

though Platonism has lately been enjoying a renaissance in the form of Intelligent Design Theory). By the 19th century, the Platonic idea had proven inadequate to the species problem, as both Darwin and Wallace appreciated.

If not Platonism, what of Aristotelianism, the other purposeful philosophy? Aristotle had his own theory of adaptation, centered on his concept of the βιος. This was an ideal form and function toward which an organism would continually strive. Each kind of organism was distinguished by a unique βιος: a starfish βιος, a horse βιος, a mosquito βιος, etc. The Aristotelian βιος was therefore every bit as teleological as Plato's ideals, but with an important difference. While Plato's ideals were otherworldly and abstract, Aristotle lodged the βιος within the organism itself. This offered a purposeful perspective on adaptation that Platonic idealism could not provide.

The organism itself was not the βιος, but was the embodied expression of it. A pigeon βιος would direct the *construction* of a pigeon, but the pigeon was not itself the βιος. How the βιος was expressed — that is to say, what form the organism took — depended upon the environment. If the environment was cold, for example, the *expression* of the βιος would change, reshaping the organism in whatever way was needed to ensure that the βιος would persist: thicker plumage, larger body size, etc. This was Aristotelian adaptation.

Like Plato's ideal forms, the Aristotelian βιος is antithetical to the evolutionnary idea. Embedded within its unique explanation for adaptation, however, is a bridge to a coherent theory of evolution. Darwin's own conception of fitness — success in the "struggle for existence" — boils down essentially to subtle variations that equipped certain individuals to compete for scarce resources: to aptitude in form and function, essentially. The question for Darwin was the source of that aptitude: adaptation, in a word.

Darwin himself had compiled innumerable "adaptation stories" which equipped him to test his ideas against the natural world he knew so well. [12] He

---

[11] See Anselm H. Amadio and Lorenzo Minio-Paluello, "Aristotle and Aristotelianism", *Encyclopædia Britannica* 1994, Vol. 14, pp. 55–71; Francisco J. Ayala, "Teleological Explanation in Evolutionary Biology", *Philosophy of Science* 1970, Vol. 37, No. 1, pp. 1–15.

[12] See Charles Darwin, **The Variation of Animals and Plants Under Domestication**, John Murray, London 1868; Charles Darwin, **On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life**, P.F. Collier & Son, New York 1909.

concluded, for example, that for new species to arise from the struggle for existence, adaptation had somehow to be heritable. His solution to this problem conceived of two forms of heritability. "Hard" inheritance would determine the organism's basic form and function: pigeons would always produce pigeon offspring, for example, rather than crow offspring. "Soft" inheritance would transmit adaptation in one generation to the next. Darwin's model of soft inheritance was his theory of pangenesis. [13] Adaptive change during an organism's lifetime would be embodied in particles of soft inheritance which Darwin called gemmules. Adaptation in a tissue, such as darker plumage developed in cold conditions, would produce specific "dark plumage gemmules" that could be conveyed to the gametes and hence to its offspring. In this way, adaptation in individuals could accumulate into adaptation in lineages of organisms: evolution.

Darwin's pangenesis idea failed to find support among his scientific contemporaries, who were increasingly focused on "hard inheritance" — what came to be the Mendelian gene, and ultimately the conception of the gene as nucleotide sequence code in DNA. The failure of pangenesis contributed substantially to Darwinism's early-20th century eclipse. [14] The genetical theory of natural selection [15] breathed new life into the Darwinian idea, but the lifeline was bought at a price. The genetical theory was a theory of hard inheritance only, and this left no room for soft inheritance, and hence no room for life's essential quality of adaptation.

Much of the subsequent history of Darwinism has been a struggle to reconcile the obvious fact of adaptation with a theory of inheritance that denies a place for it. The struggle has led Darwinism into some obvious philosophical traps, such as the tautological explanation of adaptation as the natural selection of "apt function" genes. The struggle has also led Darwinism into deeper and more abstract metaphors for adaptation. These include such concepts as Sewall Wright's adaptive landscapes, adaptive state spaces, the Hutchinsonian niche, *ad hoc* punctuated equilibrium, and, most recently, niche construction theory (NCT). These metaphors have proven to be extraordinarily rich, and have powered Darwinism

[13] See Darwin, **The Variation of Animals…**; William F. McComas, "Darwin's Invention: Inheritance & the «Mad Dream» of Pangenesis", *The American Biology Teacher* 2012, Vol. 74, No. 2, pp. 86–91, https://doi.org/10.1525/abt.2012.74.2.5.

[14] See Bowler, **The Eclipse of Darwinism…**.

[15] See Fisher (ed.), **The Genetical Theory of Natural Selection…**.

into what was arguably its intellectual golden age, stretching approximately from the 1950s to the 1990s. At the heart of these brilliant explorations, however, remained the abolition of purpose, with an ironic result: purpose could not so much be abolished as cloaked behind various forms of cryptoplatonism. The niche concept, for example, is as Platonic a concept as the Linnaean species: it is an abstract metaphor for a species' ideal "place in nature". The Hutchinsonian concept of the niche is descended from this Platonic idea, from which ecologists have spun ethereal (Platonic?) ideas such as hyperdimensional adaptive spaces. More recently, the Extended Evolutionary Synthesis (ESS) has sought to incorporate unrelated trains of evolutionary thought — genetics, developmental biology (evo-devo), and ecology (evo-eco-devo) — into a hoped-for comprehensive Darwinian framework for evolution. The EES remains wedded to the broader program of the abolition of purpose, however: where adaptation is not ignored completely, it barely warrants mention. Evolutionism, it seems, continues to choke on the adaptation nut. Is there a different way to break down the adaptation problem? [16]

Object-Thinking and Process-Thinking in Evolutionism

Modern Darwinism is a theory of objects. The organism is a thing, an object specified by other things, namely material object-genes. Natural selection is a sorting mechanism for organism-objects, from which descend other organism-objects, again specified by gene-objects that are passed from generation to generation. The organism-object evolves through conformity to a niche-object, which comes about through the object-sorting mechanism of natural selection. Species are objective categories of discrete kinds of organism-objects. Such object-thinking can produce a simulacrum of life, but no actual life need ever be involved for it to work. [17]

Actual life is distinguished by adaptation, however, which is not a phenomenon of objects, but of process. The two cannot be separated entirely, of course. Life lives in a physical world, and any life process will inevitably be an expression of flows of matter and energy, constrained by laws of thermodynamics and conservation of mass. A process is not wholly material, however. Processes introduce

[16] See TURNER, **Purpose and Desire…**.

[17] See Jessica RISKIN, **The Restless Clock: A History of the Centuries-Long Argument Over What Makes Living Things Tick**, The University of Chicago Press, Chicago — London 2016.

a dimension of time, for example, that does not apply to material objects, which merely exist, independently of time. When it comes to evolution, this poses a fundamental conundrum of cause-and-effect. The default position of modern Darwinism is that processes are determined by the object-genes that specify them. Adaptation, the process, is therefore regarded as an epiphenomenon of object-thinking. But what if the tables were reversed: if the *object* gene were the epiphenomenon of the *process* of adaptation? As recently as two decades ago, such a proposition would have been unthinkable. As we come to understand more about the relationship between DNA nucleotide code and the form and function of the organism it is looking ever more likely that the process of adaptation actually can specify the object-gene. [18]

This mutuality of cause and effect — the gene is the cause of the process which in turn is the cause of the gene — shifts our thinking toward adaptation and its heritability as dynamic, and purposeful, processes. Where Aristotle's βιος was incompatible with evolution, we may now revisit Aristotle's idea in a new scientific light. The rehabilitation of the βιος began in the late 18th century, in a new form of vitalist philosophy, so-called "process vitalism", which departed radically from earlier forms of so-called "metaphysical vitalism", derived from Hippocratic theories of medicine, which construed life as a balance of ineffable vital essences. By the late 18th century, the Hippocratic model of life was becoming unsustainable. Vital essences and vital forces proliferated willy-nilly as the complexity of the organism came better to be appreciated. Process vitalism emerged from reaction to this profligate tendency. In process vitalism, life is no longer defined by its vital essences, but by uniquely vital *processes*. To illustrate, the French physician Theophile de Bordeu argued that the living organism was the expression of an ongoing process of negotiation and mutual accommodation among the "many little lives" comprising the organism. [19] Remarkably, Bordeu's "many little lives" con-

[18] See Stephen B. Baylin and Kornel E. Schnabel, "The Epigenomic Era Opens", *Nature* 2007, Vol. 448, No. 7153, pp. 548–549; Gary Felsenfeld, "A Brief History of Epigenetics", *Cold Spring Harbor Perspectives in Biology* 2014, Vol. 6, No. 1, article number: a018200, https://doi.org/10.1101/cshperspect.a018200; Eva Jablonka and Marion J. Lamb, "Epigenetic Inheritance in Evolution", *Journal of Evolutionary Biology* 1998, Vol. 11, No. 2, pp. 159–183.

[19] See Charles T. Wolfe, "From Substantival to Functional Vitalism and Beyond: Animas, Organisms and Attitudes", *Eidos* 2011, Vol. 14, pp. 212–235; Charles T. Wolfe and Motoichi Terada, "The Animal Economy as Object and Program in Montpellier Vitalism", *Science in Context* 2008, Vol. 21, No. 4, pp. 537–579; J. Scott Turner, "Homeostasis, Complexity and the Problem of Biological Design", *Emer-*

cept led him to an early conception of the honeybee swarm as a *super*organism. The many little lives of individual bees cooperated to form an entity — the swarm — that had many of the attributes of the organisms that made up the swarm: coherency, coordination, integrity. For their parts, organisms themselves were the manifestation of this ongoing process of negotiation and mutual accommodation among the "many little lives" of the organs, and later the cells, of the body. [20]

By the mid-19th century, Bordeu's process vitalism had matured into Claude Bernard's conception of homeostasis, stated in his famous aphorism: "the steadiness of the internal environment is the condition for a free and independent life". [21] From this aphorism, Bernard founded the modern school of experimental physiology. Parsing Bernard's aphorism carefully reveals an interesting philosophical twist. Note that it is the "steadiness of the internal environment" — what came later to be named homeostasis — that is the predicate for the "free and independent life" of the body. For all that Bernard is rightly celebrated for grounding medicine on a firm foundation of chemistry and experiment, the fact remains that Bernard's homeostasis is a firmly grounded *vitalist* philosophy: the living organism is a unique phenomenon. Homeostasis is thus a cousin to the Aristotelian βιος, recast into the materialist language of experimental physiology. Bernard's process vitalism also reveals an interesting twist of cause and effect: in his conception, homeostasis is *the* fundamental property of life, from which stream the mechanisms to implement it. It is not physical and chemical processes that *determine* homeostasis, as we tend to think today: it is the other way round. [22]

The Adaptive Boundary

Adaptation is a process that operates through what we may call adaptive boundaries. The cell membrane is the most obvious example of an adaptive

gence, Complexity and Organization 2008, Vol. 10, No. 2, https://tiny.pl/wg4cr [14.09.2022].

[20] See J. Scott Turner, "Many Little Lives", *Inference: International Review of Science* 2018, Vol. 4, No. 1, https://www.doi.org/10.37282/991819.18.16.

[21] Claude Bernard, **An Introduction to the Study of Experimental Medicine**, trans. Henry Copley Greene, *Classics of Medicine Library*, Henry Schumann Inc., 1927; Charles G. Gross, "Claude Bernard and the Constancy of the Internal Environment", *The Neuroscientist* 2008, Vol. 4, No. 5, pp. 380–385.

[22] See Turner, **Purpose and Desire…**; Turner, **The Extended Organism…**; Turner, **The Tinkerer's Accomplice…**.

boundary. The membrane partitions space into internal and external environments: respectively, within the cell membrane, and the *milieu* in which the cell lives. The adaptive boundary manages the flows of matter and energy between the environments on both its sides (Figure 1).

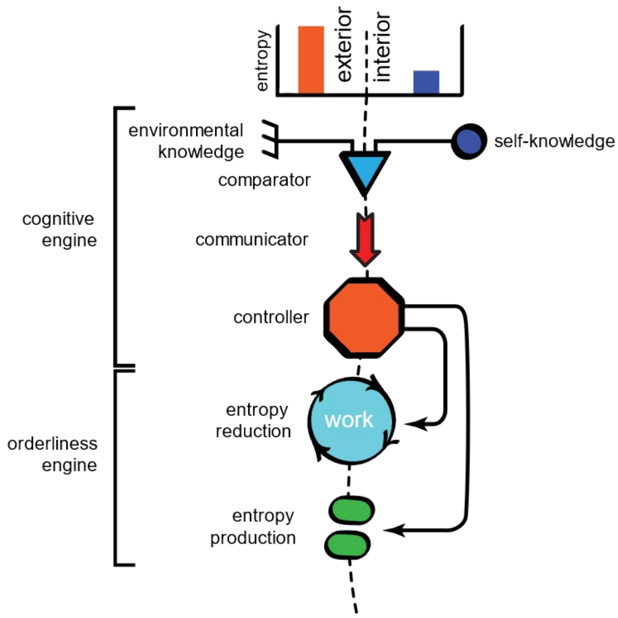


Figure 1. Schematic of the elements of the adaptive boundary. The boundary (dashed line) does work to sustain specified low entropy in its interior. To do so, work must be done through an "orderliness engine". The work of the orderliness engine is governed by a "cognitive engine", which compares a sense of the external environment against "self knowledge". Homeostasis is realizing the system's self-knowledge.

The adaptive boundary is explicitly goal-directed: it is to do the work necessary to sustain a specified orderliness within the boundary. The adaptive boundary is an engine of homeostasis, in other words. To do so, the adaptive boundary must also be a *cognitive* interface. The cell membrane contains embedded devices which sense the environment and use that information to control the flows of matter and energy across it. At the same time, there must be some form of self-knowledge: the cell must somehow "know" what its internal state should be, and know how to organize the work necessary for it to persist, no matter what the external circumstances might be. Adaptation is therefore properly seen as a form of homeostasis, with the persistence of the peculiar orderliness of the interior being its βιος. This transforms our conception of homeostasis: rather than being a doctrine of constancy, as it is usually portrayed today, homeostasis is fundamentally a doctrine of adaptability and therefore change. [23] It is through adaptation that the βιος may be reconciled with evolution.

Adaptive Boundaries Are *extenso*

Adaptive boundaries exist in many forms. The organism itself is an assembly of numerous adaptive boundaries nested within one another: cells organized into the sheet-like epithelia that line our intestines and lungs, epithelial tissue organized into organs and organ systems, culminating in the ultimate adaptive boundary that is the organism. Keeping with Bordeu's conception of the "many little lives", homeostasis at the *organismal* level is the outcome of the ongoing cooperation and mutual accommodation of the innumerable adaptive boundaries nesting within the organism. The organism is a conspiracy of homeostasis.

Adaptive boundaries can also extend beyond the conventionally defined organism. All organisms, ourselves included, construct adaptive boundaries in which to live. The nests of social insects, beaver ponds, houses, and communities are other examples of so-called extended organisms. [24] There is nothing mystical in the extended organism idea: it is derived from elementary principles of thermodynamics, conservation of mass, and cybernetics. The conspiracy of homeostasis within the organism now becomes an adaptive conspiracy of organism and environment. Combined with homeostasis as a goal-state it produces a parallel with the Aristotelian conception of the organism as the embodiment of a βιος, but now recast in the modern language of physiology and homeostasis.

The extended organism idea is, at its root, a theory of adaptation in living organisms. It does not by itself explain evolution, which requires a theory of adaptation in *lineages* of organisms: what Darwin intended his pangenesis idea to account for. We return, then, to the fundamental conundrum: modern Darwinism can never provide a coherent theory for evolution, because it is committed to the object-gene as the sole object of heredity. A coherent theory of evolution, meanwhile, requires a coherent theory of adaptation, which is explicitly purposeful.

[23] See Turner, **The Tinkerer's Accomplice…**.

[24] See Turner, **The Extended Organism…**.

This puts the phenomenon of adaptation into fundamental conflict with the Darwinian ambition of the abolition of purpose.

Teleonomy, Memory, and Novelty

Modern Darwinism has sought an escape from this philosophical trap through a kind of *faux* teleology called teleonomy. Proposed in 1958 by Colin Pittendrigh, [25] teleonomy is defined as the "apparent purposefulness and goal directedness of structures and functions of living organisms brought about by natural processes like natural selection". Teleonomy purports to connect adaptation, a phenomenon of organisms, to evolution, which is a phenomenon of lineages of organisms, [26] and thereby bring coherency to a gene-centered (that is to say, an object-centered) conception of evolution. In other words, adaptation in one generation of a lineage reflects a memory of adaptation in past generations. In the gene-selectionist form of Darwinism, hereditary memory is carried solely on the object-gene, essentially nucleotide sequence code. Natural selection sorts codes which are carried across generations from codes that are not. Codes for apt function in the struggle for existence are therefore selected, whereas codes for inapt function are not. Any notion of purposefulness is therefore illusory: it is "apparent purposefulness", in the language of the definition. No other conclusion is possible if evolution is a phenomenon of objects.

The logic of teleonomy does not support such an easy dismissal of purposefulness, however. We may generalize evolution as adaptation informed by memory. Memory of adaptation in previous generations informs adaptation in future generations. This can encompass Darwinian natural selection and gene selection, certainly. Yet our conception of hereditary memory has been broadening considerably in recent years, [27] with profound consequences for how we think about evolu-

[25] See Colin S. Pittendrigh, "Adaptation, Natural Selection and Behavior", in: Anne Roe and George Gaylord Simpson (eds.), **Behavior and Evolution,** Yale University Press, New Haven 1958, pp. 390–416.

[26] See Pittendrigh, "Adaptation, Natural Selection…", pp. 390–416; Ernst Mayr, "Weismann and Evolution", *Journal of the History of Biology* 1985, Vol. 18, No. 3, pp. 295–329, https://doi.org/10.1007/BF00138928; August Weismann, **The Germ Plasm: A Theory of Heredity**, trans. W. Newton Parker and Harriett Röunfeldt, *The Contemporary Science Series*, Walter Scott Limited, London 1893.

[27] See Jablonka and Lamb, „Epigenetic Inheritance…", pp. 159–183; Laurent Loison, "Epigenetic Inheritance and Evolution: Historian's Perspective", *Philosophical Transactions of the Royal Society*

tion. Instead of residing solely in the replicable object-gene, which *specifies* form and function, the path connecting DNA sequence code to form and function now weaves through a complicated *milieu* of context, syntax and interpretation. Hereditary memory can therefore no longer be construed as object-memory, but only as *process*-memory, which exists in an interactive and dynamic relationship with adaptation. Process memory is now defined by persistence, not existence, as is the criterion for the object-gene. To use the language of the extended organism, adaptation and hereditary memory are drawn into a conspiracy of process. Adaptation can now shape hereditary memory, an idea that would be unthinkable if genes were the sole repository of hereditary memory. The broader scope of hereditary memory now opens the door to alternative evolutionary schema: ones in which overt purposefulness is logically possible. [28]

Adaptation and Process Memory in Termite Colonies

The termite colonies (*Macrotermes* spp.) I study are a useful illustration of these concepts. [29] The *Macrotermes* colony is organized around the cultivation of a specialized fungus symbiont (*Termitomyces* spp.) that composts woody material,

---

B: Biological Sciences 2021, Vol. 376, No. 1826, article number: 20200120, https://doi.org/10.1098/rstb.2020.0120; Peter Ward, **Lamarck's Revenge: How Epigenetics Is Revolutionizing Our Understanding of Evolution's Past and Present**, Bloomsbury Publishing, New York — London — Oxford — New Delhi —Sydney 2018.

[28] See Jablonka and Lamb, „Epigenetic Inheritance...", pp. 159–183; Ward, **Lamarck's Revenge...**; Eva Jablonka and Marion J. Lamb, **Evolution in Four Dimensions: Genetic, Epigenetic, Behavioral and Symbolic Variation in the History of Life**, *Life And Mind: Philosophical Issues in Biology And Philosophy Series*, The MIT Press, Cambridge 2005; Rémy Marchal, Alexandra Chicheportiche, Bernard Dutrillaux, and Jacqueline Bernardino-Sgherri, "DNA Methylation in Mouse Gametogenesis", *Cytogenetic and Genome Research* 2004, Vol. 105, No. 2–4, pp. 316–324; Denis Noble, "Evolution Viewed from Physics, Physiology and Medicine", *Interface Focus* 2017, Vol. 7, No. 5, https://doi.org/10.1098/rsfs.2016.0159; Benjamin P. Oldroyd and Boris Yagound, "The Role of Epigenetics, Particularly DNA Methylation, in the Evolution of Caste in Insect Societies", *Philosophical Transactions of the Royal Society B: Biological Sciences* 2021, Vol. 376, No. 1826, article number: 20200115, https://doi.org/10.1098/rstb.2020.0115; Charles T. Wolfe, "Introduction. Vitalism without Metaphysics? Medical Vitalism in the Enlightenment", *Science in Context* 2008, Vol. 21, No. 4, pp. 461–463.

[29] See J. Scott Turner, "Termites as Models of Swarm Cognition", *Swarm Intelligence* 2011, Vol. 5, No. 1, pp. 19–43, https://doi.org/10.1007/s11721-010-0049-1; J. Scott Turner, "Semiotics of a Superorganism", *Biosemiotics* 2016, Vol. 9, No. 1, pp. 85–102, https://doi.org/10.1007/s12304-016-9256-5.

grass and dung brought back to the colony by the termite foragers. [30] The termites' functional diet is this composted material. *Termitomyces* spp. are always found in association with *Macrotermes* colonies. To cultivate these fungi, the colony humi-dity must be tightly regulated at about 60% relative humidity. The fungi and termites are thus organized into an extended super-organism, nested as symbiotic fungal culture < termites < colony < soil structure < ecosystem. The 60% relative humidity is essentially this extended super-organism's βιος, toward which the super-organism continually strives, even if the environment changes (Figure 2). [31]

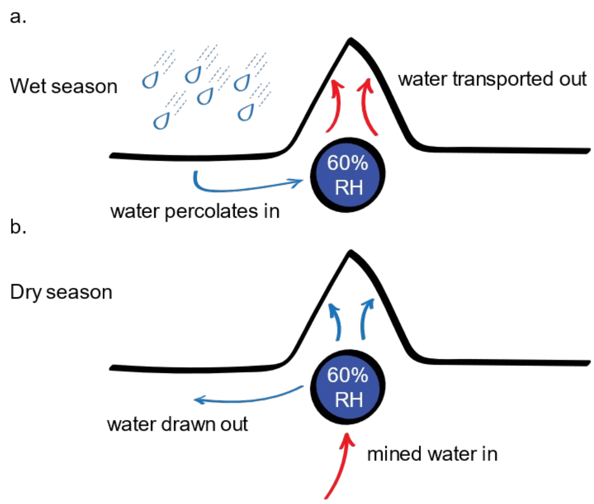


Figure 2. The water balance of *Macrotermes* colonies. The nest humidity is tightly regulated at 60%. In the wet season (a), the colony is in water surfeit: water percolates into the colony from surrounding soil (blue vector), which the termites transport out (red vectors), upward into the mound. In the dry season (b), the colony is in water deficit, drawing water away from the colony (blue vector), which the termites replace by mining liquid water (red vector) from deep soil horizons.

[30] See Lekh R. Batra and Susane W.T. Batra, "Termite-fungus Mutualism", in: Lekh R. Batra (ed.), **Insect-fungus Symbiosis: Nutrition, Mutualism and Commensalism**, John Wiley and Sons, New York 1979, pp. 117–163.

[31] See J. Scott Turner, "Termites as Mediators of the Water Economy of Arid Savanna Ecosystems", in: Paolo D'Odorico and Amilcare Porporato (eds.), **Dryland Ecohydrology**, Springer, Dordrecht 2006, pp. 303–313; J. Scott Turner, Eugene Marais, Mendes Vinte, Angela Mudengi, and Wendy Park, "Termites, Water and Soils", *Agricola* 2006, Vol. 16, pp. 40–45.

Through the year, the semi-arid savannas inhabited by these termites change considerably. During the winter, drought prevails and the colony is in net water deficit. During the wet summers, episodic torrential rains prevail, and the colony is in water surfeit. To keep nest humidity at 60% during the dry winter (i.e., for the βιος of the *Macrotermes/Termitomyces* super-organism to persist), termites mine water from subterranean water tables during the winter, and bring it into the nest. [32] During the wet summers, the termites export water from the nest, in the form of wet soil transported up into the mound.

The adaptive striving of the *Macrotermes* extended superorganism operates through a combination of collective cognition and process memory. [33] The termites live in a rich cognitive environment which comprises cognitive interactions both between worker termites and between worker termites and the soil environment they build and continually remodel. [34] With respect to the first, workers' activities are strongly driven by a subset of worker termites that act as "initiators", who prod inactive workers to move soil, and who guide their movements through various cognitive cues. With respect to the second, how workers move soil is influenced by additional cognitive cues, including how wet the local soil is (workers move soil from moist to dry), how friable the soil is (friable soils are dismantled and moved), the curvature of the tunnel surfaces (surfaces with a small radius of curvature are remodeled to create surfaces with a larger one). [35] Transient perturbations of the nest environment, which might follow damage to the carefully constructed mound, also elicit remodeling. The resulting soil modifications are long-lived, and so can act as a form of process memory. The modification imposed by one worker serves as a persistent cognitive cue to other workers that might come

[32] See Michel Lepage, "Recherches écologiques sur une savane sahélienne du Ferlo septentrional, Sénégal: influence de la séecheresse sur le peuplement en termites", *La Terre et la Vie: Revue d'Ecologie Appliquée* 1974, T. 28, No. 1, pp. 76–94.

[33] See Turner, "Termites as Models of Swarm…".

[34] See Ben Green, Paul Bardunias, J. Scott Turner, Radhika Nagpal, and Justin Werfel, "Excavation and Aggregation as Organizing Factors in *de novo* Construction by Mound-building Termites", *Proceedings of the Royal Society B: Biological Sciences* 2017, Vol. 284, No. 1856, article number: 20162730, https://doi.org/10.1098/rspb.2016.2730.

[35] See Daniel S. Calovi, Paul Bardunia, Nicole Carey, J. Scott Turner, Radhika Nagpal, and Justin Werfel, "Surface Curvature Guides Early Construction Activity in Mound-building Termites", *Philosophical Transactions of the Royal Society B: Biological Sciences* 2019, Vol. 374, No. 1774, article number: 20180374, https://doi.org/10.1098/rstb.2018.0374.

along at a later time. In the case of the *Macrotermes* colony, these cues can persist well beyond the lifetime of a typical worker: the mound and subterranean structure have lifetimes of the order of decades, while the lifespan of a *Macrotermes* worker is a few weeks.

For the lifetime of a colony (10–20 years), the sterile workers are descended from a single queen, which makes the super-organismal adaptation as I have described it akin to adaptation in an individual organism. This interaction of cognition with process memory can extend across generations of colonies, however, with evolutionary adaptation being the result.

The persistence of *Macrotermes* populations over many generations has ecosystem-wide consequences, including long-term modifications of regional hydrology. If these modifications persist beyond the lifetime of a colony, they can also act as hereditary process memory. Furthermore, they can serve as hereditary memory of past adaptation, which is teleonomy embodied. *Macrotermes* colonies are extensive modifiers of the subterranean environment. A typical colony perturbs soil to depths of 10–12 meters, which produces a persistent termite-created lens of modified soil moisture. [36] In addition, an extensive array of foraging tunnels radiating from the colony promotes percolation of water into the soil. This modifies the soil environment considerably. The emission of methane from the workers' gut flora [37] interacts with soluble calcium and water in the soil to precipitate a calcite pavement situated roughly 1–3 meters below the ground surface. The layer of calcite runs deeper below the colony itself, forming a kind of calcite

[36] See Philippe Boyer, "Les effets de l'implantation destermitières des *Bellicositermes* sur la configuration des sols des savanes de la République centrafricaine", *Bulletin de Muséum National d'Histoire Naturelle* 1969, 2e Série, T. 41, No. 3, pp. 789–800; Philippe Boyer, "Differents aspects de l'action des termites sur les tropicaux", in: Paul Pesson (ed.), **La vie dans les sols. Aspects nouveaux. Etudes expérimentales**, Gauthier Villars, Paris 1971, pp. 279–334; Philippe Boyer, "Action de certains termites constructeurs sur l'évolution des sols tropicaux I. Les termites et le sol", *Annales des Sciences Naturelles Zoologie Paris 12 série* 1973, T. 15, No. 3, pp. 329–498; Philippe Boyer, "Etude particulière de trois termitières de *Bellicositermes* et de leur action sur les sols tropicaux", *Annales des Sciences Naturelles (Zoologie et Biologie Animale)* 1975, T. 17, No. 3, pp. 273–446; Philippe Boyer, "Les différents aspects de l'action des *Bellicositermes* sur les sols tropicaux", *Annales des Sciences Naturelles (Zoologie et Biologie Animale)* 1975, T. 17, No. 4, pp. 447–504; Jean-Paul Watson, "Calcium Carbonate in Termite Mounds", *Nature* 1974, Vol. 247, No. 5435, p. 74.

[37] See Alain Brauman, Matthew D. Kane, Marc Labat, and John A. Breznak, "Genesis of Acetate and Methane by Gut Bacteria of Nutritionally Diverse Termites", *Science* 1992, Vol. 257, No. 5075, pp. 1384–1387.

saucer (Figure 3). The calcite pavement serves as a catchment for water percolating into the soil from the region's episodic torrential summer rainfalls, gathering the water into shallow perched water tables. No longer need termites venture deeply into the soil to mine water from deep water tables. Water is now easily accessible during the dry winter months from the termite-created perched water tables.[38] Because the calcite pavements, and the perched water tables they create, endure for much longer than the lifetime of an individual colony (centuries as opposed to decades), these modifications serve as process hereditary memory. Present adaptation is therefore shaped by the memory of past adaptation, with the proviso that the memory of past adaptation is not embedded in genes, but in defense of the termite colonies' collective βιος.

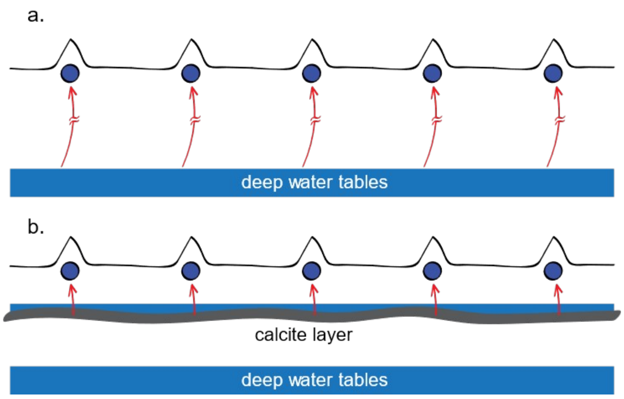


Figure 3. Ecosystem scale hereditary memory. (a) In the dry season, termites mine water from deep water tables. (b) The long-standing presence of a population of termites produces a calcite pavement a few meters deep, which can serve as a catchment for more accessible perched water tables all year round.

This can be construed as teleonomy, but it occurs in an entirely different framework from the Darwinian program of gene selectionism: it is driven by purpose. This has real evolutionary consequences, including enabling *Macrotermes* colonies to compete and survive in more arid environments compared to termite species that are not such adept hydraulic engineers.[39] All of this is shaped by modifying the environment to enable the persistence of the super-organism's

[38] See Jean-Claude Lebrun, "Une construction originale hypogée pour le stockage de l'eau par les termites en régions sahelo-soudaniennes de Haute-Volta", *Pedobiologia* 1976, Bd. 16, H. 6, pp. 451–456.

βιος. It is teleonomy, but now imbued with purpose. Purpose is no longer illusory, but the consequence of purpose-driven adaptation.

This has radical implications for how we think about evolution. For example, evolutionary novelty need not await the emergence of new genes that specify novel function. Rather, novelty arises from the active, continual, and *cognitively-driven* search for adaptive modification of environments: purposeful modification, to put it succinctly. The epigenetic web of feedbacks of adaptively-modified environments onto DNA structure and expression means that adaptive experience actually can shape genomes. Although there is still much to learn about epigenetic modification of genomes, what we are learning is pointing to a radical reconception of the gene. No longer are genes specifiers of form and function, adaptive or not. Rather, it is genes that are dragged along in the wake of cognitive and purposeful adaptation.

In the alternate conception I have outlined here, novelty arises from the adaptive boundary's active, continual, and cognitive search for environments to modify adaptively. In this conception, adaptation is no longer merely apparent and easily dismissed as illusion; instead, it is a profoundly purposeful and intentional shaper of lineages. Now, it is no longer novel genes which force lineages into the future to either live or die. Rather, the epigenetic web of feedbacks of adapted environments onto the genome drags genes along in the wake of the organism's adaptive (and purposeful) striving.

This has deep implications for the Darwinian idea itself — ones which are embodied in the title of this essay. Darwinism holds that species evolve through a kind of purposeless mechanism. There can be no question of purposeful striving, of wanting to evolve. The Darwinian idea rules such questions out of bounds *a priori*: only purposeless natural selection can generate new species. To quote Daniel C. Dennett:

> No matter how impressive the products of an algorithm [i.e., natural selection], the underlying process always consists of nothing but a series of individually mindless steps succeeding each other without the help of any intelligent supervision. [40]

---

[39] See Ian Deshmukh, "How Important are Termites in the Production Ecology of African Savannas?", *Sociobiology* 1989, Vol. 15, No. 2, pp. 155–168.

[40] Daniel C. Dennett, **Darwin's Dangerous Idea: Evolution and the Meanings of Life**, Simon & Schuster, New York 1996, p. 586.

However, if adaptation and hereditary memory are purposeful phenomena, as I argue they fundamentally are, the very idea of *natural* selection is thereby nullified. If prevailing in the "struggle for existence" is purposeful and intentional, selection cannot, by definition, be "natural". Rather, it is determined by the purposeful striving of organisms and lineages of organism to persist. Saying that species may actually, in some deep sense, *want* to evolve, is now conceivable.

J. Scott Turner

References

ALEXANDER Denis R. and NUMBERS Ronald L. (eds.), **Biology and Ideology From Descartes to Dawkins**, University of Chicago Press, Chicago 2010.

AMADIO Anselm H. and MINIO-PALUELLO Lorenzo, "Aristotle and Aristotelianism", *Encyclopædia Britannica* 1994, Vol. 14, pp. 55–71.

AYALA Francisco J., "Teleological Explanation in Evolutionary Biology", *Philosophy of Science* 1970, Vol. 37, No. 1, pp. 1–15.

BATRA Lekh R. (ed.), **Insect-Fungus Symbiosis: Nutrition, Mutualism and Commensalism**, John Wiley and Sons, New York 1979.

BATRA Lekh R. and BATRA Susane W.T., "Termite-fungus Mutualism", in: BATRA (ed.), **Insect-fungus Symbiosisq…**, pp. 117–163.

BAYLIN Stephen B. and SCHNABEL Kornel E., "The Epigenomic Era Opens", *Nature* 2007, Vol. 448, No. 7153, pp. 548–549.

BERNARD Claude, **An Introduction to the Study of Experimental Medicine**, trans. Henry Copley Greene, *Classics of Medicine Library*, Henry Schumann Inc., 1927.

BOWLER Peter J., **The Eclipse of Darwinism: Anti-Darwinian Evolution Theories in the Decades around 1900**, Johns Hopkins University Press, Baltimore — London 1983.

BOYER Philippe, "Action de certains termites constructeurs sur l'évolution des sols tropicaux I. Les termites et le sol", *Annales des Sciences Naturelles Zoologie Paris 12 série* 1973, T. 15, No. 3, pp. 329–498.

BOYER Philippe, "Etude particulière de trois termitières de *Bellicositermes* et de leur action sur les sols tropicaux", *Annales des Sciences Naturelles (Zoologie et Biologie Animale)* 1975, T. 17, No. 3, pp. 273–446.

BOYER Philippe, "Differents aspects de l'action des termites sur les tropicaux", in: PESSON (ed.), **La vie dans les sols…**, pp. 279–334.

Boyer Philippe, “Les différents aspects de l’action des *Bellicositermes* sur les sols tropicaux”, *Annales des Sciences Naturelles (Zoologie et Biologie Animale)* 1975, T. 17, No. 4, pp. 447–504.

Boyer Philippe, “Les effets de l’implantation destermitières des *Bellicositermes* sur la configuration des sols des savanes de la République centrafricaine”, *Bulletin de Muséum National d’Histoire Naturelle* 1969, 2e Série, T. 41, No. 3, pp. 789–800.

Brauman Alain, Kane Matthew D., Labat Marc, and Breznak John A., “Genesis of Acetate and Methane by Gut Bacteria of Nutritionally Diverse Termites”, *Science* 1992, Vol. 257, No. 5075, pp. 1384–1387.

Calovi Daniel S., Bardunia Paul, Carey Nicole, Turner J. Scott, Nagpal Radhika, and Werfel Justin, “Surface Curvature Guides Early Construction Activity in Mound-building Termites”, *Philosophical Transactions of the Royal Society B: Biological Sciences* 2019, Vol. 374, No. 1774, article number: 20180374, https://doi.org/10.1098/rstb.2018.0374.

King-Hele Desmond (ed.), **Charles Darwin’s The Life of Erasmus Darwin**, Cambridge University Press, New York 2003.

Darwin Francis (ed.), **Charles Darwin: His Life Told in an Autobiographical Chapter and in a Selected Series of His Published Letters**, D. Appleton and Company, New York 1893.

Darwin Charles, **On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life**, P.F. Collier & Son, New York 1909.

Darwin Charles, **The Variation of Animals and Plants Under Domestication**, John Murray, London 1868.

Darwin Erasmus, **Zoonomia; Or, The Laws of Organic Life. In Three Parts**, Thomas & Andrews, Boston 1809.

Darwin Erasmus, **The Loves of the Plants**, J. Johnson, London 1806.

Dennett Daniel C., **Darwin’s Dangerous Idea: Evolution and the Meanings of Life**, Simon & Schuster, New York 1996.

Deshmukh Ian, “How Important are Termites in the Production Ecology of African Savannas?”, *Sociobiology* 1989, Vol. 15, No. 2, pp. 155–168.

D’Odorico Paolo and Porporato Amilcare (eds.), **Dryland Ecohydrology**, Springer, Dordrecht 2006.

Felsenfeld Gary, “A Brief History of Epigenetics”, *Cold Spring Harbor Perspectives in Biology* 2014,Vol. 6, No. 1, article number: a018200, https://doi.org/10.1101/cshperspect.a018200.

Fisher Ronald A. (ed.), **The Genetical Theory of Natural Selection: A Complete Variorum Edition**, Oxford Universisty Press, Oxford — New York 1999.

Green Ben, Bardunias Paul, Turner J. Scott, Nagpal Radhika, and Werfel Justin, "Excavation and Aggregation as Organizing Factors in *de novo* Construction by Mound-Building Termites", *Proceedings of the Royal Society B: Biological Sciences* 2017, Vol. 284, No. 1856, article number: 20162730, https://doi.org/10.1098/rspb.2016.2730.

Gross Charles G., "Claude Bernard and the Constancy of the Internal Environment", *The Neuroscientist* 2008, Vol. 4, No. 5, pp. 380–385.

Jablonka Eva and Lamb Marion J., "Epigenetic Inheritance in Evolution", *Journal of Evolutionary Biology* 1998, Vol. 11, No. 2, pp. 159–183.

Jablonka Eva and Lamb Marion J., **Evolution in Four Dimensions: Genetic, Epigenetic, Behavioral and Symbolic Variation in the History of Life**, *Life And Mind: Philosophical Issues in Biology And Philosophy Series*, The MIT Press, Cambridge 2005.

Lebrun Jean-Claude, "Une construction originale hypogée pour le stockage de l'eau par les termites en régions sahelo-soudaniennes de Haute-Volta", *Pedobiologia* 1976, Bd. 16, H. 6, pp. 451–456.

Lepage Michel, "Recherches écologiques sur une savane sahélienne du Ferlo septentrional, Sénégal: influence de la séecheresse sur le peuplement en termites", *La Terre et la Vie: Revue d'Ecologie Appliquée* 1974, T. 28, No. 1, pp. 76–94.

Loison Laurent, "Epigenetic Inheritance and Evolution: Historian's Perspective", *Philosophical Transactions of the Royal Society B: Biological Sciences* 2021, Vol. 376, No. 1826, article number: 20200120, https://doi.org/10.1098/rstb.2020.0120.

Marchal Rémy, Chicheportiche Alexandra, Dutrillaux Bernard, and Bernardino-Sgherri Jacqueline, "DNA Methylation in Mouse Gametogenesis", *Cytogenetic and Genome Research* 2004, Vol. 105, No. 2–4, pp. 316–324.

Mayr Ernst, **The Growth of Biological Thought: Diversity, Evolution, and Inheritance**, The Belknap Press of Harvard University Press, Cambridge — London 1982.

Mayr Ernst, "Weismann and Evolution", *Journal of the History of Biology* 1985, Vol. 18, No. 3, pp. 295–329, https://doi.org/10.1007/BF00138928.

McComas William F., "Darwin's Invention: Inheritance & the «Mad Dream» of Pangenesis", *The American Biology Teacher* 2012, Vol. 74, No. 2, pp. 86–91, https://doi.org/10.1525/abt.2012.74.2.5.

Noble Denis, "Evolution Viewed from Physics, Physiology and Medicine", *Interface Focus* 2017, Vol. 7, No. 5, https://doi.org/10.1098/rsfs.2016.0159.

Oldroyd Benjamin P. and Yagound Boris, "The Role of Epigenetics, Particularly DNA Methylation, in the Evolution of Caste in Insect Societies", *Philosophical Transactions of the Royal Society B: Biological Sciences* 2021, Vol. 376, No. 1826, article number: 20200115, https://doi.org/10.1098/rstb.2020.0115.

Paley William, **Natural Theology; Or, Evidences of the Existence and Attributes of the Deity**, John Morgan, Philadelphia 1802.

Pesson Paul (ed.), **La vie dans les sols. Aspects nouveaux. Etudes expérimentales**, Gauthier Villars, Paris 1971.

Pigliucci Massimo, "Do We Need an Extended Evolutionary Synthesis?", *Evolution* 2007, Vol. 61, No. 12, pp. 2743–2749.

Pittendrigh Colin S., "Adaptation, Natural Selection and Behavior", in: Roe and Simpson (eds.), **Behavior and Evolution…**, pp. 390–416.

Provine William B., "The R.A. Fisher — Sewall Wright Controversy" in: Sarkar (ed.), **Boston Studies in the Philosophy…**, pp. 201–229.

Riskin Jessica, **The Restless Clock: A History of the Centuries-Long Argument Over What Makes Living Things Tick**, The University of Chicago Press, Chicago — London 2016.

Roe Anne and Simpson George Gaylord (eds.), **Behavior and Evolution,** Yale University Press, New Haven 1958.

Sarkar Sahotra (ed.), **Boston Studies in the Philosophy of Science**, Vol. 142, Kluwer Academic Publishers, Boston 1992.

Topham Jonathan R., "Biology in the Service of Natural Theology: Paley, Darwin, and *Bridgewater Treatises*", in: Aleksander and Numbers (eds.), **Biology and Ideology From Descartes…**, pp. 88–113.

Turner J. Scott, "Homeostasis, Complexity and the Problem of Biological Design", *Emergence, Complexity and Organization* 2008, Vol. 10, No. 2, https://tiny.pl/wg4cr [14.09.2022].

Turner Scott J., "Many Little Lives", *Inference: International Review of Science* 2018, Vol. 4, No. 1, https://www.doi.org/10.37282/991819.18.16.

Turner J. Scott, **Purpose and Desire: What Makes Something "Alive" and Why Modern Darwinism Has Failed to Explain It**, HarperOne, San Francisco 2017.

Turner J. Scott, "Semiotics of a Superorganism", *Biosemiotics* 2016, Vol. 9, No. 1, pp. 85–102, https:/doi.org/10.1007/s12304-016-9256-5.

Turner J. Scott, "Termites as Mediators of the Water Economy of Arid Savanna Ecosystems", in: D'Odorico and Porporato (eds.), **Dryland Ecohydrology…**, pp. 303–313.

Turner J. Scott, "Termites as Models of Swarm Cognition", *Swarm Intelligence* 2011, Vol. 5, No. 1, pp. 19–43, https://doi.org/10.1007/s11721-010-0049-1.

Turner J. Scott, **The Extended Organism: The Physiology of Animal-Built Structures**, Harvard University Press, Cambridge 2000.

Turner J. Scott, **The Tinkerer's Accomplice: How Design Emerges from Life Itself**, Harvard University Press, Cambridge — London 2007.

Turner J. Scott, Marais Eugene, Vinte Mendes, Mudengi Angela, and Park Wendy, "Termites, Water and Soils", *Agricola* 2006, Vol. 16, pp. 40–45.

Ward Peter, **Lamarck's Revenge: How Epigenetics Is Revolutionizing Our Understanding of Evolution's Past and Present**, Bloomsbury Publishing, New York — London — Oxford — New Delhi — Sydney 2018.

Watson Jean-Paul, "Calcium Carbonate in Termite Mounds", *Nature* 1974, Vol. 247, No. 5435, pp. 74.

Weismann August, **The Germ Plasm: A Theory of Heredity**, trans. W. Newton Parker and Harriett Röunfeldt, *The Contemporary Science Series*, Walter Scott Limited, London 1893.

Wolfe Charles T., "From Substantival to Functional Vita lism and Beyond: Animas, Organisms and Attitudes", *Eidos* 2011, Vol. 14, pp. 212–235.

Wolfe Charles T., "Introduction. Vitalism without Metaphysics? Medical Vitalism in the Enlightenment", *Science in Context* 2008, Vol. 21, No. 4, pp. 461–463.

Wolfe Charles T. and Terada Motoichi, "The Animal Economy as Object and Program in Montpellier Vitalism", *Science in Context* 2008, Vol. 21, No. 4, pp. 537–579.

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**
Philosophical Aspects of Origin s. 87–140
https://doi.org/10.53763/fag.2022.19.2.208
ISSN 2299-0356
PRZEKŁAD / TRANSLATION

Stephen Dilley
St. Edward's University

Rola teologii w książce Karola Darwina **O powstawaniu gatunków** [*]

Received: October 10, 2022. Accepted: November 15, 2022. Published online: December 16, 2022.

Abstrakt: Przedmiotem niniejszego artykułu jest trójstopniowa analiza pozytywnego *(positiva)* użycia teologii przez Karola Darwina w pierwszym wydaniu **O powstawaniu gatunków**. Po pierwsze, skupię się na występującym w tym dziele języku teologicznym, który przejawia się we fragmentach dotyczących pojmowalności Boga, Jego uczciwości, sposobów stwarzania, związku między Nim a prawami przyrody i tego, że nie odpowiada On za istniejące w przyrodzie cierpienia. Twierdzę, że Darwin użył teologii pozytywnej, aby uzasadnić teorię dziedziczenia z modyfikacjami (oraz nadać jej kształt) i podważyć ideę specjalnego stworzenia. Po drugie, przedstawię krytyczną analizę tej teologii, biorąc za podstawę późniejsze przemyślenia Darwina, aby pokazać, że z epistemicznego punktu widzenia w teologii pozytywnej obecnej w **O powstawaniu gatunków** można dostrzec różne wewnętrzne napięcia. Po trzecie, skupię się na względnym epistemicznym znaczeniu teologii pozytywnej dla argumentacji przedstawionej w dziele Darwina. Wszystko wskazuje na to, że ta teologia odgrywała służebną i pomocniczą rolę dla naukowych poglądów angielskiego przyrodnika.

Słowa kluczowe:

O powstawaniu gatunków; Karol Darwin; teologia pozytywna; Bóg; teologia negatywna

[*] Stephen Dilley, „Charles Darwin's Use of Theology in the **Origin of Species**", *The British Journal for the History of Science* 2012, Vol. 45, No. 1, s. 29–56, https://doi.org/10.1017/s000708741100032x. Z języka angielskiego przełożył Grzegorz Malec.

Charles Darwin's use of theology in the *Origin of Species*

Abstract: This essay examines Darwin's *positiva* (or positive) use of theology in the first edition of the **Origin of Species** in three steps. First, the essay analyses the **Origin's** theological language about God's accessibility, honesty, methods of creating, relationship to natural laws and lack of responsibility for natural suffering; the essay contends that Darwin utilized *positiva* theology in order to help justify (and inform) descent with modification and to attack special creation. Second, the essay offers critical analysis of this theology, drawing in part on Darwin's mature ruminations to suggest that, from an epistemic point of view, the **Origin's** *positiva* theology manifests several internal tensions. Finally, the essay reflects on the relative epistemic importance of *positiva* theology in the **Origin's** overall case for evolution. The essay concludes that this theology served as a handmaiden and accomplice to Darwin's science.

Keywords:

Origin of Species; Charles Darwin; positiva theology; God; reductio theology

Zgodnie z główną tezą książki **O powstawaniu gatunków** wszystkie organizmy żywe na Ziemi wywodzą się od jednego (lub kilku) wspólnych przodków istniejących w zamierzchłej przeszłości. Życie w aktualnej postaci jest wynikiem ewolucji zachodzącej przede wszystkim drogą doboru naturalnego oddziałującego na skutki losowych zmian, a także za sprawą innych procesów naturalnych. Powszechnie wiadomo, że Karol Darwin zgromadził wiele świadectw empirycznych na poparcie swojej teorii. Nie wszyscy jednak zdają sobie sprawę, że angielski przyrodnik posiłkował się również teologią. Jak zauważył nieżyjący już historyk Dov Ospovat, „Ignorowanie lub bagatelizowanie teistycznych zapatrywań Darwina uniemożliwia właściwe zrozumienie jego poglądów naukowych”. [1] Jeżeli racja leży po stronie Ospovata, to do pełnego zrozumienia naukowych poglądów Darwina trzeba zgłębić jego rozważania teologiczne — i to jest celem trójstopniowej analizy przedstawionej w tym tekście. Po pierwsze, skupię się na występującym w **O powstawaniu gatunków** języku teologicznym, który przejawia się we fragmentach dotyczących pojmowalności Boga, Jego uczciwości, sposobów stwarzania, związku między nim a prawami przyrody, tego, że nie odpowiada on za istniejące w przyrodzie cierpienia. Twierdzę, że Darwin użył teologii pozytywnej, aby

[1] Dov Ospovat, „Darwin's Theology”, *Science* 1980, Vol. 207, No. 4430, s. 520, https://doi.org/10.1126/science.207.4430.520. Jest to recenzja książki Neala C. Gillespiego **Charles Darwin and the Problem of Creation** [Karol Darwin i problem stworzenia]. Por. Neal C. Gillespie, **Charles Darwin and the Problem of Creation**, University of Chicago Press, Chicago 1979. Z tej książki, która zawiera doskonałą analizę rozumienia i użycia teologii przez Darwina, czerpałem w czasie pracy nad niniejszym tekstem.

uzasadnić teorię dziedziczenia z modyfikacjami (oraz nadać jej kształt) i podważyć ideę specjalnego stworzenia. Po drugie, przedstawię krytyczną analizę tej teologii, biorąc za podstawę późniejsze przemyślenia Darwina, aby pokazać, że z epistemicznego punktu widzenia w teologii pozytywnej obecnej w **O powstawaniu gatunków** można dostrzec różne wewnętrzne napięcia. Po trzecie, skupię się na względnym epistemicznym znaczeniu teologii pozytywnej dla argumentacji przedstawionej w dziele Darwina. Wszystko wskazuje na to, że ta teologia odgrywała służebną i pomocniczą rolę dla naukowych poglądów angielskiego przyrodnika.

Przed przystąpieniem do analizy poszczególnych twierdzeń Darwina pozwolę sobie poczynić kilka uwag wstępnych. Po pierwsze, wszystkie moje odniesienia do książki **O powstawaniu gatunków** dotyczą pierwszego jej wydania, które zdaniem historyków jest najbardziej znaczące. Po drugie, historycy od dawna debatują nad tym, czy teleologiczne poglądy wyrażone w dziele Darwina były szczere. [2] Moim zdaniem z uśrednienia poglądów współczesnych uczonych zabierających głos w tej sprawie wynika, że Darwin — w czasie, kiedy pracował nad pierwszym wydaniem **O powstawaniu gatunków** — najpewniej wierzył w większość kluczowych twierdzeń teologicznych, które są przedmiotem analizy w tym artykule. Istota mojej argumentacji nie jest jednak zależna od tej tezy. To, czy Darwin akceptował te twierdzenia, nie ma, jak zobaczymy, większego znaczenia dla faktu, że niektóre z nich wpłynęły na ostateczny kształt jego koncepcji i — co ważniejsze — wszystkie służyły (lub miały służyć) jako epistemiczne wsparcie dla teorii ewolucji. [3] Przedmiotem mojego zainteresowania nie są jednak ani motywy, ani szczerość Darwina. Interesują mnie natomiast przesłanki, twierdzenia i założenia, które rzeczywiście znalazły się na stronach **O powstawaniu gatunków** i których za-

---

[2] Por. David Kohn, „Darwin's Ambiguity: The Secularization of Biological Meaning", *The British Journal for the History of Science* 1989, Vol. 22, No. 2, s. 215–239, https://doi.org/10.1017/S0007087400026005.

[3] Twierdzenie zapewniające „epistemiczne wsparcie" innemu twierdzeniu to takie, które „zwiększa — choćby w minimalnym stopniu — prawdopodobieństwo prawdziwości tego drugiego twierdzenia" bądź „wzmacnia uzasadnienie lub uprawomocnienie, które w oczach danej osoby przemawiają na rzecz przyjęcia tego drugiego twierdzenia". Na potrzeby niniejszego tekstu przyjmuję postawę agnostyka w kwestii tego, czy teologiczne twierdzenia Darwina zawarte w **O powstawaniu gatunków** zapewniają właściwe epistemiczne wsparcie dla jego teorii. Wydaje się, że twierdzenia te miały sprawić, by teoria dziedziczenia z modyfikacjami miała większą wiarygodność, i właśnie tak będę je traktować.

daniem była obrona oraz nadanie kształtu teorii dziedziczenia z modyfikacjami. [4]

Po trzecie, główne dzieło Darwina zostało tu potraktowane jako tekst historyczny, na podstawie którego zamierzam sprawdzić znaczenie twierdzeń teologicznych w „długim szeregu dowodzeń" [*] na rzecz teorii dziedziczenia z modyfikacjami. Przedmiotem tego artykułu nie jest zatem analiza czysto epistemicznego aspektu argumentacji na rzecz teorii ewolucji, ponieważ taka analiza nie uwzględnia kontekstu historycznego i pomija wszelkie zbędne (z perspektywy epistemicznej) twierdzenia. I chociaż zamierzam przeprowadzić krytyczną analizę dzieła Darwina właśnie pod kątem epistemicznym, to uczynię to w celu zrozumienia twierdzeń teologicznych (i naukowych) zawartych w **O powstawaniu gatunków**, a nie po to, aby wskazać na epistemiczne własności samej teorii ewolucji w oderwaniu od różnych innych konkretnych zagadnień, które Darwin rozważał w swojej książce.

Na koniec przedstawię również pewien szczególny rodzaj teologii występujący w dziele Darwina. Mając na uwadze sposób, w jaki Darwin używał oświeceniowego podejścia do teologii w celu zwiększenia wiarygodności swojej argumentacji czy teorii, możemy tu mówić o teologii pozytywnej, która różni się od tego, co możemy określić mianem teologii negatywnej (*reductio theology*). Darwin wielokrotnie stosował negatywną formę teologii i czynił to, aby wyartykułować teologię stosowaną przez kreacjonistów, a następnie empirycznie sprawdzić wartość jej twierdzeń, co doprowadziło go do wniosku, że to podejście jest nieadekwatne. [5] (Często próbował pokazać, że teologia kreacjonistów jest niezgodna z faktami przyrodniczymi, i w ten sposób „sprowadzał ich teologię do niedorzeczności" —

---

[4] Mimo że w niniejszym artykule od czasu do czasu jest mowa o „teologii Darwina", to zasadność moich tez nie zależy od tego, czy Darwin rzeczywiście zaakceptował omawiane twierdzenia teologiczne, czy po prostu traktował je jako uzasadnienie dla swojego poglądu.

[*] (Przyp. tłum.) Karol Darwin, **O powstawaniu gatunków drogą doboru naturalnego, czyli o utrzymywaniu się doskonalszych ras w walce o byt**, tekst polski na podstawie przekładu Szymona Dicksteina i Józefa Nusbauma opracowały Joanna Popiołek i Małgorzata Yamazaki, *Biblioteka Klasyków Nauki*, Wydawnictwa Uniwersytetu Warszawskiego, Warszawa 2009, s. 424.

[5] Por. np. Darwin, **O powstawaniu gatunków...**, s. 52–53, 174–176, 224–226, 255–257, 331–333, 345–346, 365–369, 416–418. W tych fragmentach Darwin przeanalizował empirycznie testowalne przewidywania koncepcji specjalnego stworzenia za pomocą porównania mocy eksplanacyjnej tego ujęcia z mocą eksplanacyjną własnej teorii (czyli idei transmutacji). W analizie porównawczej Darwin posługiwał się więc teologią negatywną. Por. David Depew, „The Rhetoric of the **Origin of Species**", w: Robert Richards and Michael Ruse (eds.), **The Cambridge Companion to the *Origin of Species***, Cambridge University Press, New York 2009, s. 237–255.

jeśli użyjemy tego wyrażenia w dość luźnym sensie). Podczas gdy teologia negatywna stanowiła istotną część argumentacji Darwina na rzecz teorii ewolucji, to zasadniczo mamy tutaj do czynienia z przedsięwzięciem negatywnym mającym na celu podważenie fundamentu koncepcji specjalnego stworzenia. Natomiast za pomocą teologii pozytywnej Darwin afirmował oświeceniowe ujęcie teologii jako niezależne wsparcie dla teorii dziedziczenia z modyfikacjami i jednocześnie jako stanowisko przemawiające przeciwko koncepcji specjalnego stworzenia. [6] Jak jednak zobaczymy, granica między teologią negatywną a pozytywną może okazać się cienka, a niektóre z poniżej przedstawionych argumentów zawierają elementy jednej i drugiej.

Oczywiście te dwa rodzaje teologii nie wyczerpują wszystkich sposobów użycia bogomowy (*God-Talk*) w **O powstawaniu gatunków**. John Hedley Brooke i inni autorzy mocno podkreślają, że Darwin zawdzięcza teologii naturalnej podobne rodzaje problemów badawczych, założeń, sposobów argumentacji, metafor, pojęć i twierdzeń. [7] W niniejszym artykule nie ma jednak miejsca na wyczer-

---

[6] Teologia pozytywna jest „niezależna" w tym sensie, że jej epistemiczna prawomocność nie zależy od prawdziwości (lub uzasadnienia) koncepcji specjalnego stworzenia. Chociaż Darwin mógł założyć prawdziwość idei specjalnego stworzenia po to, aby przeprowadzić *reductio ad absurdum* twierdzeń tego ujęcia, to tego samego nie mógł uczynić z własną teologią pozytywną, ponieważ przyjęcie jej prawdziwości wymagało innych podstaw. Powinienem dodać, że nie każde analizowane w tej pracy twierdzenie teologii pozytywnej da się należycie zaliczyć do tego, co można by ogólnie nazwać „teologią w stylu oświeceniowym", aczkolwiek wiele z nich podpada pod tę kategorię.

[7] Por. John Hedley Brooke, „The Relations Between Darwin's Science and His Religion", w: John Durant (ed.), **Darwinism and Divinity: Essays on Evolution and Religious Belief**, Oxford University Press, New York 1985, s. 48–49 [40–75]. Na ten temat pisali również Neal C. Gillespie (por. **Charles Darwin…**), Robert J. Richards (por. „Theological Foundations of Darwin's Theory of Evolution", w: Paul H. Theerman and Karen H. Parshall (eds.), **Experiencing Nature: Proceedings of a Conference in Honor of Allen G. Debus**, Vol. 58, Kluwer Academic Publishers, Dordrecht 1997, s. 61–79), John Cornell (por. „Newton of the Grassblade? Darwin and the Problem of Organic Teleology", *Isis* 1986, Vol. 77, No. 3, s. 405–421, https://doi.org/10.1086/354203), Momme von Sydow (por. „Charles Darwin: A Christian Undermining Christianity?", w: David M. Knight and Matthew D. Eddy (eds.), **Science and Beliefs: From Natural Philosophy to Natural Science, 1700–1900**, Ashgate, Burlington 2005, s. 141–156), Abigail J. Lustig (por. „Natural Atheology", w: Abigail J. Lustig, Robert J. Richards, and Michael Ruse (eds.), **Darwinian Heresies**, Cambridge University Press, Cambridge 2004, s. 69–83), John Hedley Brooke (por. „Laws Impressed On Matter by the Creator?", in Richards and Ruse (eds.), **The Cambridge Companion to the *Origin*…**, s. 256–274); Paul Nelson (por. „The Role of Theology in Current Evolutionary Reasoning", *Biology and Philosophy* 1996, Vol. 11, s. 493–517, https://doi.org/10.1007/BF00138329), Chris Cosans (por. „Was Darwin a Creationist?", *Perspectives in Biology and Medicine* 2005, Vol. 48, No. 3, s. 362–371, https://doi.org/10.1353/pbm.2005.0071), Richard England (por. „Natural Selection, Teleology, and the Logos: From Darwin to the Oxford Neo-Darwinists, 1859–1909", *Osiris* 2001, Vol. 16, No. 1, s. 270–287, https://doi.org/

pujące przeanalizowanie tych zagadnień. Tutaj interesuje nas głównie teologia pozytywna. Twierdzę, że ta teologia nie tylko pomaga (bądź ma pomóc) uzyskać epistemiczne uzasadnienie dla teorii Darwina, ale częściowo wpływa także na jej treść.

Boski Architekt

W **O powstawaniu gatunków** Darwin przyjął określony teologiczny pogląd na związek między Bogiem a prawami przyrody i wykorzystywał go w argumentacji na rzecz teorii ewolucji i przeciwko koncepcji specjalnego stworzenia. Pogląd ten został wyrażony w wybranym przez Darwina fragmencie jednego z traktatów w ramach serii *Bridgewater Treatises* [Traktaty Bridgewater], [*] którego autorem był William Whewell. Darwin umieścił ten fragment w epigrafie swojego dzieła:

> Jeśli chodzi o świat materialny, możemy co najmniej stwierdzić, że zdarzeń nie wywołują poszczególne akty wszechmocy Boskiej, działające w każdym wypadku, lecz powszechnie obowiązujące prawa.[**]

10.1086/649348), Dov Ospovat (por. „God and Natural Selection: The Darwinian Idea of Design", *Journal of the History of Biology* 1980, Vol. 13, No. 2, s. 169–194, https://doi.org/10.1007/BF00125743), David Depew (por. „The Rhetoric of the **Origin of Species**...", s. 237–255) oraz James Moore (por. Charles Darwin and the Problem of Creation (Book Review)", *The British Journal for the History of Science* 1981, Vol. 14, No. 2, s. 189–200, https://doi.org/10.1017/S0007087400018537).

[*] (Przyp. tłum.) Traktaty te publikowane były w latach 1833–1836 i nawiązywały do takich dziedzin nauki jak biologia, geologia, chemia czy astronomia, a ich autorami byli znani brytyjscy uczeni: Thomas Chalmers (**The Adaptation of External Nature to the Moral and Intellectual Condition of Man. Treatise I**, Vol. I–II, William Pickering, London 1833); John Kidd (**On The Adaptation of External Nature to the Physical Condition of Man. Treatise II**, William Pickering, London 1833); William Whewell (**Astronomy and General Physics Considered with Reference to Natural Theology. Treatise III**, William Pickering, London 1833); Charles Bell (**The Hand, its Mechanism and Vital Endowments as Evincing Design. Treatise IV**, William Pickering, London 1833); Peter Mark Roget (**Animal and Vegetable Physiology Considered with Reference to Natural Theology. Treatise V**, Vol. I–II, William Pickering, London 1834); William Buckland (**Geology and Mineralogy Considered with Reference to Natural Theology. Treatise VI**, Vol. I–II, William Pickering, London 1836); William Kirby (**On the History, Habits and Instincts of Animals. Treatise VII**, William Pickering, London 1835); William Prout (**Chemistry, Meteorology, and the Function of Digestion, Considered with Reference to Natural Theology. Treatise VIII**, William Pickering, London 1834). W 1837 roku został opublikowany dziewiąty, najbardziej znany traktat, którego autorem był Charles Babbage (**The Ninth Bridgewater Treatise: A Fragment**, John Murray, London 1837).

[**] (Przyp. tłum.) Whewell, **Astronomy and General Physics...**, s. 356.

Pod koniec **O powstawaniu gatunków** Darwin napisał wprost:

> Najznakomitsi autorzy są, jak się zdaje, zupełnie zadowoleni z poglądu, że każdy gatunek został stworzony niezależnie. Moim zdaniem z prawami nadanymi materii przez Stwórcę bardziej się zgadza pogląd, że powstawanie i wymieranie dawniejszych i obecnych mieszkańców Ziemi zostało spowodowane przyczynami wtórnymi, podobnie jak się rzecz ma z tymi czynnikami, które wywołują narodziny i śmierć osobnika. [8]

W powyższym fragmencie Darwin porównał dwie teorie w świetle twierdzenia o prawach przyrody. [9] A dokładniej, porównał ideę specjalnego stworzenia z teorią ewolucji na tle bardziej podstawowego twierdzenia — o tym, co „my" już „wiemy" o prawach przyrody — aby ocenić, która teoria jest bardziej zgodna z naszą dotychczasową wiedzą. Darwin był przekonany, że nasza wiedza o prawach przyrody przemawia za poglądem, iż proces „powstawania i wymierania" flory i fauny jest wynikiem działania „przyczyn wtórnych", nie zaś niezależnych aktów stworzenia. To twierdzenie implikowało, że prawa przyrody są *niezłomne* — w innym przypadku nie można byłoby ich traktować jako świadectw na rzecz działania wyłącznie przyczyn wtórnych (a więc i na rzecz dziedziczenia z modyfikacjami), przemawiających zarazem przeciwko następowaniu cudownych interwencji (o których mówią zwolennicy koncepcji specjalnego stworzenia).

Co jednak uzasadniało (implikowane) twierdzenie o niezłomnych prawach? Podczas gdy pełna odpowiedź na to pytanie musi uwzględniać treść całej książki **O powstawaniu gatunków**, również dotyczącą roli doboru naturalnego, to w wyżej zacytowanym fragmencie bezpośrednim uzasadnieniem twierdzenia o niezłomnych prawach było przekonanie teologiczne. Zauważmy, że z perspektywy epistemicznej odwołanie do samych praw przyrody niewystarczająco uzasadniało tezę o działaniu wyłącznie przyczyn wtórnych. W tamtych czasach wielu myślicieli utrzymywało — zgodnie ze słynnym stwierdzeniem Williama Paleya — że „prawo zakłada istnienie bytu sprawczego". [10] W tradycyjnym teizmie ten „byt spraw-

---

[8] Darwin, **O powstawaniu gatunków…**, s. 449.

[9] Już w kolejnym zdaniu tego akapitu Darwin wyraźnie porównał ideę specjalnego stworzenia ze swoją teorią. Przeciwstawił tę pierwszą poglądowi, że „wszystkie istoty" są potomkami „w prostej linii niewielu przodków żyjących na długo przed osadzeniem się pokładów sylurskich" (Darwin, **O powstawaniu gatunków…**, s. 449).

[10] William Paley, **Natural Theology; or, Evidences of the Existence and Attributes of the Deity; Collected from the Appearances of Nature**, 12th ed., J. Faulder, London 1809 (pierwsze wydanie: R. Faulder, London 1802), s. 7. Por. też s. 416–418.

czy" nie tylko podtrzymywał świat w sposób uporządkowany, ale również dokonywał w nim cudownych interwencji. Zgodnie z tym podejściem te dwa sposoby działania nie kolidowały ze sobą, lecz uzupełniały się jako środki realizacji woli Bożej. Darwin musiał więc zaproponować jakieś uzasadnienie dla twierdzenia o niezłomności praw przyrody (którą nie cechują się cudy), a tym samym dla przyjęcia teorii biologicznej odwołującej się jedynie do przyczyn wtórnych.

Teologia zapewniała pewną przewagę. Zgodnie z tym ujęciem prawa zostały „nadane materii przez Stwórcę". [*] W moim przekonaniu użycie terminu „nadane" prawa wskazuje na obraz Stwórcy, który po ustanowieniu tych praw pozwolił, aby przyroda funkcjonowała jedynie na podstawie przyczyn drugorzędnych. Weźmy najpierw pod uwagę, że Darwin wyraził swoje poparcie dla tego poglądu nie tylko w **O powstawaniu gatunków**. W **Autobiografii** (która pierwotnie była przeznaczona tylko dla członków jego rodziny) również wskazał na dychotomię między prawami a cudami. Napisał wówczas, że „im więcej wiemy o niezmiennych prawach przyrody, tym mniej prawdopodobne są cuda". [11] Twierdził również, że przyroda działa wyłącznie na podstawie praw: „*Wszystko* w przyrodzie jest wynikiem *niezmiennych* praw". [12] We wczesnych notatnikach Darwina znajdujemy takie samo nastawienie. Prywatnie uznawał on ideę boskiego stworzenia na mocy praw za „znacznie wznioślejszą" aniżeli pogląd o cudownych aktach stwórczych, który „uwłacza godności tego, który miał powiedzieć: niech stanie się światłość i stała się światłość". [13] W eseju z 1844 roku dodał, że „prawa zdolne do tworzenia

[*] (Przyp. tłum.) Darwin, **O powstawaniu gatunków...**, s. 449.

[11] Karol Darwin, **Autobiografia i wybór listów. Dzieła wybrane**, t. VIII, przeł. A. Iwanowska, A. Krasicka, J. Połtowicz, S. Skowron, *Biblioteka Klasyków Biologii*, Państwowe Wydawnictwo Rolnicze i Leśne, Warszawa 1960, s. 42.

[12] Darwin, **Autobiografia...**, s. 44 [wyróżnienia dodane].

[13] Gavin de Beer (ed.), „Darwin's Notebooks on Transmutation of Species. Part III. Third Notebook [D] (July 15 to October 2nd 1838)", *Bulletin of the British Museum (Natural History)* 1960, Historical Series, Vol. 2, No. 4, s. 132 [119–150].

(Przyp. tłum.) Podobną wypowiedź można znaleźć pod koniec wczesnego szkicu Darwina z 1842 roku: „Jest to zgodne z tym, co wiemy o prawie nadanym materii przez Stwórcę. Na mocy tego prawa stwarzanie i wymieranie form, tak jak narodziny i śmierć jednostek, winno być skutkiem wtórnych praw. Jest to uwłaczające, że Stwórca niezliczonych systemów światów powinien stwarzać wszystkie z miriad pełzających pasożytów i obślizgłych robaków, które każdego dnia pojawiają się w wodach i na lądach tej jednej planety" (Charles Darwin, „The Essay of 1842", w: Francis Darwin (ed.), **The Foundations of the Origin of Species: Two Essays Written in 1842 and 1844**, Cambridge University Press, Cambridge 1909, s. 51 [1–53]).

pojedynczych organizmów [...] powinny spotęgować nasz podziw dla mocy wszechwiedzącego Stwórcy". [14] A zatem w różnych źródłach poprzedzających i następujących po **O powstawaniu gatunków** Darwin konsekwentnie wykluczał cudy i wolał powoływać się na niezłomne prawa przyrody.

Wskazane fragmenty korespondują z poglądami wielu intelektualnych mentorów Darwina — między innymi Williama Whewella, Johna Herschela, Charlesa Babbage'a i Francisa Bacona — którzy uważali, że prawa przyrody stanowią główne narzędzie, za pomocą którego Bóg rządzi światem fizycznym. Zdaniem tych uczonych wyjaśnienia naukowe powinny się odwoływać do praw przyrody, a nie do cudów. Nie byli oni jednak deistami, ponieważ wierzyli, że Bóg nieustannie podtrzymuje świat w istnieniu właśnie dzięki prawom. Mimo to odwołania do przyczyn wtórnych mają większą wartość naukową niż poleganie na cudach. [15]

Ujmując rzecz wprost, Babbage, Herschel i Whewell używali takiego samego słowa — nadane — aby wyrazić taką samą ideę Boga jako obdarzającego materię trwałymi, podlegającymi prawom właściwościami. [16] Na przykład Herschel w pracy zatytułowanej **A Preliminary Discourse on the Study of Natural Philosophy** [Rozważania wstępne o filozofii przyrody] pisał o podstawowych elementach Wszechświata w sposób następujący: „stwarzając je [...], obdarzone pewnymi niezmiennymi właściwościami i zdolnościami, już na początku natchnął je duchem [...] swojego prawa i sprawił, że wszystkie ich późniejsze złożenia i relacje były nieuniknionymi konsekwencjami tego pierwszego tchnięcia". [17] Natomiast Whewell oświadczył w jednym z *Bridgewater Treatises*, że:

> Bóg jest autorem i zarządcą Wszechświata. Włada nim za pośrednictwem praw, które nadał jego częściom, i własności, którymi obdarzył jego elementy składowe. Te prawa i własności, jak już zostało powiedziane, są instrumentami, za pomocą których sprawuje władzę [...], dzięki tym atrybutom Stwórca wszystkiego kształtuje i podtrzymuje widzialne stworzenie, porusza nim i kieruje. [18]

---

[14] Darwin, „The Essay of 1842...", s. 52.

[15] Nie znaczy to, że Darwin był teistą *per se*, ale że wolał mówić o prawach niż o cudach, niezależnie od posiadanych przekonań na temat ostatecznego statusu ontologicznego samych praw.

[16] Por. Charles Babbage, **The Ninth Bridgewater Treatise**, 2nd ed., John Murray, London 1838, s. 24. Na ten temat por. też s. 40, 95, 169.

[17] John Herschel, **A Preliminary Discourse on the Study of Natural Philosophy**, Longman, Rees, Orme, Brown, & Green, London 1840, s. 37 [wyróżnienie usunięte]. Na ten temat por. też s. 39.

[18] Whewell, **Astronomy and General Physics...**, s. 357. Na ten temat por. też s. 136, 230.

Ten fragment znajdował się w tym samym akapicie książki Whewella, co wykorzystane przez Darwina jako epigraf do książki **O powstawaniu gatunków** twierdzenie, że Bóg nie działa poprzez okazjonalne dokonywanie cudów, lecz przez „powszechnie obowiązujące prawa". W następnych dwóch akapitach Whewell zacytował Francisa Bacona [19] i przedstawioną wcześniej wypowiedź Herschela.

Tak rozumiany „Stwórca", który „nadał prawa materii", nie był Bogiem specjalnego stworzenia, lecz Bogiem niezłomnych praw. Z epistemicznego punktu widzenia argument Darwina miał sens tylko przy takim rozumieniu Boga. Odwołanie do Znamienitego Architekta, a nie do Cudotwórcy, stanowiło uzasadnienie dla poglądu o niezłomności praw, w świetle którego w przyrodzie mogą działać wyłącznie przyczyny wtórne, co z kolei przemawiało za przyjęciem teorii ewolucji, a nie za ideą specjalnego stworzenia. W tej argumentacji teologia odegrała więc subtelną, ale kluczową rolę.

Oczywiście słowa Darwina należy odpowiednio zinterpretować, gdyż nie zawsze wyrażał się wprost. Można by powiedzieć, że sposób wyrażania myśli w **O powstawaniu gatunków** jest powściągliwy i celowo wieloznaczny. Nic dziwnego, że współcześni Darwinowi nie byli zgodni w tym, czy koncepcję dziedziczenia z modyfikacjami można pogodzić z tradycyjnym teistycznym rozumieniem praw przyrody, a zwłaszcza z ideą Bożej opatrzności nad przyrodą ożywioną. [20] Jednak mimo tej różnicy zdań odwołanie się do praw przez Darwina miało znaczenie *epistemiczne* tylko wówczas, gdy prawa te były pojmowane zgodnie z ujęciem Herschela i Whewella, a nie w sposób charakterystyczny dla zwolenników idei specjalnego stworzenia.

W **O powstawaniu gatunków** występuje oczywiście pewna dwuznaczność, jeśli chodzi o pogląd Darwina na działanie niezłomnych praw w historii kosmosu, ponieważ na ostatnich stronach trzykrotnie sugeruje on możliwość cudownego stworzenia pierwszego życia. [21] W drugim wydaniu Darwin dodał nawet, że

[19] Por. Francis Bacon, „A Confession of Faith", w: James Spedding, Robert Leslie Ellis, and Douglas Denon Heath (eds.), **The Works of Francis Bacon**, Vol. 7, Longmans and Co., London 1892, s. 221 [219–226].

[20] Por. Brooke, „Laws Impressed On Matter…", s. 266–272.

[21] Por. Darwin, **O powstawaniu gatunków…**, s. 445, 449–450. Por. też Cosans, „Was Darwin a Creationist…", s. 362–371.

Stwórca „natchnął życiem kilka form lub jedną tylko”. [22] Chociaż istnieją dobre powody, na podstawie których można sądzić, że w 1859 roku Darwin był deistą, [23] w książce wydawał się niespójnie akceptować i odrzucać zarazem możliwość cudów. To wyczuwalne napięcie zostanie omówione w dalszej części artykułu, a na razie teologię zawartą w **O powstawaniu gatunków** określę jako półdeistyczną. [24]

Wielu badaczy zwracało uwagę, że w **O powstawaniu gatunków** występuje związek między postrzeganiem praw przyrody a teologią. [25] John Cornell twierdził na przykład, że w książce Darwina świat fizyczny został przedstawiony jako produkt „boskiego urządzenia praw przyrody” — podstawą tego poglądu są wczesne przekonania Darwina o ograniczonej roli Boga w świecie przyrody. [26] Robert Richards tak napisał o książce Darwina: „A jednak w tym dziele, które dojrzewało

---

[22] Darwin, **O powstawaniu gatunków…**, s. 450. W piątym wydaniu **O powstawaniu gatunków** (John Murray, London 1869, s. 577) Darwin złagodził ton niektórych teologicznych wypowiedzi, a z niektórych nawet się wycofał, co widać w jego prywatnej korespondencji z 1863 roku. Por. Francis Darwin (ed.), **The Life and Letters of Charles Darwin**, Vol. 3, John Murray, London 1887, s. 18. Por. też Brooke, „Laws Impressed On Matter…”, s. 256–274.

(Przyp. tłum.) Autor nawiązuje do ostatniego zdania książki Darwina, które w całości wygląda tak: „Wzniosły zaiste jest to pogląd, że Stwórca natchnął życiem kilka form lub jedną tylko i że gdy planeta nasza, podlegając ścisłemu prawu ciążenia, dokonywała swych obrotów, z tak prostego początku zdołał się rozwinąć i wciąż jeszcze się rozwija nieskończony szereg form najbardziej godnych podziwu i najpiękniejszych” (Darwin, **O powstawaniu gatunków…**, s. 450). To zdanie nie wskazuje na to, że Darwin był zwolennikiem takiego poglądu, a jedynie twierdził, iż jest on wzniosły.

[23] Por. Michael Ruse, **The Darwinian Revolution: Science Red in Tooth and Claw**, 2nd ed., University of Chicago Press, Chicago 1999, s. 181; Richards, „Theological Foundations of Darwin's Theory of Evolution…”, s. 64; Brooke, „Laws Impressed On Matter…”; Gillespie, **Charles Darwin…**, s. 132–133; Janet Browne, **Charles Darwin: Voyaging**, Knopf, New York 1995, s. 411, 438–439, 513; John Cornell, „God's Magnificent Law: The Bad Influence of Theistic Metaphysics on Darwin's Estimation of Natural Selection”, *Journal of the History of Biology* 1987, Vol. 20, No. 2, s. 384–391 [381–412], https://doi.org/10.1007/BF00139461.

[24] Mimo że w **O powstawaniu gatunków** występuje aluzja do idei cudownego stworzenia pierwszego życia, to teologię zawartą w tej książce oceniam jako półdeistyczną, a nie teistyczną. Nie ma tutaj bowiem wyraźnego przyjęcia poglądu, że Bóg w sposób ontologiczny podtrzymuje świat w istnieniu, co jest podstawowym założeniem tradycyjnego teizmu.

[25] Por. np. England, „Natural Selection, Teleology, and the Logos…”, s. 274–275; Ospovat, „God and Natural Selection…”, s. 169–194; von Sydow, „Charles Darwin…”, s. 141–156.

[26] Por. Cornell, „Newton of the Grassblade…”, s. 421. Cornell uważał, że przekonanie Darwina o zaprojektowaniu praw było tak głębokie, iż odegrało kluczową rolę w jego pojmowaniu „podstawowej organizacji” i zachowania organizmów żywych (por. Cornell, „Newton of the Grassblade…”, s. 414).

przez dwadzieścia lat, [Darwin] nadal sugerował, że prawa ewolucji czy prawa wtórne winny być postrzegane jako nakazy Boga”. [27] Natomiast David Kohn zwrócił uwagę nie tylko na związek między poglądem Darwina na prawa przyrody a przyjmowaną przezeń teologią, ale także podkreślał, że angielski przyrodnik uważał swoją teologię za bardziej czcigodną aniżeli teologia kreacjonistów:

> Potępiając archaiczną ideę specjalnego stworzenia, a co za tym idzie teologię opatrznościową, nieustannie uciekał się do wyższej, szlachetniejszej, ogólniejszej i bardziej oświeconej perspektywy teologicznej. W **O powstawaniu gatunków** Darwin twierdził, że prawa przyrody wskazują na porządek we Wszechświecie [...]. Niemniej jego otwarte stanowisko nie miało charakteru ateistycznego. Mógł on powiedzieć, że prawa przyrody zostały nadane materii przez Stwórcę [...]. Porządek w przyrodzie wskazywał na istnienie Boga, a teoria ewolucji drogą doboru naturalnego stanowiła wyjaśnienie tego porządku, którym żaden rozsądny, uczciwy, religijny umysł nie powinien gardzić. [28]

Można by twierdzić, że deizm Darwina odbił się na treści **O powstawaniu gatunków** także na bardziej podstawowym poziomie. Wcześniej pisałem, że poglądy angielskiego przyrodnika na ograniczone działanie Boga w świecie wpłynęły na jego *argument* za teorią ewolucji (i przeciwko koncepcji specjalnego stworzenia), ale poglądy te mogły też wpłynąć na *treść* samej teorii ewolucji. W centrum teorii Darwina znajduje się twierdzenie o doborze naturalnym oddziałującym na skutki losowych zmian. W odróżnieniu od teologii interwencjonistycznej, teologia deistyczna jest w pełni zgodna z twierdzeniem o procesie, który nie zależy bezpośrednio od ingerencji Boga, lecz od presji środowiska, rywalizacji, losowej zmienności i dziedziczności. [29] Michael Ruse napisał, że w latach trzydziestych XIX wie-

---

[27] Richards, „Theological Foundations...”, s. 65. Por. też Robert J. Richards, „Darwin's Theory of Natural Selection and Its Moral Purpose”, w: Richards and Ruse (eds.), **The Cambridge Companion to the *Origin*...**, s. 47–66.

[28] Kohn, „Darwin's Ambiguity...”, s. 238.

[29] Ponieważ taka teologia półdeistyczna również przyjmowała znaturalizowaną metodologię, pozwalała ona Darwinowi czerpać epistemiczne (lub retoryczne) korzyści z naturalizmu metodologicznego, który w tamtych czasach stawał się coraz bardziej popularnym poglądem na naukę wśród biologów. Ronald L. Numbers twierdzi, że to właśnie ścisłe przestrzeganie przez Darwina zasady naturalizmu metodologicznego — nawet w większym stopniu niż przedstawione przezeń obszerne świadectwa empiryczne — przyczyniło się do tego, że jego teoria zyskiwała zwolenników. Jeżeli Numbers ma rację, to teologia półdeistyczna odegrała jeszcze większą (chociaż pośrednią) rolę w skutecznym oddziaływaniu argumentacji Darwina. Por. Ronald L. Numbers, „Science Without God: Natural Laws and Christian Beliefs”, w: David C. Lindberg and Ronald L. Numbers (eds.), **When Science and Christianity Meet**, University of Chicago Press, Chicago 2003, s. 265–286; Ronald L. Numbers,

ku „Darwin być może dlatego wszedł na drogę ku teorii ewolucji, ponieważ doszedł do wniosku, że wyrazem wielkości Boga nie są cudy, lecz niezłomne prawa". [30] W sercu rodzącej się teorii Darwina znajdowało się twierdzenie, że odległy Stwórca posłużył się procesem obejmującym wyłącznie przyczyny wtórne. [31]

Ujmując rzecz krótko, teologia okazała się epistemicznym wsparciem dla teorii ewolucji, dostarczając jej idei niezłomnych praw i być może także — na skutek akceptacji naturalnych przyczyn zmian biologicznych — ukształtowała treść tej teorii. Widać więc, że autor **O powstawaniu gatunków** nie tylko posługiwał się bogomową, lecz również zharmonizował naukę z „właściwym" rozumieniem Boga.

Problem bólu i cierpienia w przyrodzie

Potwierdzenie swojej teorii Darwin znalazł między innymi w problemach z wyjaśnieniem istnienia bólu i cierpienia. Trzy lata przed publikacją **O powstawaniu gatunków** angielski przyrodnik napisał do przyjaciela: „Jaką książkę mógłby napisać kapłan diabła o tym niezgrabnym, marnotrawnym, nieudolnym i przerażająco okrutnym dziele natury!". [32] Dla Darwina problem bólu nie był tylko kwestią teoretyczną. W prywatnym liście napisał, że śmierć jego córki Annie — „ukochanego dziecka", jak sam ją określił — która zmarła w 1851 roku w wieku dziesięciu lat, była dla niego „bolesną i okrutną stratą". [33] Nawet dwadzieścia pięć lat po śmierci Annie angielski przyrodnik przyznał: „I teraz jeszcze mam łzy

---

Darwinism Comes to America, Harvard University Press, Cambridge 1998, s. 48.

[30] Michael Ruse, „The Origin of the **Origin**", w: Richards and Ruse (eds.), **The Cambridge Companion to the *Origin*...**, s. 2 [1–13].

[31] Twierdzenie, że teoria Darwina od początku opierała się na „przyczynach wtórnych", jest zasadniczo zgodne z ideą, że te przyczyny miały charakter progresywny, o ile progres nie był powodowany interwencjami Boga.

[32] Francis Darwin and A.C. Seward (eds.), **More Letters of Charles Darwin: A Record of His Work in a Series of Hitherto Unpublished Letters**, Vol. 1, John Murray, London 1903, s. 94.

(Przyp. tłum.) Polski przekład za: Richard Dawkins, **Kapłan diabła. Opowieści o nadziei, kłamstwie, nauce i miłości**, przeł. Michał Lipa, Helion, Gliwice 2014, s. 16. Jest to list z 13 lipca 1856 roku napisany do Josepha Daltona Hookera.

[33] List Karola Darwina do Williama Darwina Foxa z 29 kwietnia 1851 roku, *Darwin Correspondence Project*, University of Cambridge, http://tiny.pl/qf24l [09.10.2022].

w oczach, gdy myślę o jej dobroci”. [34] Wielu badaczy jest przekonanych, że problem cierpienia miał ogromny wpływ na naukowe poglądy Darwina. [35] Na stronach **O powstawaniu gatunków** Darwin pisał wprost, że samo istnienie cierpienia przemawiało na rzecz jego teorii: cierpienie w przyrodzie było w większym stopniu zgodne z teorią ewolucji niż z ideą specjalnego stworzenia. Na przykład pod koniec rozdziału poświęconego ewolucji instynktów Darwin wyraził się następująco:

> I chociaż z pewnością nie jest to pełny logiczny dowód, mojej wyobraźni daje więcej zadowolenia uznanie takich instynktów, jak wyrzucanie przez młodą kukułkę z gniazda swojego przybranego rodzeństwa, chwytanie przez mrówki niewolników czy też żerowanie larwy gąsienicznika wewnątrz żywych gąsienic innych owadów, nie za instynkty specjalnie nadane lub stworzone, lecz za niewielkie konsekwencje jednego ogólnego prawa, które prowadzi do rozwoju wszystkich istot organicznych, prawa, które nakazuje rozmnażać się i różnicować, najsilniejszym przeżyć, najsłabszym zaś zginąć. [36]

W ostatnim rozdziale **O powstawaniu gatunków**, w którym Darwin przedstawił podsumowanie swojej argumentacji, stwierdził, że biorąc pod uwagę jego teorię, nie powinniśmy być zaskoczeni, że:

> […] wszelkie wynalazki w przyrodzie nie są, o ile możemy ocenić, absolutnie doskonałe, a niektóre z nich są nawet wprost sprzeczne z naszym pojęciem doskonałości. Nie powinno nas dziwić, że żądło pszczoły powoduje jej śmierć; że trutnie w tak wielkiej liczbie stworzone do jednego tylko aktu, zostają później w ogromnej większości wytę-

---

[34] Darwin, **Autobiografia…**, s. 50. Wpływ śmierci Annie na poglądy Karola Darwina nadal jest kwestią dyskusyjną. Janet Browne twierdzi, że Annie „była oczkiem w głowie dumnego ojca” (Browne, **Charles Darwin…**, s. 499). A jej strata mogła oznaczać „formalny początek utraty wiary Darwina w tradycyjnie pojmowanego Boga” (Browne, **Charles Darwin…**, s. 203).

(Przyp. tłum.) Na temat wpływu śmierci Annie na poglądy Darwina por. też Grzegorz Malec, „Kiedy Darwin stracił wiarę w Boga?”, *Diametros* 2016, nr 48, s. 38–54, https://doi.org/10.13153/diam.48.2016.890.

[35] Por. John Hedley Brooke, „Religious Belief and the Content of the Sciences”, *Osiris* 2001, Vol. 16, No. 1, s. 20 [3–28], https://doi.org/10.1086/649336; James C. Livingston, „Frank Burch Brown, The Evolution of Darwin’s Religious Views [book review]”, *Journal of the American Academy of Religion* 1987, Vol. LV, No. 4, s. 819 [818–819], https://doi.org/10.1093/jaarel/LV.4.818-b; Brooke, „The Relations Between Darwin’s Science and His Religion”, w: Durant (ed.), **Darwinism and Divinity…**, s. 66–67; Nelson, „The Role of Theology…”, s. 493–517; David Livingstone, „Re-placing Darwinism and Christianity”, w: Lindberg and Numbers (eds.), **When Science and Christianity Meet…**, s. 185–189 [183–202].

[36] Darwin, **O powstawaniu gatunków…**, s. 226.

pione przez swoje bezpłodne siostry; że nasze sosny wytwarzają tak olbrzymie ilości pyłku; że królowa pszczół czuje instynktowną nienawiść do własnych płodnych córek lub też że gąsieniczniki karmią się żywym ciałem gąsienic i że istnieją inne podobne fakty. Z punktu widzenia doboru naturalnego należałoby się raczej dziwić temu, że nie zauważono więcej takich przypadków braku absolutnej doskonałości. [37]

W późniejszych latach Darwin wyraził się podobnie na stronach **Autobiografii**, kiedy napisał, że „istnienie cierpień" jest „argumentem przeciw istnieniu rozumnej pierwszej przyczyny", ale „doskonale daje się pogodzić z poglądem, iż wszystkie istoty organiczne rozwinęły się przez zmienność i dobór naturalny". [38] Jak zauważył John Hedley Brooke, „*Ogrom* bólu i cierpienia w świecie Darwin uważał za jeden z najmocniejszych argumentów podważających wiarę w dobrego Boga, ale — jak twierdził — jest to zgodne z jego teorią doboru naturalnego". [39]

W powyższych fragmentach Darwin chciał przede wszystkim powiedzieć, że w pewnych przypadkach (lub biorąc wszystkie takie przypadki jako całość) naturalne cierpienia są czymś, czego można się spodziewać z punktu widzenia jego teorii, a co trudno wyjaśnić z pespektywy koncepcji specjalnego stworzenia. [40] Angielski przyrodnik był przekonany, że skoro przystosowanie i rozwój gatunków są konsekwencją wyłącznie intensywnej walki o przetrwanie, to trudno się dziwić, że jednostki gorzej przystosowane giną w trakcie rywalizacji. Ten schemat śmierci i okrucieństwa jest mniej spodziewany, jeżeli weźmiemy pod uwagę ideę specjalnego stworzenia, ponieważ zgodnie z tym podejściem — a przynajmniej tak to postrzegał Darwin — zakłada się istnienie dobrego, wszechmocnego i wszechwiedzącego Boga, który tak stworzył organizmy, aby te mogły się przystosować i rozwijać w lokalnych środowiskach. Darwin *implicite* powołał się na to, co określa się mianem „pierwszej zasady potwierdzania". Zgodnie z tą zasadą świadectwa mocniej przemawiają za teorią A niż teorią B, jeżeli są bardziej prawdopodobne (lub

[37] Darwin, **O powstawaniu gatunków…**, s. 435.

[38] Darwin, **Autobiografia…**, s. 45.

[39] John Hedley Brooke, **Science and Religion: Some Historical Perspective**, *The Cambridge History of Science Series*, Cambridge University Press, New York 1991, s. 316 [wyróżnienie w oryginale].

[40] W przeciwieństwie do pierwszego fragmentu o cierpieniu w przyrodzie (cytat opatrzony przypisem 36), drugi fragment (cytat opatrzony przypisem 37) nie jest bezpośrednim porównaniem teorii ewolucji z ideą specjalnego stworzenia. Jednakże osadzenie drugiego fragmentu w szerszym kontekście pokazuje, że argumentacja Darwina ma charakter wyraźnie porównawczy.

bardziej oczekiwane) w przypadku teorii A niż teorii B. [41] Tak więc istnienie cierpienia w przyrodzie było postrzegane bardziej jako świadectwo na rzecz teorii ewolucji niż koncepcji specjalnego stworzenia, ponieważ w świetle tej pierwszej teorii cierpienie jest bardziej prawdopodobne niż w świetle drugiej.

Argument ten opiera się na teologicznym założeniu, że jest mało prawdopodobne, aby wszechdobry, wszechmocny i wszechwiedzący Bóg celowo zaprojektował stworzenia, by powodowały wielkie cierpienie lub go doświadczały. [42] Pomimo istnienia wielu tradycyjnych teodycei starających się pogodzić istnienie Boga z występowaniem cierpienia w przyrodzie Darwin twierdził, że kreacjonistyczna koncepcja Boga dokonującego specjalnych aktów stwórczych jest po prostu nieprzekonująca w obliczu bólu i cierpienia. Tym samym w **O powstawaniu gatunków** znajdujemy milczące poparcie dla określonego poglądu na naturę Boga i jego moralnych powinności. Ten pogląd został wykorzystany jako bezpośrednie epistemiczne wsparcie dla teorii ewolucji i przeciwko jej głównej rywalce — koncepcji specjalnego stworzenia.

Wszystko wskazuje na to, że na głębszym poziomie teologiczne zmagania Darwina z problemem cierpienia nie tylko dostarczyły argumentów dla jego teorii, ale także wpłynęły na jej treść. Spójrzmy raz jeszcze na fragment z **O powstawaniu gatunków**, gdzie Darwin stwierdza, że przypadki cierpienia w przyrodzie to „niewielkie konsekwencje jednego ogólnego prawa, które prowadzi do rozwoju wszystkich istot organicznych, prawa, które nakazuje rozmnażać się i różnicować, najsilniejszym przeżyć, najsłabszym zaś zginąć”. [43] W tym cytacie angielski przyrodnik opisał, jak zmienność i dobór prowadzą do „*rozwoju* wszystkich istot organicznych”. [44] Cierpienie w przyrodzie było więc akceptowalnym skutkiem ubocznym w procesie, który ostatecznie przyniósł więcej korzyści niż strat. Bóg zapro-

---

[41] Formalnie rzecz ujmując, argument Darwina można rozwinąć lub wyrazić za pomocą twierdzenia Bayesa na temat prawdopodobieństwa: P(ET/PS)/P(SC/PS) = [P(ET)/P(SC)] × [P(PS/ET)/P(PS/SC)], gdzie PS = ból i cierpienie, ET = teoria ewolucji, a SC = koncepcja specjalnego stworzenia.

[42] Ściślej rzecz biorąc, założenie teologiczne w argumentacji Darwina nie polegało na tym, że ból i cierpienie w przyrodzie są czymś mało prawdopodobnym z punktu widzenia kreacjonistycznej koncepcji Boga dokonującego specjalnych aktów stwórczych, lecz że ból i cierpienie są mniej prawdopodobne w świetle tej koncepcji Boga niż w świetle teorii ewolucji. W tekście głównym użyłem tego pierwszego twierdzenia, ponieważ uważam, że dobrze oddaje ducha argumentacji Darwina. Czytelnicy, którzy wolą tę drugą, ściślejszą interpretację argumentu Darwina, powinni zauważyć, że ona również zależy od oceny tego, co zrobiłby Bóg, a czego by nie zrobił.

[43] Darwin, **O powstawaniu gatunków…**, s. 226.

jektował prawa przyrody w zgodzie ze swoją naturą moralną. Prawa te prowadziły do postępu, a więc cel ostateczny usprawiedliwiał wszelkie cierpienia, które pojawiały się po drodze. W ten sposób dobór naturalny zdjął z Boga ciężar cierpienia tak problematyczny dla koncepcji o specjalnym działaniu Boga, ten ostatni teraz został zwolniony z bezpośredniej odpowiedzialności za cierpienie w przyrodzie, ponieważ walka o byt prowadziła do moralnie oczekiwanego celu. [45] Tym sposobem teologiczne poglądy Darwina usankcjonowały jego teorię. Wiara w odległego, ale moralnego Boga wymagała takiego sposobu stworzenia, który mógłby wyjaśnić obecność cierpienia w przyrodzie zgodnie z określonym rozumieniem Boga. I właśnie to zapewniały zmienność i dobór naturalny wraz zawartym w nich elementem postępu.

Jedyny mądry (oraz pomysłowy i oszczędny) Bóg

Słynny Darwinowski argument z homologii również opierał się na teologii. [46] W **O powstawaniu gatunków** Darwin rozważał podobny układ struktur kost-

[44] Darwin, **O powstawaniu gatunków…**, s. 226 [wyróżnienie dodane]. Pod koniec **O powstawaniu gatunków** Darwin napisał: „Ponieważ zaś dobór naturalny działa tylko dla dobra każdej żywej istoty, wszelkie dalsze cielesne i duchowe przymioty będą dążyć do doskonałości" (Darwin, **O powstawaniu gatunków…**, s. 449). I dalej: „Tak więc z walki w przyrodzie, z głodu i śmierci bezpośrednio wynika najwznioślejsze zjawisko, jakie możemy pojąć, a mianowicie powstawanie wyższych form zwierzęcych" (Darwin, **O powstawaniu gatunków…**, s. 450). Michael Ruse twierdzi, że Darwin na przestrzeni sześciu wydań **O powstawaniu gatunków** coraz bardziej podkreślał dokonywanie się postępu w świecie przyrody. Por. Ruse, **Darwinian Revolution…**, s. 268–274. W podobnym tonie wyraził się Dov Ospovat, który zwrócił uwagę na to, że poglądy teologiczne Darwina były jednym z fundamentów jego wiary w postęp. Por. Dov Ospovat, **The Development of Darwin's Theory: Natural History, Natural Theology, and Natural Selection, 1838–1859**, Cambridge University Press, Cambridge 1981, s. 223–224. Por. też Richards, „Theological Foundations…", s. 47–66; von Sydow „Charles Darwin: A Christian…", s. 147–150.

(Przyp. tłum.) W pierwszym cytacie jest mowa o „duchowych przymiotach", co może sugerować, że Darwin miał na myśli jakieś religijne zdolności. W oryginale został użyty zwrot „mental endowments", co należałoby przetłumaczyć jako zdolności mentalne lub umysłowe. Por. Charles Darwin, **On the Origin of Species**, *Oxford World's Classics*, Oxford University Press, Oxford — New York 2008, s. 360.

[45] Por. Gillespie, **Charles Darwin…**, s. 127. Dov Ospovat zwrócił uwagę na to, że Darwin mógł odwołać się do „postępu", aby obronić się jako autor teorii, która przedstawiała przyrodę jako „pełną cierpień i rozlewu krwi" (Ospovat, **The Development of Darwin's Theory…**, s. 224).

[46] Ten temat wnikliwie przeanalizowali Paul Nelson i Abigail Lustig. Por. Nelson, „The Role of Theology…", s. 493–517; Lustig, „Natural Atheology…", s. 69–83.

nych w dłoni człowieka, łapie kreta, nodze konia i płetwie morświna. Zwolennicy koncepcji specjalnego stworzenia utrzymywali, że każda z tych struktur ma wysoce funkcjonalny cel (a być może nawet jest optymalna) i w ten sposób uwidacznia określony dla każdego gatunku plan mądrego Stwórcy. Natomiast Darwin przekonywał, że teoria ewolucji drogą doboru naturalnego jest wyjaśnieniem lepszym, i aby to wykazać, przypuścił bezpardonowy atak na przeciwny punkt widzenia:

> Nie ma rzeczy bardziej beznadziejnej niż próba wyjaśnienia podobieństwa planu budowy członków tej samej gromady za pomocą użyteczności lub celowości. Beznadziejność takich starań dobitnie uwydatnił Owen w nadzwyczaj ciekawym dziele **Nature of Limbs**. [47]

Przy różnych okazjach, omawiając argument z homologii, Darwin czerpał głównie z dzieła zatytułowanego **On the Nature of Limbs. A Discourse** [Rozprawa o naturze kończyn], Richarda Owena, czołowego anatoma porównawczego tamtych czasów. [48] Jako że Darwin nie tylko powołał się na autorytet Owena, ale także cytował jego pracę w szeroko zakrojonym ataku na koncepcję specjalnego stworzenia, [49] należy bliżej przyjrzeć się poglądom wyrażonym na stronach tej książki. Analiza treści **On the Nature of Limbs** pokazuje, że oprócz przedstawionych danych empirycznych Owen odwołał się także do twierdzeń teologicznych, aby odrzucić przyczyny celowe (lub ideę celowych boskich adaptacji) jako wyjaśnienia struktur homologicznych. Zwróćmy uwagę na poniższy fragment, który dobrze przedstawia główne twierdzenie Owena zawarte w **On the Nature of Limbs**:

> Niezależnie od tego, jakimi środkami lub narzędziami człowiek wspomaga lub zastępuje swoje naturalne narządy ruchu, to owe narzędzia są wyraźnie i natychmiastowo dostosowywane do zamierzonego celu. Człowiek nie jest skrępowany okowami jakichkolwiek powszechnych rozwiązań w odniesieniu do środków lokomocji i nie trudzi się koniecznością dopasowywania części i dbałością o ich proporcje, tak aby w jak najlepszy sposób osiągnąć wyznaczony cel, nie odbiegając od uprzednio ustalonego ogólnego wzorca. Nie ma czegoś takiego jak wspólnota planu lub konstrukcji dla łodzi i balonu bądź dla silnika lokomotywy autorstwa Stephensona i maszyny do drążenia tuneli zaprojektowanej przez Brunela. Jeżeli w ogóle można tu wskazać na analogię

[47] Darwin, **O powstawaniu gatunków…**, s. 402.

[48] Por. Richard Owen, **On the Nature of Limbs: A Discourse**, University of Chicago Press, Chicago 2007 (pierwsze wydanie: John Van Voorst, London 1849).

[49] Więcej na ten temat w dalszej części niniejszego tekstu.

> między narzędziami skonstruowanymi przez człowieka do podróżowania w powietrzu, na morzu czy na ziemi, to jest ona bardzo słaba. [50]

Krótko mówiąc, wynalazcy konstruują przeróżne maszyny do lokomocji „celowo i bezpośrednio" mając na uwadze cel każdej konkretnej maszyny. Nie stosują przy tym wspólnego projektu dla wszystkich maszyn, ponieważ jeśli kurczowo trzymaliby się uniwersalnego planu, to nie byliby w stanie wprowadzić nowych funkcji.

Owen utrzymywał, że zwolennik poglądu o specjalnym stworzeniu (czyli [jak pisał Owen] „teleolog") uważa, że Bóg stwarzał w ten sam sposób: „Teleolog […] oczekiwałby, że odkryje to samo bezpośrednie i celowe przystosowanie kończyny do jej funkcji jak w przypadku maszyny [wynalezionej przez człowieka]". [51] Tak jak ludzie nie konstruują maszyn lokomocyjnych na podstawie wspólnego typu, lecz mając bezpośrednio na uwadze określony cel, tak też Bóg *de novo* stworzył kończyny gatunków odpowiednio do różnych środowisk, zamiast wprowadzać modyfikacje do bardziej ogólnego typu. Podstawowe założenie — jak zauważył filozof Paul Nelson — wygląda tutaj następująco: „Jeżeli stwórca może robić, co mu się żywnie podoba, wówczas to, co uznajemy za plan, może wydawać się ograniczeniem lub przymusem sugerującym brak wyobraźni lub wręcz niewolnicze powielanie struktur według jednego z góry ustalonego wzorca". [52] Owen twierdził, że „dostrzegalna jedność pewnych wzorców biologicznych przeczy wolności Stwórcy do działania podług własnej woli". [53] Według Owena niczym nieograniczony Bóg zawsze zaczynałby tworzyć od zera. [54]

Owen wykorzystał właśnie to założenie, aby skrytykować ideę specjalnego stworzenia. W **On the Nature of Limbs** obszernie argumentował, że budowa kończyn różnych gatunków wskazuje czasami na wspólny typ lub „jedność planu", [55] czyli przejawia cechy dokładnie przeciwne do tych przewidywanych przez kon-

---

[50] Owen, **On the Nature of Limbs…**, s. 9–10.

[51] Owen, **On the Nature of Limbs…**, s. 10.

[52] Nelson, „The Role of Theology…", s. 511.

[53] Nelson, „The Role of Theology…", s. 511.

[54] Ściślej rzecz biorąc, Bóg dokonujący specjalnych aktów stwórczych zawsze zaczynałby od zera i nigdy nie korzystałby z jakiegoś wspólnego wzorca, a jeżeli nawet by się na to zdecydował, to najpewniej zatarłby wszelkie ślady świadczące o tym, że tak uczynił. Dla ułatwienia odbioru niniejszego tekstu skupię się na pierwszym z tych założeń.

cepcję specjalnego stworzenia. Krytykę Owena można więc przedstawić w postaci *modus tollendo tollens*:

1. Jeżeli koncepcja specjalnego stworzenia jest słuszna, to kończyny organizmów nie będą należały do wspólnego typu powyżej poziomu gatunku.

2. Jednakże niektóre kończyny organizmów należą do wspólnego typu powyżej poziomu gatunków.

3. Zatem koncepcja specjalnego stworzenia nie jest prawdziwa.

Argumentacja Owena może być poprawna tylko wtedy, gdy założenie istotne dla przesłanki pierwszej jest prawdziwe — mianowicie, że Bóg dokonujący cudów zawsze tworzy od nowa, a nie poprzez wykorzystanie ogólnego planu. Prawdą jest, że koncepcja specjalnego stworzenia zakłada, iż Bóg celowo i bezpośrednio stwarzał organizmy, narządy i kończyny na poziomie gatunków, tak aby były one dostosowane do poszczególnych środowisk. Koncepcja ta — logicznie rzecz biorąc — nie wykluczała jednak możliwości, że punktem wyjścia dla Boga był wspólny plan strukturalny, który następnie poddawał modyfikacjom ze względu na wymagania nowego gatunku w nowym środowisku. Ta ostatnia idea stanowiła dodatek Owena, który pozwolił mu wykorzystać dane empiryczne w celu krytyki idei specjalnego stworzenia.

Owen pokazał teologiczny kunszt również w innych fragmentach **On the Nature of Limbs**. Pod koniec pierwszej szczegółowej analizy kończyn — to jest koło czterdziestej strony swojego dzieła — Owen świadomie wykonał krok w tył, aby jasno przedstawić swój argument przeciwko koncepcji specjalnego stworzenia:

> Wydaje się oczywiste, że zasada ostatecznego przystosowania nie rozwiązuje wszystkich problemów. To, że każda część i prawie każda kość obecna w ludzkiej dłoni i ręce powinna występować również w płetwie wieloryba tylko dlatego, iż założono, że te elementy były potrzebne w takiej, a nie innej liczbie, i w takim, a nie innym zestawieniu umożliwiającym funkcjonowanie tego niepodzielonego i nieelastycznego wiosła, jest w równie niewielkim stopniu zgodne z naszym wyobrażeniem o najprostszym

[55] Por. np. Owen, **On the Nature of Limbs…**, s. 4–40, zwł. s. 39–40. Owen sugerował również, że Bóg dokonujący specjalnych aktów stwórczych nie wykorzystałby wspólnego planu do stworzenia kończyn przeznaczonych do różnych celów u tego samego zwierzęcia. Na ten temat wypowiadał się przy okazji omówienia kończyn przednich i tylnych u nietoperzy. Por. Owen, **On the Nature of Limbs…**, s. 7, 18–19, 39. Niestety, ze względu na ograniczoną objętość niniejszego artykułu nie mogę pozwolić sobie na analizę tego wariantu założenia teologicznego dotyczącego stwarzania *de novo*.

> sposobie realizacji tego celu, jak to, że domniemany powód, dla którego wielka liczba kości w czaszce pisklęcia powinna umożliwić bezpieczną kompresję mózgoczaszki w czasie aktu wyklucia, pokrywa się z wymogami tego aktu. [56]

W tym zawiłym fragmencie Owen przedstawił dwa zasadnicze twierdzenia. Po pierwsze, podobieństwa struktury kostnej między ludzką dłonią (i ręką) a płetwą wieloryba nie są zgodne z „naszym wyobrażeniem o najprostszym sposobie" wytworzenia funkcjonalnej płetwy. Po drugie, „wielka liczba kości w czaszce pisklęcia" przewyższa fizyczne „wymogi" konieczne do wylęgu z jaja („aktu wyklucia").

Rozważając te twierdzenia w kolejności, przypomnijmy, że zgodnie z koncepcją specjalnego stworzenia Bóg w sposób bezpośredni i celowy stworzył kończyny poszczególnych gatunków z uwagi na określony cel adaptacyjny. Oznacza to, że Bóg bezpośrednio i celowo stworzył płetwę wieloryba w celu poruszania się w wodzie. Owen odrzucił jednak ten pogląd, ponieważ płetwa wieloryba ma taką samą podstawową strukturę kostną jak dłoń i ręka człowieka, co — jak sądził Owen — było zbyt skomplikowane, mając na uwadze „potrzebę" funkcjonalności prostego „niepodzielonego i nieelastycznego wiosła". Przekombinowana konstrukcyjnie płetwa nie pasuje do „naszego wyobrażenia o najprostszym sposobie" budowy płetwy do określonego celu. A więc koncepcja specjalnego stworzenia jest nie do przyjęcia, ponieważ jest niezgodna z ludzkim rozumieniem (najwyższej) prostoty — „najprostszym sposobem" tworzenia. Krótko mówiąc, każdy wiarygodny pogląd dotyczący boskiej kreatywności musi być zgodny z ludzkim pojęciem oszczędności. [57] Chociaż Owen nie określił dokładnie, co stanowi „najprostszy sposób" tworzenia, to jego pogląd zdawał się sugerować, że Bóg był ograniczony i mógł wytworzyć tylko minimalnie złożoną strukturę wewnętrzną niezbędną do zewnętrznej funkcji wiosła. (To dlatego Owen odrzucił pomysł, że prosta funkcja wiosła wymagała złożonej struktury kostnej).

Drugie twierdzenie Owena wyrażone w cytowanym fragmencie wzmacniało odwołanie do oszczędności. Duża liczba kości w czaszce pisklęcia nie pokrywa się z „wymogami" wyklucia z jaja. W świetle poglądów Owena racjonalny Bóg nie stworzyłby struktury szkieletu — czy to w płetwie wieloryba, czy w głowie pisklęcia — charakteryzującej się wyższym poziomem skomplikowania, niż wymaga tego funkcja danej struktury. Krótko mówiąc, Bóg ukształtował części organiczne

[56] Owen, **On the Nature of Limbs…**, s. 39–40.

[57] Por. Lustig, „Natural Atheology…", s. 74–76.

w najprostszy możliwy do ich funkcjonowania sposób. Co ciekawe, w tym fragmencie Owen nie przedstawił żadnych świadectw przyrodniczych ani argumentów przemawiających na rzecz przyjmowanych przezeń założeń teologicznych. [58] Być może uczynił tak dlatego, że nie uznawał tych założeń za kontrowersyjne. Najwyraźniej dobrzy ludzie z epoki wiktoriańskiej wiedzieli, że Wszechmogącemu obca jest rozrzutność.

Istnieje także możliwość, że Owen osobiście akceptował teologiczne założenia, za pomocą których poddał krytyce ideę specjalnego stworzenia. Niemniej osobiste poglądy Owena nie mają tutaj większego znaczenia. Ważne jest, że wykorzystał wspomniane twierdzenia jako część krytyki tej idei (uznając jednocześnie, że przemawiają one na rzecz niematerialistycznej teorii archetypów). Twierdzenia te można przedstawić następująco: po pierwsze, Bóg, który ma całkowitą wolność stwarzania, stworzyłby kończyny *de novo*, nie posiłkując się istniejącym już wzorcem; po drugie, Bóg, chcąc uzyskać określone funkcje poszczególnych struktur, musiał stworzyć struktury biologiczne (jak na przykład kończyny) zgodnie z ludzką koncepcją „najprostszego sposobu realizacji"; po trzecie, Bóg mógłby stworzyć jedynie takie struktury, które charakteryzowałyby się minimalnym stopniem złożoności wymaganym do pełnienia danej funkcji. Można by się zastanawiać, czy Owen podświadomie dążył do uszlachetnienia Boga, by przypominał klasycznego wiktoriańskiego dżentelmena, który jest nie tylko pomysłowy i pracowity, ale jednocześnie cechuje się rozsądną powściągliwością. W każdym razie te pozytywne dodatki umożliwiły Owenowi przetestowanie domniemanych przewidywań idei specjalnego stworzenia za pomocą szczegółowych obserwacji empirycznych.

Kiedy Darwin odwołał się do poglądów Owena w celu ataku na ideę specjalnego stworzenia, bezpośrednio wykorzystał ten sam sposób rozumowania, dzięki czemu wzmocnił swój argument z homologii. Darwin odniósł się do przedstawionego wcześniej fragmentu i użył przykładu czaszki ptaków, czyli tego samego przykładu, co Owen. [59] Co więcej, Darwin w jednym z fragmentów **O powstawa-**

---

[58] Por. Nelson, „The Role of Theology…", s. 509–510.

[59] „Dlaczego mózg znajduje się w puszce zbudowanej z tak wielu i tak niezwykle ukształtowanych kawałków kości? Jak to zauważył Owen, pożytek wynikający z ustępowania osobnych części czaszki podczas porodu u ssaków nie może nam tłumaczyć takiej samej budowy czaszki u ptaków" (Darwin, **O powstawaniu gatunków…**, s. 403). Te twierdzenia odnoszą się do zdania z książki Owena, gdzie ten pisał o „najprostszych sposobach realizacji", oraz do dwóch kolejnych zdań (por. Owen, **On the Nature of Limbs…**, s. 40).

niu gatunków zacytował poglądy Owena. Fragment ten przedstawiał zmasowany atak Darwina na kreacjonistyczne wyjaśnienie homologii. Darwin zadał wówczas cztery kluczowe pytania retoryczne mające na celu zdyskredytowanie koncepcji specjalnego stworzenia, a każde z tych pytań zakładało jedno lub więcej pozytywnych założeń zapożyczonych od Owena. [60]

Dla niniejszego tekstu nie ma większego znaczenia, czy Darwin zdawał sobie sprawę z teologicznych założeń zawartych w książce Owena. Z epistemologicznego punktu widzenia Darwin potrzebował tych teologicznych twierdzeń, aby efektywnie wykorzystać argumentację Owena do rozprawienia się z ideą specjalnego stworzenia. Po usunięciu twierdzeń teologicznych pozostaje niewiele treści. Jeżeli ktoś akceptuje na przykład pogląd, że Bóg mógł projektować organizmy „przez modyfikacje" wcześniej istniejących projektów w celu zapewnienia nowym organizmom wymaganego stopnia przystosowania, to nie musi akceptować założenia o stwarzaniu *de novo*. A jeżeli przyjmuje, że Boskie metody stwarzania nie zawsze odpowiadają ludzkim wyobrażeniom o „najprostszej" metodzie, to może odrzucić inne z głównych założeń Owena. Podobną krytykę można by przedstawić wobec ostatniego twierdzenia teologicznego. Tak czy inaczej, prawdziwość tych twierdzeń (lub ich krytyki) nie ma znaczenia. Najważniejsze jest to, że teologia pozy-

[60] Por. Darwin, **O powstawaniu gatunków…**, s. 403. Por. też Owen, **On the Nature of Limbs…**, s. 7, 18–19, 36, 39–42. Treść dwóch z czterech pytań została zapożyczona z książki **On the Nature of Limbs**. Co więcej, uważni czytelnicy przekonają się, że każde pytanie zakłada jedno lub więcej przedstawionych powyżej założeń teologicznych. Na przykład Darwin zapytał: „Dlaczego w akcie stworzenia nietoperz miałby zostać wyposażony w podobne kości w skrzydłach i w nogach, służących do tak zupełnie innych celów?" (Darwin, **O powstawaniu gatunków…**, s. 403). To pytanie zakłada między innymi wariant założenia o stwarzaniu *de novo*, zgodnie z którym Bóg stworzyłby nowe kończyny w sposób bezpośredni i z przeznaczeniem do określonego celu, zamiast modyfikować każdą z osobna na podstawie wspólnego planu strukturalnego.

(Przyp. tłum.) Fragment z **O powstawaniu gatunków**, do którego nawiązuje autor tekstu, w całości wygląda tak: „Jakże trudno wyjaśnić te fakty, odwołując się do powszechnego poglądu o stworzeniu! Dlaczego mózg znajduje się w puszce zbudowanej z tak wielu i tak niezwykle ukształtowanych kawałków kości? Jak to zauważył Owen, pożytek wynikający z ustępowania osobnych części czaszki podczas porodu u ssaków nie może nam tłumaczyć takiej samej budowy czaszki u ptaków. Dlaczego w akcie stworzenia nietoperz miałby zostać wyposażony w podobne kości w skrzydłach i w nogach, służących do tak zupełnie innych celów? Dlaczego skorupiaki o skomplikowanych narządach gębowych, złożonych z wielu części, mają odpowiednio do tego mniej odnóży i na odwrót — te, które posiadają więcej odnóży, mają proste narządy gębowe? Wreszcie, dlaczego działki kielicha i płatki korony, pręciki i słupki jednego kwiatu, mimo przystosowania do rożnych zupełnie celów, są wszystkie zbudowane według tego samego wzoru?" (Darwin, **O powstawaniu gatunków…**, s. 403).

tywna zaproponowana przez Owena pozwoliła Darwinowi na krytykę idei specjalnego stworzenia. Co za tym idzie — atak przeprowadzony przez Darwina również opierał się na teologii.

Teologia pozytywna nie tylko pomogła Darwinowi podważyć ideę specjalnego stworzenia, ale także umożliwiła ugruntowanie poglądu o dziedziczeniu z modyfikacjami. Ponieważ Darwin uczynił z książki **O powstawaniu gatunków** głównie pole bitwy między koncepcją specjalnego stworzenia a teorią dziedziczenia z modyfikacjami, udany atak na to pierwsze ujęcie sugerował, że to drugie jawi się *de facto* jako zwycięzca. Twierdzenia teologiczne w sposób pośredni dały więc pozytywne epistemiczne poparcie dla argumentu z homologii mającego potwierdzać teorię ewolucji. Oczywiście nie oznacza to, że przesłanki teologiczne były jedynymi ważnymi przesłankami tego argumentu. Dokonując oceny doktryny przyczyn celowych, zarówno Owen, jak i Darwin korzystali ze starannie zgromadzonych danych empirycznych na temat homologii. Nie zmienia to jednak faktu, że — jak widzieliśmy — założenia teologiczne były istotne dla argumentacji Owena, a skoro tak, to były istotne również dla argumentu Darwina.

W książce **O powstawaniu gatunków** argument z homologii odegrał niemałą rolę w rozważaniach na temat dziedziczenia z modyfikacjami. W swoim dziele Darwin pisał o homologii, że przynależy do morfologii, która jest „jedną z najciekawszych części historii naturalnej i można ją nazwać duszą tej dziedziny”. [61] Prawidłowe wyjaśnienie struktur homologicznych dałoby zatem wgląd w samo serce historii organicznej. W liście z 1860 roku Darwin zauważył, że wraz z embriologią homologia stanowiła niemal wystarczającą podstawę „mojej niewiary w nieskończoną liczbę aktów stworzenia”. [62] W gruncie rzeczy o znaczeniu argumentu z homologii świadczy jego długowieczność. W dzisiejszych czasach argument ten — wraz z jego teologiczną istotą — jest rutynowo cytowany jako ważne świadectwo na rzecz teorii ewolucji. [63]

Podsumowując, Darwin użył teologii nie tylko jako części swojej apologetyki ewolucjonizmu, ale także w argumentacji, którą uznawał za ważny element całościowo pojmowanej argumentacji na rzecz dziedziczenia z modyfikacjami.

[61] Darwin, **O powstawaniu gatunków…**, s. 401.

[62] List Karola Darwina do Heinricha Georga Bronna z 5 października 1860 roku w: Darwin, **Autobiografia…**, s. 236 [236–237].

[63] Por. Nelson, „The Role of Theology…”, s. 506–512; Lustig, „Natural Atheology…”, s. 74–83.

Boska uczciwość

Bóg, o jakim mowa w **O powstawaniu gatunków**, nie pozostawił zwodniczych śladów w świecie przyrody. A dokładniej rzecz ujmując, Darwin zasugerował, że Wszechmogący nie stworzył organizmów, które w trakcie badań ujawniałyby fałszywe informacje o swoim pochodzeniu. Zamiast tego informacje dostarczane przez organizmy mogą być traktowane jako wiarygodne wskazówki na temat ich pochodzenia. I właśnie ta idea pojawiała się we wszystkich sześciu wydaniach książki **O powstawaniu gatunków** i w prywatnej korespondencji Darwina. [64] Podobne uwagi Darwin poczynił we wczesnych notatnikach,[*] w szkicu z 1842 roku, [**] w tekście z 1844 roku [***] i w książce **O pochodzeniu człowieka**, [****] aczkolwiek w tych pracach nie twierdził, że gwarantem „prawdziwości" przyrody jest istnienie Boga. [65]

---

[64] Por. Darwin, **O powstawaniu gatunków…**, s. 6. W analogicznych fragmentach innych wydań **O powstawaniu gatunków** Darwin wypowiadał się w ten sam sposób. Por. Darwin, **The Life and Letters…**, Vol. 2, s. 361.

(Przyp. tłum.) Autor nawiązuje tutaj do znanego fragmentu ze „Wstępu" do książki Darwina: „Ponieważ w każdym gatunku rodzi się znacznie więcej osobników, niż może przeżyć, i ponieważ na skutek tego często toczy się między nimi walka o byt, osobnik, który pod wpływem złożonych i nieraz zmiennych warunków zmodyfikuje się nieznacznie, lecz w sposób korzystny dla siebie, będzie miał większe szanse na przetrwanie, a tym samym ulegnie działaniu doboru naturalnego. Zgodnie zaś z potężnym prawem dziedziczności każda w ten sposób wyselekcjonowana odmiana będzie dążyć do przekazania potomstwu swojej nowej, zmienionej postaci" (Darwin, **O powstawaniu gatunków…**, s. 6).

[*] (Przyp. tłum.) Por. Paul H. Barrett, Peter J. Gautrey, Sandra Herbert, David Kohn, and Sydney Smith (eds.), **Charles Darwin's Notebooks, 1836-1844: Geology, Transmutation of Species, Metaphysical Enquiries**, Cornell University Press, Ithaca — New York 1987.

[**] (Przyp. tłum.) Por. Darwin, „The Essay of 1842…".

[***] (Przyp. tłum.) Por. Charles Darwin, „The Essay of 1844", w: Darwin (ed.), **The Foundations of the Origin of Species…**, s. 57–255.

[****] (Przyp. tłum.) Por. Karol Darwin, **O pochodzeniu człowieka. Dzieła wybrane**, t. IV, przeł. Stanisław Panek, *Biblioteka Klasyków Biologii*, Państwowe Wydawnictwo Rolnicze i Leśne, Warszawa 1959.

[65] Gillespie wyraził się w podobny sposób, chociaż z mniejszą precyzją. Por. Gillespie, **Charles Darwin…**, s. 128–129. Por. też: Gavin de Beer (ed.), „Darwin's Notebooks on Transmutation of Species. Part I. First Notebook [B] (July 1837–February 1838)", *Bulletin of the British Museum (Natural History)* 1960, Historical Series, Vol. 2, No. 2, s. 67 [23–73]; Darwin, „The Essay of 1842…", s. 49; Darwin, „The Essay of 1844…", s. 250–251. Inny przykład podobnej wypowiedzi Darwina por. w: Darwin, **O pochodzeniu człowieka…**, s. 143–144; Darwin, **O powstawaniu gatunków…**, s. 443–445.

W rozdziale piątym **O powstawaniu gatunków** Darwin zauważył, że w niektórych przypadkach potomstwo koni posiada w większej mierze cechy innego gatunku konia niż własnego gatunku. Podobnie ma się rzecz z hybrydami koni, które czasami bardziej przypominają inne gatunki z rodzaju konia niż ich gatunek rodzicielski. [66] Darwin był przekonany, że tendencje te można łatwo wytłumaczyć ideą pradawnego przodka posiadającego cechy wspólne dla wszystkich gatunków z rodzaju konia. Jednocześnie postrzegał te fakty jako kłopotliwe dla koncepcji specjalnego stworzenia, ponieważ zgodnie z tym poglądem Bóg stworzył każdy gatunek jako istniejący niezależnie od innego gatunku, czyli potomstwo powinno przypominać swoich rodziców, a nie osobniki należące do innych gatunków. Koncepcja specjalnego stworzenia wydawała się napotykać problem na gruncie empirycznym: fakty nie zgadzały się z bezpośrednimi przewidywaniami tego ujęcia. Jednakże Darwin twierdził, że kreacjoniści mogą wyjaśnić tę anomalię, przyjmując, że „każdy gatunek został *stworzony* ze skłonnością do zmian, zarówno w stanie udomowionym, jak i dzikim, i to w takim szczególnym kierunku, że często staje się pręgowany tak jak inne gatunki tego rodzaju". [67] Oznacza to, że kreacjoniści mogliby skorygować swoją teorię, twierdząc, że w pewnych przypadkach Bóg zaprojektował zarówno potomstwo czystej krwi, jak i hybrydy mogące przypominać inne gatunki z rodzaju konia. Tak więc, podczas gdy tendencje zmienności koni wydają się dobrze wyjaśnione przez odwołanie do wspólnego przodka, (skorygowane) wyjaśnienie kreacjonistyczne może tłumaczyć te fakty w sposób następujący: Bóg zataił swój bezpośredni wkład w stworzenie, projektując różnorodne konie w sposób, który wydawał się dokładnie taki, jakiego należałoby się spodziewać na podstawie teorii wspólnego pochodzenia.

Współcześnie może się wydawać, że przyjmując takie rozwiązanie, zwolennicy koncepcji specjalnego stworzenia po prostu odwołali się idei wszechmocnego Boga nie po to, aby wyjaśnić fakty, które powinny być uważane za kłopotliwe dla ich ujęcia, lecz po to, aby dostosować do nich teorię. Pomińmy jednak współczesne zapatrywania i oddajmy głos Darwinowi, gdyż wystarczająco dosadnie wyraził się w kolejnych zdaniach:

W ten sam sposób Darwin wyraził się także w czwartym, piątym i szóstym wydaniu (autor wcześniej cytował trzecie wydanie **O powstawaniu gatunków** — przyp. tłum.).

[66] Por. Darwin, **O powstawaniu gatunków…**, s. 152–154.

[67] Darwin, **O powstawaniu gatunków…**, s. 154 [wyróżnienie dodane].

> Przyjęcie tego wyjaśnienia oznacza, jak mi się wydaje, odrzucenie przyczyny realnej dla nierealnej lub przynajmniej nieznanej. Oznacza to uznawanie dzieł boskich jedynie za kpinę i oszustwo. Równie dobrze mógłbym uwierzyć wraz z dawnymi i ciemnymi kosmogonistami, że mięczaki, których muszle odkrywamy jako skamieniałości, nigdy nie istniały, ale że muszle te zostały stworzone w kamieniu tylko po to, aby imitować mięczaki żyjące obecnie na brzegach mórz. [68]

Odniesienie Darwina do „ciemnych kosmogonistów" jest najpewniej aluzją do prac niektórych dawniejszych paleontologów, którzy twierdzili, że Bóg stworzył pewne naturalne artefakty, jak na przykład skamieniałości, aby te wyglądały na starsze, niż są w rzeczywistości. [69] Dla Darwina takie wyjaśnienie było nie do przyjęcia. Mając na uwadze zasadę poszukiwania *verae causae*, stwierdził, że to kreacjonistyczne wyjaśnienie opierało się na „nierealnej" lub „nieznanej" przyczynie, ponieważ nie istniały niezależne, obecne lub przeszłe świadectwa empiryczne, na podstawie których można by sądzić, iż Bóg stwarzał z zamiarem ukrycia swojego działania. [70] Zgodnie z koncepcją specjalnego stworzenia niezwykłe cechy niektórych koni w rzeczywistości były wynikiem boskiego cudu, ale wyglądają na rezultat ewolucji od wspólnego przodka. I dlatego dokładne badania tych koni nie mogły dostarczyć wiarygodnych informacji na temat ich pochodzenia. Ujmując

---

[68] Darwin, **O powstawaniu gatunków…**, s. 154.

[69] Darwin mógł także przedstawić tutaj subtelną krytykę współczesnych mu poglądów Philipa Gosse'a, który na stronach książki **Omphalos** [Pępek] argumentował, że Bóg stworzył skamieniałości, które sprawiają wrażenie pochodzących sprzed milionów lat. Por. Philip H. Gosse, **Omphalos: An Attempt to Untie the Geological Knot**, John Van Voorst, London 1857. Gosse został mocno skrytykowany za przedstawienie Boga jako oszusta.

(Przyp. tłum.) Na temat krytyki poglądów Gosse'a szeroko pisał Ron Roizen. Por. Ron Roizen, „The Rejection of «Omphalos»: A Note on Shifts in the Intellectual Hierarchy of Mid-Nineteenth Century Britain", *Journal for the Scientific Study of Religion* 1982, Vol. 21, No. 4, s. 365–369.

[70] Można by zaprotestować, że zawarte w tym fragmencie odwołanie Darwina do poszukiwania *verae causae* jest epistemicznie niezależne od jego komentarza na temat boskiej uczciwości przedstawionego w kolejnym zdaniu. Taka możliwość jest dopuszczalna. Biorąc jednak pod uwagę, że bezpośrednim kontekstem są rozważania Darwina na temat koncepcji specjalnego stworzenia, wymóg *verae causae* dla „realnej" (w przeciwieństwie do „nierealnej" lub „nieznanej") przyczyny odnosi się bezpośrednio do (skorygowanego) opisu specjalnego stworzenia, zgodnie z którym Bóg stworzył organizmy, aby dać fałszywe świadectwo empiryczne ich pochodzenia. Zdaniem Darwina taka „przyczyna" nie przechodzi testu *verae causae*, ponieważ nie ma niezależnych, przeszłych lub obecnych, danych empirycznych potwierdzających takie rozumienie boskości. W gruncie rzeczy w następnym zdaniu Darwin sugeruje coś dokładnie odwrotnego: Bóg nie jest oszustem. Prawda o moralnej naturze Boga jest powodem, dla którego (skorygowany) opis specjalnego stworzenia nie przechodzi testu *verae causae*.

rzecz bardziej ogólnie, oznaczało to, że nie można polegać na danych empirycznych zebranych na podstawie analizy danego organizmu przy próbach ustalenia jego pochodzenia. Wyjaśnienia kreacjonistyczne sprawiały, że same dane empiryczne stawały się niewiarygodne, a jeżeli tak, to naukowcy nie mogli ufać danym, co w konsekwencji podważało samo przedsięwzięcie nauki.

Dlaczego więc Darwin po prostu nie zakończył rozważań nad tą kwestią, pokazując za pomocą zasady *verae causae*, że wyjaśnienia kreacjonistyczne „oznaczają uznawanie *dzieł boskich* jedynie za kpinę i oszustwo"? [71] Moim zdaniem powód był taki, że Darwin zamierzał wskazać na wiarygodność danych empirycznych poprzez odniesienie ich do koncepcji z moralnej natury Boga. Wyjaśnienia kreacjonistyczne były błędne nie tylko dlatego, że godziły w zasadę *verae causae*, ale także dlatego, że — i jest to ważniejszy powód — podważały uczciwość Boga, czyli dokładnie to, co gwarantowało wiarygodność danych naukowych. Uczciwość Boga oznaczała, że można było przyjąć, iż dane empiryczne dostarczają rzetelnych informacji. Jeżeli więc *wygląda na to*, że konie wywodzą się od wspólnego przodka, to znaczy, iż tak rzeczywiście *jest*. Uczciwość Boga była dla Darwina kluczowym czynnikiem, który przemawiał na rzecz ewolucjonizmu kosztem koncepcji specjalnego stworzenia.

Ponadto twierdzenie o uczciwości Boga pokazywało, dlaczego wymóg *verae causae* nie może zostać spełniony przez koncepcję specjalnego stworzenia: nie sposób oczekiwać, że natrafimy na niezależne, przeszłe lub obecne, świadectwa empiryczne nieprawdziwych „faktów", ponieważ moralny Bóg nigdy do czegoś takiego by nie dopuścił. Ogólniej rzecz biorąc, wiarygodność danych empirycznych znalazła się poza wszelką wątpliwością — nauka była możliwa właśnie dlatego, że Bóg nie był oszustem.

Na podstawie tego, co napisał Darwin — poczynając od wczesnych notatników, a na książce **O pochodzeniu człowieka** skończywszy — trudno jednoznacznie stwierdzić, czy osobiście utrzymywał on takie przekonanie. Jak już zwracałem uwagę, angielski przyrodnik wielokrotnie powtarzał, że przyroda nie jest zwodnicza, ale tylko na stronach **O powstawaniu gatunków** i w prywatnej korespondencji wiązał to twierdzenie z istnieniem Boga. Tak czy inaczej, przedmiotem niniejszego tekstu nie jest analiza osobistych poglądów teologicznych Darwina, lecz zbadanie epistemicznej roli teologii w pierwszym wydaniu **O powstawaniu ga-**

[71] Darwin, **O powstawaniu gatunków…**, s. 154 [wyróżnienia dodane].

tunków. Jeśli chodzi o tę ostatnią kwestię, to Darwin użył teologii, aby wzmocnić argumentację zawartą na stronach swojej książki.

Należy podkreślić, że w tym przypadku wyjaśnienia ewolucjonistyczne i kreacjonistyczne znajdowały się w empirycznym martwym punkcie — zarówno pierwsze, jak i drugie podejście mogło wyjaśnić zadziwiające dane empiryczne dotyczące koni. Świadectwa naukowe nie były najwyraźniej w stanie pomóc w rozstrzygnięciu tego sporu. Darwin zwrócił więc wzrok ku niebu, powołując się na twierdzenie o moralnej uczciwości Boga, którą uznał za czynnik rozstrzygający. Słusznie czy niesłusznie, przyrodnik odniósł się do (domniemanej) uczciwości Boga i potraktował to jako coś więcej niż tylko zakotwiczenie dla ogólnej filozofii przyrody — było to bezpośrednie epistemiczne wsparcie dla idei dziedziczenia z modyfikacjami. [72]

Podsumowując, Darwin zastosował bogomowę jako argument na rzecz teorii ewolucji i przeciwko koncepcji specjalnego stworzenia. Uczynił to w sytuacji, w której jego zdaniem ani dane empiryczne, ani zasada *verae causae* nie wystarczały. W tym konkretnym przypadku istotne wsparcie dla jego argumentacji stanowiło kryterium pozaempiryczne — i to kryterium, co zaskakujące, dotyczyło uczciwości Boga. Konsekwencją przyjęcia tego teologicznego poglądu było również zagwarantowanie wiarygodności danych empirycznych i samej nauki.

Niepojmowalny Bóg

W czasach Darwina argument na rzecz projektu w biologii doczekał się bardzo precyzyjnego sformułowania. Dokonał tego William Paley, który na stronach książki **Natural Theology** [Teologia naturalna] argumentował, że złożona adaptacja narządów i organizmów do ich środowiska wskazuje raczej na boski projekt aniżeli działanie przypadkowych procesów przyrodniczych. Nie ma wątpliwości, że jednym z najważniejszych punktów książki Paleya był jego argument na rzecz projektu dotyczący oka kręgowców:

> Nie znam lepszej metody wprowadzenia tak ważnego tematu niż porównanie jednej rzeczy z drugą — na przykład oka z teleskopem. Analiza tych przyrządów wskazuje, iż istnieje dokładnie ten sam dowód, że oko zostało stworzone do widzenia i że teleskop

[72] Niektórzy współcześni uczeni mogliby pomyśleć, że Darwin popełnił błąd przesunięcia kategorialnego, powołując się na teologię tam, gdzie nie ma dla niej miejsca. Niemniej naszym celem jest zrozumienie przekazu zawartego w książce **O powstawaniu gatunków**, a nie jego krytyka.

> został skonstruowany do wspomożenia oka. Jedno i drugie jest wykonane zgodnie z tymi samymi zasadami; jedno i drugie jest dostosowane do praw, podług których regulowana jest transmisja i załamanie promieni światła. [73]

Od tego momentu Paley zaczął szczegółowo omawiać różne strukturalne i funkcjonalne adaptacje oka do jego otoczenia, zastanawiając się, dlaczego oko i teleskop są strukturami ściśle analogicznymi i dlaczego prowadzi to do wniosku, że oko, podobnie jak teleskop, zostało zaprojektowane. Poglądy Paleya nie były obce Darwinowi, który w trakcie studiów w Cambridge studiował treść **Natural Theology** i **Evidences of Christianity** [*] [Świadectwa chrześcijaństwa]. W późniejszych latach wspominał, że były to książki, które „zachwycały podobnie jak geometria Euklidesa", jego ulubionego autora. [**] Zaledwie dwa tygodnie przed publikacją **O powstawaniu gatunków** Darwin napisał do przyjaciela: „Nie sądzę, abym kiedykolwiek podziwiał jakąś książkę bardziej niż **Natural Theology** autorstwa Paleya. Dawniej mógłbym ją niemal całą zarecytować z pamięci". [74]

Ponadto od roku 1838 — czyli od momentu, kiedy zaczął spisywać swoje notatniki — Darwin otwarcie zmagał się z zagadnieniem, jak wyjaśnić oko wyłącznie działaniem przyczyn wtórnych. [75] Jak zauważyła Abigail Lustig, zagadnienie rozwoju oka kręgowców było jedną z głównych trudności dla teorii Darwina. Był to także jeden z „klasycznych przykładów" wykorzystywanych w teologii naturalnej i Darwin czuł, że na stronach **O powstawaniu gatunków** powinien rozpatrzyć go z punktu widzenia teorii ewolucji. [76]

Nie ma więc nic zaskakującego w tym, że odpowiedź na Paleyowski argument

---

[73] Paley, **Natural Theology...**, s. 18.

[*] (Przyp. tłum.) Por. William Paley, **A View of the Evidences of Christianity: In Three Parts**, R. Faulder, London 1794.

[**] (Przyp. tłum.) Darwin, **Autobiografia...**, s. 26.

[74] List Karola Darwina do Johna Lubbocka z 22 listopada 1859 roku, *Darwin Correspondence Project*, University of Cambridge, https://tiny.pl/w95v4 [09.10.2022]. Por. też Darwin, **Autobiografia...**, s. 26.

[75] Por. Gavin de Beer (ed.), „Darwin's Notebooks on Transmutation of Species. Part II. Second Notebook [C] (February to July 1838)", *Bulletin of the British Museum (Natural History)* 1960, Historical Series, Vol. 2, No. 3, s. 103 [75–118]; de Beer (ed.), „Darwin's Notebooks on Transmutation of Species. Part III. Third Notebook...", s. 130.

[76] Por. Abigail J. Lustig, „Darwin's Difficulties", w: Richards and Ruse (eds.), **The Cambridge Companion to the *Origin*...**, s. 109–110 [109–128]; Lustig, „Natural Atheology...", s. 72–74.

na podstawie oka stała się główną kwestią w rozdziale poświęconym najpoważniejszym zarzutom stawianym teorii ewolucji. [77] Darwin stwierdził, że *prima facie* wydaje się „w najwyższym stopniu niedorzeczne", iż organ tak skomplikowany jak oko mógł „powstać drogą doboru naturalnego". [78] Następnie oznajmił:

> Trudno uniknąć porównania oka z teleskopem. Wiemy, że instrument ten został udoskonalony dzięki długotrwałym staraniom najznakomitszych umysłów. Stąd wnioskujemy naturalnie, że i oczy powstały w analogiczny sposób. [79]

W następnym zdaniu Darwin zadał dwa pytania, z którymi następnie musiał się zmierzyć: „Czy jednak wniosek podobny nie będzie zbyt śmiały? Czy mamy prawo przypuszczać, że Stwórca działa za pomocą intelektu, podobnie jak człowiek?". [80] Chociaż zwięzłość wypowiedzi Darwina utrudnia ich interpretację, pytania te sugerowały, że analogia między działaniami człowieka i Boga jest nie do utrzymania. Angielski przyrodnik doszedł do wniosku, że istoty ludzkie nie mogą wiedzieć, że ich zdolności sprawcze są podobne do zdolności sprawczych Boga. Najwyraźniej taka wiedza jest dla człowieka nieosiągalna. [81] Darwin zapytał retorycznie, czy ludzie mają „prawo" używać tej analogii, czyli na jakiej podstawie można sądzić, że istoty ludzkie mogą coś takiego wiedzieć na temat „zdolności intelektualnych" Boga? [*] Jego pytania sugerowały, że uzasadnienie argumentu dotyczącego oka kręgowców zawiodło, ponieważ wiedza na temat pewnych atrybutów Boga — jak na przykład tych odnoszących się do Jego mocy stwórczej — była niedostępna dla człowieka. [82] Negatywna odpowiedź Darwina na argument dotyczący oka kręgowców niewątpliwie obejmowała więc teologiczne twierdzenia na temat ludzkich zdolności poznawczych.

---

[77] Por. Lustig, „Natural Atheology…", s. 72; Darwin, **O powstawaniu gatunków…**, s. 175–182.

[78] Darwin, **O powstawaniu gatunków…**, s. 175–176.

[79] Darwin, **O powstawaniu gatunków…**, s. 177.

[80] Darwin, **O powstawaniu gatunków…**, s. 177.

[81] Por. Brooke, „The Relations Between Darwin's Science…", s. 53–54.

[*] (Przyp. tłum.) Darwin, **O powstawaniu gatunków…**, s. 177.

[82] W tym przypadku Darwin brzmi jak David Hume, który stwierdził, że „[…] musi się wydać oczywiście rzeczą niezgodną z wszelkimi prawidłami analogii, jeżeli na podstawie zamiarów i planów ludzkich rozumujemy o planach i zamiarach Istoty tak bardzo odmiennej i o tyle wyższej" (David Hume, **Badania dotyczące rozumu ludzkiego**, przeł. Jan Łukasiewicz, Kazimierz Twardowski, Ediciones Altaya & De Agostini, Warszawa 2001, s. 143–144).

Przedstawiwszy pozytywną alternatywę dla argumentu Paleya, Darwin stwierdził, że istniejące obecnie kręgowce dostarczają niewielu danych empirycznych na rzecz ewolucji oka u tych organizmów, a zapis kopalny nie zapewnia żadnych tego rodzaju danych. [83] W takiej sytuacji Darwin odniósł się do zmienności obecnych *bez*kręgowców i opisał, w jaki sposób na przestrzeni wielu pokoleń mogło dojść do rozwoju oka kręgowców. Następnie zasugerował, że ten scenariusz dostarczył wystarczających podstaw, by sądzić, że narząd „tak doskonały jak oko orła mógł zostać ukształtowany przez dobór naturalny", nawet jeżeli „*nieznane* są stadia pośrednie". [84] Darwin napisał również, że prymitywne światłoczułe nerwy mogły w ciągu wielu lat i drogą niewielkich, dziedzicznych, korzystnych zmian zachowywanych przez dobór naturalny powoli ewoluować w złożone narządy. Następnie wysunął twierdzenie, że płuca kręgowców były pierwotnie zaopatrzone „w aparat hydrostatyczny, jakim jest pęcherz pławny" występujący u pradawnego organizmu, który pozostaje dla nas „*nieznany*". [85] Była to kluczowa przesłanka na rzecz tezy o stopniowym rozwoju narządów złożonych. Darwin sądził, że te argumenty przekonają bezstronnego czytelnika, który ma w pamięci, że „Rozum musi pokonać wyobraźnię". [86]

Co ciekawe, scenariuszom Darwina nie towarzyszył zbyt wielki namysł nad konkretnymi świadectwami empirycznymi. Historyk Peter Dear zauważył, że, pomimo retorycznych zabiegów Darwina, jego ujęcie w gruncie rzeczy podporządkowuje rozum wyobraźni. Jak napisał Dear, „argumentacja Darwina [...] [sprowadzała się do zasady] używaj rozumu do analizy idei, których źródłem jest wyobraźnia. Rola rozumu polega tak naprawdę na umożliwieniu skoku od zwykłej wyobraźni do tego, co dosłownie niewyobrażalne". [87] W podobnym tonie wyraził się specjalista w zakresie retoryki David Depew, który stwierdził, że argument Darwina to „mało wyrafinowany eksperyment myślowy" mający przekonać wik-

[83] Por. Darwin, **O powstawaniu gatunków...**, s. 176.

[84] Darwin, **O powstawaniu gatunków...**, s. 177 [wyróżnienie dodane].

[85] Darwin, **O powstawaniu gatunków...**, s. 179 [wyróżnienie dodane].

[86] Darwin, **O powstawaniu gatunków...**, s. 177.

[87] Peter Dear, **The Intelligibility of Nature: How Science Makes Sense of the World**, University of Chicago Press, Chicago 2006, s. 100. Por. też John Angus Campbell, „Why Was Darwin Believed?", *Configurations* 2003, Vol. 11, No. 2, s. 227–230 [203–237], https://doi.org/10.1353/con.2004.0016.

toriańskich odbiorców o skuteczności doboru naturalnego. [88]

Abstrahując od specyfiki tego fragmentu, należy przypomnieć, że pełna odpowiedź Darwina na teistyczny kreacjonizm w wykonaniu Paleya zawiera się w **O powstawaniu gatunków** jako całości, a nie w tej czy innej części tekstu. Darwin postrzegał dobór naturalny jako zasadniczy substytut dla Paleyowskiego zegarmistrza. Książka angielskiego przyrodnika, biorąc za podstawę dane empiryczne, przedstawia obszerną argumentację na rzecz koncepcji ślepego zegarmistrza. [*] Odpowiedź Darwina na Paleyowski argument dotyczący oka kręgowców należy więc rozważyć w kontekście całej książki **O powstawaniu gatunków**.

Tak czy inaczej, teoria doboru naturalnego miała tłumaczyć nawet złożone narządy. Teoria ta mogła dostarczyć czegoś *więcej* niż tylko wyjaśnienia oka kręgowca, ale z pewnością nie *mniej*. Droga do zwycięstwa musiała wieść przez całkowite unicestwienie argumentacji Paleya, a ważna część tej argumentacji dotyczyła oka kręgowców, czemu Darwin nie był w stanie przeciwstawić żadnych konkretnych danych empirycznych. Ostrze miecza Paleya — gdzie argument na rzecz projektu był najgroźniejszy — Darwin chciał więc stępić nie za pomocą mocnych danych empirycznych, lecz dzięki spekulatywnej wyobraźni i epistemologii przesiąkniętej

---

[88] Depew oznajmił, że Darwin sprytnie ujął dobór naturalny w kategoriach czynnika sprawczego o niemalże boskiej mocy, który „z nieomylną sprawnością wyłowi każde ulepszenie" u organizmów (Por. Depew, „The Rhetoric…", s. 245–251). Z nieco bardziej życzliwą rekonstrukcją czytelnik może się zapoznać u Lustig. Por. Lustig, „Natural Atheology…", s. 109–128. Por. też Darwin, **O powstawaniu gatunków…**, s. 177–179.

(Przyp. tłum.) Przywołując poglądy Depewa, autor nawiązał do fragmentu **O powstawaniu gatunków**, w którym Darwin napisał: „U żywych organizmów zmienność będzie powodowała drobne odstępstwa od form wcześniejszych i odstępstwa te przez kolejne pokolenia będą się mnożyć w nieskończoność, a dobór naturalny z nieomylną sprawnością wyłowi każde ulepszenie. Przypuśćmy, że proces ten będzie postępował przez miliony lat i że w każdym roku dotknie miliony najróżniejszych osobników. Czyż nie możemy oczekiwać, że w ten sposób powstanie żywy instrument optyczny o tyle doskonalszy od szklanego, o ile dzieła Stwórcy są wyższe od dzieł człowieka?" (Darwin, **O powstawaniu gatunków…**, s. 178).

[*](Przyp. tłum.) Autor w oczywisty sposób nawiązuje tu do poglądów Richarda Dawkinsa zawartych w książce **Ślepy zegarmistrz**: „Dobór naturalny — odkryty przez Darwina ślepy, bezrozumny i automatyczny proces, o którym wiemy dziś, że stanowi wyjaśnienie zarówno istnienia, jak i pozornej celowości wszystkich form życia — działa bez żadnego zamysłu. Nie ma ani rozumu, ani wyobraźni. Nic nie planuje na przyszłość. Nie tworzy wizji, nie przewiduje, nie widzi. Jeśli w ogóle można o nim powiedzieć, że odgrywa w przyrodzie rolę zegarmistrza — to jest to ślepy zegarmistrz" (Richard Dawkins, **Ślepy zegarmistrz, czyli jak ewolucja dowodzi, że świat nie został zaplanowany**, przeł. Antoni Hoffman, *Biblioteka Myśli Współczesnej*, Państwowy Instytut Wydawniczy, Warszawa 1994, s. 27).

teologią. To, co Darwin zawdzięczał teologii, a nie nauce, to w szczególności bezpośrednie obalenie argumentacji Paleya wskazujące na niepojmowalność stwórczych mocy Boga.

Wielu historyków uznało, że odpowiedź Darwina na argumentację Paleya była głęboko zakorzeniona w jego osobistych i teologicznych poglądach. Historyk James Moore wnikliwie zauważył, że jest pewna nuta pobożności w sposobie, w jakim pełen skromności Darwin podchodził do kwestii metafizycznych i teologicznych. [89] John Hedley Brooke napisał: „Nawet kiedy Darwin dawał upust chandrze spowodowanej apologetycznym szturmem teologii naturalnej, zwykle unikał — jak to postrzegał — arogancji tych, którzy sądzili, że poznali zamiary Boga". [90] Natomiast John Cornell twierdził, że „teologiczny wątek przenika" krytykę Darwina wymierzoną w poglądy Paleya. Pogląd Darwina był „zgodny z bardziej wzniosłą teologią". [91] W **O powstawaniu gatunków** Darwin najwyraźniej odwołał się do tej „bardziej wzniosłej teologii", twierdząc, że stwórcze moce Boga są niedostępne dla człowieka. Po raz kolejny odwołał się do twierdzeń teologicznych, by wzmocnić swoje naturalistyczne ujęcie historii organicznej.

Wewnętrzne napięcia w teologicznej warstwie *O powstawaniu gatunków*

Odejdźmy teraz od analiz poszczególnych wątków teologicznych w **O powstawaniu gatunków** i spójrzmy na tę książkę jako na całość. Jest być może zaskakujące, że ta „plątanina" Darwina na tematy teologiczne — do czego przyznał się w późniejszym okresie życia [92] — znalazła subtelne odbicie w pierwszym wydaniu

[89] Por. James R. Moore, **The Post-Darwinian Controversies: A Study of the Protestant Struggle to Come to Terms with Darwin in Great Britain and America, 1870-1900**, Cambridge University Press, Cambridge 1979, s. 318. Moore zauważył również, że książka **O powstawaniu gatunków** „w dużej mierze [...] została poświęcona kwestiom teologicznym", które „dogłębnie" nurtowały Darwina „przez całą karierę naukową" (Moore, „Charles Darwin and the Problem of Creation...", s. 189). Moore z aprobatą przedstawił tutaj „wybitne osiągnięcie" Neala C. Gillespiego (Moore, „Charles Darwin and the Problem of Creation...", s. 189).

[90] Brooke, „The Relations Between Darwin's Science...", s. 65; de Beer (ed.), „Darwin's Notebooks on Transmutation of Species. Part II. Second Notebook...", s. 79.

[91] Cornell, „God's Magnificent Law...", s. 399–400; Gillespie, **Charles Darwin...**, s. 132–133.

[92] Por. list Karola Darwina do Josepha D. Hookera z 12 lipca 1870 roku, *Darwin Correspondence Project*, University of Cambridge, https://tiny.pl/w7vtr [09.10.2022]; Darwin and Seward (eds.), **More Letters of Charles Darwin...**, s. 321.

O powstawaniu gatunków w postaci niejasności, logicznej niespójności i epistemicznej bezzasadności. Uzasadnienie tego twierdzenia wymaga, aby ta część artykułu miała charakter w większej mierze oceniający niż poprzednie. Uzasadnienie to przyjdzie „od wewnątrz" — a nie poprzez zapożyczenie „zewnętrznych" poglądów przeciwstawianych teologii w stylu oświeceniowym — dzięki rozpatrzeniu teologii z **O powstawaniu gatunków** w takiej postaci, w jakiej została tam wyrażona, oraz przeanalizowaniu jej pod kątem wewnętrznej spójności logicznej i zgodności z późniejszymi refleksjami Darwina.

Pierwsze napięcie w książce Darwina jest stosunkowo łagodne i dotyczy kwestii pozornej akceptacji i odrzucenia cudów. Jeżeli przedstawiona wcześniej interpretacja jest słuszna, to w dyskusji na temat naszej wiedzy „o prawach nadanych materii przez Stwórcę", autor **O powstawaniu gatunków** milcząco uznał koncepcję niezłomnych praw za jedyne wiarygodne wyjaśnienie „powstawania i wymierania dawniejszych i obecnych mieszkańców Ziemi". [93] Co ciekawe, w innym miejscu Darwin napisał, że „[życie] po raz pierwszy tchnął Stwórca" w „jedną, pierwotną formę", czym wyraźnie zasugerował cudowne pochodzenie życia. [94] Argumentowanie jednym razem na rzecz koncepcji niezłomnych praw, a innym razem na rzecz koncepcji przeciwnej, może wskazywać na pewien leżący u podstaw konflikt. Jednakże życzliwa interpretacja sugeruje, że na stronach **O powstawaniu gatunków** został wyrażony półdeizm, a zgodnie z tym poglądem Bóg pierwotnie narzucił materii prawa, później w sposób bezpośredni stworzył pierwsze życie, a następnie pozwolił, by niezłomne prawa przyrody rządziły przebiegiem ewolucji organizmów. Wprawdzie jest to spójne ujęcie, ale rodzi ono pewne niewygodne

(Przyp. tłum.) Autor nawiązuje tutaj do jednego z bardziej znanych listów Darwina, w którym przyrodnik napisał tak: „Moja teologia stanowi zwyczajną plątaninę. Nie mogę traktować Wszechświata jako wyniku działań ślepego przypadku. A jednak w szczegółach nie mogę też dostrzec żadnych dowodów dobroczynnej celowości (*design*) czy w ogóle jakiejkolwiek celowości. Nie mogę wierzyć w to, iż każda odmiana, która zaistniała kiedykolwiek, została ukierunkowana dla swojego szczególnego celu (*special end*), tak samo jak nie mogę wierzyć, iż specjalnie ustanowione zostało to miejsce, na które padają krople deszczu". Polski przekład tego listu podaję za: Józef Życiński, **Ułaskawianie natury**, Wydawnictwo Znak, Kraków 1992 (cyt za: Piotr Bylica, „Darwin o celowości w przyrodzie", *Kwartalnik Historii Nauki i Techniki* 2008, R. 53, nr 3–4, s. 264 [259–273]). Por. też list Karola Darwina do Asy Graya z 22 maja 1860 roku w: Darwin, **Autobiografia…**, s. 217 [216–217].

[93] Darwin, **O powstawaniu gatunków…**, s. 449.

[94] Darwin, **O powstawaniu gatunków…**, s. 445. Por. też Darwin, **O powstawaniu gatunków…**, s. 449–450; Cosans, „Was Darwin a Creationist…", s. 362–371; Gillespie, **Charles Darwin…**, s. 127–133.

pytania o to, czy Bóg, który interweniował raz, aby stworzyć życie, nie mógłby uczynić tego ponownie. [95]

To był niepewny grunt. Świadomie bądź nieświadomie, strategia, którą obrał Darwin, polegała na unikaniu wyjaśnienia tej i podobnych kwestii. Niejasna bogomowa miała tę wadę, że zacierała prawdziwe teologiczne podłoże oraz implikacje płynące z nowej nauki przedstawionej w **O powstawaniu gatunków**. Zaletą takiego sposobu wypowiedzi było jednak to, że deistom i teistom pozwalał on interpretować treść książki Darwina zgodnie z utrzymywanymi przez nich ujęciami Boga, a przez to teoria ewolucji drogą doboru naturalnego wydawała się bardziej wiarygodna. Być może Darwin zrezygnował z teologicznej klarowności wywodu na rzecz innego, ważniejszego celu, którym było dla niego odniesienie sukcesu naukowego.

Drugie napięcie dotyczyło epistemicznej wartości bólu i cierpienia w przyrodzie w kontekście teorii ewolucji. Jak widzieliśmy, Darwin argumentował, że chociaż nie sposób dokonać tutaj logicznej dedukcji, to ból i cierpienie uważa się raczej za świadectwo dziedziczenia z modyfikacjami aniżeli specjalnego stworzenia. Darwin mówił o „Stwórcy", który narzucił materii prawa, ale od momentu powołania do istnienia pierwszego życia nie dokonywał już cudów w historii organicznej. Najwyraźniej odległy Bóg, który pozwolił przyrodzie funkcjonować podług „jednego ogólnego prawa" prowadzącego do „rozwoju wszystkich istot organicznych", nie był odpowiedzialny za ból i cierpienie w przyrodzie, co różniło go od Boga, który celowo zaprojektował wszystkie organizmy. [*]

Można by się jednak zastanawiać, „co by było, gdyby Stwórca pierwszego życia był wszechwiedzący?". Taki Bóg wiedziałby, że „ogólne prawo", które umożliwia „najsilniejszym przeżyć, najsłabszym zaś zginąć", [**]obejmowałoby niezliczone przypadki agonii i śmierci, toteż można by zasadnie powiedzieć, że taki Bóg byłby równie winny jak Bóg dokonujący specjalnych aktów stwórczych. [96] Wymaga to

[95] Por. np. list Williama Henry'ego Harveya do Karola Darwina z 24 sierpnia 1860 roku, *Darwin Correspondence Project*, University of Cambridge, https://tiny.pl/w7vsw [09.10.2022].

[*] (Przyp. tłum.) Darwin, **O powstawaniu gatunków…**, s. 226.

[**] (Przyp. tłum.) Darwin, **O powstawaniu gatunków…**, s. 226.

[96] W **O powstawaniu gatunków** Darwin musiał jednak zachować milczące poparcie dla idei moralnej dobroci Stwórcy. Idea ta najwyraźniej wzmacniała twierdzenia o boskiej uczciwości, a także o „rozwoju wszystkich istot organicznych" w obliczu cierpienia w przyrodzie.

oczywiście głębokich rozważań, a celem niniejszego tekstu nie jest „zewnętrzna" krytyka argumentacji Darwina, lecz analiza jego dojrzałych przemyśleń. Co jednak zaskakujące, angielski przyrodnik w liście do Mary Everest Boole z 1866 roku wyraźnie stwierdził:

> Mógłbym jednak zwrócić uwagę na to, iż zawsze wydawało mi się, że słuszniejszą jest rzeczą uważać bezmiar bólu i cierpień na tym świecie za nieuchronne następstwo naturalnego biegu wydarzeń, a więc praw ogólnych, a nie za skutek bezpośredniej interwencji Boga. Świadom jednak jestem, że nie jest to zgodne z pojęciem wszechwiedzącego Bóstwa. [97]

Nie ma więc wątpliwości, że do 1866 roku Darwin wierzył, że istnienie bólu i cierpienia nie jest bardziej zgodne z ideą wszechwiedzącego Boga (który pozwala na ewolucję zgodnie z ogólnymi prawami) niż z Bogiem specjalnego stworzenia.

Niemniej w **O powstawaniu gatunków** Darwin wypowiadał się na ten temat niejednoznacznie. Rzecz w tym, że angielski przyrodnik w wydaniu z 1859 roku nie przypisywał Bogu wszechwiedzy. [98] Jednakże wielu czytelników właśnie w ten sposób interpretowało jego odniesienie do „Stwórcy" i czynili to bez żadnych zastrzeżeń. (Cokolwiek by powiedzieć, w manuskrypcie z 1844 roku Darwin wyraźnie odniósł się do „wszechwiedzącego Stwórcy"). [99] Tak czy inaczej, jeżeli dojrzałe refleksje Darwina dobrze oddają, co miał na myśli, to niejednoznaczność treści **O powstawaniu gatunków** na temat wszechwiedzy Boga utrudniła zrozumienie tego, w jaki sposób cierpienie w przyrodzie przemawia na rzecz teorii dziedziczenia z modyfikacjami kosztem idei specjalnego stworzenia. Problemem tutaj nie jest jednak grzech śmiertelny wynikający z braku logicznej konsekwencji, lecz grzech powszedni będący skutkiem braku precyzji wypowiedzi. Na gruncie osobi-

---

[97] List Karola Darwina do pani Boole z 14 grudnia 1866 roku w: Darwin, **Autobiografia…**, s. 293.

[98] Wydaje się, że zawarty w **O powstawaniu gatunków** pogląd Darwina na temat cierpienia w przyrodzie przypominał to, co wyraził on w liście do Mary Everest Boole. Sugeruje to, że Darwin w1859 roku mógł zdawać sobie sprawę, że idea wszechwiedzącego „Stwórcy" stanowiła wyzwanie dla jego argumentacji. W **O powstawaniu gatunków** Darwin napisał: „chociaż z pewnością nie jest to pełny logiczny dowód, mojej wyobraźni daje więcej zadowolenia" i pozwala przyjąć, że ból w przyrodzie jest bardziej zgodny z ideą ewolucji aniżeli koncepcją specjalnego stworzenia (Darwin, **O powstawaniu gatunków…**, s. 226). Zwrot „chociaż z pewnością nie jest to pełny logiczny dowód" ściśle przypomina ustępstwo wyrażone w liście do pani Boole: „Świadom jednak jestem, że nie jest to zgodne z pojęciem wszechwiedzącego Bóstwa" (List Darwina do pani Boole z 14 grudnia 1866 roku w: Darwin, **Autobiografia…**, s. 293).

[99] Darwin, „The Essay of 1842…", s. 52.

stym Darwin w 1859 roku pod wieloma względami zmagał się z problemem cierpienia w przyrodzie, jednakże problem ten — na gruncie retorycznym — oferował przyrodnikowi zbyt potężną broń, aby tak po prostu z niej zrezygnować. Głównym celem książki **O powstawaniu gatunków** było przeforsowanie koncepcji dziedziczenia z modyfikacjami przy jednoczesnym podważeniu idei specjalnego stworzenia. W przypadku zagadnienia cierpienia w przyrodzie teologia odegrała rolę w realizacji tego ważniejszego celu, przy czym niewiele uwagi poświęcono temu, czy można ją zasadnie do tego celu wykorzystać.

Trzecia i poważniejsza trudność dotyczy wzajemnej logicznej niezgodności niektórych teologicznych twierdzeń w **O powstawaniu gatunków**. Na przykład w odpowiedzi na argument Paleya dotyczący oka kręgowców Darwin zapytał retorycznie: „Czy mamy prawo przypuszczać, że Stwórca działa za pomocą intelektu, podobnie jak człowiek?”. [100] Zgodnie z tym twierdzeniem ludzie nie mają podstaw, by twierdzić, że Bóg działa w sposób analogiczny do ludzkiego umysłu. Jednakże w argumencie z homologii Darwin dał do zrozumienia — idąc za przykładem Owena — że Bóg stwarzał w sposób zgodny z ludzkim pojęciem prostoty. Owen był przekonany, że Bóg nie ukształtowałby pewnych struktur biologicznych na podstawie wspólnego typu, ponieważ jest to „niezgodne z naszym wyobrażeniem o najprostszym sposobie realizacji”, polegającym na stwarzaniu tych struktur do pełnienia swoich funkcji. [101] Podsumowując, Darwin twierdził, że — po pierwsze — ludzie nie mogą wiedzieć, że Bóg tworzy w sposób analogiczny do intelektualnych zdolności ludzkiego umysłu, i — po drugie — że Bóg działa zgodnie z ludzką koncepcją najprostszego sposobu realizacji.

Dodajmy do tych twierdzeń wiarygodne założenie, że przynajmniej w niektórych kontekstach pojęcia (najwyższej) prostoty najpewniej kształtują sposób myślenia ludzi, a w szczególności sposób konstruowania nowych wynalazków i teorii. A więc omawiane wcześniej trzy twierdzenia prowadzą do logicznie niespójnego wniosku, zgodnie z którym ludzie mogą zarówno *wiedzieć*, jak i *nie wiedzieć*, że metody stwórcze Boga odpowiadają ludzkim wyobrażeniom o najwyższej prostocie. Książka **O powstawaniu gatunków** skutecznie rozprawiła się z poglądami Paleya i Owena, ale odbyło się to kosztem jej wewnętrznej spójności.

[100] Darwin, **O powstawaniu gatunków…**, s. 177.

[101] Owen, **On the Nature of Limbs…**, s. 40.

Najpoważniejsze napięcie można jednak znaleźć w podstawowym uzasadnieniu wszystkich twierdzeń teologii pozytywnej zawartych w **O powstawaniu gatunków**. [102] Z epistemicznego punktu widzenia twierdzenia te dostarczają istotnego wsparcia dla koncepcji dziedziczenia z modyfikacjami tylko o tyle, o ile mają już uzasadnienie. Biorąc to pod uwagę, można by zapytać: „jeżeli zaproponowana przez Darwina teoria jest słuszna, to jakie jest uzasadnienie dla teologii pozytywnej, której używał jako wsparcia dla własnej teorii?". Aby zdać sobie sprawę z wagi tego pytania, rozważmy refleksje Darwina zawarte w jego **Autobiografii**, kiedy czuł, że jest:

> [...] zmuszony zwrócić się ku Pierwszej Przyczynie władającej rozumem w jakimś stopniu analogicznym do rozumu ludzkiego [...]. Przekonanie to głęboko tkwiło w moim umyśle jeszcze w okresie pisania **O powstawaniu gatunków**, lecz od tego czasu stopniowo i z różnymi wahaniami coraz bardziej słabło. Powstaje wszakże wątpliwość, czy można zaufać umysłowi człowieka, gdy dochodzi on do tak doniosłych wniosków? Wszak rozwinął się on, jak jestem o tym przekonany, z umysłu tak niskiego [stopnia rozwoju], jaki posiadają niższe zwierzęta. [103]

To pytanie, w takiej czy innej formie, prześladowało Darwina przynajmniej od około 1859 roku do końca jego życia. [104] Zaledwie sześć miesięcy po publikacji pierwszego wydania **O powstawaniu gatunków** Darwin zmagał się z kwestią relacji między Bogiem a ewolucją, co wyraził w liście do Asy Graya, pisząc, że wierzy, iż Bóg zaprojektował prawa, a szczegóły pozostawił roli przypadku. Darwin wówczas oznajmił, że „Nie znaczy to, aby ten wniosek zadowalał mnie w zupełności", po czym szybko dodał: „Szczerze czuję, że całego tego zagadnienia umysł ludzki zgłębić nie jest w stanie. To tak jakby pies zastanawiał się nad poglądami Newtona". [105]

---

[102] Jak wskazano dalej, być może jedynym wyjątkiem jest twierdzenie, że ludzie nie mogą wiedzieć, czy zdolności intelektualne Boga są analogiczne do ich własnych.

[103] Darwin, **Autobiografia...**, s. 47.

[104] W liście napisanym w 1881 roku Darwin zmagał się z kwestią tego, czy zważywszy na trafność teorii ewolucji, może on wiedzieć, czy Wszechświat był rezultatem działania przyczyn celowych, czy przypadku (a co dopiero, czy może wiedzieć coś o istnieniu lub atrybutach Boga). Por. Darwin (ed.), **The Life and Letters...**, Vol. 1, s. 316. Por. też England, „Natural Selection, Teleology, and the Logos...", s. 274–275.

[105] List Karola Darwina do Asy Graya z 22 maja 1860 roku w: Darwin, **Autobiografia...**, s. 217 [216–217] [wyróżnienie dodane]. W liście tym Darwin nie napisał, że jego teologiczne dylematy miały związek z teorią ewolucji. Ten związek został wskazany później.

Zdaniem Darwina ludzki umysł nie został zaprojektowany przez Boga po to, aby człowiek mógł Go poznać, lecz został wyposażony przez przyrodę w pewne zdolności umożliwiające przetrwanie i wychodzące naprzeciw potrzebom reprodukcji dawnych łowców-zbieraczy zamieszkujących Afrykę. [106] I rzeczywiście, w książce **O pochodzeniu człowieka**, na której stronach Darwin analizował gatunek ludzki z punktu widzenia teorii ewolucji, Bóg nie ukształtował umysłu człowieka, ale raczej odwrotnie: Darwin argumentował, że wierzenia religijne, w tym monoteistyczna koncepcja Boga, powstały jako skutek połączenia myślenia abstrakcyjnego, antropocentrycznej projekcji i użyteczności społecznej. [107]

Co jednak z twierdzeniami teologii pozytywnej zawartymi w **O powstawaniu gatunków**? Wydaje się, że gdyby Darwin w trakcie pisania swojego dzieła odniósł teorię ewolucji do siebie, to nie znalazłby uzasadnienia dla własnych twierdzeń o Bogu. I tu pojawia się problem: jeżeli teoria ewolucji jest trafna, to niektóre z ar-

(Przyp. tłum.) Autor cytuje tutaj jeden z najbardziej znanych listów Darwina, w którym angielski przyrodnik wyraził swoje teologiczne rozterki: „Uwikłałem się. Pisząc, nie miałem ateistycznych intencji. Lecz wyznaję, że nie umiem dostrzec dookoła nas celowości i dobrodziejstw tak wyraźnie jak inni i jak bym sam sobie tego życzył. Wydaje mi się, że jest zbyt wiele nieszczęść na tym świecie. Nie mogę uwierzyć, aby miłosierny i wszechmocny Bóg miał celowo stworzyć gąsieniczniki [*Ichneumonidae*] z osobliwą zaiste intencją, aby żywiły się one żywym ciałem gąsienic; albo kota, aby musiał igrać z myszą. Nie uznając tego, nie widzę konieczności przyjęcia, że oko zostało celowo zaplanowane. A mimo to patrząc na ten wspaniały wszechświat, a zwłaszcza zastanawiając się nad naturą człowieka, nie mogę zadowolić się wnioskiem, że wszystko to jest wynikiem działania bezrozumnej siły. Skłonny jestem uznać, że wszystko jest rezultatem działania bezwzględnych praw, a poszczególne zjawiska — zarówno dobre, jak i złe — są pozostawione grze tego, co nazwalibyśmy przypadkiem. Nie znaczy to, aby ten wniosek zadowalał mnie w zupełności. Szczerze czuję, że całego tego zagadnienia umysł ludzki zgłębić nie jest w stanie. To tak jakby pies zastanawiał się nad poglądami Newtona. Pozwólmy każdemu ufać i wierzyć w to, w co może wierzyć. Oczywiście zgadzam się z Tobą, że moje poglądy wcale niekoniecznie muszą być ateistyczne. Piorun zabija człowieka bez względu na to, czy jest dobry, czy zły, po prostu w wyniku skomplikowanego działania praw natury. Dziecko (które może okazać się idiotą) rodzi się dzięki działaniu jeszcze bardziej skomplikowanych praw. I nie widzę racji, dlaczego by człowiek lub inne zwierzę nie miało powstać dzięki jakimś jeszcze innym prawom. Nie widzę również podstawy, aby przypuszczać, że te prawa miały być celowo zaplanowane przez wszechwiedzącego Stwórcę, który przewidział każde przyszłe zdarzenie i jego następstwa. Lecz im więcej myślę, tym bardziej wikłam się, co niewątpliwie widać z mego listu" (List Karola Darwina do Asy Graya z 22 maja 1860 roku w: Darwin, **Autobiografia…**, s. 217 [216–217]).

[106] Niektórzy współcześni darwiniści powtarzają tę samą śpiewkę. Por. Michael Ruse, „Belief in God in a Darwinian Age", w: Jonathan Hodge and Gregory Radick (eds.), **The Cambridge Companion to Darwin**, Cambridge University Press, New York, 2003, s. 350–351 [368–392]; Patricia S. Churchland, „Epistemology in the Age of Neuroscience", *Journal of Philosophy* 1987, Vol. 84, No. 10, s. 548–549 [544–553], https://doi.org/10.5840/jphil1987841026.

[107] Por. Darwin, **O pochodzeniu człowieka…**, s. 49–52.

gumentów przemawiających na rzecz tego podejścia — na przykład argument z homologii, argument o cierpieniu w przyrodzie czy twierdzenia o uczciwości Boga i jego stosunku do praw przyrody — przestają mieć uzasadnienie. [108] Tym sposobem teologia zawarta w **O powstawaniu gatunków** podkopała własne fundamenty.

Darwin nadał mógł posługiwać się teologią negatywną, w ramach której po prostu poważnie traktował teologię specjalnego stworzenia, aby przetestować jej empirycznie przewidywania. (Można na przykład testować twierdzenie, że Ziemia jest płaska, nie posiadając jednocześnie uzasadnienia dla tego twierdzenia.) Jeżeli jednak dojrzałe refleksje Darwina są słuszne, to teologia pozytywna, stanowiąca rzekomo niezależne wsparcie dla teorii ewolucji, okazała się epistemiczną porażką.

Podsumowując, jeżeli poważnie podejdziemy do praw logiki oraz dojrzałych poglądów Darwina, to analiza teologii zawartej w **O powstawaniu gatunków** ujawnia logiczną niespójność i epistemiczną bezpodstawność. Jego późniejsza „plątanina" w kwestiach teologicznych miała swoje ciche przejawy już w 1859 roku. Zgodnie z tym poglądem teologia występująca w **O powstawaniu gatunków** przywodzi na myśl zbiór twierdzeń, które — nawet jeżeli uznać je za egzystencjalnie ważne dla Darwina — z epistemicznego punktu widzenia nie wydają się dokładnie przenalizowane pod kątem wiarygodności, jasności czy spójności, ale raczej zostały wykorzystane do zrealizowania głównego celu, czyli ugruntowania teorii ewolucji i osłabienia jej najważniejszej rywalki.

Podsumowanie i wnioski

Podsumujmy więc treść niniejszego artykułu. Twierdzę, że w pierwszym wydaniu **O powstawaniu gatunków** Darwin powołał się przynajmniej na następujące twierdzenia teologii pozytywnej przemawiające z jednej strony na rzecz koncepcji dziedziczenia z modyfikacjami, a z drugiej — przeciwko idei specjalnego stworzenia:

1. ludzie nie mają dobrych podstaw, by wierzyć, że Bóg tworzy w sposób analogiczny do intelektualnych zdolności ludzkiego umysłu;

---

[108] Warto to porównać z opinią von Sydowa, który przedstawił pogląd o przejściowej utracie wiary przez Darwina, do czego w dużym stopniu miał się przyczynić rozwój teorii ewolucji. Por. von Sydow, „Charles Darwin…", s. 150–156.

2. Bóg, który mógł dokonać stworzenia w dowolny sposób, nie posłużyłby się wspólnym wzorcem, lecz stwarzałby nowe kończyny zwierząt *de novo*;

3. godny szacunku Bóg stwarzałby struktury biologiczne zgodnie z ludzką koncepcją „najprostszego sposobu realizacji" funkcji tych struktur;

4. Bóg stworzyłby jedynie strukturę o minimalnym stopniu złożoności wymaganym do pełnienia funkcji danej części;

5. Bóg nie dostarcza fałszywych danych empirycznych dotyczących pochodzenia organizmów;

6. Bóg nadał materii prawa przyrody;

7. Bóg w sposób bezpośredni stworzył „pierwotne" życie;

8. po stworzeniu pierwszego życia Bóg nie dokonywał już cudów w historii organicznej;

9. „odległy" Bóg nie jest moralnie odpowiedzialny za ból i cierpienie w świecie przyrody;

10. Bóg dokonujący cudownych aktów stwórczych w historii organicznej nie jest — biorąc pod uwagę ból i cierpienie w świecie przyrody — wiarygodny.

Następnie argumentowałem, że w książce **O powstawaniu gatunków** Darwin wykorzystał twierdzenia teologiczne w celu zapewnienia epistemicznego wsparcia dla koncepcji dziedziczenia z modyfikacjami (i przeciwko idei specjalnego stworzenia). Uczynił to przynajmniej w następujące sposoby:

1. jako kluczowe twierdzenie dostarczające kontekstu, który umożliwił rozstrzygnięcie między jego teorią a koncepcją konkurencyjną; [109]

2. jako główny czynnik eliminujący rywalizującą teorię wówczas, gdy teoria zaproponowana przez Darwina oraz jej konkurentka znalazły się w empirycznym impasie; [110]

3. jako uzasadnienie zastosowania kryterium *verae causae* względem konku-

[109] Por. np. fragment, gdzie Darwin mówił o „prawach nadanych materii" (Darwin, **O powstawaniu gatunków...**, s. 449) i jego odpowiedź na zaproponowane przez (zmodyfikowaną) koncepcję specjalnego stworzenia wyjaśnienie różnorodności koni.

[110] Por. np. odpowiedź Darwina na zaproponowane przez (zmodyfikowaną) koncepcję specjalnego stworzenia wyjaśnienie różnorodności koni.

rencyjnej teorii w celu jej odrzucenia; [111]

4. jako podstawę do odparcia potężnego Paleyowskiego argumentu na rzecz projektu odnoszącego się do oka kręgowców;

5. jako częściowy substytut wobec braku możliwości empirycznego odparcia Paleyowskiego argumentu na rzecz projektu dotyczącego oka kręgowców; [112]

6. jako milczącą przesłankę w argumentacji na temat cierpienia i bólu w przyrodzie;

7. jako milczące założenie w słynnym argumencie z homologii, która według Darwina stanowiła ważny obszar badań będący „duszą" historii naturalnej. [*]

Argumentowałem również, że Darwin czerpał z teologii nie tylko po to, by po prostu przedstawić swoją teorię, ale także by nadać jej (lub jej kluczowym aspektom) odpowiedni kształt i moc, co chciał uzyskać przez:

1. wymóg odwoływania się wyłącznie do procesów, przyczyn i zdarzeń naturalnych (lub wtórnych); [113]

2. uzasadnienie wiarygodności danych empirycznych. [114]

Na koniec argumentowałem, że przeprowadzona na metapoziomie analiza teologicznych przekonań Darwina ujawnia kilka napięć:

---

[111] Darwin najpewniej odrzucił wyjaśnienie (zmodyfikowanej) idei specjalnego stworzenia dotyczące różnorodności koni jako opierające się na „nierealnej" lub „nieznanej" przyczynie — a zatem naruszające wymóg *verae causae* — ponieważ nie było wystarczających i niezależnych, przeszłych lub obecnych, świadectw empirycznych przemawiających za tym, że Bóg był oszustem, jak mogło sugerować ujęcie kreacjonistyczne. Darwin uważał, że Bóg nie powinien być postrzegany jako oszust. Zwolennicy (zmodyfikowanej) idei specjalnego stworzenia odwoływali się do „nierealnej" przyczyny (a nie prawdziwej), a ta zawierała błędne pojęcie o moralnej naturze Boga. Więcej na ten temat piszę w części „Boska uczciwość" oraz w przypisie 70.

[112] Pamiętajmy, że Darwin odrzucił poglądy Paleya nie z uwagi na dane empiryczne, lecz jako skutek — korzystając z określenia Davida Depewa — „mało wyrafinowanego eksperymentu myślowego" oraz dwóch teologicznie obciążonych twierdzeń o niemożliwości zrozumienia sposobów działania Boga.

[*] (Przyp. tłum.) Darwin, **O powstawaniu gatunków...**, s. 401.

[113] Por. części zatytułowane „Problem bólu i cierpienia" oraz „Boski architekt".

[114] W swojej krytyce zaproponowanego przez (zmodyfikowaną) ideą specjalnego stworzenia wyjaśnienia różnorodności koni Darwin odwołał się do twierdzenia o uczciwości Boga, które pomogło mu uzasadnić pogląd o niezwodniczym charakterze danych empirycznych.

1. brak precyzji w jego argumentacji dotyczącej cierpienia w przyrodzie; [115]

2. logiczna niespójność w odpowiedzi na twierdzenia Paleya i odwołaniach do poglądów Owena; [116]

3. brak epistemicznego uzasadnienia dla twierdzeń teologii pozytywnej zawartych w **O powstawaniu gatunków**. [117]

Wielu uczonych zgodnie twierdzi, że Darwin w znacznym stopniu posiłkował się teologią, kiedy pracował nad książką **O powstawaniu gatunków**. Jak wcześniej pokazałem, John Hedley Brooke wskazał, że Darwin zapożyczył z teologii naturalnej charakterystyczne dla niej założenia, koncepcje, metafory, wzorce argumentacji, treści przemawiające na rzecz jego teorii, a także problemy badawcze. [118] Dov Ospovat, który dokładnie przeanalizował ewolucjonistyczne poglądy Darwina, twierdził, że posługiwał się on „zasadniczo takim samym" wyjaśnieniem cierpienia w przyrodzie jak Malthus i Paley, a mianowicie, że „prawa przyrody zostały zaprojektowane przez życzliwego Boga". [119] Abigail Lustig podkreślała, że książka **O powstawaniu gatunków** „została napisana w odpowiedzi na [...] teologiczny argument na rzecz projektu", a jej treść może być właściwie zrozumiana tylko z punktu widzenia teologicznego dziedzictwa Paleya. [120] Momme von Sydow utrzymuje, że „trzy główne czynniki mające wpływ na biologiczną teorię Darwina" to „Paleyowski pogląd, że przyroda jest projektem Boga; przekonanie, że Bóg sprawuje rządy za pomocą wiecznych, uniwersalnych i niezmiennych praw; [...]

[115] Przypomnijmy sobie brak precyzji Darwina na temat tego, czy cierpienie w przyrodzie jest bardziej zgodne z teorią ewolucji aniżeli z ideą specjalnego stworzenia w świetle przekonania o (rzekomo) wszechwiedzącym Stwórcy. Pamiętajmy też, że na stronach **O powstawaniu gatunków** była mowa o (rzekomo) wszechwiedzącym Stwórcy, który przewidział (i dopuścił) cierpienie w przyrodzie.

[116] W szczególności sprzeczne twierdzenia wygłoszone przez Darwina dotyczące ludzkiej ignorancji (*à la* Paley) i ludzkiej wiedzy (*à la* Owen) na temat boskich metod stwarzania.

[117] Przyjmując słuszność dojrzałych poglądów Darwina, teologiczne twierdzenia — od drugiego do dziesiątego — są nieuzasadnione. Jednakże pierwsze twierdzenie może zostać utrzymane, nawet biorąc pod uwagę (dojrzały) ewolucjonistyczny antyrealizm Darwina w kwestiach teologicznych.

[118] Por. Brooke, „The Relations Between Darwin's Science...", s. 48–49.

[119] Ospovat, **The Development of Darwin's Theory...**, s. 223.

[120] Lustig, „Natural Atheology...", s. 70. Lustig stwierdziła również, że „teoria ewolucji [...] zrodziła się z teologii" (Lustig, „Natural Atheology...", s. 70).

[oraz] maltuzjańskie prawo ludności po części przedstawione jako teodycea”. [121] Co zaskakujące, John Cornell i Robert Richards niezależnie twierdzą, że jądro teorii Darwina — koncepcja doboru naturalnego — wywodzi się ze swoistej dla Darwina teologii. [122] Na przykład Richards argumentuje, że „Darwin stworzył teorię doboru naturalnego na obraz Boga”, tak że w ujęciu angielskiego przyrodnika „dobór naturalny był czymś więcej niż ślepą siłą przyrody, ponieważ funkcjonował jako substytut stwórcy działający zgodnie z boskimi nakazami”. [123] Ujmując rzecz bardziej ogólnie, wielu historyków twierdzi, że Darwina nie należy postrzegać jako kogoś, kto uparcie dążył do podważenia teologii, lecz bardziej jako radykalnego reformatora teologii naturalnej. [124]

W **O powstawaniu gatunków** występują także elementy teologii negatywnej. Wystarczy przypomnieć, że Darwin często odnosił się do teologii utrzymywanej przez zwolenników koncepcji specjalnego stworzenia w celu empirycznego przetestowania ich twierdzeń i wykazania ich słabości. Darwin wielokrotnie przeprowadzał takie testy w odniesieniu do teorii ewolucji i w ten sposób wskazywał na imponującą moc eksplanacyjną teorii doboru naturalnego i koncepcji wspólnoty pochodzenia w porównaniu z niewielkimi możliwościami wyjaśniającymi idei specjalnego stworzenia. Krótko mówiąc, teologia negatywna miała kluczowe znaczenie w argumentacji porównawczej zaprezentowanej na stronach **O powstawaniu gatunków**.

Nawiasem mówiąc, całkiem sporo współczesnych zwolenników neodarwinizmu bezpośrednio lub pośrednio posługuje się niektórymi z tych samych teolo-

---

[121] von Sydow, „Charles Darwin…”, s. 142.

(Przyp. tłum.) Słynna książka Thomasa Malthusa została opublikowana w języku polskim w 1925 roku jako **Prawo ludności**. Por. Thomas Malthus, **Prawo ludności**, przeł. K. Stein, *Biblioteka Wyższej Szkoły Handlowej*, Nakład Gebethnera i Wolffa, Warszawa — Kraków — Lublin — Łódź — Poznań — Wilno — Zakopane 1925.

[122] Por. Cornell, „God’s Magnificent Law…”, s. 381–412; Richards, „Theological Foundations…”, s. 61–79. Por. też Lustig, „Natural Atheology…”, s. 75.

[123] Richards, „Theological Foundations…”, s. 63 i [drugie zdanie] 69.

[124] Por. zwłaszcza Neal C. Gillespie (por. Gillespie, **Charles Darwin…**), Dov Ospovat (por. „God and Natural Selection…”, s. 169–194), John Hedley Brooke (por. „Laws Impressed On Matter by the Creator…”, s. 256–274) i James Moore (por. „Charles Darwin and the Problem of Creation…”, s. 189–200). Już nieco leciwe, ale nadal użyteczne przedstawienie poglądów badaczy opowiadających się za i przeciw tej tezie można znaleźć w artykule Davida Kohna. Por. Kohn, „Darwin’s Ambiguity…”, s. 215–218.

gicznych twierdzeń i argumentów, którymi również posługiwał się Darwin.[125] Chociaż niniejszy tekst dotyczy jedynie rozważań przedstawionych w książce **O powstawaniu gatunków**, to czytelnicy, którzy wątpią, że we współczesnych dyskusjach stosuje się twierdzenia teologiczne, powinni sięgnąć do cytowanych publikacji. Przekonają się wówczas, że w kółko rozprawia się tam o Bogu.

Pozostaje jeszcze jedno, kluczowe pytanie: nawet jeżeli teologia w swoich różnorodnych postaciach odegrała jakąś epistemiczną rolę w **O powstawaniu gatunków**, przemawiając na rzecz teorii ewolucji (i przeciwko koncepcji specjalnego stworzenia), to *jak istotna* była to rola? Mam tu na myśli wpływ teologii na postrzeganie danych empirycznych i naturalistycznych (czyli świeckich) koncepcji, założeń, argumentów, metafor i tym podobnych. Krótko mówiąc, jak bardzo Darwin potrzebował Boga? Chociaż nie sposób w tym tekście przedstawić wyczerpującej odpowiedzi na to pytanie, to pokuszę się o dwa komentarze. Po pierwsze, należy pamiętać, że niniejszy artykuł nie podważa tego, iż teoria zaproponowana przez Darwina była w swej istocie naturalistyczna — postulowała prawa przyrody, byty i przyczyny naturalne jako wyjaśnienie zmian biologicznych.[126] Nie

[125] Przykłady tego rodzaju poglądów można znaleźć w: Jerry A. Coyne, **Ewolucja jest faktem**, przeł. Marcin Ryszkiewicz, Wiesław Studencki, *Na Ścieżkach Nauki*, Prószyński i S-ka, Warszawa 2009, s. 107–112; Francis S. Collins, **Język Boga. Kod życia — nauka potwierdza wiarę**, przeł. Małgorzata Yamazaki, Świat Książki, Warszawa 2008, szczególnie rozdziały 3–9; Stephen Jay Gould, **The Panda's Thumb: More Reflections in Natural History**, W.W. Norton & Co., New York 1992, s. 20–21; Elliott Sober, **Philosophy of Biology**, 2nd ed., Westview Press, Boulder 2000, s. 27–57; Francisco J. Ayala, **Darwin and Intelligent Design**, *Facets Series*, Fortress Press, Minneapolis 2006, s. 85–89; Kenneth Miller, **Finding Darwin's God: A Scientist's Search for Common Ground Between God and Evolution**, HarperCollins, New York 1999, s. 80, 100–103, 267–269; Philip Kitcher, **Abusing Science: The Case Against Creationism**, MIT Press, Cambridge 1982, s. 124–164; Michael Shermer, **Why Darwin Matters: The Case Against Intelligent Design**, Times Books, New York 2006, s. 16–18; Douglas J. Futuyma, **Science on Trial: The Case for Evolution**, Sinauer Associates, Sunderland 1995, s. 128–131; Arthur Peacocke, „Welcoming the «Disguised Friend» — Darwinism and Divinity", w: Robert Pennock (ed.), **Intelligent Design Creationism and Its Critics: Philosophical, Theological, and Scientific Perspectives**, MIT Press, Cambridge 2002, s. 471–486; Jean Pond, „Independence", w: Richard Carlson (ed.), **Science and Christianity: Four Views**, InterVarsity Press, Downers Grove 2000, s. 67–104; Howard Van Till, „Partnership", w: Carlson (ed.), **Science and Christianity...**, s. 195–234; Ian Barbour, **When Science Meets Religion: Enemies, Strangers, or Partners?**, HarperCollins, New York 2000, s. 111–113; John Haught, **Deeper than Darwin: The Prospect for Religion in the Age of Evolution**, Westview Press, Boulder 2004, s. 55–68. Por. też odnośniki w pracach Nelsona i Lustig. Por. Nelson, „The Role of Theology...", s. 493–517; Lustig, „Natural Atheology...", s. 69–83.

[126] Niemniej niektórzy z cytowanych wcześniej uczonych oczywiście nie zaakceptowaliby w pełni tego twierdzenia.

twierdzę też, że dane empiryczne, twierdzenia oraz koncepcje nieteologiczne nie odgrywały ważnej roli dla Darwina, który za ich pomocą usiłował wyrazić, bronić i zastosować swoją teorię.

Po drugie, co jeszcze bardziej istotne, rozłożenie na czynniki pierwsze tego, co Darwin nazywał „długim szeregiem dowodzeń”, [*] i wyszczególnienie wątków „teologicznych”, „naturalistycznych”, „empirycznych” (i innych) — a następnie ocena wartości epistemicznej każdego z nich — jest niezwykle skomplikowanym zadaniem, biorąc pod uwagę zwłaszcza poglądy Thomasa Kuhna i jego wnikliwą analizę wzajemnych zależności między metafizyką, epistemologią, metodologią i empirią występujących w różnych paradygmatach. [127] Jeżeli wspomniani uczeni mają rację, to teologia odgrywa znaczącą rolę w koncepcjach, założeniach, strukturze oraz w obronie argumentacji i teorii autorstwa Darwina. W tym artykule bronię znacznie skromniejszego stanowiska i skupiam się jedynie na epistemicznej roli teologii pozytywnej. W książce **O powstawaniu gatunków** teologia ta wchodzi w złożone relacje z danymi empirycznymi i naturalistycznymi koncepcjami, funkcjonując na wielu różnych poziomach epistemicznych — od dostarczenia tła problemowego, poprzez zapewnienie przesłanek w argumentacji, aż do poziomu podstawowych założeń. Tak czy inaczej, wydaje się, że można zasadnie twierdzić, że teologia pozytywna była jednym z wielu źródeł, z których korzystał Darwin, ale z którego jednocześnie nie korzystał zbyt obficie. Teologia pozytywna pełni funkcję służebną, wiernie wspierając centralną ideę Darwina (teorię doboru naturalnego), oraz funkcję pomocniczą w odniesieniu do rozmaitych świadectw empirycznych, rozumowań logicznych i naturalistycznych koncepcji oraz twierdzeń na rzecz teorii ewolucji i przeciwko idei specjalnego stworzenia.

Służebnice i wspólniczki są oczywiście mniej interesujące dla historyków niż głowy rodzin matriarchalnych i przywódcy. Nie jest jednak tak, że są one nieważne. Teologia pozytywna legitymizowała wszystko — od wiarygodności danych empirycznych, poprzez słynny argument z homologii, aż po naturalistyczną meto-

[*] (Przyp. tłum.) Darwin, **O powstawaniu gatunków…**, s. 424.

[127] Nie znaczy to oczywiście, że analiza Kuhna jest całkowicie słuszna, zwłaszcza biorąc pod uwagę jej śmielsze wątki konstruktywistyczne i tezę o niewspółmierności. Por. Thomas S. Kuhn, **Struktura rewolucji naukowych**, przeł. Helena Ostromęcka, Państwowe Wydawnictwo Naukowe, Warszawa 1968. Istotne są tu również współczesne dyskusje na temat tezy Duhema–Quine’a o holizmie w testowaniu hipotez.

dologię Darwina. Pomimo wewnętrznych napięć teologia pozytywna nadała kształt zarówno „długiemu szeregowi dowodzeń", jak i teorii ewolucji.

Wbrew powszechnie obowiązującemu poglądowi książka **O powstawaniu gatunków** nie tyle oddzielała naukę od teologii, ile stanowiła artykulację nauki z perspektywy półdeizmu. Co więcej, Darwin zaproponował teorię ewolucji drogą doboru naturalnego jako alternatywę dla innego obciążonego teologicznie wyjaśnienia — idei specjalnego stworzenia. Ostatecznie **O powstawaniu gatunków** nie przeciwstawia teistycznego kreacjonizmu naturalistycznej teorii ewolucji, lecz teistyczną ideę specjalnego stworzenia półdeistycznej koncepcji ewolucji — ta ostatnia uwzględniała (być może wzajemnie sprzeczne) pojęcia istnienia, natury, działania i powinności Boga.

Stephen Dilley

Bibliografia

AYALA Francisco J., **Darwin and Intelligent Design**, *Facets Series*, Fortress Press, Minneapolis 2006.

BABBAGE Charles, **The Ninth Bridgewater Treatise**, 2nd ed., John Murray, London 1838.

BACON Francis, „A Confession of Faith", w: SPEDDING, ELLIS and HEATH (eds.), **The Works of Francis Bacon...**, s. 219–226.

BARBOUR Ian, **When Science Meets Religion: Enemies, Strangers, or Partners?**, HarperCollins, New York 2000.

BARRETT Paul H., GAUTREY Peter J., HERBERT Sandra, KOHN David, and SMITH Sydney (eds.), **Charles Darwin's Notebooks, 1836-1844: Geology, Transmutation of Species, Metaphysical Enquiries**, Cornell University Press, Ithaca — New York 1987.

BROOKE John Hedley, „Laws Impressed On Matter by the Creator?", w: RICHARDS and RUSE (eds.), **The Cambridge Companion to the *Origin*...**, s. 256–274.

BROOKE John Hedley, „Religious Belief and the Content of the Sciences", *Osiris* 2001, Vol. 16, No. 1, s. 3–28, https://doi.org/10.1086/649336.

BROOKE John Hedley, **Science and Religion: Some Historical Perspective**, *The Cambridge History of Science Series*, Cambridge University Press, New York 1991.

BROOKE John Hedley, „The Relations Between Darwin's Science and His Religion", w: DURANT (ed.), **Darwinism and Divinity...**, s. 40–75.

BROWNE Janet, **Charles Darwin: Voyaging**, Knopf, New York 1995.

Bylica Piotr, „Darwin o celowości w przyrodzie", *Kwartalnik Historii Nauki i Techniki* 2008, R. 53, nr 3–4, s. 259–273.

Campbell John Angus, „Why Was Darwin Believed?" *Configurations* 2003, Vol. 11, No. 2, s. 203–237, https://doi.org/10.1353/con.2004.0016.

Carlson Richard (ed.), **Science and Christianity: Four Views**, InterVarsity Press, Downers Grove 2000.

Churchland Patricia S., „Epistemology in the Age of Neuroscience", *Journal of Philosophy* 1987, Vol. 84, No. 10, s. 544–553, https://doi.org/10.5840/jphil1987841026.

Collins Francis S., **Język Boga. Kod życia — nauka potwierdza wiarę**, przeł. Małgorzata Yamazaki, Świat Książki, Warszawa 2008.

Cornell John, „God's Magnificent Law: The Bad Influence of Theistic Metaphysics on Darwin's Estimation of Natural Selection", *Journal of the History of Biology* 1987, Vol. 20, No. 2, s. 381–412, https://doi.org/10.1007/BF00139461.

Cornell John, „Newton of the Grassblade? Darwin and the Problem of Organic Teleology", *Isis* 1986, Vol. 77, No. 3, s. 405–421, https://doi.org/10.1086/354203.

Cosans Chris, „Was Darwin a Creationist?", *Perspectives in Biology and Medicine* 2005, Vol. 48, No. 3, s. 362–371, https://doi.org/10.1353/pbm.2005.0071.

Coyne Jerry A., **Ewolucja jest faktem**, przeł. Marcin Ryszkiewicz, Wiesław Studencki, *Na Ścieżkach Nauki*, Prószyński i S-ka, Warszawa 2009.

Darwin Charles, **On the Origin of Species**, *Oxford World's Classics*, Oxford University Press, Oxford — New York 2008.

Darwin Charles, „The Essay of 1842", w: Darwin (ed.), **The Foundations of the Origin of Species…**, s. 1–53.

Darwin Charles, „The Essay of 1844", w: Darwin (ed.), **The Foundations of the Origin of Species…**, s. 57–255.

Darwin Francis (ed.), **The Foundations of the Origin of Species: Two Essays Written in 1842 and 1844**, Cambridge University Press, Cambridge 1909.

Darwin Francis (ed.), **The Life and Letters of Charles Darwin**, Vol. 3, John Murray, London 1887.

Darwin Francis and Seward A.C. (eds.), **More Letters of Charles Darwin: A Record of His Work in a Series of Hitherto Unpublished Letters**, Vol. 1, John Murray, London 1903.

Darwin Karol, **Autobiografia i wybór listów. Dzieła wybrane**, t. VIII, przeł. A. Iwanowska, A. Krasicka, J. Połtowicz, S. Skowron, *Biblioteka Klasyków Biologii*, Państwowe Wydawnictwo Rolnicze i Leśne, Warszawa 1960.

Darwin Karol, **O pochodzeniu człowieka**, **Dzieła wybrane**, t. IV, przeł. Stanisław Panek, *Biblioteka Klasyków Biologii*, Państwowe Wydawnictwo Rolnicze i Leśne, Warszawa 1959.

Darwin Karol, **O powstawaniu gatunków drogą doboru naturalnego, czyli o utrzymywaniu się doskonalszych ras w walce o byt**, tekst polski na podstawie przekładu Szymona Dicksteina i Józefa Nusbauma opracowały Joanna Popiołek i Małgorzata Yamazaki, *Biblioteka Klasyków Nauki*, Wydawnictwa Uniwersytetu Warszawskiego, Warszawa 2009.

Dawkins Richard, **Kapłan diabła. Opowieści o nadziei, kłamstwie, nauce i miłości**, przeł. Michał Lipa, Helion, Gliwice 2014.

Dawkins Richard, **Ślepy zegarmistrz, czyli jak ewolucja dowodzi, że świat nie został zaplanowany**, przeł. Antoni Hoffman, *Biblioteka Myśli Współczesnej*, Państwowy Instytut Wydawniczy, Warszawa 1994.

de Beer Gavin (ed.), „Darwin's Notebooks on Transmutation of Species. Part I. First Notebook [B] (July 1837–February 1838)", *Bulletin of the British Museum (Natural History)* 1960, Historical Series, Vol. 2, No. 2, s. 23–73.

de Beer Gavin (ed.), „Darwin's Notebooks on Transmutation of Species. Part II. Second Notebook [C] (February to July 1838)", *Bulletin of the British Museum (Natural History)* 1960, Historical Series, Vol. 2, No. 3, s. 75–118.

de Beer Gavin (ed.), „Darwin's Notebooks on Transmutation of Species. Part III. Third Notebook [D] (July 15 to October 2nd 1838)", *Bulletin of the British Museum (Natural History)* 1960, Historical Series, Vol. 2, No. 4, s. 119–150.

Dear Peter, **The Intelligibility of Nature: How Science Makes Sense of the World**, University of Chicago Press, Chicago 2006.

Depew David, „The Rhetoric of the *Origin of Species*", w: Richards and Ruse (eds.), **The Cambridge Companion to the *Origin*...**, s. 237–255.

Durant John (ed.), **Darwinism and Divinity: Essays on Evolution and Religious Belief**, Oxford University Press, New York 1985.

England Richard, „Natural Selection, Teleology, and the Logos: From Darwin to the Oxford Neo-Darwinists, 1859-1909", *Osiris* 2001, Vol. 16, No. 1, s. 270–287, https://doi.org/10.1086/649348.

Futuyma Douglas J., **Science on Trial: The Case for Evolution**, Sinauer Associates, Sunderland 1995.

Gillespie Neal C., **Charles Darwin and the Problem of Creation**, University of Chicago Press, Chicago 1979.

Gosse Philip H., **Omphalos: An Attempt to Untie the Geological Knot**, John Van Voorst, London 1857.

Gould Stephen Jay, **The Panda's Thumb: More Reflections in Natural History**, W.W. Norton & Co., New York 1992.

Haught John, **Deeper than Darwin: The Prospect for Religion in the Age ff Evolution**, Westview Press, Boulder 2004.

Herschel John, **A Preliminary Discourse on the Study of Natural Philosophy**, Longman, Rees, Orme, Brown, & Green, London 1840.

Hodge Jonathan and Radick Gregory (eds.), **The Cambridge Companion to Darwin**, Cambridge University Press, New York 2003.

Hume David, **Badania dotyczące rozumu ludzkiego**, przeł. Jan Łukasiewicz, Kazimierz Twardowski, Ediciones Altaya & De Agostini, Warszawa 2001.

Kitcher Philip, **Abusing Science: The Case Against Creationism**, MIT Press, Cambridge 1982.

Knight David M. and Eddy Matthew D. (eds.), **Science and Beliefs: From Natural Philosophy to Natural Science, 1700–1900**, Ashgate, Burlington 2005.

Kohn David, „Darwin's Ambiguity: The Secularization of Biological Meaning", *The British Journal for the History of Science* 1989, Vol. 22, No. 2, s. 215–239, https://doi.org/10.1017/S0007087400026005.

Kuhn Thomas S., **Struktura rewolucji naukowych**, przeł. Helena Ostromęcka, Państwowe Wydawnictwo Naukowe, Warszawa 1968.

Lindberg David C. and Numbers Ronald L. (eds.), **When Science and Christianity Meet**, University of Chicago Press, Chicago 2003.

List Karola Darwina do Asy Graya z 22 maja 1860 roku w: Darwin, **Autobiografia…**, s. 216–217.

List Karola Darwina do Heinricha Georga Bronna z 5 października 1860 roku w: Darwin, **Autobiografia…**, s. 236–237.

List Karola Darwina do Johna Lubbocka z 22 listopada 1859 roku, *Darwin Correspondence Project*, University of Cambridge, https://tiny.pl/w95v4 [09.10.2022].

List Karola Darwina do Josepha D. Hookera z 12 lipca 1870 roku, *Darwin Correspondence Project*, University of Cambridge, https://tiny.pl/w7vtr [09.10.2022].

List Karola Darwina do pani Boole z 14 grudnia 1866 roku w: Darwin, **Autobiografia…**, s. 293.

List Karola Darwina do Williama Darwina Foxa z 29 kwietnia 1851 roku, *Darwin Correspondence Project*, University of Cambridge, http://tiny.pl/qf24l [09.10.2022].

List Williama Henry'ego Harveya do Karola Darwina z 24 sierpnia 1860 roku, *Darwin Correspondence Project*, University of Cambridge, https://tiny.pl/w7vsw [09.10.2022].

Livingston James C., „Frank Burch Brown, The Evolution of Darwin's Religious Views [book review]", *Journal of the American Academy of Religion* 1987, Vol. LV, No. 4, s. 818–819, https://doi.org/10.1093/jaarel/LV.4.818-b.

Livingstone David, „Re-placing Darwinism and Christianity", w: Lindberg and Numbers (eds.), **When Science and Christianity Meet…**, s. 183–202.

Lustig Abigail J., „Darwin's Difficulties", w: Richards and Ruse (eds.), **The Cambridge Companion to the *Origin*…**, s. 109–128.

Lustig Abigail J., „Natural Atheology", w: Lustig, Richards and Ruse (eds.), **Darwinian Heresies…**, s. 69–83.

Lustig Abigail J., Richards Robert J., and Ruse Michael (eds.), **Darwinian Heresies**, Cambridge University Press, Cambridge 2004.

Malec Grzegorz, „Kiedy Darwin stracił wiarę w Boga?", *Diametros* 2016, nr 48, s. 38–54, https://doi.org/10.13153/diam.48.2016.890.

Malthus Thomas, **Prawo ludności**, przeł. K. Stein, *Biblioteka Wyższej Szkoły Handlowej*, Nakład Gebethnera i Wolffa, Warszawa — Kraków — Lublin — Łódź — Poznań — Wilno — Zakopane 1925.

Miller Kenneth, **Finding Darwin's God: A Scientist's Search for Common Ground Between God and Evolution**, HarperCollins, New York 1999.

Moore James R., „Charles Darwin and the Problem of Creation (book review)", *The British Journal for the History of Science* 1981, Vol. 14, No. 2, s. 189–200, https://doi.org/10.1017/S0007087400018537.

Moore James R., **The Post-Darwinian Controversies: A Study of the Protestant Struggle to Come to Terms with Darwin in Great Britain and America, 1870-1900**, Cambridge University Press, Cambridge 1979.

Nelson Paul, „The Role of Theology in Current Evolutionary Reasoning", *Biology and Philosophy* 1996, Vol. 11, s. 493–517, https://doi.org/10.1007/BF00138329.

Numbers Ronald L., **Darwinism Comes to America**, Harvard University Press, Cambridge 1998.

Numbers Ronald L., „Science Without God: Natural Laws and Christian Beliefs", w: Lindberg and Numbers (eds.), **When Science and Christianity Meet…**, s. 265–286.

Ospovat Dov, „Darwin's Theology", *Science* 1980, Vol. 207, No. 4430, s. 520, https://doi.org/10.1126/science.207.4430.520.

Ospovat Dov, „God and Natural Selection: The Darwinian Idea of Design", *Journal of the History of Biology* 1980, Vol. 13, No. 2, s. 169–194, https://doi.org/10.1007/BF00125743.

Ospovat Dov, **The Development of Darwin's Theory: Natural History, Natural Theology, and Natural Selection, 1838–1859**, Cambridge University Press, Cambridge 1981.

Owen Richard, **On the Nature of Limbs: A Discourse**, University of Chicago Press, Chicago 2007 (pierwsze wydanie: John Van Voorst, London 1849).

Paley William, **A View of the Evidences of Christianity: In Three Parts**, R. Faulder, London 1794.

Paley William, **Natural Theology; or, Evidences of the Existence and Attributes of the Deity; Collected from the Appearances of Nature**, 12th ed., J. Faulder, London 1809 (pierwsze wydanie: R. Faulder, London 1802).

Peacocke Arthur, „Welcoming the «Disguised Friend» — Darwinism and Divinity", w: Pennock (ed.), **Intelligent Design Creationism and Its Critics…**, s. 471–486.

Pennock Robert (ed.), **Intelligent Design Creationism and Its Critics: Philosophical, Theological, and Scientific Perspectives**, MIT Press, Cambridge 2002.

Pond Jean, „Independence", w: Carlson (ed.), **Science and Christianity…**, s. 67–104.

Richards Robert J., „Darwin's Theory of Natural Selection and Its Moral Purpose", w: Richards and Ruse (eds.), **The Cambridge Companion to the *Origin*…**, s. 47–66.

Richards Robert J., „Theological Foundations of Darwin's Theory of Evolution", w: Theerman and Parshall (eds.), **Experiencing Nature…**, s. 61–79.

Richards Robert and Ruse Michael (eds.), **The Cambridge Companion to the *Origin of Species***, Cambridge University Press, New York 2009.

Roizen Ron, „The Rejection of «Omphalos»: A Note on Shifts in the Intellectual Hierarchy of Mid-Nineteenth Century Britain", *Journal for the Scientific Study of Religion* 1982, Vol. 21, No. 4, s. 365–369.

Ruse Michael, „Belief in God in a Darwinian Age", w: Hodge and Radick (eds.), **The Cambridge Companion to Darwin…**, s. 368–392.

Ruse Michael, **The Darwinian Revolution: Science Red in Tooth and Claw**, 2nd ed., University of Chicago Press, Chicago 1999.

Ruse Michael, „The Origin of the **Origin**", w: Richards and Ruse (eds.), **The Cambridge Companion to the *Origin*…**, s. 1–13.

Shermer Michael, **Why Darwin Matters: The Case Against Intelligent Design**, Times Books, New York 2006.

Sober Elliott, **Philosophy of Biology**, 2nd ed., Westview Press, Boulder 2000.

Spedding James, Ellis Robert Leslie, and Heath Douglas Denon (eds.), **The Works of Francis Bacon**, Vol. 7, Longmans and Co., London 1892.

Theerman Paul H. and Parshall Karen H. (eds.), **Experiencing Nature: Proceedings of a Conference in Honor of Allen G. Debus**, Vol. 58, Kluwer Academic Publishers, Dordrecht 1997.

Van Till Howard, „Partnership", w: Carlson (ed.), **Science and Christianity...**, s. 195–234.

von Sydow Momme, „Charles Darwin: a Christian Undermining Christianity?", w: Knight and Eddy (eds.), **Science and Beliefs...**, s. 141–156.

Whewell William, **Astronomy and General Physics Considered with Reference to Natural Theology. Treatise III**, William Pickering, London 1833.

Życiński Józef, **Ułaskawianie natury**, Wydawnictwo Znak, Kraków 1992.

ISSN 2299-0356

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**

Philosophical Aspects of Origin s. 141–162

https://doi.org/10.53763/fag.2022.19.2.207

ARTYKUŁ ORYGINALNY / ORIGINAL ARTICLE

Michał Jakub Wagner

Uniwersytet Kardynała Stefana Wyszyńskiego w Warszawie

The Liminal Nature of the "Eclipse of Darwinism" as a Critical Phase in the History of Evolutionary Biology

Received: October 25, 2022. Accepted: November 20, 2022. Published online: December 2, 2022.

Abstract: The term "eclipse of Darwinism" was popularized by Julian Huxley, who used it to describe the period before the emergence of the evolutionary synthesis. The idea of the "eclipse" was later criticized, because it was used to show the superiority of the synthesis over earlier evolutionary theories. This historiography was opposed by Peter Bowler and Mark Largent. According to Bowler, Darwin was not a central figure in nineteenth-century biology. Rather, most naturalists worked within a different evolutionary paradigm. Largent suggested replacing the term "eclipse" with "interphase of Darwinism", which would better reflect its nature as a preparatory phase for the creation of the synthesis. However, the philosophical presuppositions on which these interpretations were built, while helping them to avoid the errors of their predecessors, also led to new problems. The problems with the interpretations of the "eclipse" can be explained by its "liminal" character. Liminality is an intermediate period between the old and the new. Because of its transgressivity, a liminal period is hard to integrate within a given structure and is mostly excluded from the latter. When analyzing works of historians dealing with the "eclipse" we encounter a common tendency towards excluding this period from historical narratives.

Keywords:

Charles Darwin; eclipse of Darwinism; Ernst Mayr; Peter Bowler; interphase of Darwinism; liminality; axial periods; historiography of biology; Darwin industry

When Jean-Paul Sartre reflected on the problem of slime, he noted that its transgressive character causes cognitive dissonance. On the one hand, viscosity disgusts us because, as something intermediate between solid and liquid, it does not fit into the established order of the world, transcending as it does our presupposed cognitive categories, while on the other hand, it enriches human life by undermining the latter. [1] But can we speak of transgressivity in the context of philosophy and the history of science? For this purpose, one should go beyond the classical epistemological perspective used in historical research and enrich it with an ontological one. The use of ontology in historical research has been postulated by, among others, Michael Bentley [2] in the context of a broad understanding of history, and David Hull in that of the history of science. According to Hull, most problems in the history of science can be solved through the abandonment of an epistemological perspective in favor of an ontological one – in which historians interpret scientific theories as historical entities. Hull noted that most philosophers of science view scientific theories in an essentialist way, and this perspective leads to a distortion of the history of science. In his view, therefore, historians must abandon essentialism for a population-based approach that better captures the nature of the development of science. [3] Putting aside the validity of Hull's proposal for a new ontology of the philosophy of science, it is worth noting that this ontological perspective provides a new angle for tackling some of the classic problems of the history and philosophy of biology. One such problem is the question of the status of the "eclipse of Darwinism". In this article, it will be argued that the main problems with the interpretation of the latter result from the problematic ontological status of this period, which confronts the historian with a cognitive dissonance similar to Sartre's slime.

The term "eclipse of Darwinism" was popularized by Julian Huxley in his **Evolution: The Modern Synthesis**, and denoted a period at the turn of the nineteenth-century when Darwin's theory of evolution was losing popularity in favour of other, non-Darwinian theories of evolution such as neo-Lamarckism, orthogenesis, and mutationism. The "eclipse" ended with the advent of the modern synthesis. [4] From an ontological point of view, it has an intermediate character, because

[1] See Jean-Paul Sartre, **Being and Nothingness: An Essay on Phenomenological Ontology**, Routledge, London 1969, pp. 610–612.

[2] See Michael Bentley, "Past and «Presence»: Revisiting Historical Ontology", *History and Theory* 2006, Vol. 45, No. 3, s. 349–361, https://doi.org/10.1111/j.1468-2303.2006.00370.x.

[3] See David L. Hull, **Science as a Process: An Evolutionary Account of the Social and Conceptual Development of Science**, The University Chicago Press, Chicago — London 1988, pp. 12–17.

[4] The "modern synthesis", in the context of this article, is to be understood as a synonym for the modern synthetic theory of evolution.

it represents a historical period in which science did not move towards acceptance of Darwinism, but instead entered a state of crisis in which the correct theory was discarded in favor of other, incorrect theories of evolution. It forms a kind of gap in the development of science to which it is difficult to assign an appropriate place in the historical narrative. Following Hull's suggestions, therefore, it will be argued that the "eclipse" has a specific, transgressive ontological status, and because of that can be called a "liminal period". The main problem with the "eclipse" is that it breaks out of historians' conceptions of how science should develop. [5] It is therefore marginalized or ignored in historiographical interpretations, precisely because historians' philosophical preconceptions about the development of science do not allow them to accept such a liminal period.

The present article is divided into three main parts. The first discusses the concept of liminality and shows how it is related to the "eclipse", while the next explores how the "eclipse of Darwinism" has been marginalized in modern historiography. In the final section, the new interpretations of the "eclipse" that have been proposed by the so-called "non-Darwinian industry" — in particular by Peter Bowler and Mark Largent — will be discussed, and their way of dealing with the liminal character of the "eclipse" considered.

The "Darwin Industry" and the "Eclipse of Darwinism"

The concept of liminality was introduced by Arnold van Gennep and further developed by Victor Turner. [6] Originally, liminality was meant to denote a stage within rites of passage that, according to van Gennep, themselves consist of three phases: (a) the moment of separation — when an individual leaves his or her social position; (b) the liminal moment — when the individual remains in a state of limbo between the old and the new state; (c) the moment of incorporation —

[5] This point was dealt with in detail in Chapter 3 of Michał Jakub Wagner, **Interpretacje rozwoju biologii ewolucyjnej na przełomie XIX i XX wieku** [Interpretations of the Development of Evolutionary Biology at the Turn of the Twentieth Century], Liber Libri, Warszawa 2020. The present article should be considered an extension of this book, as it provides new perspectives and arguments pertaining to the topic discussed there.

[6] For more on the history of the concept of liminality and its use in the modern humanities, see Shalini Rana and Digvijay Pandya, "Liminality: A Close Study of Historical Roots and Theoretical Structure", *Language in India* 2021, Vol. 21, No. 10, pp. 21–43, https://tiny.pl/ wfm2q [28.11.2022].

when the individual enters the new state. [7] As Bjørn Thomassen notes, the categories proposed by van Gennep are so universal that they can be applied not only to the stages of a ritual but also to historical periods. [8] Thomassen compares the liminality of the historical period with what Karl Jaspers calls "axial periods". [9] As he writes, "Karl Jaspers' famous description of the axial age bears every element of liminality: it was an in-between period between two structured world-views and between two rounds of empire building […] it was an age of uncertainty, where possibilities lie open". [10] Such liminal periods are further characterized by him as exhibiting "prolonged intellectual confusion" of a kind characteristic for "revolutionary periods". [11] Because of their revolutionary character, liminal periods are particularly valuable to the historian:

> If historical periods can be considered liminal, it follows that the crystallization of ideas and practices that take place during this period must be given special attention. Once liminality ends the ideas and practices that have become established therein will tend to take on the quality of structure. [12]

Thus, the study of liminal states is important, because from this stage of temporary chaos the status quo emerges. The "eclipse", as a period of crisis, of exchange of ideas, of searching for a new scientific path, corresponds to the general definition of the liminal historical period about which Thomassen writes. It lies between the moment of separation, when science moved from natural theology towards evolutionism thanks to Darwin, and the moment of integration, when a new order was created in science — namely, the modern synthesis. Theoretically, then, there is a continuum — Darwin's scientific revolution, then the period

---

[7] See Victor Turner, "Liminal to Liminoid, in Play, Flow, and Ritual: An Essay in Comparative Symbology", *Rice Institute Pamphlet — Rice University Studies* 1974, Vol. 60, No. 3, pp. 56–60 [53–92], https://doi.org/10.5433/2176-6665.2012v17n2p214.

[8] See Bjørn Thomassen, "The Uses and Meanings of Liminality", *International Political Anthropology* 2009, Vol. 2, No.1, pp. 16–18 [5–28].

[9] Karl Jaspers, **The Origin and Goal of History**, Yale University Press, New Haven — London 1957, p. 7.

[10] Thomassen, "The Uses and Meanings…", pp. 19–20.

[11] Thomassen, "The Uses and Meanings…", p. 17.

[12] Thomassen, "The Uses and Meanings…", p. 20.

of the "eclipse", and afterwards the emergence of the modern synthesis — which should be reflected in historical work on the development of evolutionary biology.

It seems, then, that the period of "eclipse", representing a liminal state, should be of particular interest to historians, since it preceded the synthetic theory of evolution and represents the moment when the foundations for the emergence of the latter were established. Since the 1980s, historical research has increasingly focused on investigating the "eclipse" as it was viewed at the time when a new order in science was beginning to emerge. As Frederick Churchill wrote: "What we need now is a careful search among historians of biology working in tandem with American social historians and philosophers of science to find better ways of characterizing the peculiar changes that took place in the New Biology between 1880 and 1920". [13] Such an approach was a clear departure from previous historiographical practice, which Vassiliki Smocovitis characterized as follows:

> All historical explanations had focused subsequently on the "removal of these barriers" [that block the further development of science — author's note] so that the proper path toward true scientific knowledge had been cleared of such unnecessary obstructions to scientific progress. Thus the emphasis on explaining reasons for dissent rather than reasons for consent was concomitant with the philosophical commitment that held that science was a linear, progressive activity leading inexorably to truth. [14]

Smocovitis' statement clashed with earlier interpretations of the "eclipse" proposed by biologists and historians such as Julian Huxley and Ernst Mayr. When Huxley proposed the term, he also suggested that this was a time of stagnation in the development of evolutionary biology. [15] A similar view was later promoted by Ernst Mayr. According to Mayr, although Darwin had succeeded in disseminating the idea of evolution, he had not been able to persuade the scientific community to accept the most important element of his theory — the concept of natural selection. [16] As Mayr explained, Darwinism was rejected because contemporary biologists were influenced by a number of non-scientific factors (mainly of a philosoph-

---

[13] Frederick B. Churchill, "In Search of the New Biology: An Epilogue", *Journal of the History of Biology* 1981, Vol. 14, No. 1, p. 191 [177–191], https://doi.org/10.1007/BF00127520.

[14] Vassiliki B. Smocovitis, **Unifying Biology: The Evolutionary Synthesis and Evolutionary Biology**, Princeton University Press, New Jersey 1996, p. 59.

[15] See Julian Huxley, **Evolution: The Modern Synthesis**, George Allen and Unwin, London 1945, pp. 17–28.

ical and religious kind). [17] The "eclipse" is thus viewed by Mayr as an abnormal period in the history of biology, in which irrational/unscientific influences disturbed the progress of science. [18] The interpretations of Mayr and Huxley created a pejorative image both of this period and of the naturalists active during this time. As later commentators went on to note, [19] by discrediting the biologists who were working during the "eclipse" the architects of the modern synthesis sought to establish their own theory as the one and only proper continuation Darwin's work. In this way, they created a certain dominant interpretation according to which the history of evolutionary biology *de facto* began with Darwin and was continued by the architects of the synthesis. Historians who supported this view are now referred to as the "Darwin industry". [20] Ultimately, the historiography of the "Darwin industry" has removed the period of "eclipse" from the continuum of events and created a simplified historical narrative in which the modern synthesis emerges directly from the Darwinian revolution. But how is this fact to be interpreted in the light of the concept of liminality?

On the surface, the use of the category of liminality itself adds little to the discussion about the "eclipse" beyond a mere change of labelling. The latter, it must be added, is rather obvious, since the term "eclipse" itself suggests an interpretation of this period as being something transitional. To make full use of the concept of liminality, one would need to examine more closely the role that liminal entities might play in a given structure. The problem with liminal entities lies primarily in their transgressive character, which arises from the fact that they are suspended between an old and a new state, and do not possess the properties of either of these. As Victor Turner noted, depending on the culture, liminality can either be

[16] See Ernst Mayr, **The Growth of Biological Thought: Diversity, Evolution, and Inheritance**, The Belknap Press of Harvard University Press, Cambridge — London 1982, pp. 517–519.

[17] See Ernst Mayr, **One Long Argument: Charles Darwin and the Genesis of Modern Evolutionary Thought**, Harvard University Press, Cambridge 1991, pp. 38–39.

[18] See Mayr, **The Growth of Biological Thought...**, pp. 516–517.

[19] See, e.g., Joe Cain, "Rethinking the Synthesis Period in Evolutionary Studies", *Journal of the History of Biology* 2009, Vol. 42, No. 4, p. 639 [621–648], https://doi.org/10.1007/s10739-009-9206-z.

[20] See, e.g., Peter J. Bowler, **The Non-Darwinian Revolution: Reinterpreting a Historical Myth**, The Johns Hopkins University Press, Baltimore — London 1988, pp. 196–198; Richard G. Delisle, "From Charles Darwin to the Evolutionary Synthesis: Weak and Diffused Connections Only", in: Richard G. Delisle (ed.), **The Darwinian Tradition in Context**, Springer, Cham 2017, p. 134 [133–167].

considered a state to which society must pay special attention, and which is to be treated as sacred, or the transgressive character of liminality can be seen as a threat to the social order, and because of that as something to be destroyed. [21] Turner, citing the work of Mary Douglas, explains that for those who want to maintain the social structure at all costs, liminal states must be excluded (i.e. hedged around with certain prescriptions, prohibitions and conditions) as elements that go beyond the established system of classification and so amount to some kind of destructive anarchism. [22] Douglas notes that exclusion of transgressive entities is a common practice, as their inclusion forces one to abandon an existing mode of classification and to create a new one, something which is a rare occurrence, due to the conservative nature of culture. [23] Thus, if historical periods can also be liminal, it is to be expected that they will meet with one of the two reactions Turner mentions: distinction or exclusion. Assuming that the structure here is a historiographical narrative, and that the individuals responding to such a liminal period are historians themselves, one can hypothesize that liminality is being eliminated by them in order to preserve a particular image of the history of science that they themselves subscribe to. Certainly, such an interpretation would be consistent with the relationship that the "Darwin industry" stands in to the "eclipse", where the liminality of the latter threatens the narrative promoting the privileged position of Darwinism and its contemporary supporters.

The exclusion of the "eclipse" takes place at the interpretative level, where historians are obliged to point out why it is an anomalous element that ought to be ignored in historical research. The historical works of Mayr, who is probably the most important representative of the "Darwin industry", can serve here as an example of this sort of practice. Mayr openly advocates an internalist interpretation of the development of science, but makes an exception when he writes about the "eclipse", which in his works is seen as the result of philosophical and ideological influences: i.e. it is interpreted externalistically. [24] The "eclipse" and the theo-

---

[21] See Victor Turner, **The Ritual Process: Structure and Anti-Structure**, Cornell University Press, New York 1991, pp. 48–50.

[22] See Turner, **The Ritual Process...**, pp. 108–109.

[23] See Mary Douglas, **Purity and Danger: An Analysis of Concepts of Pollution and Taboo**, Routledge, London — New York 1984, pp. 36–41.

[24] See Mayr, **The Growth of Biological Thought...**, pp. 3–6; Mayr, **One Long Argument...**, pp. 38–39.

ries developed during it are thus literally treated by him as something that exists outside of science, not fitting into its structure. Non-Darwinian theories of evolution become transgressive entities that on the one hand claim to be scientific, but on the other cannot be so, because their genesis is not a scientific one. By marginalizing non-Darwinian theories, Mayr attempts to maintain the narrative in which Darwinism and the modern synthesis are the only valid paths of scientific development on the one hand, and to justify his own beliefs about the rationality of science on the other. According to Mayr, science is producing better concepts that explain nature in ever more accurate ways, with faulty theories being eliminated by natural selection in the noosphere. [25] The very existence of non-Darwinian theories can be seen as undermining this cumulative vision of science, as after Darwin's discovery his research was not continued: instead, a number of concepts were developed that directly challenge the veracity of his theory. Non-Darwinian theories, therefore, not only undermine Mayr's vision of the evolution of science, but also challenge the revolutionary nature of Darwinism. Mayr thus recognizes the liminal character of the "eclipse", and behaves like Douglas's conservative who, faced with liminality, decides to disregard it as something threatening to the structure of science.

David Hull's historiography can serve as an another interesting example of the practice of marginalizing the "eclipse". As was mentioned earlier, Hull's ontological approach to historiography proposes interpreting theories as historical entities: that is, entities that change over time and, like species, form phylogenetic trees. Thus, if Hull wants to marginalize the "eclipse" because he sees it as a "liminal" period that disrupts his view of the history of biology (i.e. one in which the development of evolutionary biology began with Darwin and was directly continued by the modern synthesis), he must reflect this in his ontology. Therefore, in Hull's interpretation, non-Darwinian theories developed during the "eclipse" are treated as belonging to a phyletic lineage separate from the mainstream of biology that originated in Platonic idealism. [26] On this reading, the "eclipse" is eliminated from the historical narrative because the development of evolutionism is treated

[25] See Mayr, **One Long Argument...**, pp. 132–133; Ernst Mayr, **What Makes Biology Unique? Considerations on the Autonomy of a Scientific Discipline**, Cambridge University Press, Cambridge 2004, pp. 162–163; Ernst Mayr, "The Advance of Science and Scientific Revolutions", *Journal of the History of the Behavioral Sciences* 1994, Vol. 30, No. 4, pp. 331–332 [328–334], https://doi.org/10.1002/1520-6696(199410)30:4<328::AID-JHBS2300300402>3.0.CO;2-0.

[26] See Hull, **Science as a Process...**, pp. 41–46.

as synonymous with the "phylogeny" of Darwinism. Because of this, non-Darwinian theories are seen as "foreign bodies" that *de facto* do not belong to the history of biology.

The Problem of the Liminality of the "Eclipse" in Peter Bowler's Historiography

With the change in approach to the history of evolutionary biology that the statements of Churchill and Smoctovits signified, historiographical interpretations began to emerge that did not ignore the "eclipse of Darwinism" as the "Darwin industry" had done. In opposition to this approach, the "non-Darwinian industry" — as Peter Bowler put it [27] — began to form. It started to focus on the "eclipse", and on the naturalists working then. The need for such a historiographical initiative was partially generated by the development of Evo-Devo, and the resulting realization that many important discoveries in the field had been made during the previously overlooked "eclipse of Darwinism". These new interpretations were to show how the success of Darwin's theory was followed by a crisis and resurgence of non-Darwinian theories, and how the "eclipse" led to the emergence of the modern synthesis. The "non-Darwinian industry", with its emphasis on the study of the "eclipse", seems to present a very different part of the spectrum of responses to liminal entities, in that it sides with the devotional impulse where liminality is concerned. In practice, however, as will be shown below, its interpretative efforts reproduced many of the missteps committed by the historiography of the "Darwin industry" itself.

The two names most often mentioned in connection with non-Darwinocentric interpretations of the "eclipse" are the aforementioned Peter Bowler and Mark Largent. Bowler's books, such as **The Eclipse of Darwinism or The Non-Darwinian Revolution**, had a major impact on the modern historiography of nineteenth-century natural sciences, and many contemporary historians support his interpretative framework. [28] With his reinterpretation of the "eclipse of Darwin-

---

[27] See Peter J. Bowler, "Do We Need a Non-Darwinian Industry?", *Notes and Records of the Royal Society of London* 2009, Vol. 63, No. 4, pp. 393–395 [393–398], https://doi.org/10.1098/rsnr.2009.0008.

[28] See Peter J. Bowler, "Revisiting the Eclipse of Darwinism", *Journal of the History of Biology* 2005, Vol. 38, No. 1, pp. 23–24 [19–32], https://doi.org/10.1007/s10739-004-6507-0.

ism", Bowler created a historiography that provided a unique counterpoint to Mayr's. To distance himself from the legacy of previous historians, he focused on overturning the prevailing interpretation of the "eclipse of Darwinism" and demonstrating the true meaning of Darwin's theory in the context of Victorian biology. [29] He concluded that the nineteenth-century image of Darwin differed from modern interpretations of his persona. The Victorian Darwin had been a symbol of an evolutionist movement that, in itself, had little to do with his own ideas. [30] According to Bowler, the majority of scientists accepted evolution, but not in the form proposed by Darwin. [31] Darwin's theory proved too radical for its time, so most scientists returned to earlier, more easily understood evolutionary theories, such as Lamarckism. These were more consistent with their own research, which focused on reconstructing the history of life — the kind of studies Darwin was not particularly interested in. As Bowler concluded, they were working in a different paradigm than Darwin's, locating themselves within that of "developmental evolutionism". [32] According to this interpretation, Darwin was the "catalyst" who renewed interest in the idea of evolution. This elevated him to the position of a revolutionary, as even his contemporaries grasped how important he was for the popularization of evolutionism. [33] Nevertheless, the true significance of his theory was only recognized during the modern synthesis. In fact, according to Bowler, research done during the "eclipse" was essential to the emergence of the latter. As he states in his book **Life's Splendid Drama**, during the "eclipse" evolutionists conducted active research, especially in phylogenetics, leading to the development and transformation of this discipline. [34] Their research, although initially ignoring Darwin's work, gradually led to an acceptance of his theory. The arrival of the evolutionary synthesis and the recognition of the correctness of Darwin's theory were therefore natural consequences of the progress of science:

[29] See Bowler, **The Non-Darwinian Revolution...**, p. 19.

[30] See Peter J. Bowler, **Charles Darwin: The Man and His Influence**, Basil Blackwell, Oxford 1990, pp. 14–16.

[31] See Bowler, **The Non-Darwinian Revolution...**, p. 47.

[32] See Peter J. Bowler, **Life's Splendid Drama: Evolutionary Biology and the Reconstruction of Life's Ancestry 1860–1940**, The University of Chicago Press, Chicago — London 1996, pp. 7–11.

[33] See Bowler, **The Non-Darwinian Revolution...**, pp. 4–5, 22.

[34] See Bowler, **Life's Splendid Drama...**, pp. 2–4.

> Modern Darwinism extends certain key ideas that were developed, either explicitly or implicitly, by Darwin himself, and which were ignored by many biologists of the immediately post-Darwinian era. Changing styles of phylogenetic research helped to articulate these more generally Darwinian insights quite independently of the rise of the new selection theory. Even those evolutionists who still accepted a role for non-selectionist mechanisms could thus participate in the formulation of a Darwinian world view. [35]

Thus, the biologists of the "eclipse" period were able, quite independently of Darwin, to arrive at conclusions similar to his. Here, however, the following question must be asked: if "developmental evolutionism" paved the way for a synthetic theory of evolution, could a synthesis have arisen entirely without Darwin's involvement? Bowler sought to answer this question in his counterfactual study **Darwin Deleted**. One of its theses was that if Darwin had not published his theory, the turn of the twentieth-century would have still looked the same as in a world with Darwinism, with one difference: biology would have been dominated by neo-Lamarckism and other non-Darwinian theories. [36] Bowler believed that even under such a scenario biologists would have worked out the theory of natural selection, and that the idea for this would have emerged from an "alliance" of geneticists and field naturalists: "Evolutionism would be seen as the product of the regular processes of scientific discovery, of normal rather than revolutionary science (to use T. S. Kuhn's terms) or at least of a continuous series of mini-revolutions rather than one big one". [37] However, this interpretation is problematic, especially if one analyzes it from the perspective of Kuhnian philosophy, as Bowler suggests doing in the above quote.

In his books Bowler is pretty open about his philosophical inspirations. In **The Eclipse of Darwinism**, [38] as well as in later works, [39] a crucial place in his historiography is occupied by the philosophy of Thomas Kuhn — especially the latter's

---

[35] Bowler, **Life's Splendid Drama…**, p. 442. See also Bowler, **Life's Splendid Drama…**, pp. 433–446.

[36] Peter J. Bowler, **Darwin Deleted: Imagining a World Without Darwin**, The University of Chicago Press, Chicago — London 2013, pp. 98–104.

[37] Bowler, **Darwin Deleted…**, p. 286. See also Bowler, **Darwin Deleted…**, pp. 284–286.

[38] See Peter J. Bowler, **The Eclipse of Darwinism: Anti-Darwinian Evolution Theories in the Decades Around 1900**, The John Hopkins University Press, Baltimore — London 1992, pp. 11–12.

[39] See Bowler, **The Non-Darwinian Revolution…**, pp. 1–2; Bowler, **Life's Splendid Drama**…, p. 15.

concept of scientific revolution. Although Bowler notes that Kuhn's theory of scientific change is too simplistic to be fully adapted to the history of evolutionism, [40] as the Darwinian revolution did not manifest itself as a singular shift in science, but rather as a slow process of integration of different approaches that ended in their unification during the modern synthesis, he still juxtaposes his own analysis of the Darwinian revolution with Kuhn's analysis of the Copernican one. While aiming to uncover differences between these [41] he also tries to find similarities: for example, by comparing the roles that Darwin and Robert Chambers played in the development of evolutionism with those of Copernicus, Kepler and Galileo in the development of heliocentrism. [42] This ultimately serves as a central argument for his main thesis to the effect that nineteenth-century Darwinism did not in fact have the status of a paradigmatic theory. [43] On this interpretation, Darwin was a visionary who forged ahead of his time but did not fit the prevailing paradigm of evolutionism. Even so, this interpretation represented a shift from one extreme — the marginalizing of the influence of non-Darwinians by the "Darwin industry" — to another: the marginalization of Darwin himself. Mayr, in particular, drew attention to this, stating that Bowler, wishing to faithfully present the influence of nineteenth-century biologists on the advancement of science, omitted the most important of them — Darwin. [44] Here one can refer to Kuhn, to show how his philosophy generates this problem. The Kuhnian model does not allow one to treat researchers operating outside of the dominant paradigm as fully-fledged scientists, because they are not participating in "normal science". [45] In this context, if Darwin's theory was not part of "developmental evolutionism" then he could not in fact have been contributing to science.

Recall that the liminality of the "eclipse" would be evidenced by the fact that there was a continuum in which (a) Darwin played an important role in the cre-

[40] See Bowler, **Life's Splendid Drama...**, pp. 17–18.

[41] See Peter J. Bowler, **Evolution: The History of an Idea**, University of California Press, Berkeley — Los Angeles — London 1989, p. 2.

[42] See Bowler, **The Eclipse of Darwinism...**, p. 12.

[43] See Bowler, **The Eclipse of Darwinism...**, p. 12, 28.

[44] See Ernst Mayr, "The Myth of the Non-Darwinian Revolution", *Biology and Philosophy* 1990, Vol. 5, No. 1, pp. 90–91 [85–92], https://doi.org/10.1007/BF02423835.

[45] See Thomas S. Kuhn, **The Structure of Scientific Revolutions**, The University of Chicago Press, Chicago 1996, pp. 18–19.

ation of evolutionary biology, (b) post-Darwinian evolutionists rejected his theories and created new non-Darwinian theories of evolution, and (c) the modern synthesis was a return to Darwin's ideas. Bowler eliminates this liminality by rejecting postulate (a) and adopting in its place the idea that before the synthesis there was a "developmental evolutionism" which led straight to point (c). By removing the transitionality of the "eclipse", Bowler fails to answer the question of why, after the publication of **On the Origin of Species**, a number of theories arose that stood in open opposition to Darwinism. The "eclipse" no longer has a liminal character, as Darwin is excluded from the realm of science. By marginalizing Darwin, Bowler presents the history of evolutionism as a process that consisted of a series of discoveries culminating in the triumph of the correct theory — i.e. the "modern synthesis". Therefore, when Bowler describes the history of "developmental evolutionism", he ultimately focuses on how its explanatory potential continued to weaken and how new discoveries have led to a resurgence of Darwinism. As a consequence, he focuses on the failed research programs undertaken by the proponents of neo-Lamarckism (*Entwicklungsmechanik*), [46] the connections between the orthogeneticists and idealist philosophy and essentialism, [47] and the prevalence of typological thinking. [48] All of these are identified as causes of the decline of non-Darwinian theorizing, and as obstacles to the acceptance of Darwinism. In the end, his interpretation boils down to a vision of scientific development as the process of "removing barriers" that Smocovitis wrote about. In part, Kuhn's philosophy itself promotes such a narrative. As noted by Hasok Chang, his philosophy assumes that each paradigm is subject to a "life cycle", where this means that from the moment of its first being accepted by the scientific community it is destined to undergo a depletion of its explanatory potential as it encounters new anomalies, and to always ultimately be displaced by another paradigm. [49] In this sense, a historian who studies past paradigms and attempts to fit them into the whole history of a given discipline will be compelled to focus on the crises that enabled new paradigms come to existence.

---

[46] See Bowler, **The Eclipse of Darwinism...**, pp. 76–77.

[47] See Bowler, **The Eclipse of Darwinism...**, p. 220.

[48] See Bowler, **The Non-Darwinian Revolution...**, p. 59.

[49] See Hasok Chang, **Is Water H_2O? Evidence, Realism and Pluralism**, Springer, Cambridge 2012, p. 258.

Of course, one may wonder at this point whether the liminal nature of the "eclipse" can be presented at all in the context of Kuhn's philosophy. The latter's model of scientific revolutions imposes exceptional limits on the interpretative possibilities of a historian wishing to demonstrate the transitionality of a given period. This is mainly due to the fact that Kuhn based his model on the assumption that the evolution of science takes place in a saltationist manner. Such a model does not allow for the existence of a transitional state in science, because paradigms are closed wholes that transition from one to another by evolutionary leaps. Using David Hull's terminology, it can be said that Kuhn's model assumed the existence of the essence of a paradigm. Essentialism, in turn, as Mayr wrote, [50] is incompatible with gradualism — let alone with the idea of transitionality — because it presupposes the existence of a static core that defines being. In Kuhn's philosophy, the closest thing to transitional moments are periods of crisis in science, which are located precisely between the old paradigm and the new one. One could argue that Kuhn's idea of a crisis is precisely a description of a liminal state, where scientists are at their most creative and innovative in searching for a new paradigmatic theory. This description can also be regarded as corresponding to what happened during the "eclipse". Bowler initially used the concept of crisis to interpret the "eclipse", before going on to explore fully the idea of "developmental evolutionism". In **The Eclipse of Darwinism** he wrote that the "eclipse" "seems to resemble the crisis state before the consolidation of a new paradigm". [51] But still, even with this similarity to liminality, scientific crises cannot be considered a part of the history of any discipline, as they do not count as a part of science. In Kuhn's philosophy, the state of crisis occurs when a paradigm in an established discipline collapses, which in turn triggers calls for a successor, or for an explanation of the anomalies causing the crisis. [52] During the crisis scientists, deprived of their paradigm, continue their research, which delves more into the realm of philosophy than of real science. [53] The problem here is that for Kuhn, the mere existence of a paradigm constitutes the main criterion of demarcation. So, as long as there is no established paradigm that dictates the rules and determines the conditions for solving scientific problems, any knowledge-creating activity pursued cannot be

[50] See Mayr, **The Growth of Biological Thought...**, p. 407.

[51] Bowler, **The Eclipse of Darwinism...**, p. 11.

[52] See Kuhn, **The Structure of Scientific Revolutions...**, pp. 82–84.

[53] See Kuhn, **The Structure of Scientific Revolutions...**, pp. 47–48.

considered fully scientific.[54] Thus, if one treats the "eclipse" as a period of crisis, then according to Kuhn's philosophy the theories proposed during that period should not be recognized as fully scientific, as they neither triggered a period of normal science nor were subsequently established as a paradigm. This provides grounds for recognizing such theories as irrational and irrelevant to the advancement of science, thus validating the conclusions of historians like Mayr and Hull. Referring to the "eclipse" as a period of crisis is tantamount to casting it beyond the realm of science, and liminality is therefore again excluded from the narrative.

Ultimately, Bowler, along with the historians of the "Darwin industry", eliminates liminality from his narrative. Depending on which interpretation one appeals to, he either portrays the "eclipse" as a moment of crisis which, according to the philosophical model on which he builds his interpretation, is not scientific, or undermines Darwin's influence on the development of nineteenth-century biology by making the "eclipse" not a moment of transition, but a period that needed to be overcome. Treating the "eclipse" as a period of crisis or of degeneration of the paradigm of "developmental evolutionism" justifies its omission from historical research because, in the last analysis, as a period during which erroneous theories were developed it is irrelevant to the history of evolutionism. What is interesting here is that Bowler himself recognized those problematic consequences of his historiography. As he wrote,[55] historians referring to his works often drew erroneous conclusions, stating that the theories from the "eclipse" period were completely unscientific, or that Darwin was not an important figure in the history of evolution and his work was derivative of the theories of Chambers or Ernst Haeckel. Bowler dissociated himself from both of these conclusions, emphasizing that they were not only incorrect, but also misinterpreted his intent.[56] Yet I would

---

[54] See Thomas S. KUHN, "Logic of Discovery or Psychology of Research", in: Thomas S. KUHN, **The Essential Tension: Selected Studies in Scientific Tradition and Change**, The University of Chicago Press, Chicago 1977, pp. 272-277 [266-292].

[55] See BOWLER, "Revisiting the Eclipse of Darwinism…", pp. 24–28.

[56] Similarly, Bowler's work on the "eclipse" has also been used to criticize Darwinism and the modern synthesis as instances of unchallenged and unexamined dogma — something which also runs counter to his intentions (see BOWLER, **The Eclipse of Darwinism…**, pp. 224–226). One such use of Bowler's works can be seen in Robert F. Shedinger's **The Mystery of Evolutionary Mechanisms**, in which he argues that the "resurgence" of Darwinism in the twentieth century occurred not for scientific but for philosophical reasons, and was pursued by scientists who wanted to separate biology from metaphysics and theology. See Robert F. SHEDINGER, **The Mystery of Evolutionary Mechanisms: Darwinian Biology's Grand Narrative of Triumph and the Subversion of Religion**, Cas-

argue that such "erroneous" conclusions were entirely justified, given the way in which he went about creating his historical narratives. Like the "Darwinian industry" before him, his historiography focuses on the exclusion of specific historical figures in order to construct a coherent narrative. Until historians manage to show how the transition from the Darwinian revolution to the creation of the synthesis via the "eclipse" happened without attempting to exclude any of these stages, no subsequent interpretation can be expected to capture the specificity of the "eclipse" as a moment of creation of a new scientific *status quo*.

The Interphase of Darwinism as a Pseudo-Liminal Period

It might seem that the solution proposed by Largent best captures the true meaning of the "eclipse", especially as he himself tries to address the problems facing other interpretations. According to him, the notion of the "eclipse of Darwinism" introduced into the history of biology a problematic discontinuity, which imposed on researchers an interpretative dichotomy with regard to this period: the "eclipse" was to be treated either as a period of marginalization of Darwinism in favor of other theories, or as one of complete rejection of Darwin's theory. However, both of these interpretations had a common conclusion: the continuity of the advancement of biology was restored with the emergence of the modern synthesis. This approach allowed for many of the scientists conducting research at the turn of the nineteenth- century to be dismissed as not contributing to the progress of science. [57] The "eclipse" metaphor should therefore be abandoned. Largent instead proposes that we talk about the "interphase of Darwinism". In biology, the interphase is the longest phase in the life of a cell, in which it prepares for mitosis or meiosis. For Largent, the period of the "eclipse" was of a similar nature: just as the interphase corresponds to a cell's preparation for mitosis, the interphase of Darwinism was supposed to be a period of preparation for the creation of the modern synthesis. [58]

On the surface, Largent's approach perfectly captures the liminal character of

cade Books, Eugene 2019, pp. 66–94.

[57] Mark A. Largent, "The So-Called Eclipse of Darwinism", in: Joe Cain and Michael Ruse (eds.), **Descended from Darwin: Insights into the History of Evolutionary Studies, 1900-1970**, American Philosophical Society, Philadelphia 2009, pp. 3–4 [3–21].

[58] See Largent, "The So-Called Eclipse of Darwinism…", pp. 17–18.

the "eclipse", as he treats the whole period as a preparatory step for the conceiving of the modern synthesis. Hence, the "interphase" is an interpretation focused on the synthesis and its arrival: one that places investigations into all of the changes and discoveries that occurred during the "eclipse" in a transitional perspective. Nevertheless, what is interesting here is that even in this interpretative scheme, where liminality is highlighted, Largent has still interpreted the history of the "eclipse" as a history of Darwinism only. Admittedly, he considered Darwinism a theory that had evolved and changed over time, but he still accepted that it was the prevailing scientific perspective. So, when Largent wrote about naturalists of the "eclipse" period, he meant not the scientists who opposed the theory of natural selection but the ones who interpreted it differently from how it is understood today. In the article "The So-called Eclipse of Darwinism", where he proposed his interpretation, he did not refer to the proponents of neo-Lamarckism or other non-Darwinian evolutionists; he focused on Vernon L. Kellogg, a Darwinist who actively fought against them. [59] Largent presented the "eclipse" as a period permanently dominated by Darwinism — with non-Darwinian theories marginalized, as he argued in his other work, [60] and their influence mostly confined to popular-scientific literature. [61]

This distinction between mainstream science and its more marginal popular-scientific counterpart splits scientific thought illegitimately into two disparate systems. It could even be said that by calling non-Darwinian theories "popular-scientific", Largent was trying to retain at any cost a single progressive line of development in respect of evolutionary biology, and in this way eliminate the liminal character of the "eclipse". He simply rejected the gap created by this period, doing so by dismissing the whole idea of an "eclipse", together with all of its competing theories. In deprecating non-Darwinian theories as merely "popular-scientific", he expelled them from the domain of science, such that they could be ignored in the context of considerations pertaining to the history of the development of biology. The question of why they emerged at all then remains open. As was mentioned

---

[59] See Largent, "The So-Called Eclipse of Darwinism...", pp. 7–8.

[60] See Mark A. Largent, "Darwinism in the United States, 1859–1930", in: Michael Ruse (ed.), **The Cambridge Encyclopedia of Darwin and Evolutionary Thought**, Cambridge University Press, Cambridge 2009, pp. 230–231 [226–234].

[61] See Christian C. Young and Mark A. Largent, **Evolution and Creation: A Documentary and Reference Guide**, Greenwood Press, Westport — London 2007, p. 110.

above, Mayr, Hull and Bowler used similar tactics when erecting a barrier between Darwinism and non-Darwinism in the form of ideological influences (Mayr, Hull) and paradigmatic differences (Bowler). In Largent's case, the distinction between mainstream science and "pop-science" suggests that discussions between Darwinists and non-Darwinists were not scientific as the views of the latter were not respected or even taken seriously by the former. The problem facing all of the aforementioned interpretations of the "eclipse of Darwinism" is that they cannot accept the possibility that science could have been shaped by more than one influence. Those interpretations presuppose that there is always some kind of barrier that does not allow scientists with opposing views to shape each other's worldviews. The liminal character of the "eclipse" thus proves too problematic to be fully included in the historiographical narrative.

Conclusions

The main problem that can be identified in existing interpretations of the "eclipse of Darwinism" is the impossibility of inscribing a time continuum in the development of science in which Darwin changes the trajectory of the development of biology, his theory is rejected in favor of non-Darwinian theories, and then a modern synthesis is established. The midway moment of this brief crisis of Darwinism, which I have termed liminal, poses the most problems, as it contradicts historians' presuppositions about how science should develop. However, despite this cognitive dissonance, it seems that this period can also teach us much about the current *status quo* in science. As representatives of the "non-Darwinian industry" have noted, it is in this period that we should look for the answers to questions about how the synthesis came about. However, in order to do so, it would be necessary to show that during the "eclipse" there was a rational, scientific discussion between Darwinists and non-Darwinists about the evolution of species. This is one thing that all of the aforementioned interpretations failed to show. The historiography of both the "Darwinian" and the "non-Darwinian industry" focused on disabling the liminal nature of the "eclipse". Thus, they attempted to construct a narrative in which there was always one main line of scientific development, in which there was no room for a period of indeterminacy — i.e. one in which science was not dominated by a single research perspective. The common denominator that unites all these interpretations and prevents them from achieving this is their assumption of a specific epistemological perspective: cognitive monism. Hasok Chang has described it as follows: "Monism about scientific knowledge springs from the notion that science is the search for the truth about nature; since there is only one world, there is only one truth about it, and only one science that should seek it". [62] In Mayr's, Hull's and Largent's historiographies, this monism manifested itself in their discrediting of non-Darwinian theories and presentation of the history of evolutionary biology as the history of Darwinism. In the case of Kuhn's philosophy, and Bowler's historiography, monism took on a different form. As Chang has noted, in Kuhn's case monism manifested itself in his conviction that only one paradigm could be valid in each discipline during each period of normal science. [63] When Bowler argued that there was one dominant paradigm which contributed to the dismissal of Darwinism, he was adopting the same monism as Kuhn. As Bowler saw it, Darwinism was incompatible with "developmental evolutionism". Thus, the domination of the latter excluded all other alternatives. What all those interpretations have in common is the fact that they reject the pluralism characteristic of the "eclipse" period in favor of a monistic view of science in which there is no place for conflicting perspectives. [64]

Monism precludes the existence of liminality, because it does not allow one to explain the transition from one state to another. As in monistic ontology, no other state of things exists, and this means that in cognitive monism, likewise, only one view is valid and the rest should be disregarded. Hence, in the end, monist historians interpreting the "eclipse" are unable to show what the scientific basis for the rejection of Darwinism by non-Darwinists was, or how the research of non-Darwinists contributed to the development of biology. Translating this situation into Van Gannep's terminology, it can be said that monists are unable to capture the moment of separation and incorporation. At most, they may succeed in grasping one while omitting the other — as was the case with Bowler. In order to do proper justice to the specificity of the development of evolutionism during the "eclipse", one would have to create an interpretation sufficiently inclusive to allow for equal treatment of the different research perspectives that emerged during this period. However, it will not be possible to arrive at such an interpretation, as

[62] Chang, **Is Water H_2O…**, p. 259.

[63] See Chang, **Is Water H_2O…**, p. 224.

[64] For more detailed discussion, see Wagner, **Interpretacje rozwoju biologii ewolucyjnej…**, pp. 224–228.

long as the historiography of biology continues to be constructed on the basis of cognitive monism.

Michał Jakub Wagner

References

Bentley Michael, "Past and «Presence»: Revisiting Historical Ontology", *History and Theory* 2006, Vol. 45, No. 3, s. 349–361, https://doi.org/10.1111/j.1468-2303.2006.00370.x.

Bowler Peter J., "Do We Need a Non-Darwinian Industry?", *Notes and Records of the Royal Society of London* 2009, Vol. 63, No. 4, pp. 393–398, https://doi.org/10.1098/rsnr.2009.0008.

Bowler Peter J., **Charles Darwin: The Man and His Influence**, Basil Blackwell, Oxford 1990.

Bowler Peter J., **Darwin Deleted: Imagining a World Without Darwin**, The University of Chicago Press, Chicago — London 2013.

Bowler Peter J., **Evolution: The History of an Idea**, University of California Press, Berkeley — Los Angeles — London 1989.

Bowler Peter J., **Life's Splendid Drama: Evolutionary Biology and the Reconstruction of Life's Ancestry 1860–1940**, The University of Chicago Press, Chicago — London 1996.

Bowler Peter J., "Revisiting the Eclipse of Darwinism", *Journal of the History of Biology* 2005, Vol. 38, No. 1, pp. 19–32, https://doi.org/10.1007/s10739-004-6507-0.

Bowler Peter J., **The Eclipse of Darwinism: Anti-Darwinian Evolution Theories in the Decades Around 1900**, The John Hopkins University Press, Baltimore — London 1992.

Bowler Peter J., **The Non-Darwinian Revolution: Reinterpreting a Historical Myth**, The Johns Hopkins University Press, Baltimore — London 1988.

Cain Joe, "Rethinking the Synthesis Period in Evolutionary Studies", *Journal of the History of Biology* 2009, Vol. 42, No. 4, pp. 621–648, https://doi.org/10.1007/s10739-009-9206-z.

Cain Joe and Ruse Michael (eds.), **Descended from Darwin: Insights into the History of Evolutionary Studies, 1900-1970**, American Philosophical Society, Philadelphia 2009.

Chang Hasok, **Is Water H_2O? Evidence, Realism and Pluralism**, Springer, Cambridge 2012.

Churchill Frederick B., "In Search of the New Biology: An Epilogue", *Journal of the History of Biology* 1981, Vol. 14, No. 1, pp. 177–191, https://doi.org/10.1007/BF00127520.

Delisle Richard G., "From Charles Darwin to the Evolutionary Synthesis: Weak and Diffused Connections Only", in: Delisle (ed.), **The Darwinian Tradition...**, pp. 133–167.

Delisle Richard G. (ed.), **The Darwinian Tradition in Context**, Springer, Cham 2017.

Douglas Mary, **Purity and Danger: An Analysis of Concepts of Pollution and Taboo**, Routledge, London — New York 1984.

Hull David L., **Science as a Process: An Evolutionary Account of the Social and Conceptual Development of Science**, The University Chicago Press, Chicago — London 1988.

Huxley Julian, **Evolution: The Modern Synthesis**, George Allen and Unwin, London 1945.

Jaspers Karl, **The Origin and Goal of History**, Yale University Press, New Haven — London 1957.

Kuhn Thomas S., "Logic of Discovery or Psychology of Research", in: Kuhn, **The Essential Tension...**, pp. 266-292.

Kuhn Thomas S., **The Essential Tension: Selected Studies in Scientific Tradition and Change**, The University of Chicago Press, Chicago 1977.

Kuhn Thomas S., **The Structure of Scientific Revolutions**, The University of Chicago Press, Chicago 1996.

Largent Mark A., "Darwinism in the United States, 1859–1930", in: Ruse (ed.), **The Cambridge Encyclopedia of Darwin...**, pp. 226–234.

Largent Mark A., "The So-Called Eclipse of Darwinism", in: Cain and Ruse (eds.), **Descended from Darwin...**, pp. 3–21.

Mayr Ernst, "The Advance of Science and Scientific Revolutions", *Journal of the History of the Behavioral Sciences* 1994, Vol. 30, No. 4, pp. 328–334, https://doi.org/10.1002/1520-6696(199410)30:4<328::AID-JHBS2300300402>3.0.CO;2-0.

Mayr Ernst, **One Long Argument: Charles Darwin and the Genesis of Modern Evolutionary Thought**, Harvard University Press, Cambridge 1991.

Mayr Ernst, **The Growth of Biological Thought: Diversity, Evolution, and Inheritance**, The Belknap Press of Harvard University Press, Cambridge — London 1982.

Mayr Ernst, **What Makes Biology Unique? Considerations on the Autonomy of a Scientific Discipline**, Cambridge University Press, Cambridge 2004.

Mayr Ernst, "The Myth of the Non-Darwinian Revolution", *Biology and Philosophy* 1990, Vol. 5, No. 1, pp. 85–92, https://doi.org/10.1007/BF02423835.

Rana Shalini and Pandya Digvijay, "Liminality: A Close Study of Historical Roots and Theoretical Structure", *Language in India* 2021, Vol. 21, No. 10, pp. 21–43, https://tiny.pl/wfm2q [28.11.2022].

Ruse Michael (ed.), **The Cambridge Encyclopedia of Darwin and Evolutionary Thought**, Cambridge University Press, Cambridge 2009.

SARTRE Jean-Paul, **Being and Nothingness: An Essay on Phenomenological Ontology**, Routledge, London 1969.

SHEDINGER Robert F., **The Mystery of Evolutionary Mechanisms: Darwinian Biology's Grand Narrative of Triumph and the Subversion of Religion**, Cascade Books, Eugene 2019.

SMOCOVITIS Vassiliki B., **Unifying Biology: The Evolutionary Synthesis and Evolutionary Biology**, Princeton University Press, New Jersey 1996.

THOMASSEN Bjørn, "The Uses and Meanings of Liminality", *International Political Anthropology* 2009, Vol. 2, No. 1, pp. 5–28.

TURNER Victor, "Liminal to Liminoid, in Play, Flow, and Ritual: En Essay in Comparative Symbology", *Rice Institute Pamphlet – Rice University Studies* 1974, Vol. 60, No. 3, pp. 53–92, https://doi.org/10.5433/2176-6665.2012v17n2p214.

TURNER Victor, **The Ritual Process: Structure and Anti-Structure**, Cornell University Press, New York 1991.

WAGNER Michał Jakub, **Interpretacje rozwoju biologii ewolucyjnej na przełomie XIX i XX wieku**, Liber Libri, Warszawa 2020.

YOUNG Christian C. and LARGENT Mark A., **Evolution and Creation: A Documentary and Reference Guide**, Greenwood Press, Westport — London 2007.

U podstaw nowożytnej nauki

At the Roots of Modern Science

ISSN 2299-0356

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**
Philosophical Aspects of Origin s. 165–189

https://doi.org/10.53763/fag.2022.19.2.206

ARTYKUŁ ORYGINALNY / ORIGINAL ARTICLE

Michael Esfeld

University of Lausanne

The Metaphysics of Cartesian Science

Received: September 17, 2022. Accepted: November 1, 2022. Published online: November 17, 2022.

Abstract: The argument of this paper is that the rationale, potential and limits of modern science are evident in Descartes, and in respect of its basic Cartesian features are still valid today. Its rationale is objectivity, its potential is a great improvement in human living conditions, and its limit is that, due to its striving for objectivity, modern science cannot in principle encompass human thought and action. Cartesian dualism is therefore well grounded, and can be elaborated on without any commitment to two autonomous types of substances.

Keywords:

Descartes; methodological scepticism; modern science; *res cogitans*; *res extensa*

1. The Objectivity of Modern Science

In his **Discours de la méthode**, [1] Descartes famously stresses the utility of modern science: it enables us to "nous rendre comme maîtres et possesseurs de la nature", that is, to turn us into masters and owners of nature. [2] By "nature", Descartes means in the first place human nature: namely, the improvement of medicine, in order to fight lethal diseases, through scientific study of the human body. After that comes improving human living conditions through technological progress achieved on the basis of the scientific study of the physical environment. Indeed, this aim was well taken, given the situation in the seventeenth century:

[1] See René Descartes, **Discours de la méthode**, Jean Maire, Leyden 1637.

[2] René Descartes, **Œuvres de Descartes. Volume 6. Publié par Charles Adam et Paul Tannery**, Cerf, Paris 1902, section 6, p. 62.

the plague killed large parts of the population in Europe. By far the largest part of the workforce was employed in agriculture in order to secure the daily survival of the people. Against that background, it is obvious that modern science paved the way for an enormous success in respect of the improvement of human life.

How did modern science make this success possible? In this paper, I first sketch out how Cartesian science achieves objectivity (this section and the next one) and then briefly go into the development of modern science beyond Descartes. [3] The focus of the second half of the paper then consists in elaborating on the argument as to why Cartesian science meets a principled limit in human thought and action. [4] I conclude with a brief assessment of Cartesian dualism. [5] The rationale of this paper is thus not to give an exegesis of Descartes's texts. Its aim is to offer an assessment of the science for which Descartes laid the foundation, both in his scientific and in his metaphysical work.

The key to the success of modern science is its objectivity. This means abstracting from all judgements of value. Science studies things as they are independently of attributing any value, and thus also any intrinsic goodness, to them. Modern science is thereby based on a strict separation between facts and norms. This implies also refraining from describing things in terms of intrinsic essences or forms, for these conceptualize things by imposing a norm on them.

Indeed, adopting a very broad and general perspective, we can characterize the transition from ancient and medieval science and epistemology to modern science and epistemology in the following way: ancient and medieval science and epistemology do not in general implement a principled distinction between knowledge of facts and knowledge of norms or values. Knowledge is knowledge of the intrinsic essences of things — be they transcendent, as with Platonic ideas, or immanent, as with Aristotelian forms. These essences are not only matters of fact, but also set a standard as to how things *should* be. Thus, for instance, the form or idea of a horse traces out the ideal type of a horse. Flesh and blood horses participate in that idea, or implement that form, insofar as they come close to the ideal

[3] See Descartes, **Œuvres de Descartes...**, section 3.

[4] See Descartes, **Œuvres de Descartes...**, section 4.

[5] See Descartes, **Œuvres de Descartes...**, section 5.

type of a horse. But they can never match it. They are always to a certain extent deficient. [6]

This view of intrinsic essences of things that are matters of fact as well as normative then enables the conception of a hierarchy of forms that implements values and that culminates in a supreme being. In other words, the normative character of the forms makes it possible to establish a hierarchy that goes from ordinary things — such as horses — up to a supreme being. When philosophy turns Christian, the supreme being is God. God not only is the culmination point of the hierarchy of being, but also creates the world. He is not only absolutely good, but also absolutely powerful.

However, in late-medieval scholasticism, it becomes evident that there is a tension in the notion of God being absolutely powerful. His being absolutely powerful implies that He can do anything in virtue of His power (*de potentia absoluta Dei*): for instance, he could also send a saint to hell. If, by contrast, God exercises His power in an ordinary manner (*de potentia ordinata Dei*), what God does is determined by the hierarchy of forms and thus subordinated to it. A tension in the notion of absolute power is therefore evident: power as subordinated to reason is restricted. For if power is subordinated to reason, then anything that *de facto* is the result of the exercise of power can be recognized as reasonable independently of any use of power coming into play. In consequence, power manifests itself *qua* power only by bringing about things that fly in the face of reason. The possibility of God acting in virtue of His absolute power therefore calls into question whether human beings can rely on recognizing a hierarchy of forms as a guide for their thought and action. Against the background of late-medieval voluntarism and the way this stance works out the consequences of God having absolute power, one can thus regard modern science with its rejection of a hierarchy of forms that implement values and its separation between facts and norms as legitimate [7] — or dismiss it as illegitimate, if one considers the voluntarist conception of God's absolute power to be illegitimate. [8]

[6] See, e.g., Plato, **Parmenides**, trans. Mary Louise Gill and Paul Ryan, in: John M. Cooper (ed.), **Plato: Complete Works**, Hackett Publishing Co., Indianapolis 1997, 130e–133a, pp. 364–367 [359–397].

[7] See Hans Blumenberg, **The Legitimacy of The Modern Age**, trans. Robert M. Wallace, MIT Press, Cambridge — London 1983 (German original: **Die Legitimität der Neuzeit**, Suhrkamp, Frankfurt 1966).

To stress again, modern science as conceived by Descartes is not free from purpose and values: it aims at improving the human condition by enabling medical and technological progress. However, in order to serve that aim, science has to be objective. Being objective means in the first place abstracting from all judgements about purpose and value in the things that one is considering. Insofar as things in nature — including our own bodies — are open to scientific enquiry, they are conceived as not having a purpose or a value in themselves. Being free of value in themselves, they are at the disposal of human goals. Thus, when one intervenes in the movement of things in order to change their motion to fit human purposes, one does not violate any intrinsic values or purposes of these things.

Furthermore, being objective means abstracting from all the features that are intrinsic to the human perception of the world: that is, the sensory qualities such as colours, sounds, tastes, smells and the like. These do not belong to things in nature in themselves, but to our way of gaining knowledge of them by using our senses. If one abstracts from all these features, what remains of the natural world is extension and change in extension — that is, motion. We thus arrive at the Cartesian characterization of nature, including our own bodies, as *res extensa*, extended substance. [9]

This is what the world amounts to when we have abstracted from all subjective features — that is, by approaching the (point of) view from nowhere: no qualities, only matter in motion, meaning extension and change in extension. Obviously, however, the notion of a (point of) view from nowhere is inconsistent: such a point of view would be no point of view at all. It would not be anything from which one could express knowledge claims in a human language using a semantics and a pragmatics. The ideal of the scientific viewpoint being the (point of) view from nowhere is therefore only a regulative idea, to use a Kantian term: it is something that science aspires to achieve without being able to achieve it.

Science therefore needs a methodology of scepticism: any knowledge claim has to be subject to scrutiny in order to find out whether it really expresses knowledge of objective matters of fact or is still penetrated by subjective elements

[8] See André de Muralt, **L'enjeu de la philosophie médiévale: études thomistes, scotistes, occamiennes et grégoriennes**, Brill, Leiden 1991, chapter 2, pp. 47–89.

[9] See René Descartes, **Principia Philosophiae**, Part Two, Elsevier, Amsterdam 1644, paragraph 4.

rooted in the limited perspective of the person or persons formulating the knowledge claim in question. Scrutiny means not only searching for evidence that confirms the claim in question, but also — and more importantly — determining what speaks against it and would falsify it, and then trying to find out whether there in fact is evidence that invalidates the claim in question. In short, a knowledge claim is confirmed to the extent that it resists efforts to falsify it.

2. Nature as *res extensa*

Abstracting from all qualities means recognizing position as the only basic or primitive physical parameter. There is a good reason for doing so: in the first place, when examining a knowledge claim in science, all the empirical evidence that can be obtained to confirm or invalidate the claim in question consists in observations of the positions and changes of position of discrete objects. Accordingly, all measurement outcomes are recorded as relative positions within configurations of discrete objects — such as, for instance, pointer positions or digital numbers on a screen. In this vein, the physicist John Bell famously said: "[…] in physics the only observations we must consider are position observations, if only the positions of instrument pointers". [10] The qualification "in physics" (or "in science", generally speaking) is appropriate: common sense observations typically involve colours, sounds or scents of spatially arranged objects. In common sense, the positions of objects are discerned by means of these sensory qualities. Science abstracts from the sensory qualities. What then remains are the relative positions of discrete objects and their alteration. These are correlated with the sensory qualities, in the sense that science can account for changes in sensory qualities on the basis of changes in position.

According to physics, macroscopic objects are composed of microscopic objects that ultimately are elementary particles. Consequently, if a theory describes the spatial arrangement of the particles and its change in time correctly — that is, the arrangement and evolution of fermionic matter according to contemporary physics [11] — it has got everything right that can ever be checked in scientific ex-

[10] John S. Bell, **Speakable and Unspeakable in Quantum Mechanics**, *Collected Papers on Quantum Philosophy*, Cambridge University Press, Cambridge 1987, p. 166.

[11] See Bell, **Speakable and Unspeakable…**, p. 175.

periments. [12] Two theories that agree on the spatio-temporal arrangement of the elementary particles cannot be distinguished by any empirical means, whatever else they may otherwise say and disagree on. By the same token, two possible worlds with the same spatio-temporal arrangement of the elementary particles are indiscernible by any scientific means.

This is the strongest argument for treating position as the only basic or primitive physical parameter, and thus for the natural world, insofar as it is accessible to modern science, being *res extensa* only: admitting anything else over and above positions as basic or primitive would imply treating empirically indiscernible situations or worlds as being nonetheless different in some matters of fact. Obviously, this is a generalization of Leibniz' famous argument against Newton's ontological commitment to absolute space and time: [13] the argument applies, in fact, to anything that is admitted as ontologically primitive in the scientific description of the world beyond relative positions and their alteration.

The obvious objection to this stance consists in raising the following question: positions of what? To be sure, science abstracts from all sensory qualities. However, even if all that is pertinent for scientific explanations are the relative positions of discrete objects only, and their changes, one may wonder whether there has to be more to them than relative positions for them to be the *substance* of the natural world. In other words, it seems that a *res* cannot only consist in extension in the sense of distance relations that obtain among featureless objects that, in the last resort, are not extended themselves, being merely point particles. [14] Hence, even if an intrinsic essence of objects in nature is irrelevant for and inaccessible to science, it may nevertheless have to exist for these objects to be able to do what science wants them to do: namely, to account for macroscopic phenomena as accessed through sensory qualities. And if there is no intrinsic essence of individual objects, it seems that there would still at least have to be a general stuff-like essence of matter — something more than relative positions and their alteration, in

[12] See Tim Maudlin, **Philosophy of Physics: Quantum Theory**, Princeton University Press, Princeton 2019, pp. 49–50.

[13] See Leibniz' third letter to Clarke, in : Carl Immanuel Gerhardt (ed.), **Die philosophischen Schriften von G. W. Leibniz**, Bd. 7, Weidmannsche Verlagsbuchhandlung, Berlin 1890, pp. 363–364.

[14] See John Foster, **The Case for Idealism**, *International Library of Philosophy*, Routledge, London 1982, pp. 51–67.

virtue of which the things in nature are *material* objects. Otherwise, if all that remains of matter is the geometry of distances between sparsely distributed point particles and changes to these distances, it would seem that their material nature will fade away upon inquiry. However, this concern is unfounded. There is nothing incoherent in the notion of *res extensa*.

If there is a plurality of objects, there has to be something that individuates them — that is, something that answers the question why *this* is one object, *that* another, etc., so that there really is a plurality of objects instead of just one. Furthermore, there also has to be something that unites these objects so that they make up a world. In other words, there has to be a world-making relation: that is, a relation that binds all and only those objects together that make up a world. It is evident that the distance relation fulfils the latter task: all and only those objects that are spatially related constitute a world. If there were objects not at a distance from each other, they would inhabit different worlds. If they are related by distance, they are in one and the same world. [15]

Moreover, the distance relations — and only they — individuate the objects: what distinguishes each object in a configuration of objects is the position that it has relative to all other objects. Even if a configuration is partially symmetrical, there always is at least one object in the real world outside that symmetry relative to which all the other objects can be distinguished. Thus, for example, motion can always be referred to the fixed stars as a reference system relative to which the other objects are in motion and can be distinguished by their distances.

Scientific parameters that are attributed to physical objects over and above their relative positions — such as mass or charge — cannot distinguish the latter as such: they differentiate between various kinds of particles, such as those particle species admitted in today's standard model of elementary particles. They cannot distinguish between the individual particles within a species or kind, because all the particles of a given species — such as, for instance, all electrons — have the same values in respect of mass, charge, etc. The demand for something that individuates the physical objects is fulfilled by the distance relations, and by them only. Therefore, there is no need for anything more than distance relations to both individuate the objects and have a relation that binds them together so that they constitute a world. This insight is expressed in today's metaphysics by

[15] See David Lewis, **On the Plurality of Worlds**, Blackwell, Oxford 1986, pp. 69–81.

the stance known as *ontic structural realism*, which draws support from contemporary physics. [16]

Indeed, one can regard these considerations as confirming the Cartesian metaphysics of nature, and vindicating it also in the context of contemporary science: nature, insofar as it is accessible to scientific enquiry, is *res extensa.* That is to say, there is nothing more to matter than extension in the guise of distance relations — between what are, in the last resort, point particles — and their alteration. In particular, there is no stuff-like essence of matter per se. The impenetrability of matter, often invoked as a criterion for the latter, is also accounted for by the individuation of material objects through distance relations: for there to be two material objects, there has to be a distance between them, in the sense of a non-vanishing distance — consequently, if there are two objects, they cannot penetrate each other.

Against this background, Esfeld and Deckert set out to show how modern physics can be construed on the basis of a primitive ontology of matter that is defined by the following two axioms or principles:

(1) There are distance relations that individuate simple objects — namely, matter points.

(2) The matter points are permanent, with the distances between them changing. [17]

The task of physics, then, is to uncover salient patterns or regularities in the motion of matter — that is, the changing of distance relations — such that laws can be formulated that represent the motion of matter in a simple and informative manner and make it amenable to human intervention. Obviously, in order to con-

---

[16] See James Ladyman, "What is Structural Realism?", *Studies in History and Philosophy of Modern Science* 1998, Vol. 29, No. 3, pp. 409–424, https://doi.org/10.1016/S0039-3681(98)80129-5; Steven French and James Ladyman, "Remodelling Structural Realism: Quantum Physics and The Metaphysics of Structure", *Synthese* 2003, Vol. 136, No. 1, pp. 31–56; https://doi.org/10.1023/A:1024156116636; Michael Esfeld, "Quantum Entanglement and A Metaphysics of Telations", *Studies in History and Philosophy of Modern Physics* 2004, Vol. 35, No. 4, pp. 601–617, https://doi.org/10.1016/j.shpsb.2004.04.008; Michael Esfeld and Vincent Lam, "Moderate Structural Realism About Space-Time", *Synthese* 2008, Vol. 160, No. 1, pp. 27–46, https://doi.org/10.1007/s11229-006-9076-2.

[17] Michael Esfeld and Dirk-André Deckert, **A Minimalist Ontology of The Natural World**, Routledge, New York 2017, p. 21.

ceive of laws of nature, more parameters are needed than just relative positions and their changes. The reason is that if a configuration of matter is characterized only in terms of relative positions, this characterization contains nearly no information about how the configuration evolves. Taking the particles to be individuated by their relative positions puts only a few general constraints on how they move, such as ruling out their penetrating one another. Yet this is insufficient to obtain a law that would tell us how they move. Ned Hall expresses the point at issue in these terms:

> [...] the primary aim of physics — its first order business, as it were — is to account for *motions*, or more generally for change of spatial configurations of things over time. Put another way, there is one Fundamental Why-Question for physics: Why are things located where they are, when they are? In trying to answer this question, physics can of course introduce *new* physical magnitudes [...]. [18]

The new physical magnitudes or parameters are introduced in terms of the role that they play with respect to the motion of matter. Consider Newtonian gravitation: the particles are characterized not only by their relative positions and initial velocity, but also by the parameter of mass (inertial and gravitational mass, which always have the same value). In virtue of having a mass, the particles attract each other as described by the law of gravitation, modulo the gravitational constant. Given the positions, velocities and masses of the particles in the universe at a time *t* and the gravitational constant, their gravitational attraction at *t* is fixed. There is no force over and above the masses. The crucial — and sufficient — parameter for capturing the pattern of attractive, gravitational motion is mass.

There is no need to add a commitment to mass as an intrinsic property to the characterization of the particles in terms of their relative positions. It is not the case that something like intrinsic essences re-enters modern science through the backdoor, under the mantle of the dynamical parameters attributed to physical objects to capture their motion in terms relevant to the formulation of laws of motion. As Ernst Mach put it, when commenting on Newton's **Principia**, "The true definition of mass can be deduced only from the dynamical relations of bodies"; [19]

[18] Ned Hall, "Humean Reductionism About Laws of Nature". Unpublished manuscript, 2009, p. 29 [1–55], https://tiny.pl/wc7f9 [14.11.2022]. The shorter version of this article was published in: Barry Loewer and Jonathan Schaffer (eds.), **A Companion to David Lewis**, *Blackwell Companions to Philosophy*, John Wiley & Sons, Inc., Malden — Oxford — West Sussex 2015, pp. 262–277, https://doi.org/10.1002/9781118398593.ch17 [emphasis in the original].

that is to say, mass is a parameter that expresses a dynamical relation among the physical objects. There is nothing more to mass than the role that it plays in respect of the motion of physical objects.

The same goes for all the other dynamical parameters that a physical theory conceives of in order to formulate a law of motion — such as charge, energy, fields, a wave function, etc. They are all introduced in terms of the role that they play in relation to the motion of matter as expressed in a law of motion. They can therefore all be subsumed under the label of the "dynamical structure" of a physical theory. By contrast, the basic or primitive ontology is the ultimate referent of the theory — the bedrock of the physical world, so to speak, that can no longer be characterized in terms of the role that it plays with regard to the evolution of something. These are the relative positions of point particles that are individuated by these positions and their alteration, with the changes then being accounted for by introducing further parameters relating to the role that these parameters play in respect of the evolution of the particles' positions.

Hence, there is no cogent reason to go beyond the Cartesian characterization of nature as *res extensa* when accounting for the motion of matter. Mass, charge, energy, etc., are all literally speaking *located* or *placed* in the motion of matter — to use the terms common in today's metaphysics. [20] In other words, first comes the motion of matter, as characterized in (Cartesian) terms of *res extensa* only (i.e. distances and their alteration), and then come the dynamical parameters, such as mass, charge, energy, etc., as located in the overall particle motion. Because particles move in a salient pattern of attracting each other, they have a mass. Because particles move in a salient pattern of attracting and repelling each other, they are like-or opposite-charged, etc. Mass, charge, energy, etc., are therefore not a matter of intrinsic essences or properties of physical objects that the latter have in and of themselves, over and above their standing in distance relations and any alterations to these. They are instantiated as the patterns or regularities *of* such

[19] Ernst Mach, **The Science of Mechanics: A Critical and Historical Account of its Development**, trans. Thomas J. McCormack, Fourth Edition, Open Court, Chicago 1919, p. 241 (German original: **Die Mechanik in Ihrer Entwickelung Historisch-Kritisch Dargestellt**, Brockhaus, Leipzig 1897).

[20] See Frank Jackson, **From Metaphysics to Ethics: A Defence of Conceptual Analysis**, Oxford University Press, Oxford 1998, pp. 1–27; Huw Price, "Naturalism Without Representationalism", in: Mario de Caro and David Macarthur (eds.), **Naturalism in Question**, Harvard University Press, Cambridge 2004, pp. 71–88.

change. Consequently, they are nothing over and above the manner in which this change actually occurs.

It seems that this way of conceptualizing the laws of nature and the dynamical structure of a physical theory gets scientific explanations upside down: science seems to explain the motion of matter by attributing parameters such as mass, charge, energy, etc., to physical objects, yet these parameters only provide for an efficient tracking of the motions that occur in the universe, enabling us to identify salient patterns such as those pertaining to gravitational or electromagnetic motion. Supposing that these parameters explain how the motion in question comes about runs into the circularity problem that Molière illustrates in his piece *Le malade imaginaire* (1673): one does not explain why people fall asleep after the consumption of opium by attributing a dormitive power to opium, because this power is *defined* in terms of the role of making people fall asleep. By the same token, one does not explain why there is attractive motion in the universe by attributing a mass to bodies, because mass is *defined* in terms of the role of making bodies attract each other.

Physics explains things through unification: one establishes that it is not astonishing that apples fall from trees in the autumn, in that this involves the same pattern of motion as the Earth turning around the Sun. That is, one explains something by showing how that which calls for explanation is part of a general pattern or regularity of motion, such as attractive motion as described by the law of gravitation. Physics has accomplished its task once it has identified the salient, universal patterns or regularities of motion. But science cannot explain why there are these patterns of motion. In short, science can retrace various apparently different motions to a universal pattern of motion such as gravitation, but it cannot explain why there is gravitation.

3. Beyond Cartesian Science

Cartesian science evinces a direct link to empirical phenomena. The connection also includes the outcome of measurements, although Descartes does not talk about measurements specifically. According to him, science abstracts from all subjective features, including the particular ways in which we perceive things through our senses (i.e. colours, sounds, smells and tastes), keeping only the relative positions of things and their alteration.[21] However, there is a direct link through the representation of positions and the account of their evolution to objects in the world and their changes. As was mentioned in the previous section, if a theory correctly describes the spatial arrangement of objects and their alteration, it has described everything that can ever be checked in scientific experiments and measurements. Cartesian science thus consists in geometry and kinematics. Newton then adds dynamics, through the force-related laws that he formulates in his **Philosophiae Naturalis Principia Mathematica**.[22] There is no problem with the interpretation of classical mechanics, constructed on this basis, of the sort that we encounter with quantum mechanics: it is clear what classical mechanics is referring to, and how it describes the evolution of what it is talking about, such that it thereby accounts for the experiments and measurement outcomes that serve to confirm the theory in question.

However, classical mechanics is applicable to concrete situations only if certain conditions are met. The laws that a fundamental physical theory poses are always universal laws: they apply to the configuration of matter across the *entire* universe. Consider Newtonian gravitation: given the positions, velocities and masses of the bodies in the universe at a specific time plus the gravitational constant, the law will tell us how the configuration of matter in the universe evolves with respect to gravitational motion. Generally speaking, the dynamical structure of a fundamental physical theory relates the state of the universe at one time to the state of the universe at other times.

Nonetheless, no such dynamical structure could be tested if it were not applicable also to particular objects within the universe (or if it did not, at least, contain a procedure for how to derive its application to particular objects). Consider again Newtonian gravitation: the theory says that the gravitational acceleration of any one object in the universe at any given time depends, strictly speaking, on the positions, velocities and masses of all the other objects in the universe at that time. But it formulates that dependence in mathematical terms that pertain to the correlated motion of pairs of objects.

[21] See Descartes, **Principia Philosophiae…**, paragraph 4.

[22] See Isaac Newton, **Philosophiae Naturalis Principia Mathematica**, Royal Society, London 1687, chapter entitled "Axiomata, sive Leges Motus", https://tiny.pl/wp75q [14.11.2022].

Even so, in applying the law of gravitation to pairs of objects, one must presuppose that nothing outside the pair in question interferes with its interaction in a significant manner. In other words, one has to presume that the influence of the environment — which is the rest of the universe, in the last resort — is negligible, at least for all practical purposes. The satisfaction of this condition cannot be assured by the mere formulation of a physical theory. It is a substantial assumption about what the world is like, which, fortunately, is satisfied: it is usually possible to consider two bodies in isolation and abstract from the influence of the rest of the world, because this influence is insignificant, as when one calculates the trajectory of a stone falling to the ground. Furthermore, such trajectories are, fortunately, by and large insensitive to slight variations in the initial positions and velocities of these pairs of objects. That is why, in these paradigmatic cases, one can apply the Newtonian law of gravitation to make deterministic predictions about the motion of particular objects even though one does not know about all of the rest of the universe, and cannot really exactly know their initial positions and velocities.

On the other hand, the conditions for employing Newtonian gravitation to make deterministic predictions about the motions of particular bodies are in fact satisfied only in rather rare cases. If, instead of a stone, one throws a coin to the ground, one cannot predict whether it will land heads or tails: a very tiny variation in the initial position and velocity of the coin can alter the entire result, and it is practically impossible for us to know the exact initial positions and velocities. Indeed, the coin-tossing case is unfortunately the paradigmatic one. That is why Cartesian and Newtonian science — geometry, kinematics, dynamics — needs to be complemented by a statistical theory that enables us to make statistical predictions about outcome distributions given our ignorance of the exact initial conditions.

Statistical mechanics achieves this result: it tells us what the typical evolution of a system with many particles is: that is, the evolution that occurs under almost all initial conditions. Thus, for instance, the molecules of a gas will move into a state of thermic equilibrium under almost all initial conditions, a long series of coin tosses will exhibit an equal distribution of heads and tails under almost all initial conditions, and so on.

Statistical mechanics presupposes the Hamiltonian formulation of classical mechanics. This formulation introduces a mathematical space known as *phase* *space* in order to represent the particle configuration and its evolution; for N particles, phase space has $6N$ dimensions — three for the initial position, and three for the initial velocity of each particle. Thus, each point of $6N$-dimensional phase space represents a possible configuration of N particles in three-dimensional physical space. The Lebesgue measure is used as the measure of probability for phase space. This then enables the formulation of statements such as that gases typically evolve towards a state of equilibrium, etc., which make predictions about the statistical distribution of outcomes possible. [23]

While this way of proceeding is key to practising physics when ignorant of the exact initial conditions involved, by operating in an abstract mathematical space one loses the direct reference to physical objects that characterizes Cartesian science. The operations in the mathematical space in question have no direct physical meaning apart from the fact of their eventually yielding statistical predictions of measurement outcome distributions that can be tested. This, then, is also the reason why quantum mechanics, in contrast to classical mechanics, faces a problem of interpretation: the theory only makes predictions of measurement outcome statistics achieved via operations in an abstract mathematical space (i.e. a configuration space, Hilbert space, or Fock space).

Indeed, we must also go beyond Cartesian science in yet another respect. There is more to natural science than physics. Physics is universal: it deals with universal patterns or regularities of motion that obtain everywhere in the universe, as far as we can judge. All the objects in the universe are physical objects. They are all subject to gravitation. However, there are also special properties and systems that emerge during the evolution of the cosmos in particular places and times — notably during the evolution occurring on Earth.

In the twentieth century, a powerful tool was developed that enables us to integrate emergent properties into Cartesian science. That tool is functionalism. Starting from configurations of basic physical objects described in terms of extension and motion, one defines everything else by means of its function in the sense of its role with respect to the evolution of these configurations; this then enables

[23] See Dustin Lazarovici and Paula Reichert, "Typicality, Irreversibility and The Status of Macroscopic Laws", *Erkenntnis* 2015, Vol. 80, No. 4, pp. 689–716, https://doi.org/10.1007/s10670-014-9668-z.

the locating of the things thus defined within configurations of basic physical objects — namely, in those ones that realize the role in question.

Functionalism in this sense was set out most notably by David Lewis. [24] As was mentioned in the previous section, it applies already to dynamical physical parameters over and above the primitive parameters of extension (distances) and motion (change in distances). Thus, parameters such as mass, charge, energy, etc., are introduced in terms of the functional role that they play with respect to the motion of matter. It is significant that functionalism then applies to emergent properties.

Consider water. As we know from scientific investigation, there is no fundamental water-stuff in the world. Modern science has superseded the ancient conception of the four elements of earth, water, air and fire. Yet there is, of course, water in the world: there are things in the world that fulfil the functional role of appearing odourless and colourless, of being thirst-quenching in virtue of the change in the motion of certain parts of our bodies that they bring about. These are configurations of H_2O molecules. Thus, by defining water in terms of its thirst-quenching role — that is, its role as regards certain motions occurring in our bodies — one locates it within the scientific ontology of matter in motion (*res extensa*). Certain particle configurations, moving in certain characteristic ways, simply *are* water.

By the same token, there is no *élan vital*, in the sense of a *sui generis* life-stuff or causal power, yet there are organisms in the world. The functional role that defines what it is to be alive in terms of characteristic motions such as reproduction and adaptation to the environment is realized by certain configurations of molecules — as we have known ever since the rise of molecular biology in the twentieth century. One famous example is the discovery of the molecular composition of DNA by James Watson and Francis Crick. [25] Again, this means that certain particle

[24] See David Lewis, "How to Define Theoretical Terms", *Journal of Philosophy* 1970, Vol. 67, No. 13, pp. 427–446, https://doi.org/10.2307/2023861; David Lewis, "Psychophysical and Theoretical Identifications", *Australasian Journal of Philosophy* 1972, Vol. 50, No. 3, pp. 249–258, https://doi.org/10.1080/00048407212341301.

[25] See James D. Watson and Francis H.C. Crick, "Molecular Structure of Nucleic Acids: A Structure for Deoxyribose Nucleic Acid", *Nature* 1953, Vol. 171, No. 4356, pp. 737–738, https://doi.org/10.1038/171737a0.

configurations, moving in certain particular ways, *are* organisms. Life is thus located in certain particle configurations. There is no additional, primitive life-stuff.

Again, this is not an intrinsic affair. No particle configurations are intrinsically water, or intrinsically organisms. Certain particle configurations are water or organisms only if they are inserted in an environment with certain stable conditions — that is, certain stable regularities — such that these configurations can exercise the functional roles that define water or organisms. That environment is, strictly speaking, the whole of the rest of the universe: this condition defines normal conditions for the exercising of these functional roles in terms of nothing from the rest of the universe preventing the stable regularities in question from obtaining — such as the regularity that leads from H_2O molecules to thirst quenching motions in the body, or from certain chains of molecules to motions that are phenotypic traits of certain organisms, etc. Hence, showing how emergent features of the universe fit into the treatment of the natural world as *res extensa* only is always a global affair, even though these features are located in certain particle configurations.

Functionalism, as a method for dealing with emergent features, is in principle unlimited. In a sense, it is just a matter of definition. One can simply stipulate that everything that is not part of the primitive ontology of matter in motion be defined in terms of a functional role that it exerts for matter in motion. Thus, one can apply functionalism also to the mind, stipulating that thoughts and intentions are to be defined by certain functional roles, which in the end are functional roles for the behaviour and thus the bodily motions of persons, realized by certain neuronal configurations in the brain. One can even go as far as applying functionalism in ethics: starting from the normative, moral attitudes that people *de facto* have in a society at a certain time, one can formulate functional definitions of these attitudes that ultimately come down to definitions in terms of dispositions for behaviour — that is, what people do under certain circumstances given their attitudes. [26]

If one takes functionalism to be unlimited, one goes from science to scientism. Scientism is the view that the method of science is unlimited: it applies to all areas of being. However, the issue is whether the functional definitions, articulated in terms of a role with respect to matter in motion, are still convincing when it

[26] See Jackson, **From Metaphysics to Ethics...**, pp. 113–162.

comes to the human mind. Here, Cartesian science encounters a principled limit that rules out also applying its method to human thought and action.

4. Persons as *res cogitans*

Modern science as conceived by Descartes abstracts from all subjective judgements and seeks objectivity, the (point of) view from nowhere. However, this very method implies that it cannot in principle be applied to subjective features. If the scientific viewpoint consists in abstracting from the latter in order to arrive at objectivity, then it simply follows that those same subjective features are not accessible to the scientific viewpoint.

This limitation concerns, in the first place, sense experience. The general argument, in today's metaphysics, for something along these lines can be summed up in the following way: having sense experience means having a perspective on the world, which is by definition a subjective perspective. A being that has sense experience is not merely an object that moves according to certain patterns of motion: rather, it has a subjective perception and feeling of what it is like to be in the world, having certain qualitative experiences. To be sure, Cartesian science can discover sufficient physiological conditions for having sense experience, and the content of the experience may supervene on certain brain states, given certain conditions in the environment. Nevertheless, it is not the case that the brain states in question realize the experience in the sense that the sensory qualities could be captured by means of a functional definition of the role they play with respect to the behaviour of the organism that is such that certain physiological states of the organism *are* sensory experiences. Such a functional definition misses the qualitative character of the experience, the subjective perspective on the world. It cannot account for what it is like to see colours, taste cheese, smell smoke, jump for joy, etc. Accordingly, the issue of how to account for subjective experience has come to be known as the "hard problem of consciousness". [27]

Subjective experience pertains to many higher-level animals. Thought and action — which, as far as we know, characterize only humans — presuppose a subjective perspective on the world, and thus experience, but are still categorically different from it. The reason is that with thought and action normativity comes

[27] See David J. Chalmers, **The Conscious Mind: In Search of a Fundamental Theory**, Oxford University Press, Oxford 1996.

into play. It makes no sense to ask for a justification for the behaviour of animals that have subjective experience. When a cat frightens a mouse before catching and eating it, it would be pointless to morally condemn the behaviour of the cat, for this is merely the instinctive behaviour of cats. By contrast, in the case of humans, it does make sense to ask for a justification, as humans are not simply subject to their sense impressions, desires and needs, but have the ability to position themselves with respect to them.

The obvious argument against human thought and action being accessible to the method of Cartesian science is that in the case of these, the issue is not what the objective facts are, but how human subjects assess them in forming beliefs and intentions for action. This is, most notably, the argument against scientism of Friedrich von Hayek and Karl Popper: [28] when it comes to human thought and action, everything that science abstracts from is of central importance. The obvious counterargument is that what humans think and do is open to scientific investigation, too: it is possible to describe objectively what the thoughts and intentions of a human subject — or a group or a population of human subjects — are.

However, thoughts and intentions are not open to scientific investigation from the standpoint of the view from nowhere. From that point of view, there is neither sense experience in the world, nor thought and action. In order to have the realization that a being has sense experience, and to understand the qualitative character of its experience, one has to take one's own sense experience as a basis and attribute qualitative experience to other beings by analogy with one's own — that is, one can precisely not abstract from one's own subjective perspective. Propositions about the experience of other beings will be objective, then, in the sense that they will be true or false depending on what the experience of these other beings is; but conceiving of such propositions presupposes one's not abstracting from one's subjective perspective.

When it comes to understanding the thoughts and intentions of humans, the adoption of a normative attitude towards them is called for: that is, the attitude that consists in realizing that behaviour that expresses thoughts and actions is subject to being assessed as correct or incorrect. This is not possible if one just

[28] See Friedrich August von Hayek, **The Counter-Revolution of Science: Studies on The Abuse of Reason**, Free Press, Glencoe 1952; Karl R. Popper, **The Poverty of Historicism**, Routledge, London 1957.

adopts a third-person perspective towards this behaviour; rather, it only becomes so by linking it up with one's own thoughts and actions — that is, by adopting a first-person perspective. Propositions about the thoughts and intentions of other humans formulated from that perspective can then count as objective, in the sense that they are true or false depending on what the thoughts and intentions of the humans in question (present or past) are (or were); but, again, any such conceiving of such propositions presupposes our not abstracting from the subjective, first-person perspective.

The upshot of these considerations is a *transcendental argument* about the human mind. A transcendental argument is concerned with necessary conditions for the possibility of something. More precisely, it is about conditions whose denial would amount to a performative contradiction: the performance of the denial of these conditions would in fact be an act that exemplifies these conditions. Accordingly, a transcendental argument is an *a priori* argument. It cannot be invalidated by experience, since its content is not touched by empirical facts. A transcendental argument can only be wrong through committing a logical error: one can take something to be a performative contradiction without there being any such contradiction in respect of the purported facts.

Descartes formulates a transcendental argument in the second of his **Meditationes de prima philosophia**. [29] The thinking mind exists because denying that one thinks would be a performative contradiction — a performance of the act of thinking in denial. However, Descartes then neglects the point at issue in thought (or *logos*): namely, its being subject to justification (*logon didonai*).

Immanuel Kant elaborates on a transcendental argument in that respect. He says, in the:

> If an appearance is given to us, we are still completely free as to how we want to judge things from it. [30]

That is to say, appearances — sensory impressions — do not impose thoughts

[29] See René Descartes, **Meditationes de prima philosophia**, Soly, Paris 1641.

[30] Immanuel Kant, "Prolegomena to Any Future Metaphysics that will be Able to Come Forward as Science", trans. Gary Hatfield, in: Henry Allison and Peter Heath (eds.), **Theoretical Philosophy After 1781**, trans. Gary Hatfield, Michael Friedman, Henry Allison, and Peter Heath, *The Cambridge Edition of The Works of Immanuel Kant*, Vol. 3, Cambridge University Press, Cambridge 2002, paragraph 13, note III, p. 85 [29–170].

on persons. A being forms beliefs if and only if she has the capacity to position herself with respect to sensory impressions and to make up her mind by thinking about reasons for her beliefs. That is how normative attitudes come into play: a person grants something the status of being a reason for a thought or an action by taking it to be correct or incorrect in relation to the situation at hand and thus being subject to justification. Consequently, reason (*logos*), freedom and normativity are intertwined.

Consider how John McDowell describes what it would take for a wolf to entertain beliefs:

> A rational wolf would be able to let his mind roam over possibilities of behaviour other than what comes naturally to wolves. [...] [This] reflects a deep connection between reason and freedom: we cannot make sense of a creature's acquiring reason unless it has genuinely alternative possibilities of action, over which its thought can play. [...] An ability to conceptualize the world must include the ability to conceptualize the thinker's own place in the world; and to find the latter ability intelligible, we need to make room not only for conceptual states that aim to represent how the world anyway is, but also for conceptual states that issue in interventions directed towards making the world conform to their content. A possessor of *logos* cannot be just a knower, but must be an agent too; and we cannot make sense of *logos* as manifesting itself in agency without seeing it as selecting between options [...]. This is to represent freedom of action as inextricably connected with a freedom that is essential to conceptual thought. [31]

Hence, freedom in thought and action are linked to one another, and freedom is self-determination: a being is a person and thinks and acts if and only if she positions herself in relation to what is given to her mind in the guise of sensory impressions, desires and needs, and makes up her mind as to what to think and to do.

The same point is brought out by Wilfrid Sellars when he denounces what he takes to be the "Myth of the Given": [32] this is the idea that something that is simply given to the mind has, as such, the epistemic status of being in a position to justify

[31] John McDowell, "Two Sorts of Naturalism", in: Rosalind Hursthouse, Gavin Lawrence, and Warren Quinn (eds), **Virtues and Reasons: Philippa Foot and Moral Theory**, Oxford University Press, Oxford 1995, p. 152 [149–179].

[32] See Wilfrid Sellars, "Empiricism and the Philosophy of Mind", in: Herbert Feigl and Michael Scriven (eds.), **The Foundations of Science and the Concepts of Psychology and Psychoanalysis**, University of Minnesota Press, Minneapolis 1956, pp. 253–305 [253–329].

beliefs and actions. Thus, according to Sellars, sense impressions, for instance, construed as the effects of interactions of a person with her environment, cannot, qua being the result of physical *causal* processes, *justify* anything. By the same token, supposedly innate ideas cannot as such justify anything. The reason is that with respect to whatever is given to her mind, a person has to take the attitude of endorsing what is given as a reliable source of knowledge and guide for actions; only thereby does she confer upon it an epistemic status. Hence, in deliberating about what is given to her mind, the person must herself decide which beliefs she *should* adopt and which actions she *should* take. This conclusion is also strengthened by what Descartes says in the third of his **Meditationes de prima philosophia** about the idea of God: the fact that this idea is given to him does not imply that he *should* believe that there is a God. Only *his* deliberation about this idea, *his* examination of it leads to that conclusion.

This is a transcendental argument: the performance of denying the freedom involved in thought and action would itself be an instance of that freedom by forming a thought, albeit a contradictory one. Functionalism about the mind therefore always comes too late: it can offer a functionalist treatment of the thoughts and actions manifested by a person or group of persons, but it fails to capture the freedom involved in forming a thought or an intention to act. Thus, for instance, if the functionalist claims that everything is realized by matter in motion, and hence identical with a configuration of matter in motion, such that it can be captured by the method of inquiry of natural science (scientism), she commits a performative contradiction: to claim that the matter in motion in the world imposes on us the theory that everything is matter in motion, because the theory itself is nothing but a configuration of matter in motion in the sense that it is nothing beyond the beliefs that persons have, where these are realized by or identical with certain particle configurations in their brains, is a performative contradiction, because any such claim is only itself conceived by exercising the freedom involved in forming thoughts on the basis of whatever is given to one's mind. Taking the content of this claim to be imposed on us by matter in motion in the world would be an instance of the "Myth of the Given". It misses the point of what it is to think and act.

Rejecting the "Myth of the Given" thus leads to a transcendental argument in favour of treating persons as ontologically primitive, on a par with matter in motion: persons must take decisions, and thus answer the question of what they should do, including which beliefs and theories they should accept. This is what is established by the Cartesian argument that one cannot doubt that one thinks. Consequently, normativity is presupposed by the very formulating of what may be considered the scientific view of the world. This view depends on thought for its existence as a *view*. Formulating and endorsing this view is a choice that persons make and that can only be justified within the sphere of normative attitudes of giving and asking for reasons. The referents of the theory — whatever the theory poses as existing in the world — cannot impose acceptance of the theory on persons, or justify this. In that sense — as beings that formulate and justify theories — persons are indispensable, and so primitive: whatever the theory, persons must conceive, endorse and justify it. Consequently, insofar as they formulate scientific theories and the scientific view of the world as a whole, persons cannot be located or placed within what science poses as existing.

Persons, qua thinking and acting beings (*res cogitans*), can be conceived by analogy with matter in motion (*res extensa*) in the following sense: as matter in motion is individuated by distance relations that make it such that the entities that stand in these relations are *matter* points, so persons qua thinking and acting beings can be taken to be individuated by normative relations of justification that mean that the entities that stand in these relations are *mind* points. In that way, one can vindicate the Cartesian dualism of *res extensa* and *res cogitans* without being committed to two kinds of substances that can exist independently of one another. As all there is to matter is certain relations and their alteration, i.e. distance relations, so all there is to minds will be certain relations and their changes, i.e. normative relations of justification. [33]

5. Conclusion

Science, broadly conceived as the exercise of reason built on argument and evidence, is a twofold enterprise: there is the science from the point of view of nowhere, i.e. natural science and its method, which is empirical, being concerned with matters of fact and *a posteriori*. And there is the science of human thought

[33] See Michael Esfeld and Guillaume Köstner, “Normative Relations, Mind Points and Social Ontology”, *Synthese* 2022, Vol. 200, No. 6, article number 455, https://doi.org/10.1007/s11229-022-03889-3.

and action from the first-person perspective, which operates with a transcendental argument and is normative and *a priori*. Each depends on the other. On the one hand, the very formulation, testing and justifying of scientific theories in the first sense presupposes the freedom in thought and action, and the normative attitude, that are the subject of inquiry of the transcendental, *a priori* argument formulated from the first-person perspective. On the other hand, human thought and action presupposes for its very existence and operation certain natural conditions (organisms with brains) that are the object of enquiry revealed from the third-person perspective, this being the (point of) view from nowhere. How to bring these two stances together without subsuming one into the other is the Cartesian predicament that remains with us today: through its method of objectivity, Cartesian science has made possible enormous technological progress, that has in turn greatly improved humanity's living conditions. Nevertheless, it also leaves us with the issue of how to understand the relationship between ourselves as thinking and acting beings and the world as described by Cartesian science.

Michael Esfeld

References

ALLISON Henry and HEATH Peter (eds.), **Theoretical Philosophy After 1781**, trans. Gary Hatfield, Michael Friedman, Henry Allison, and Peter Heath, *The Cambridge Edition of The Works of Immanuel Kant*, Vol. 3, Cambridge University Press, Cambridge 2002.

BELL John S., **Speakable and Unspeakable in Quantum Mechanics**, *Collected Papers on Quantum Philosophy*, Cambridge University Press, Cambridge 1987.

BLUMENBERG Hans, **The Legitimacy of The Modern Age**, trans. Robert M. Wallace, MIT Press, Cambridge – London 1983 (German original: **Die Legitimität der Neuzeit**, Suhrkamp, Frankfurt 1966).

CHALMERS David J., **The Conscious Mind: In Search of a Fundamental Theory**, Oxford University Press, Oxford 1996.

COOPER John M. (ed.), **Plato: Complete Works**, Hackett Publishing Co., Indianapolis 1997.

DE CARO Mario and MACARTHUR David (eds.), **Naturalism in Question**, Harvard University Press, Cambridge 2004.

DE MURALT André, **L'enjeu de la philosophie médiévale: études thomistes, scotistes, occamiennes et grégoriennes**, Brill, Leiden 1991.

DESCARTES René, **Discours de la méthode**, Jean Maire, Leyden 1637.

Descartes René, **Meditationes de prima philosophia,** Soly, Paris 1641.

Descartes René, **Œuvres de Descartes. Volume 6. Publié par Charles Adam et Paul Tannery**, Cerf, Paris 1902.

Descartes René, **Principia Philosophiae**, Part Two, Elsevier, Amsterdam 1644.

Esfeld Michael, "Quantum Entanglement and A Metaphysics of Telations", *Studies in History and Philosophy of Modern Physics* 2004, Vol. 35, No. 4, pp. 601–617, https://doi.org/10.1016/j.shpsb.2004.04.008.

Esfeld Michael and Deckert Dirk-André, **A Minimalist Ontology of The Natural World**, Routledge, New York 2017.

Esfeld Michael and Köstner Guillaume, "Normative Relations, Mind Points and Social Ontology", *Synthese* 2022, Vol. 200, No. 6, article number 455, https://doi.org/10.1007/s11229-022-03889-3.

Esfeld Michael and Lam Vincent, "Moderate Structural Realism About Space-Time", *Synthese* 2008, Vol. 160, No. 1, pp. 27–46, https://doi.org/10.1007/s11229-006-9076-2.

Feigl Herbert and Scriven Michael (eds.), **The Foundations of Science and the Concepts of Psychology and Psychoanalysis**, University of Minnesota Press, Minneapolis 1956.

Foster John, **The Case for Idealism**, *International Library of Philosophy*, Routledge, London 1982.

French Steven and Ladyman James, "Remodelling Structural Realism: Quantum Physics and The Metaphysics of Structure", *Synthese* 2003, Vol. 136, No. 1, pp. 31–56; https://doi.org/10.1023/A:1024156116636.

Gerhardt Carl Immanuel (ed.), **Die philosophischen Schriften von G. W. Leibniz**, Bd. 7, Weidmannsche Verlagsbuchhandlung, Berlin 1890.

Hall Ned, "Humean Reductionism About Laws of Nature". Unpublished manuscript, 2009, pp. 1–55, https://tiny.pl/wc7f9 [14.11.2022].

Hursthouse Rosalind, Lawrence Gavin, and Quinn Warren (eds), **Virtues and Reasons: Philippa Foot and Moral Theory**, Oxford University Press, Oxford 1995, pp. 149–179.

Jackson Frank, **From Metaphysics to Ethics: A Defence of Conceptual Analysis**, Oxford University Press, Oxford 1998.

Kant Immanuel, "Prolegomena to Any Future Metaphysics that will be Able to Come Forward as Science", in: Allison and Heath (eds.), **Theoretical Philosophy…**, pp. 29–170.

Ladyman James, "What is Structural Realism?", *Studies in History and Philosophy of Modern Science* 1998, Vol. 29, No. 3, pp. 409–424, https://doi.org/10.1016/S0039-3681(98)80129-5.

Lazarovici Dustin and Reichert Paula, "Typicality, Irreversibility and The Status of Macroscopic Laws", *Erkenntnis* 2015, Vol. 80, No. 4, pp. 689–716, https://doi.org/10.1007/s10670-014-9668-z.

Leibniz' third letter to Clarke, in : Gerhardt (ed.), **Die philosophischen Schriften…**, pp. 363–364.

Lewis David, "How to Define Theoretical Terms", *Journal of Philosophy* 1970, Vol. 67, No. 13, pp. 427–446, https://doi.org/10.2307/2023861.

Lewis David, "Psychophysical and Theoretical Identifications", *Australasian Journal of Philosophy* 1972, Vol. 50, No. 3, pp. 249–258, https://doi.org/10.1080/00048407212341301.

Lewis David, **On the Plurality of Worlds**, Blackwell, Oxford 1986.

Loewer Barry and Schaffer Jonathan (eds.), **A Companion to David Lewis**, *Blackwell Companions to Philosophy*, John Wiley & Sons, Inc., Malden — Oxford — West Sussex 2015.

Mach Ernst, **The Science of Mechanics: A Critical and Historical Account of its Development**, trans. Thomas J. McCormack, Fourth Edition, Open Court, Chicago 1919 (German original: **Die Mechanik in Ihrer Entwickelung Historisch-Kritisch Dargestellt**, Brockhaus, Leipzig 1897).

Maudlin Tim, **Philosophy of Physics: Quantum Theory**, Princeton University Press, Princeton 2019.

McDowell John, "Two Sorts of Naturalism", in: Hursthouse, Lawrence, and Quinn (eds), **Virtues and Reasons…**, pp. 149–179.

Newton Isaac, **Philosophiae Naturalis Principia Mathematica**, Royal Society, London 1687, https://tiny.pl/wp75q [14.11.2022].

Plato, **Parmenides**, trans. Mary Louise Gill and Paul Ryan, in: Cooper (ed.), **Plato…**, pp. 359–397.

Popper Karl R., **The Poverty of Historicism**, Routledge, London 1957.

Price Huw, "Naturalism Without Representationalism", in: de Caro and Macarthur (eds.), **Naturalism in Question…**, pp. 71–88.

Sellars Wilfrid, "Empiricism and the Philosophy of Mind", in: Feigl and Scriven (eds.), **The Foundations of Science…**, pp. 253–329.

von Hayek Friedrich August, **The Counter-Revolution of Science: Studies on The Abuse of Reason**, Free Press, Glencoe 1952.

Watson James D. and Crick Francis H.C., "Molecular Structure of Nucleic Acids: A Structure for Deoxyribose Nucleic Acid", *Nature* 1953, Vol. 171, No. 4356, pp. 737–738, https://doi.org/10.1038/171737a0.

ISSN 2299-0356

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**

Philosophical Aspects of Origin s. 191–230

https://doi.org/10.53763/fag.2022.19.2.205

ARTYKUŁ ORYGINALNY / ORIGINAL ARTICLE

Gonzalo Munévar

Lawrence Technological University

The Origin of Modern Physical Science: Some Passages from *A Theory of Wonder*

Received: May 1, 2022. Accepted: October 16, 2022. Published online: November 3, 2022.

Abstract: The triumph of the Copernican revolution is commonly associated with the introduction of the scientific method, mainly by Galileo. The nature of science presumably depends on the way observation passes judgment on theory. This is how, according to empiricism, the practice of science improves our worldviews. Some historically inclined philosophers of science, most notably Kuhn and Feyerabend, have insisted on paying attention to what Galileo actually said and did. Shockingly, he drives a dagger through the heart of empiricism: observation does not have such priority over theory, because observation itself *assumes* theory. This is what he argues when dismantling Aristotle's Tower Argument, according to which a stone dropped from a tower falls straight down to the base of the tower. If this is so, the Earth cannot rotate, for it would carry the tower with it, making our observation of the stone's flight wildly different. According to Galileo, to conclude that the stone *really* falls vertically requires the assumption that the Earth does not move – the theoretical issue in question. Given Galileo's proper understanding of the nature of science, I view Feyerabend's principle of proliferation as the realization that a good strategy for the latter is to elaborate radical alternatives and, on their basis, reconsider what counts as evidence. Moreover, a science produced by human brains should be analyzed on the basis of evolutionary theory and neuroscience. From that perspective, we may be able to defend a sensible notion of relativism. These considerations have led me to the main arguments of my new book, **A Theory of Wonder: Evolution, Brain, and the Radical Nature of Science** (*Philosophy of Science*, Vernon Press, Wilmington — Malaga 2021). I hope to entice the

Keywords:

Galileo; Copernican revolution; Kuhn; Feyerabend; proliferation; evolutionary relativism; neuroscience and knowledge; radical knowledge; Tower Argument; theory-laden observations

reader into a discussion of some of the issues developed there.

Empiricism tells us that science succeeds because it follows the scientific method: Observation passes judgment on Theory — supports or rejects it. And much credit is given to the inventor of the method, Galileo. This is a very common account of the origin of modern science. But when historically minded philosophers of science like Kuhn and Feyerabend called our attention to what Galileo actually wrote and did, we were shocked to find out that Galileo instead drives a dagger through the heart of empiricism: he strikes down the distinction between theory and observation. Plain facts like the vertical fall of a stone ruled out the motion of the Earth. But, Galileo argued, to conclude that the stone *really* falls vertically, *we must assume* that the Earth does not move. If it does move, then the stone only *seems* to fall vertically. Galileo thus replaced the facts against the motion of the Earth with facts in agreement with the motion of the Earth.

Moreover, this process is typical during scientific revolutions: i.e., at the origin of new sciences, or new ways of doing science. As it turns out, a good strategy for science is to elaborate radical alternatives then, and on their basis reconsider what counts as evidence. Feyerabend was called irrational for this suggestion. Nevertheless, looking at the practice of science from the perspective of evolution and neuroscience shows that his suggestion is quite rational instead, and explains why science works best as a radical form of knowledge. It also leads to a sensible form of relative truth. And we need that biological perspective because the ways we perceive and are able to conceive of the universe depend on the central nervous system. But evolution could have gone a different way. In terms of perception, it certainly has for many creatures on Earth. And in terms of developing science, it might have done so as well on faraway planets. Completely different forms of thought might be comparable only in terms of how they allow biological beings to perform.

This theory, which I have called evolutionary relativism in some writings, is fully explained in my new book **A Theory of Wonder: Evolution, Brain, and the Radical Nature of Science**. [1] This book aims to determine the best way science can satisfy our sense of wonder by exploring the world. Since a great many new

[1] See Gonzalo Munévar, **A Theory of Wonder: Evolution, Brain, and the Radical Nature of Science,** *Philosophy of Science,* Vernon Press, Wilmington — Malaga 2021.

ideas and issues come up in the book, it would be useful to bring them to the attention of readers in this paper. What follows is not, however, a summary of the book. It is rather a way of enticing readers with new approaches to understanding science. If enticed enough, readers may consult the book for the full arguments.

The Critique of Falsificationism

Falsificationism appeals to the intuitions of many working scientists, particularly Karl Popper's notion that as scientists we come up with hypotheses about the world and then derive predictions from them: if the predictions are wrong, we reject the hypothesis under test; if the predictions are true, then we accept the hypothesis tentatively, until the next text. Nevertheless, Imre Lakatos points out that, at least in its most common version, falsificationism is untenable. Let us consider the example of Halley's Comet. Halley made a detailed record of the path of the comet. On the basis of this path and Newton's physics, he was able to calculate the orbit of the comet and to predict when it would be back. Now, what was relevant to his calculations? Among other things, he took into account the gravitational influences of other bodies on the comet, mainly the Sun's, since the forces that move the comet in its orbit are gravitational. The comet and those other bodies together form a system. From a certain state of that system Halley was able to predict what a future state of the system would be like. Notice, however, that the prediction does not follow unless we assume that *nothing interferes* with the system, as Imre Lakatos pointed out. [2]

Let me explain. Comets typically have very long orbits that take them to the outer reaches of the solar system. In its long journey, Halley's comet might have passed near Neptune, and this would have falsified Halley's prediction, for Neptune's gravity would have thrown it off its orbit, as Neptune is a very massive planet while Halley's comet is barely a few miles across. But Halley could not have taken this into account for the simple reason that Neptune had not yet been discovered. There were many other possible factors that with a bit of bad luck would have kept the comet from its famous appointed round. And the point is that the

[2] See Imre Lakatos, "Methodology of Scientific Research Programmes", in: Imre Lakatos and Alan Musgrave (eds.), **Criticism and the Growth of Knowledge**, *Proceedings of the International Colloquium in the Philosophy of Science*, Vol. 4, Cambridge University Press, London 1970, pp. 91–196.

prediction would have failed then even though Halley's hypothesis — that the comet would behave in accordance with Newton's physics — was correct.

It is clear that Halley's prediction must assume that nothing other than the factors he considered will affect the future state of the system. That is, the prediction requires that the system be closed to outside interference. This is the case for most scientific predictions. We expect a certain event on the basis of a theory, *all other things being equal*. This is a simple point, so what is the problem for the method of falsification? The problem is that when the prediction fails we cannot blame the theory, for things might not have been equal: something might have interfered with the system.

Suppose Neptune had thrown Halley's comet off its regular orbit. Halley's prediction would have failed, but his hypothesis should not be blamed. Falsificationism's mode of inference cannot then be as straightforward as is usually supposed. Three things come together to make the prediction:

If (1) the comet behaves according to Newton's physics

And (2) the path of the comet through the solar system in 1682 has been properly described, and

And (3) only the Sun and the (then known) planets will affect the orbit of the comet

Then (4) the comet will be back in December of 1758.

But if (then unknown) Neptune had interfered, the comet would not have returned on that date.

Therefore, something would be false. But what? Pointing the finger at the theory surely would be arbitrary. And wrong. In this case the failure was caused by the violation of requirement (3).

The falsification advice to scientists on what to do turns out to be too simple-minded. So does the advice on what not to do. The falsificationist believes that nothing could be further from the scientific spirit than *ad hoc* moves to safeguard a theory that conflicts with experience. But let us see how this falsificationist advice would have served the makers of scientific history. According to the Copernican view, for example, the Earth orbits around the Sun. If this is so, the famous fifteenth-century observer Tycho Brahe reasoned, the positions of the stars relative to one another should change as seen from the Earth at different points in its orbit. In other words, the stars should exhibit what is called "parallax motion". But neither Tycho Brahe nor anyone else was able to detect such motion for another one hundred fifty years (and then only with far more powerful instruments). Such failure led Brahe to reject the Copernican system. His conclusion accords with the method of falsification: parallax motion is a logical consequence of the heliocentric view, but it cannot be found, therefore the view is refuted. The same objection had been directed against Aristarchus, a Greek precursor of Copernicus, almost two millennia earlier.

How did the Copernicans preserve their view from refutation? They advanced the notion that the universe was far larger than Tycho had assumed: immensely larger, for if the parallax motion of the stars went undetected, then the size of the Earth's orbit would be insignificant compared to the distance to the fixed stars — just as a man walking in circles around his desk in his study can notice the relative changes of position of the chairs and bookcases in the room, but cannot detect any such changes in a line of trees that he can see far away through his window. We now believe that the Copernicans were right. But at the time the idea seemed inconceivable to Tycho, for by the standards of his day the proposed axis of the Earth's orbit was an extraordinary distance already. Moreover, and this is the most important point, he could not see any motivation for advancing this notion except to save the Copernican view from refutation. Tycho could tell an *ad hoc* move when he saw one.

To clinch the matter, Tycho Brahe also argued that if the universe were of a Copernican size, it would not be possible for the stars to be seen! His argument was based on a relationship between the size of stars and their apparent brightness. Today we know that Tycho was wrong in assuming that the perceived brightness of a point of light against a dark background can tell us much about the size of its source. But as far as anyone could tell at that time, Tycho was right. The Copernicans had no convincing rebuttal to offer. In time their hunch was justified. But their chance had to be purchased at the price of flouting the falsificationist ideal of science. *Ad hoc* moves saved the Copernican view from refutation, and thus gave it the breathing room it needed to develop and eventually show its superiority.

These considerations may serve as warm-up exercises leading up to the highlights Feyerabend points to in his **Against Method**, concerning the distinction between theory and observation, which played itself out in the scientific revolution carried out by Copernicus and Galileo, allegedly the first great triumph of empiricism. [3]

The view that the Earth moves may seem commonsensical to many of us today. But that is only because we are the heirs to a revolution in scientific thought. When the battle was fought, victory was by no means easy. Among the many telling objections against the movement of the Earth perhaps the Tower Argument, presented by Aristotle, in his **On the Heavens**, almost two thousand years earlier, was the strongest of all. [4] It goes as follows. Suppose that you let go of a stone from the top of a tall tower. If the world moves, by the time the stone hits the ground, the tower being stuck in the Earth, will have moved considerably (back then the velocity of rotation of the Earth would have been calculated to be about one milion miles per hour). Thus, there will be a perceptible difference between the initial and final distances from stone to tower. But when we actually look, there is practically no difference at all! We plainly see the stone fall straight down. For the distance to remain constant, if the Earth did move, the stone would have to fall in a parabolic path — something that any fool with even less than average sight can see is not so. Therefore, it is as plain as plain can be that the Earth does not move. The idea that it does makes no sense.

It does no good to talk about gravity and the like, for the appropriate concepts were not developed until years later, and then partly as a result of Galileo's success. Presented with the Tower Argument, what could Galileo say? First, in "The Second Day" of his **Dialogue Concerning the Two Chief World Systems**, he made the argument against his view as strong as possible. [5] For example, equal cannons shooting east and west will send their cannonballs pretty much the same distance, but if the Earth moved, the cannon shooting East should go a lot further. If you shoot a cannon straight up, and the Earth moves, by the time the cannonball falls to the ground, the cannon should have moved a great distance and the cannonball will hit the ground far from it; but obviously that is not so: the cannonball

[3] See Paul K. Feyerabend, **Against Method: Outline of an Anarchistic Theory of Knowledge**, Verso Books, London 1978 (first published by New Left Books in 1975).

[4] See Aristotle, **On the Heavens**, Book II, trans. and ed. Stuart Leggatt, *Aris & Phillips Classical Texts*, Liverpool University Press, Liverpool 1995, Ch. 14, 296b7–24 (written around 350 BCE).

[5] See Galileo, "Dialogues Concerning the Two Chief World Systems: The Second Day", in: Michael R. Matthews (ed.), **The Scientific Background to Modern Philosophy: Selected Readings**, Hackett, Indianapolis 1989, pp. 61–81 (first published in 1623).

will fall back straight down towards the cannon. Galileo then acknowledges that *all the experiments* are on Aristotle's side! This greatly pleases Simplicio, Aristotle's representative in the dialogue, who admiringly tells Salviati, Galileo's representative, that it would appear to be "an impossible feat to contradict such palpable experiences". If these experiments were false, Simplicio asks, "[...] what true demonstrations were ever more elegant?". [6]

That is quite an admission from someone who is introduced as the inventor of the empirical or scientific method in the first chapter of many science textbooks, because of his presumed insistence that observation and experiment are to have precedence over theory. According to Newton's **Third Law for Reasoning in Philosophy** (in those days people made no distinction between science and philosophy), the qualities of bodies determined by experiment ought to be considered universal, therefore the good (natural) philosopher does not consider alternative accounts of the phenomena: "We are certainly not to relinquish the evidence of experiments for the sake of dreams and vain fictions of our own devising". [7]

Nevertheless, Galileo does entertain hypotheses contrary to such powerful experimental results (contrary to Rule III), and without having produced any "other phenomena" (as Rule IV requires) — i.e., no new observations or experimental results. What did Galileo do instead? *He offered a theoretical argument*. He begins by asking what may seem to be a silly question: How do we know that the rock falls vertically? We see it, obviously, as Simplicio points out ("by means of the senses"). But what if the Earth did rotate? How would the rock move then? Galileo's move here anticipates Feyerabend's advice to imagine "*a dream-world in order to discover the features of the real world we think we inhabit*". [8] Salviati gives the answer: The motion would then be a compound of two motions, "one with which it measures the tower, and the other with which it follows it". [9] The real motion would thus be a compound of a vertical and a circular motion. Of course, this is implied: we only observe the vertical motion, since we share, with the rock and the tower, the motion of the Earth. A few pages earlier Galileo had pointed out

[6] Galileo, "Dialogues Concerning...", p. 73.

[7] Isaac Newton, **Principia**, in: Matthews (ed.), **The Scientific Background to Modern Philosophy...**, p. 146 [137–153] (first published in 1687).

[8] Feyerabend, **Against Method...**, p. 32, my italics.

[9] Galileo, "Dialogues Concerning...", p. 77.

that any motions that may be attributed to the Earth "must necessarily remain imperceptible to us […] for as inhabitants of the Earth, we consequently participate in the same motions". [10]

It follows, then, that from *seeing* the motion of the stone "you could not say for sure that it described a straight and perpendicular line, *unless you first assumed the Earth to stand still*". [11] But whether the Earth stands still is precisely what is in question. The evidence adduced to show that the Earth stands still *assumes* that the Earth stands still! Aristotle, the great logician, has committed the fallacy of *petitio principii*. [12] His "facts" assumed the theory in question.

In a few pages, then, and without providing one single piece of new empirical evidence, Galileo disposes of the main objection against the very possibility that the Earth rotates, thus creating the stage for the eventual triumph of the Copernican Revolution. By relinquishing the evidence of experiments for the sake of a dream of his own devising, he was able not only to discover important features of the world we thought we inhabited, but eventually to show that such a world was itself a dream.

What conclusions can we draw about the Tower Argument, then? According to Feyerabend, people noticed a phenomenon and *interpreted* it in what they thought was the most *natural* way, i.e., the stone *moves* only straight down. [13] It was this "natural" *interpretation* of the phenomenon, not the phenomenon itself, which contradicted the Copernican view. Galileo did away with the contradiction by providing a *different set of interpretations*. Thus, he constructed a new empirical basis! This new empirical basis, furthermore, is constituted by a *new theory of interpretation*. It is fair to conclude, therefore, that when confronted by facts that refuted his theory, Galileo changed the facts!

On the surface, there was a clash between theory and fact — for, clearly, that the stone falls straight down looked like a fact, if anything did. But what we really were dealing with was a clash between a rather explicit theory (i.e. Copernicus') and a covert theory of interpretation. After close analysis, it turns out that instead

[10] Galileo, "Dialogues Concerning…", p. 69.

[11] Galileo, "Dialogues Concerning…", p. 77, my italics.

[12] See Galileo, "Dialogues Concerning…", p. 77.

[13] Feyerabend, **Against Method…**, pp. 69–98.

of theory vs. fact, we have theory vs. theory. In any event, the main moral of the story is that observations make theoretical assumptions, and thus it is arbitrary to *always* go along with the judgment of experience, no matter how careful, intersubjective, etc., it may be. (Again, all those requirements were met in the case of the Tower Argument).

Galileo's admiration for Copernicus did not decrease, even though Copernicus, "with reason as his guide [...] resolutely continued to affirm what sensible experience seemed to contradict". [14] Reason, it appears, can overturn the verdict of experience. In Galileo's case, as Feyerabend reminds us, [15] he came upon "the existence of a superior and better sense than natural and common sense": the telescope, which then joins "forces with reason". [16]

The second, and major, difficulty for empiricism, as Feyerabend points out, is that Galileo's trust in the telescope required the granting of several *theoretical* assumptions. Images from the heavens would travel immense distances, enter a different medium upon hitting the Earth's atmosphere, work their way through the telescope, and finally be handled by a brain that had never perceived anything like them. To be assured that those images were not significantly distorted, Galileo needed supporting theories about optics, about the nature of light, about the atmosphere, about the interaction between light and a variety of gases, about the telescope, and about perception. We may realize, then, that it was not Galileo's telescopic *observations* that challenged the geocentric view of the universe, but his observations together with a host of assumptions from many supporting or auxiliary sciences that had not yet been invented, and were thus only theoretical guesses at that time. The crucial question was: could experience alone have reconciled the magnitudes of the planets with Copernicus' thesis? If, by experience, we mean sensory experience, the answer is "no". If we allow telescopic experience, then we should remember that such experience could be taken as reliable only if interpreted on the basis of certain theories. The answer, again, is "no".

To make matters worse, most of the auxiliary sciences in question were not within Galileo's reach. Some of them required hundreds of years of development

[14] Galileo, **Dialogue Concerning the Two Chief World Systems: Ptolemaic and Copernican**, trans. Stillman Drake, *Modern Library Science*, Modern Library, New York 2001, p. 381.

[15] See Feyerabend, **Against Method...**, p. 103.

[16] Galileo, **Dialogue Concerning...**, p. 381.

before they could fully back Galileo's hunches. Thus, to a good empiricist of the day, many of Galileo's theoretical assumptions should have seemed unwarranted.

If we take a more flexible approach, however, the situation does not look so dismal. We have seen that the telescope could be trusted only if we made certain theoretical assumptions. But the same analysis that leads to this result applies to the eye as much as it does to the telescope. The eye is also an instrument. Visual perception is a complex process in which the brain takes into account the "input" not just from the retina, but also from the inner ear and hundreds of skeletal muscles (to determine the position of the body), *and* from the other senses. Think of how vague images suddenly come into focus when we smell the particular scent of a flower in a forest or hear the growling of a dog in a dark street.

The brain does not merely "copy" or "process" the shapes and colors that objects imprint on the retina, as we can easily tell by noticing how often in our visual perception shape and color remain constant. Once we have identified an object as a red apple, we tend to see it that way even if we look at it from an odd angle and in a yellow light (so the frequency of the light bouncing off the apple and hitting the retina is not that of red). And, as we will see later, the brain also uses memory and imagination in making its "pictures" of the world.

That perception should work in these and other complex ways is the result of the history of adaptations of the brains of our ancestors to a variety of environments. And, as extensive as that ancestral history has been, it is quite limited compared to the range of situations that science considers. The extent to which the senses can be "trusted" is thus not a matter for philosophy alone to determine. Psychology tells us of the richness and complexity of perception; neuroscience may help reveal the structures that make such richness and complexity possible; and evolutionary biology may explain how those structures arose and give us clues about where they apply. [17]

Galileo, incidentally, as Feyerabend quotes him, [18] is quite conscious of what is at stake. Time and again he praises Copernicus for resisting the verdict of experience. "There is no limit to my astonishment", Galileo writes, "when I reflect that Aristarchus and Copernicus were able to make reason so conquer sense that, in

[17] See Munévar, **A Theory of Wonder…**, pp. 133–172.

[18] See Feyerabend, **Against Method…**, p. 101.

defiance of the latter, the former became mistress of their belief". [19]

Feyerabend is often considered in conjunction with Thomas Kuhn, though he often not only differs from, but is also very critical of, the latter — even if his starting point is Kuhn's account of the practice of science. An interesting angle presented by that account is that in Kuhn's "normal science", which is research based on an accepted scientific paradigm, we can learn not only what most scientists normally do, but also the roots of the main models of scientific method offered by philosophers of science. For example, in empirical work undertaken to articulate the paradigm theory, we find:

(a) The determination of physical constants (e.g., the universal gravitational constant, Avogadro's number, coefficients, etc.).

(b) The determination of quantitative laws (e.g., Boyle's law).

There is a striking resemblance between these two types of factual research and inductivism. Boyle, for example, took measurement after measurement until he was satisfied of having a basis broad enough for his famous generalization that the pressure and the volume of a gas are inversely proportional. But even in such cases we should note how the paradigm directs the enterprise of fact collection, for Boyle's research made little sense unless his paradigm had first assured him that air was a fluid to which he could apply the elaborate concepts of hydrostatics.

Since these two types of research comprise so much of normal science, it is not surprising that many have taken them as characteristic of the nature of science. But whereas in inductivism the emphasis is placed on the justification that such investigations provide for the theories of science, in Kuhn's scheme they play no such role. The paradigm is not in question. On the contrary, if it were not assumed, these investigations with their inductivist air would make no sense. Apparently, by examining science in its historical context, we not only gain a new understanding of its nature, but also come to understand some of the fixations in the history of the *philosophy* of science.

With this application in mind, let us consider one last type of factual research aimed at articulating the paradigm:

(c) Experiments designed to choose between alternative ways of extending a paradigm to areas closely related to the area of success of the paradigm, but

[19] Galileo, **Dialogue Concerning…**, p. 328.

where the paradigm gives no specific direction as to the most fruitful approach. There were, for example, many plausible ways of extending the caloric theory of heat, e.g. chemical combination, friction, compression, etc.

Hypotheses are then made, tested, and rejected if they conflict with experience. And in the experiments to choose between the different alternatives we can see a strong resemblance to the crucial experiments of the falsificationist. But this is at best a case of *in-house* falsificationism. The paradigm, once again, is not in question. What is in question is merely a particular proposal to extend or articulate the paradigm. Nevertheless, in this and other aspects of normal science we can find the roots of the tendency to see the testing of hypotheses as *the* fundamental characteristic of science. This tendency is reinforced by the spectacular disputes occurring during revolutionary periods (extraordinary science), when alternatives are openly sought and paradigms really brought into question.

At any rate, we are now in a position to realize how it was that some philosophers could look at science and see inductivism in it, whereas others — in part spurred by the epistemological failures of the inductivists — could find falsification to be of the essence. But when looking at science through Kuhn's spectacles, we see that what resembled inductivism and falsificationism were merely the expected functions of the normal practice of a mature science — that is, of research based on a paradigm.

Nevertheless, these "new" things that the paradigm brings to the scientific community are not just additions to the accomplishments of the old view: they often *replace* such accomplishments. To change paradigms may well involve a change in sets of facts about the world as well. Thus, the growth of science need not be cumulative. A revolution in science, Kuhn says, has the nature of a gestalt-switch, of a change of perception about the universe (in the particular field involved). It would be unusual for it to be otherwise, since what used to be seen as a recalcitrant anomaly in one paradigm is now seen as straightforward, perhaps even obvious, in the new one. Choice between paradigms, Kuhn claims, "proves to be a choice between incompatible modes of community life". [20]

If all this is correct, then it does not seem possible to give reasons that are logically or probabilistically compelling for why the new paradigm is better than the

[20] Thomas S. Kuhn, **The Structure of Scientific Revolutions**, 2nd Edition, Chicago University Press, Chicago — London 1970, p. 94.

old one. It is rather a question of providing a clear exhibit of what the new scientific practice will be like. And this exhibit can be extremely persuasive, persuasive enough to encourage the adherents of old ways of doing science to step into the new circle and evaluate its supporting evidence in its terms.

Within research based on a paradigm, i.e. within normal science, the paradigm supplies the standards for evaluating the merits of competing claims. But when the paradigm itself is in question (thus, when the standards themselves are in question), there is no higher authority to which appeal can be made. A successful scientific revolution, then, brings about the establishment of a new scientific order.

Analytical philosophy, the dominant approach in the English-speaking world, has very often proceeded on the basis of the credo that most philosophy can be reduced to the philosophy of language, whether formal or natural language: if we could just be transparent and rigorous about meaning, our philosophical problems would either be solved or just fall by the wayside. Given Kuhn's approach, though, the meanings of scientific terms would depend on how scientists use them in their respective paradigms. It came to seem, then, that the same terms would have different meanings, and so the problem of the incommensurability of meanings was born. Although the book discusses how, on this issue, philosophers have expended much effort for little gain, I will mention how Feyerabend explains its pointlessness.

The issue of difference in meanings was of monumental significance for philosophers of science, because they thought of the latter in terms of derivations, and a derivation is invalid if the meanings of the terms in the conclusion (e.g., conserved masses in Newton) are different from those in the premises (e.g., relative masses in Einstein). But this is a problem for philosophers only. Scientists are not troubled by it in their disputes. For Feyerabend, "incommensurability" simply means that there are no common standards for measurement. The bottom line is that there may be no common sets of facts with which to judge one theory or paradigm superior to another. But when we put the matter this way, we realize that we are actually talking about the possibility of overthrowing its empirical foundations. And this we have done, without semantic mirrors. [21]

[21] See MUNÉVAR, **A Theory of Wonder…**, pp. 27–48.

Kuhn correctly claims that a comprehensive view is abandoned not because it has anomalies, but because it is replaced by an alternative. Anomalies thus do not refute a paradigm, but they may bring a crisis about if they are thought to be important enough (for then the failure to assimilate them assumes great significance). And Feyerabend largely agrees. [22]

No anomaly, however, Feyerabend points out, is as important as one which a competitor claims to have explained — no anomaly, that is, accentuates more the loss of confidence in the paradigm. The reason is that, as Kuhn believes, a paradigm is accepted on the basis of its promise of future performance — the promise, that is, that it will prove the best way to conceive of the world. When a competing would-be paradigm seems to be doing better, our faith in the *promise* of our anomaly-besieged paradigm may falter. Thus, Feyerabend thought, we will create more crises, and therefore more fruitful change, in Kuhn's own terms, by providing a mechanism to strengthen the anomalies. To accomplish this goal, science should be organized so as to require the *continuous generation of alternatives*. This Feyerabend calls the *principle of proliferation.* [23]

The principle of proliferation, and within its operation, the principle of tenacity (that scientists should continue to work at what seems promising to them), create the conditions for fruitful change and improvement in science. Moreover, they lead to greater human happiness. Therefore, both humanity and science are the better for their presence.

As Feyerabend argues, counter-inductive hypotheses give us evidence that cannot be obtained in any other way. Prejudice is often discovered not by analysis, but by contrast. If, as we have seen, every fact is already viewed in a certain way, and to progress often requires viewing facts in a different way, then we simply need alternative ways of seeing. As for the conflict between those counter-inductive hypotheses and the facts — and it is that conflict that presumably makes them counter-inductive — we should remember that no theory ever agrees with all the facts in its domain. We have already seen why this should be so (e.g., Kuhn's account of how a paradigm is a promise of results and not a collection of them). If such conflict is grounds for throwing out a theory, then we should throw

[22] See Feyerabend, **Against Method…**, p. 202.

[23] See Paul K. Feyerabend, "Consolations for the Specialist", in: Lakatos and Musgrave (eds.), **Criticism and the Growth of Knowledge…**, pp. 197–230.

out all theories. The main reason for not trembling in the shadow of the facts is that facts are constituted by older ideologies, and thus a clash between facts and theories may actually be an indication of progress, an indication that our probe is coming into contact with some of the principles assumed in familiar observational notions. [24]

It is often said that we cannot step outside science to see whether it represents the world. This simple point is supposed to dog the idea that truth is correspondence to reality. And maybe it does. But we may still observe the relationship between our science and the world by comparing our science with an alternative interpretation of what the world is like. As Feyerabend says, "*We need a dream-world in order to discover the features of the real world we think we inhabit* (and which may actually be just another dream-world)". [25] In this, Feyerabend echoes John Stuart Mill. [26] If our present views are right, by criticizing them from another vantage point we come to understand them better. And if they are not right, we gain the opportunity to replace them.

If this is so, however, we come to realize that any idea, no matter how ancient or absurd, is capable of improving our knowledge. This sounds preposterous at first. For example, we finally got rid of all that Aristotelian nonsense in science. Why bring it back? But then, many of the central ideas of modern science were once considered preposterous. Consider, to name only three, heliocentrism, held by Aristarchus; atomism, held by Democritus; and evolution, held by Lamarck and before him by even more disreputable characters. Of course, the modern versions of those ideas are quite different. But the fact of the matter is that thinkers like Copernicus, Dalton, and Darwin found promise in those discredited ideas and took the trouble to develop them. To those thinkers we owe in large part the glory of modern science. Here we can observe in operation both the principle of proliferation and that of tenacity.

Feyerabend arrives at this position not via a mere examination of historical cases, but through a historical examination backed by "an analysis of the relation

---

[24] See Munévar, **A Theory of Wonder…**, pp. 27–48.

[25] Feyerabend, **Against Method…**, p. 32, my italics.

[26] See John Stuart Mill, "On Liberty", in: Michael L. Morgan (ed.), **Classics of Moral and Political Theory**, 4th Edition, Hackett Publishing Co., Indianapolis — Cambridge 2005, pp. 1010–1068 (first published in 1859).

between idea and action".[27] Or as Einstein once put it: "The external conditions which are set for [the scientist] by the facts of experience do not permit him to let himself be too much restricted, in the construction of his conceptual world, by the adherence to an epistemological system. He therefore must appear to the systematic epistemologist as a type of unscrupulous opportunist…".[28]

The situation is, then, as follows. According to the rationalist, alias methodologist, alias systematic epistemologist, certain events in the history of science constitute progress. But, Feyerabend points out, for those events to come about some scientists have to be opportunistic enough to adopt "whatever procedure seems to fit the occasion".[29] This means that even the best of methodological rules *must* be violated from time to time. This inherent limitation of all rules implies that nothing can be excluded once and for all. To a methodologist this amounts to an admission that *anything goes*. Therefore, *from the methodologist's point of view*, anarchy will occasionally be essential to science.

Now, what about the rules of logic? Must science obey them? Let's see. An inference is valid if and only if its corresponding conditional is a logical truth. To say that a sentence is a logical truth is to say that it comes out true no matter what the actual truth values (true and false) of its components are. Take, for example, the sentence "I am Martian, or I am not". This sentence is true if I am Martian and true if I am not, since both possibilities are covered. There are no more possibilities; thus, the sentence will be true no matter what.

Valid inferences are then required to have logical truths as corresponding conditionals. The problem is that the conditionals of logic are very peculiar. Indeed, they are not equivalent to those of the sciences or of real life. A conditional of logic, called a "material conditional", has an antecedent (the sentence that follows the "if") and a consequent (the sentence that follows the "then"), just as real conditionals do. It also shares another property with real conditionals: whenever the antecedent is true and the consequent false, the entire conditional is considered false (e.g., "If Feyerabend was born in Austria, he is Chinese").

---

[27] Feyerabend, **Against Method…**, p. 17.

[28] Albert Einstein, "Remarks Concerning the Essays Brought Together in this Co-Operative Volume", trans. Paul Arthur Schilpp, in: Paul Arthur Schilpp (ed.), **Albert Einstein: Philosopher-Scientist**, *The Library of Living Philosophers*, Vol. VII, MJF Books, New York 1951, p. 684 [665–688].

[29] Feyerabend, **Against Method…**, p. 10.

Here the similarity ends: material conditionals are true under all other conditions. For example, in the logic of logicians, the following is true: "If the moon is made of cheese, the human population problem is due to an overproduction of storks". The reason is simply that the antecedent is false, and all material conditionals with false antecedents are automatically true. There need be no connection at all between antecedent and consequent. By contrast, in the conditionals of science we often find a causal connection between antecedent and consequent (e.g., "if the mass of that star is one hundred times that of the Sun, it will eventually become a black hole").

The consequence of this line of thought is that material conditionals do not apply in science. And one of the main reasons is precisely that they can be made true simply by having a false antecedent. But, and here we come to the crucial point: a presumably valid inference must have a corresponding conditional that is always true. The determination of such truth must be made, for the logician, in terms of his definition of the material conditional. That is, that determination will give a value of true in all cases in which the antecedent is false. Of course, these cases will include antecedents with contradictions in them — precisely the conditionals that correspond to the most puzzling "valid" inferences. But these cases are inadmissible in science! And since the notion of logical validity is tied to that of the material conditional, such a notion of validity is also inadmissible in science! In other words, the logic of logicians does not apply to science (at least not fully) — and neither, by the way, does it do so to real life.

Nevertheless, as illustrated in this essay, the historical and psychological facets of science do make a great difference; indeed, the tides of historical investigation have washed away the castles that philosophy built on the sands of logic.

Science as Part of Nature

It is high time to acknowledge that human beings are part of nature and that, when analyzing their conceptions of themselves and the world, we should take seriously the lessons that Darwin began to teach us in 1859 with the publication of his **Origin of Species**. [30] In this vein, it pays to recall that science is a product of intelligence, that intelligence is an instrument of adaptation and itself the result of

[30] Charles Darwin, **On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life**, John Murray, London 1859.

evolution. Now, what distinguishes intelligence from other chemical and neural mechanisms of interaction with the world is that intelligence transcends the ability to respond to the immediate demands of the environment, as Piaget made clear. [31] It is this freedom of response that permits intelligence to form sweeping views of the world and the means to criticize them. Science is, of course, a communal enterprise that involves a division of labor and is carried out in a social milieu. It is, thus — to speak perhaps metaphorically, but not inaccurately — a social application of intelligence to the understanding of our world, a world of which we ourselves are part.

The view I will argue for is not like the analogical evolutionary epistemology of Popper, Campbell, Toulmin, and Hull. Nor is it like Quine's naturalized epistemology. In Chapter 8, I go on to sketch a biological view of scientific rationality: a view more in line with the spirit, and occasionally the letter, of Lorenz's thought. [32]

I do not wish to say that science is *like* nature, but rather that it is part of nature. Let me return to my account of the origin, the genesis of science. I claimed earlier that science is a social expression of intelligence in dealing with the world. A characteristic aspect of intelligence, Piaget tells us, is that it allows organisms to transcend the immediate demands of the environment so that they may behave to their greater advantage at a more convenient time and place. This indirect action of intelligence permits us, for example, to evaluate alternative courses of action on the basis of prior experience, and to rehearse future actions in the imagination. Piaget found intelligence to be a powerful instrument of adaptation. His insight is buttressed by an analysis of the neural basis of intelligence. As the complexity of the central nervous system increases, so does the flexibility of its response. Information from the senses can now be rerouted, delayed, and stored; it can be compared with information from other sense modalities, as well as with previous information, and with expectation. As the complexity of the central nervous system increases, so does the number of modes of indirect action. Intelligence, of course, has many facets, but there is one, in particular, that suggests how adaptability may be increased: I am referring to curiosity.

---

[31] See Jean Piaget, **The Psychology of Intelligence**, Adams & Co., Littlefield 1972.

[32] See Munévar, **A Theory of Wonder…**, pp. 119–132.

Curiosity is best seen as a form of play (with the environment), and as such it arises in situations that do not demand immediate attention to the environment. Animals play, or exhibit curiosity, not to satisfy hunger or sex drives directly, but because play (and curiosity as a form of it) provides a motivation of its own: it is enjoyable. In trying to satisfy its curiosity, an animal rehearses a wide range of skills, and of combinations of skills, that will later enable it to deal more effectively with the environment. For those skills — cognitive skills, in this case — will permit the animal to either know its environment better or devise strategies by which to accomplish that goal. (By "knowing the environment better" I mean developing means of dealing with the environment that lead to a more successful response). Through curiosity, others can adapt to environments for which their species have not been "designed", and still others, who preserve much of their playful character throughout their lives, can adapt to changing environments.

My suggestion is that we can find the origins of science at the juncture where human curiosity about the world becomes social. Just as we came to hunt in groups — an exercise of another form of social intelligence — now we try to satisfy our curiosity in groups. There are two main reasons why this should be so. The first is simply that to explore our environment in great depth often requires the cooperation of others. An experiment in gravitational physics may have to be carried out beyond the Earth's atmosphere and will involve fields as diverse as rocketry, metallurgy, superconductors, chemistry and orbital dynamics, as well as the general theory of relativity. Even in the same field some projects are much too large to be taken up by a single investigator. At a certain level of sophistication, division of labor becomes of the essence.

The second reason is that the very attempt to satisfy one's curiosity in a specific way may well require the prior existence of an institution devoted to such a goal. One cannot just decide to study the interactions between hadrons and leptons unless one has available to one the possibility of entry into a society committed to a program of research in elementary particle physics; likewise, one cannot just decide to become a milkman in a continent where placental mammals do not exist.

Once it becomes social, the attempt to satisfy our curiosity about the world gains extraordinary power, and so do the skills that result from it. Now, if this general account is correct, we should expect that such a social enterprise (science) would allow us to:

(a) have a more thorough interaction with the environment,

(b) increase the number of environments to which we can adapt, and

(c) adapt to a changing environment.

What increases adaptation (or the potential for adaptation) in one type of organism depends on the sorts of interactions organisms of that type can have with the environment. An opposable thumb may be of great value to animals that exhibit a certain skeletal structure and development of their central nervous system, e.g., humanoids, in many but not all environments. But to other types of animals, say horses or cockroaches, an opposable thumb would be disadvantageous or useless in most typical environments.

Nor should one think that every product of science, or every scientific skill or technique, must be clearly adaptive. Surely, the model of science as arising out of curiosity does not entail such a conclusion. After all, not every skill that an animal develops in its play with the environment will later prove to be of the greatest usefulness. Some of them will be of no use at all, and others will be put to use indirectly. If science is play, as I suggest, we are likely to devise all sorts of games in exploring our world, and some of those games are bound to be very abstract and intricate. A few of those may greatly facilitate the development of some skills that will prove useful in our dealing with one or several environments (e.g., by providing for conceptual, mathematical, or instrumental elaborations of our theories). As it is, Kuhn already pointed out that much scientific work goes into the articulation of the main views we hold.

With this account of the genesis and nature of science in mind, let me now turn to the problem of rationality. Given that science is a communal enterprise with a division of labor, the question of the rationality of science should be asked of science as a whole. This point goes directly against the typical manner in which philosophers have approached the question of rationality: they look at whether this or that great scientist, or research group, adhered to this or that set of methodological rules. But it seems to me that to approach the question in this manner is to commit a reasoning mistake. In trying to determine whether a football (soccer) team is good, we cannot merely look at whether its players are individually good. We wish to know instead the social and structural relations that the team exhibits during its games: whether, in short, it can play as a team. When a player creates space into which another can move to receive the ball and score, the social unit is working well. Even brilliant individual action often depends on good positioning by teammates that keeps the defense guessing about what the next move is going to be. In any event, to ascribe the properties of the individual members to the whole team would be a mistake, and it seems to me that the same is true in science.

I propose that the question "What would it take for science to be rational?" be thought of as equivalent to the question "How should science be structured so as to perform its function?" My evolutionary account forces us to pose the question in this way, and it also suggests how to answer it. To determine how science should be structured or organized so as to perform its function is to determine what it would take for science to enable us to adapt to new environments or to a changing environment, and so on.

We may then easily realize that scientific views are often designed to make sense of a particular environment: that of our experience. But success in one environment, or in one context, does not guarantee success in others. If the environment or context is likely to change, it pays to have a strategy for generating alternative points of view. That is, an organizational requirement of science is that it should allow dissension and the generation of alternatives. Moreover, this requirement of intellectual freedom must be accompanied by another: that scientific views be given a chance to develop. They must begin like all ideas: as small and almost certainly vague. Yet, if we see some promise in them, we should not abandon them just because they are in conflict with the evidence. We may do so, but we should not have to. Otherwise, ideas would never blossom into glorious scientific achievements. Let us recall a key reason why counterevidence need not be always decisive: observation and experiment always have to be interpreted, but the interpretation that makes them into counterevidence may depend on theories that the very development of the new ideas would expose as inadequate.

These two requirements of intellectual freedom — that science must be organized so as to permit, and perhaps encourage, the generation and development of new ideas — must be met by science as a whole, though not necessarily by individual scientists. Some scientists will generate new approaches, others will develop them in a very stubborn fashion, and still others will reject all but the accepted views of the time. Some scientists will be open-minded, and some will not. That does not matter, as long as there is enough room in science for all kinds. If there is, if science does employ a strategy for accepting and developing new ideas, then science will be in a better position to adapt flexibly to new challenges. It will thus permit us to deal with new or changing environments. If so, it will perform its function, the function suggested by my biological account. And, on a very straightforward means-ends analysis of rationality, we ought to conclude that science would then be a rational enterprise.

It should be noted that this means-ends analysis also provides a recipe for solving the contemporary problem of scientific rationality. Two demands were placed upon the epistemologist. The first was that science should proceed in such a manner that its practitioners generate opportune methods and procedures. When viewed from the perspective of my social conception of rationality, science offers precisely a general strategy to improve the chances of accomplishing the desired goal. The second demand was that the first should be met without tying science to the dangers of being ruled by a stagnant elite. The two requirements of freedom under the social conception will reduce such dangers.

Indeed, what I have called the two requirements of intellectual freedom overlap to a great extent with Feyerabend's principles of proliferation and tenacity. [33] What looks like anarchy under a conception that equates rationality with adherence to methodological standards now looks like the very sort of organizational structure that science ought to have. With the shift to a social conception, we also shift from looking for rationality in the choice of theory to finding rationality in the ability to reach certain goals. As happens in science itself, the solving of a problem takes place within a transformation of outlook in the field.

I do not mean to say, incidentally, that irrationality at the level of the individual becomes rationality at the social level. My point is rather that the concept of scientific rationality no longer should be applied to individual scientists. Social properties are social properties. Nevertheless, there are many other ways in which the question of individual rationality may still come up. For example, once a certain view of the world is found promising by a scientist or group of scientists, procedures are devised for developing it further and testing it. Many goals and subgoals must then be reached, and some means may be more effective in reaching those goals. Once more, a means-ends analysis of rationality would be employed.

[33] See Munévar, **A Theory of Wonder…**, pp. 87–104.

Realism vs. Relativism

Scientific realism is the view that the world has a certain structure, and that it is the function of science to try to uncover it. One important version of scientific realism holds that this view is supported by the success of science because, as Richard Boyd says, truth is the only reasonable explanation for that success. [34] In this he follows Hilary Putnam, who argued that realism "is the only philosophy that doesn't make the success of science a miracle". [35] Such a position has been elaborated from then until the present by a variety of authors, with comments from J. Brown, P. Lipton, S. Psillos, E.C. Barnes, T. D. Lyons, J. Busch, G. Frost-Arnold, and F. Dellsén. [36]

By contrast, *evolutionary relativism* holds that an organism's view of the world depends on its mind, that mind depends on biology, that biology supports a logically impeccable form of relativism, and that success explains truth, not the other way around. [37] This approach is consistent with the history of science and with the science most relevant to understanding the pursuit of knowledge.

Behind the first intuition is the feeling that if realism is not right, pursuing science makes little sense. After all, the business of science is presumably to investi-

[34] See Richard Boyd, "On the Current Status of Scientific Realism", in: Richard Boyd, Philip Gasper, and John D. Trout (eds.), **The Philosophy of Science**, MIT Press, Cambridge 1992, pp. 195–222.

[35] Hilary Putnam, **Mathematics, Matter and Method**, Cambridge University Press, Cambridge 1975, p. 79.

[36] See James Robert Brown, "The Miracle of Science", *Philosophical Quarterly* 1982, Vol. 32, No. 128, pp. 232–244, https://doi.org/10.2307/2219325; Peter Lipton, "Truth, Existence, and the Best Explanation", in: Anthony A. Derksen (ed.), **The Scientific Realism of Rom Harré**, *Studies In General Philosophy of Science*, Tilburg University Press, Tilburg 1994, pp. 89–111; Stathis Psillos, **Scientific Realism: How Science Tracks Truth**, *Philosophical Issues in Science Routledge*, Routledge, London — New York 1999; Eric C. Barnes, "The Miraculous Choice Argument for Realism", *Philosophical Studies* 2002, Vol. 111, No. 2, pp. 97–120, https://doi.org/10.1023/A:1021204812809; Timothy D. Lyons, "Explaining the Success of a Scientific Theory", *Philosophy of Science* 2003, Vol. 70, No. 5, pp. 891–901, https://doi.org/10.1086/377375; Jacob Busch, "No New Miracles, Same Old Tricks", *Theoria* 2008, Vol. 74, No. 2, pp. 102–114, https://doi.org/10.1111/j.1755-2567.2008.00011.x; Greg Frost-Arnold, "The No-Miracles Argument for Realism: Inference to an Unacceptable Explanation", *Philosophy of Science* 2010, Vol. 77, No. 1, pp. 35–58, https://doi.org/10.1086/650207; Finnur Dellsén, "Explanatory Rivals and the Ultimate Argument", *Theoria* 2016, Vol. 82, No. 3, pp. 217–237, https://doi.org/10.1111/theo.12084.

[37] See Gonzalo Munévar, **Evolution and the Naked Truth: A Darwinian Approach to Philosophy**, *Avebury Series in Philosophy*, Ashgate Publishing Ltd, Aldershot 1998.

gate what is *out there*. If talking about what is out there is pointless (e.g., because realism is false or nonsense), then science has no particular significance. Popper, for instance, talks about realism as a metaphysical presupposition of doing science. [38] Of course, trying to show that realism is true has been such a messy affair that many philosophers, particularly in the twenty twentieth century, rose to great levels of sophistication in how they sought to wash their hands of the issue. Nevertheless, realism seems to come as standard equipment where most philosophers are concerned. As we have seen, according to Boyd, only realism can explain why scientific success is not a mystery. [39]

Absolute Truth vs. Success

Popper and Boyd notwithstanding, when we look into the history of science, we find a disturbing separation between "absolute truth" and success. Greek astronomy postulated a universe with two basic spheres: the Earth in the center, and the sphere of stars on the outer edge. This model has been an excellent guide to navigation. Only in the last century did modern science surpass it (with the help of electronic inventions, such as satellites that indicate position, etc.). That is, during more than two thousand years a completely false point of view has had great success in an area of major importance to the survival and welfare of human beings.

Boyd's claim that only realism can explain the success of science thus seems less than compelling. To make matters worse for him, the most successful scientific field of the last century is quantum physics, and quantum physics in its orthodox interpretation is decidedly anti-realist. At least, that is what Niels Bohr, the foremost thinker in the field, explicitly claimed: "[…] an independent reality in the ordinary physical sense can neither be ascribed to the phenomena nor to the agencies of observation". [40] By "phenomena", Bohr does not mean the sense data of philosophers but the subatomic objects being *measured*. Phenomena are always the result of specific interactions with specific measuring equipment, but we

---

[38] See Karl R. Popper, **Objective Knowledge: An Evolutionary Approach**, Oxford University Press, Oxford — New York 1972, p. 203.

[39] See Boyd, "On the Current Status…", pp. 195–222.

[40] Niels Bohr, "The Quantum Postulate and the Recent Development of Atomic Theory", *Nature* 1928, No. 121, p. 580 [580–590], https://doi.org/10.1038/121580a0.

should not therefore conclude that they are two separate things, one of which gives us information about the other, as Bohr insists on the "*impossibility of any sharp separation between the behavior of atomic objects and the interaction with the measuring instruments which serve to define the conditions under which the phenomena appear*". [41]

This interactionist view has many unpleasant philosophical consequences. One of them results from the fact that some measuring arrangements exclude others. In some, an electron will behave as a wave, in others as a particle, but never as both. It all depends on what kind of experimental arrangement we employ, and we thus end up with *complementary* descriptions, as happens in the Two-Slit Experiment. *Real* things, however, supposedly cannot behave this way. If we are realists, we want to know *the* way the electron really is. These complementary descriptions, moreover, cover the gamut of Heisenberg's uncertainty relations. One experimental arrangement allows us to measure the momentum of a particle, but this brings about some uncertainty as to its position, and so on. Given all of these considerations, it seems unjustified to ascribe an independent reality to those subatomic objects. Furthermore, insisting on their independent reality requires that we do away with complementary arrangements (and, therefore, descriptions) inconsistent with that reality. Yet we then rule out discovering important aspects of the subatomic "realm". As Bohr puts it: "In fact, it is only mutually exclusive of two experimental procedures, permitting the unambiguous definition of complementary physical quantities, which provides room for new physical laws, the coexistence of what might at first sight appear irreconcilable with the basic principles of science". [42]

Brains and Knowledge

Some may think that evolution supports scientific realism, for even at the level of perception it seems clear that (approximately) true or veridical perceptions give an organism a greater chance to survive. Organisms with false perceptions in-

---

[41] Niles Bohr, **Atomic Physics and Human Knowledge**, John Wiley and Sons, New York 1958, pp. 39–40, my italics.

[42] Niels Bohr, "Can Quantum Mechanical Description be Complete?", in: Stephen Toulmin (ed.), **Physical Reality: Philosophical Essays on Twentieth-Century Physics**, Harper & Row, New York 1970, p. 139 [122–143].

stead are likely doomed. Moreover, by "truth" they mean correspondence to the way things really are. Nevertheless, considerations from evolutionary biology, neuropsychology, and other scientific fields make implausible the claim that veridical ideas or perceptions are required to explain evolutionary success. Going further back in the history of science, Galileo's comments on perceptual realism should no longer come as a surprise:

> […] tastes, odors, colors, etc., so far as their objective evidence is concerned, are nothing but mere names for something which resides exclusively in our sensitive body[…] so that if the perceiving creatures were removed, all of these qualities would be annihilated and abolished from existence. [43]

What may surprise some is that Galileo's attitude, albeit with an evolutionary turn, is quite common today among scientists whose work is obliged to take perception into account. As the neuroscientist V.S. Johnston tells us, we must abandon the common-sense view of reality, because:

> […] although the external environment is teeming with electromagnetic radiation and air pressure waves, without consciousness it is both totally black and utterly silent. Conscious experiences, such as our sensations and feelings, are nothing more than evolved illusions generated within biological brains. [44]

Consider an example: the color spectrum is linear, while our experience of the spectrum is not. Perceptually, red and green are "opposing" colors, but the wavelength difference between them is barely 1/150,000,000,000 m. Why do we perceive such an extraordinarily small difference, then? Evolution gives us the reason: green "corresponds" to a band of frequencies reflected in normal white light by chlorophyll molecules, whose detection would have given an evolutionary advantage to our remote ancestors. Perception of other colors such as red and blue helps fix the detection of chlorophyll at dawn and dusk and in cloudy days. In a different place, where vital resources depend on different chemical compounds, evolution may bring about a different perceptual parceling of the color spectrum. This means that the "normal" color experiences of creatures on Earth and on Carnap II (a yet-to-be-discovered planet in Andromeda) may be quite different, even

[43] Galileo, "The Assayer", in: Matthews (ed.), **The Scientific Background to Modern Philosophy…**, pp. 56–57 [56–61](first published in 1623).

[44] Victor S. Johnston, **Why We Feel: The Science of Human Emotions**, Perseus Books, Cambridge 1999, p. viii.

at the hypothetical level of the "sense data" so beloved by the logical positivists.

When looking at Figure 1. we clearly see a three-dimensional image. But we know it is a two-dimensional drawing. When I project it on a screen, I run my hand up and down and sideways over it. My hand confirms what my intellect affirms: it is not three-dimensional. But try as we might, we see it as three-dimensional. That is, we see it as it is not. Of course, there exist reasons why our visual mechanism works this way, and one of them is that, as we will see below, there are evolutionary advantages, at least on occasion, for perceiving falsely.

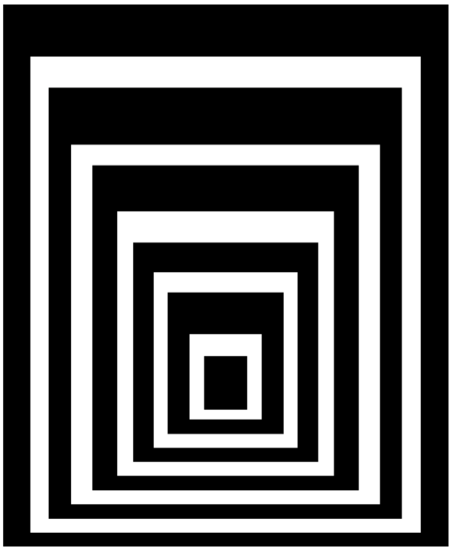


Figure 1. Drawing courtesy of Ruoyu Huang.

The extraordinary complexity of the brain mechanisms that produce our perceptions contrasts starkly with the ready-to-be-used character of the perceptions they produce. Instead of the realist impulse, it seems more sensible to suppose that the brain constructs perceptions that will allow us to interact promptly and successfully (at least much of the time) with our environment. Thus, when we look at a scene full of snow (or dots, or letters), but there is a different feature in our blind spot, we do not see the feature: instead, our brain fills the blind spot with more of the same — snow, or dots, or letters. [45] This construction by the brain is more than a bet on what is most likely to be in front of us. Indeed, the

[45] See Susan BLACKMORE, **Consciousness**, Oxford University Press, New York 2002.

brain takes the direct response of its own neurons to sensory input and transforms it into a meaningful perception that is in important respects different from that response. As Edelman and Tononi point out:

> […] the activity of many neurons in sensory […] pathways can be correlated with rapidly varying details of a sensory input […] but do not seem to map to conscious experience. For example, patterns of neural activity in the retina and other early visual structures *are in constant flux* and correspond more or less faithfully to spatial and temporal details of the rapidly changing visual input. However, *a conscious visual scene is considerably more stable*, and it deals with properties of objects that are *invariant* under changes in position or illumination, properties that are easily recognized and manipulated. [46]

Daniel Hoffman's remarks on illusions show how far the brain may go in constructing perception. In **Figure 1.**, for example, we know that the perception is radically different from the sensory input. Perceptions, he explains with a very apt metaphor, are like the icons that appear on user-friendly computer screens. The actual software and hardware those icons "stand for" are complicated and beyond the knowledge of most computer users. The colorful, easy-to-identify icons constructed by the programs are not like anything in particular — they are not like the programs, certainly — but they are convenient "symbols" for them. The relation is arbitrary, since the symbols could have been quite different. Similarly, the relation between our perceptions and those "real" objects they are supposed to be about (and that, on some accounts, produce them) is arbitrary. They could have been quite different also. Let us consider the case of color.

As we have seen, even creatures somewhat similar to terrestrial land mammals may chromatically divide the world differently from the way we do, and might thus experience different colors when looking at our "green" grass and "red" apples. But we need not travel to other planetary systems. Right here in the Earth's ocean we find shrimp with as many as eleven primary colors — instead of our three primary colors (red, green and blue), which combine to produce the others, according to Young and Helmholtz's trichromatic theory of color vision. The biological basis for this theory is provided by the relative activation of our three types of cone. [47] Some women actually have four types of cone, and are thus likely to perform more color discriminations than men. The shrimp mentioned

---

[46] Gerald Edelman and Giulio Tononi, **A Universe Of Consciousness: How Matter Becomes Imagination**, Basic Books, New York 2000, p. 141, my italics.

earlier may share our planet, but their "world" is quite different from ours, and so are their environmental challenges and opportunities. It should not be surprising, then, that their color experience should be different as well. Moreover, there are also the better-known cases of birds, snakes, and insects that *see* portions of the electromagnetic spectrum that remain dark to us (ultraviolet or infrared). Being able to do so is clearly advantageous to them. These considerations suggest that the "reason" for perception is pragmatic, and that there is nothing intrinsic about "greenness" or "redness" (as regards corresponding to essential "features" of the world).

The present evolutionary line of thought is strengthened by the discovery that perception works through exaggeration, particularly when small differences of degree are perceived as drastic differences in kind. This process of radical, false contrast is the same as that employed by space science in its observation of other worlds (and of our own planet, for that matter). I have in mind so-called "false color", in which arbitrary bands of electromagnetic frequencies can be assigned colors arbitrarily to help us determine at a glance patterns of global temperatures. We can also photograph contiguous regions made of materials of slightly different hues of brown and show them instead in clear-cut patterns of, say, purple and gold.

The mammalian brain, in particular, has evolved an appropriate structure. As Paul Churchland explains it, the lateral geniculate nucleus (LGN), for example, "projects a massive cable of ascending axons forward to your visual cortex. Curiously, the neurons in your visual cortex project ten times as many descending axons to make synaptic connections within the LGN". [48] As he says, this pattern is "widespread throughout the brain". "Higher" centers in the cortex can, thus, by means of these descending axons, affect "lower" LGN neurons' response to stimuli with previous information, concerns, etc. What this means is that previous states of the brain partially determine your present perception, often by tilting the arrangement of the otherwise confusing patterns of light hitting your retina in favor of one interpretation found meaningful on the basis of previous experience.

---

[47] See Christof Koch, **The Quest for Consciousness: A Neurobiological Approach**, Roberts & Company Publishers, Englewood 2004.

[48] Paul M. Churchland, **The Engine of Reason, the Seat of the Soul: A Philosophical Journey into the Brain**, *Bradford Books,* MIT Press, London — Cambridge 1996, p. 99.

Perception is also often influenced by evolutionary considerations, many of which do their work in subcortical areas. Francis Crick suggested that the thalamic reticular nucleus plays a big role in the processing or filtering of potential perceptual consciousness — a suggestion recently vindicated. M. Halassa and his team individuated a complicated neural circuit that also includes the basal ganglia. [49] Most of the activity of this circuit concerning perception consists in a massive inhibition of incoming signals. In addition, the signals that are favored involve movement, size, and bright coloring, as well as other properties that would be relevant to being able to survive or adapt to the environment. For example, Tadin and other autors found inhibition of the detection of large objects in favor of the perception of the motion of small objects. [50]

This construction of perception through brain structure makes use of many neuronal networks, including those that involve emotions. Emotions can, of course, interfere with useful perception, but they may also provide the key to resolving perceptual ambiguities. The reason they can do so is that they provide us with what Edelman and Tononi call "value systems". In neuronal terms, out of several possible interpretations emotions will tilt the perceptual system towards those that are most significant for, say, our survival (so a tiger's face will suddenly stick out of the jungle's canopy). Not unlike perception itself, emotions also work by exaggeration, by tending to react very strongly to subtle differences in the situations in which we find ourselves. [51] Once again, exaggeration and contrast, rather than "true" representation, are the keys to success.

Emotions motivate us to action. They do so by exaggeration, by tending to react very strongly to subtle differences in the situations in which we find ourselves. In this, the brain adapts us to the world as it does with perception. Nevertheless, wise people advise us to let reason prevail over emotion. The reasonable conclusion is that emotion plays a role in effective reasoning, at least when it comes to

---

[49] See Ralf D. Wimmer, L. Ian Schmitt, Thomas J. Davidson, Miho Nakajima, Karl Deisseroth, and Michael M. Halassa, "Thalamic Control of Sensory Selection in Divided Attention", *Nature* 2015, Vol. 526, No. 7575, pp. 705–709, https://doi.org/10.1038/nature15398.

[50] See Duje Tadin, Woon Ju Park, Kevin C. Dieter, Michael D. Melnick, Joseph S. Lappin and Randolph Blake, "Spatial Suppression Promotes Rapid Figure-Ground Segmentation of Moving Objects", *Nature Communications* 2019, Vol. 10, article number: 2732, https://doi.org/10.1038/s41467-019-10653-8.

[51] See Johnston, **Why We Feel…**, p. 87.

practical reasoning.

On our planet many animals have senses that are quite different from ours. The luna moth, for example, sees in the ultraviolet. To human eyes, the male and female moths look pretty much alike. But the moths themselves detect some very vivid patterns that distinguish them. Other animals perceive the world through even more drastically different senses: vipers detect heat, bats navigate with sonar, and the main interactions with the world of some fish are based on electric fields.

Electroreceptors are particularly interesting. They work by analyzing the distortions to the electric waves or pulses the fish sends out when they return. The fish needs a sophisticated system to distinguish its own returning signals from those emitted by other fish, particularly members of its own species, as the latter could be rivals or possible mates. Entire social and courtship rituals depend on the proper manipulation of the fields (e.g., turning them down in the presence of a friendly fish). The world appears very different to them than it does to us. We depend, for instance, on the perception of surfaces that reflect light, which to the fish may not be an important consideration (those surfaces may be transparent to the electroreceptor), while the changes in mood that are given away by changing electric fields may well be.

An even more important lesson is that such different senses are likely to require different brain structures. As intelligence develops, it follows the paths opened up to it by the structures with which the animal interprets the world, including its social world, and which the animal uses to cope with that world. This is not a merely theoretical point. We can find such differences in structure in the brains of ordinary fish and fish that perceive using electric fields. Of particular interest is the clear segregation between relay cells and pacemaker cells in the brains of the latter. We encounter there a radically different type of brain. An intelligent creature whose main sensory modality is electric rather than visual will have patterns of thought completely foreign to us.

What this line of reasoning establishes, as the book explains, is not that *all* (perceptual and conceptual) frames of reference are equally good, but rather that, no matter how good a frame is, others may be equally good, in the sense of the level of interaction with the world that they permit the relevant species to enjoy. Given that, it would be arbitrary to say of any one frame that it gives us *the way* *the world really is*. If it turns out that there is only one “good” frame (e.g., the human one), we still cannot say that its view of the world is *the* correct way of viewing the world, for it is a mere accident that natural history did not bring about different but equally good frames (or ones that would have been better than ours). The difficulty is not due to lack of information, for there is no new information that, added to any one view, could turn it into the uniquely proper representation of the world. And when every possible view fails to represent “the world” correctly, we seem to face a dilemma: either the world is unrepresentable, or else the expression “the world” is a mere convenience — there is no truth of the matter there, as is discussed in the book.

The views of “the world” produced by different frames may thus be *complementary* in a sense akin to Bohr’s. It is possible, then, to produce information in one frame that is not logically, conceptually, theoretically, or mathematically equivalent to any produced in another, even if it is presumably about the same aspect of “reality”. (They are “equivalent” only when that word is understood as a synonym of “analog”, which is not the relevant sense here). As Bohr pointed out, the wave and the particle descriptions are in no relevant sense *equivalent*. An analogous situation (as in quantum physics) may thus obtain between descriptions of the “world” produced in mutually exclusive frames of reference.

It is worth emphasizing that there is nothing common to waves and particles for us to discover that would provide a more complete description of the subatomic realm. So, there is no information we lack: failure to arrive at “reality” is a consequence of complementarity, not of ignorance on our part. My suggestion is, not surprisingly, that since analogous conditions obtain in the case of the different conceptual biological frames, we should arrive at the same sort of conclusion: our talk of reality is misplaced — there is no truth of the matter “out there”.

Not all brains are equal. Some are better at certain tasks than others, depending, of course, on what structures they have and how those structures function alone and in concert with other brain structures. How do those structures come about? In a variety of ways. While still in the mother’s womb, for example, neurons grow in the new brain, led by their growth cones, which are attracted to certain chemicals and move in the direction of the strongest signal. A slight difference in genes can alter the balance of those chemicals in the new brain and thus the structures that result. For example, visual area V1 in the occipital cortex is emphasized considerably in an animal for whom quick and sharp appraisals of three-dimensional structures are crucial aspects of their environments (e.g., the flying fox), but not so developed in the mouse. There is some overlap of structure in these cases, but we can imagine easily that as perceptual structures dominate the brain to a large extent, they affect the overall function of the brain. It also happens that, in the development of the brain, to emphasize a structure (or function) means to make a choice at the expense of others. Furthermore, as natural selection slowly shapes the evolution of the brain, a change in emphasis, which leads to a change in structures, provides a different context, a different niche. And given a different evolutionary context, other new structures are more likely to arise, creating even larger differences. For example, when an organism acquires the ability to react to small amounts of chemicals in the atmosphere or oceans (smell), several new structures will be favored over others (such as neurons to carry the information, connections to combine it with the sense of taste, others to synchronize it with an internal sense of position, and still others to allow the organism to act on the perception of those chemicals quickly).

Doing things in one way, then, starts to exclude doing them in another. At appropriate phylogenetic distances, e.g., between humans and electric fish, the brains have several incompatible structures and functions. At even larger evolutionary distances, one type of intelligence will be mutually exclusive of certain others. Their resulting approaches in dealing with the world will thus also be mutually exclusive. (We even experience that within our own species: interpreting a situation in terms of waves excludes interpreting it in terms of particles). Nevertheless, they both may give equally fruitful information about the world. They are thus "complementary" in a sense akin to Bohr's.

Neither uncertainty relations, nor the notion of complementarity, reflect ignorance on our part. These are precisely the conditions described earlier, conditions that led to the conclusion that, since "real" objects could not behave this way, we should not speak of "reality" in the subatomic world. My suggestion is, not surprisingly, that since analogous conditions obtain in the case of different conceptual frames, we should arrive at the same sort of conclusion: our talk of reality is misplaced — there is no truth of the matter "out there".

This is the view at which I arrived many years ago as a result of my failed attempt to develop an interactionist epistemology along the lines of Popper's scientific realism. It was Paul Feyerabend who first drew my attention to the similarity between my evolutionary relativism and Bohr's epistemological position regarding quantum mechanics — a position that I had not fully appreciated until then. I do not mean to suggest, though, that Bohr's epistemology is on the whole similar to mine. The views of his that I favor were clearly confined by him to the description of the behavior of atomic objects, and he might very well have looked unsympathetically upon a generalization of those views to the entire field of empirical knowledge. He did try to extrapolate the concept of complementarity to a few other areas of experience, without much acceptance anywhere. The significant difference, it seems to me, is that the principle of complementarity made eminent sense where the classical notion of reality was found wanting by the quantum phenomena. In the philosophical view that I propose, the classical notion of reality is found wanting even for macroscopic phenomena. This finding requires a certain amount of reflection, and in that reflection an analog of Bohr's principle of complementarity helps us understand the possibility of equally worthy yet non-equivalent frames.

The reasoning I have employed is also analogous to that used by Einstein concerning some important conceptual consequences of his Special Theory of Relativity. In evolutionary relativism we can show that (a) our perceptions and conceptualizations of the world are relative to a biological frame of reference (or, rather, to a biologico-social frame of reference), and (b) that there is no preferred frame. Likewise, in the Special Theory of Relativity, (a) mass, length, and time are relativized to an inertial frame of reference, and (b) there is no preferred inertial frame of reference. From the fulfillment of these two conditions, (a) and (b), we conclude that mass, length, and time are relative properties and so cannot have absolute values. I trust I have used an analogous mode of reasoning to establish the relativism of perception, intelligence and science.

This suggests that the notion of performance can be fruitfully tied to the notion of understanding — particularly scientific understanding, which in turn suggests a biological theory of relative truth. I will introduce that theory by means of an illustration.

Let me suppose that when I perceive a mango, I see it as golden-red, taste it as juicy and delicious, and find it beautiful enough to make it the subject of a still-life painting. Successful perceptions of the mango lead me to suppose that they best serve me for dealing with that portion of the world (the mango). Imagine, now, that beings of a very different kind have perceptions of the mango different from mine, though just as successful as mine. Upon coming to know of these beings' perceptions, should I stop trusting my perception of the mango? Should I replace it by the perceptions those beings have? The answer in both cases is "no". For I have already said that this is the best way I can perceive that section of the world. Thus, learning of the other beings' perceptions would lead me to conclude that I do not perceive "the way the mango really is", simply because doing so would require me to claim my frame of reference as the preferred one, and that would be arbitrary. Nonetheless, this conclusion does not obligate me to change my perceptions of the mango.

In this example, my perceptions best exploit the resources of my genotype (or rather, of the genotype of beings like me) in dealing with a typical environment. Whenever the resulting performance is as satisfactory as in the case of the ideal perceptions of the mango, we tend to think that the world must be just as we perceive it. We then feel entitled to speak of true representations. Our talk of truth is warranted by the successful interaction with the world, given our frame of reference. A "little green man", though, can also have successful interactions with the mango, but since his frame of reference is drastically different from ours, his perceptions will also be different. Nevertheless, that success will entitle him just as much to speak of truth.

Of course, in our conceptualizations of the world — e.g., in our scientific views — we seldom, if ever, reach the level of sufficiency or satisfaction given in the case of the mango. But when we do approach it, we speak of truth. Human science is ultimately a variety of human behavior, and human behavior is part of the human phenotype. And yet, at least in the case of humans, we should really speak of phenotypes, since the plasticity of human behavior is such that there could be many expressions of the genotype even in the same environment. It seems to me also that some phenotypic expressions better exploit the resources of our genotype in a given environment. Likewise, some scientific viewpoints (with their complex machinery of practices, experimental procedures, and so on) permit us to exploit better the resources of our genotype in a given environment (e.g., in dealing with the dynamics of bodies). In other words, some viewpoints enable us to realize more of our potential for performance. In this biological context, a viewpoint is said to be relatively true when it approaches the limits of the resources of the genotype. When a theory allows us to deal with the world in a great variety of ways, when thinking that the world accords with the theory leads to continuing success, when this capacity for performance clearly surpasses that of its competitors, then we come to think that the world must be so. And in a limited domain we may not be able to conceptualize the world any better. We conceptualize the world as powerfully as in the earlier example we perceive the mango. It is then that we may speak of truth.

This account explains why it may be worthwhile to make distinctions between what is true and what is untrue. On my account, we would say that a viewpoint is true because the interaction (with the world) that results is (or seems to be) of very high quality, and greatly superior to its alternatives. This is not to say that we have finally arrived at the way things really are, but merely that our "picturing" of the world approaches the level of quality exemplified earlier by our perception of the mango. This "picturing", however, just like that perception, is relative to a frame of reference, and thus the kind of truth involved is a relative one.

The relative (or seemingly absolute) truth of a viewpoint depends on its success, not the other way around. Certain views hold us in a strong grip because they permit a strong, successful interaction with the world. I suggest that it is that grip under those conditions of successful interaction that seems to have a special character — one that is what philosophers have sought to explain by invoking correspondence theories of truth.

Few views are so successful that they are accepted on the basis of a clearly superior track record. They are accepted because, in a few instances, the success achieved is felt to be so striking that many members of the discipline find that way of doing things extremely promising. That is, they are accepted on the basis of a promise of performance, rather than overall performance. After a group takes up a way of thinking about the world and elaborates it to the point that its performance begins to approach the limit of the potential of the genotype in the relevant environments, its truth seems "evident" to all those concerned. There are also cases in which that limit is not approached, but the scientists committed to the point of view are unable to think about the world in any other way, and so keep on feeling that the truth must lie somewhere along the path they have undertaken.

There are, in addition, cases in which a point of view, if developed, would have better exploited the resources of the genotype — and so, years later, we feel that an opportunity has been missed. Moreover, I suppose there are cases in which the superiority of a point of view goes unrecognized. All the sensible things that philosophers wanted to convey with the old correspondence-based notions can be conveyed with this relativistic and evolutionary one.

It is in this sense that I accept the truths of evolutionary theory, neuroscience, and other scientific views I am sympathetic to as being relative. To alien beings elsewhere, engaged in completely different modes of interaction with the universe, evolutionary thinking, say, of any kind resembling ours might not make sense within the bounds of their conceptual equipment. But to beings like us it does. Or so I believe. I would say similar things about the truth of my philosophical position, if called upon to do so, and I would adduce as evidence precisely the evolutionary and other scientific arguments I have provided so far.

Such evolutionary relativism has some features in common with pragmatism's conception of ideal truth as approaching a limit. But they differ in that on the evolutionary account that limit may well be a horizon that recedes.

Treating science as human behavior, i.e., as part of the human phenotype, allows us to put into perspective the question of its rationality. [52] Organisms as simple as bacteria may change their behavior radically as their environments change — from, say, being impoverished to being rich in nutrients (from preying on their competitors to avoiding them instead). The second phenotype does not "follow" from the first in a logical or rational way. The organisms simply undergo a radical change of posture toward the environment. Similarly, our scientific views at a given point in time need not be continuous with those that replace them, although in some cases there might be quite a bit of continuity. In any event, looking at the history of science from a naturalistic perspective gives us some strong hints of a new conception of rationality.

Once again, this view does not depend on a mere analogy with evolution, as others have proposed. After all, what does follow, from even a close analogy to evolution? Surely not that science is rational. Being like the evolution of life, *which is not itself rational*, cannot suffice. Thus, the very approach seems wrongheaded. To make matters worse, all such proposed analogies have broken down upon close inspection.

I much admire Feyerabend's keen insight and skillful use of the history of science to help us understand how to approach the pursuit of science. Nevertheless, it has struck me that his own contributions could be enhanced by looking at sci-

[52] See Munévar, **A Theory of Wonder…**, pp. 119–132.

ence through the lens of neuroscience as construed in the context of evolutionary biology.

Acknowledgments

I thank Phillip McMurray for his helpful comments.

Gonzalo Munévar

References

Aristotle, **On the Heavens**, Book II, trans. and ed. Stuart Leggatt, *Aris & Phillips Classical Texts*, Liverpool University Press, Liverpool 1995, Ch. 14, 296b7–24 (written around 350 BCE).

Barnes Eric C., "The Miraculous Choice Argument for Realism", *Philosophical Studies* 2002, Vol. 111, No. 2, pp. 97–120, https://doi.org/10.1023/A:1021204812809.

Blackmore Susan, **Consciousness**, Oxford University Press, New York 2002.

Bohr Niels (ed.), **The Philosophical Writings of Niels Bohr: Essays 1932–1957. On Atomic Physics and Human Knowledge**, *The Philosophical Writings of Niels Bohr*, Vol. 2, Ox Bow, Woodbridge 1987.

Bohr Niels, "Can Quantum Mechanical Description be Complete?", in: Toulmin (ed.), **Physical Reality…**, pp. 122–143.

Bohr Niels, "The Quantum Postulate and the Recent Development of Atomic Theory", *Nature* 1928, No. 121, p. 580–590, https://doi.org/10.1038/121580a0.

Boyd Richard, "On the Current Status of Scientific Realism", in: Boyd, Gasper, and Trout (eds.), **The Philosophy of Science…**, pp. 195–222.

Boyd Richard, Gasper Philip, and Trout John D. (eds.), **The Philosophy of Science**, MIT Press, Cambridge 1992.

Brown James Robert, "The Miracle of Science", *Philosophical Quarterly* 1982, Vol. 32, No. 128, pp. 232–244, https://doi.org/10.2307/2219325.

Busch Jacob, "No New Miracles, Same Old Tricks", *Theoria* 2008, Vol. 74, No. 2, pp. 102–114, https://doi.org/10.1111/j.1755-2567.2008.00011.x.

Churchland Paul M., **The Engine of Reason, the Seat of the Soul: A Philosophical Journey into the Brain,** *Bradford Books*, MIT Press, London — Cambridge 1996.

Darwin Charles, **On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life**, John Murray, London 1859.

Dellsén Finnur, "Explanatory Rivals and the Ultimate Argument", *Theoria* 2016, Vol. 82, No. 3, pp. 217–237, https://doi.org/10.1111/theo.12084.

Derksen Anthony A. (ed.), **The Scientific Realism of Rom Harré**, *Studies In General Philosophy of Science*, Tilburg University Press, Tilburg 1994.

Edelman Gerald and Tononi Giulio, **A Universe Of Consciousness: How Matter Becomes Imagination**, Basic Books, New York 2000.

Einstein Albert, "Remarks Concerning the Essays Brought Together in this Co-Operative Volume", trans. Paul Arthur Schilpp, in: Schilpp (ed.), **Albert Einstein…**, p. 665–688.

Feyerabend Paul K., "Consolations for the Specialist", in: Lakatos and Musgrave (eds.), **Criticism and the Growth of Knowledge…**, pp. 197–230.

Feyerabend Paul K., **Against Method: Outline of an Anarchistic Theory of Knowledge**, Verso Books, London 1978 (first published by New Left Books in 1975).

Frost-Arnold Greg, "The No-Miracles Argument for Realism: Inference to an Unacceptable Explanation", *Philosophy of Science* 2010, Vol. 77, No. 1, pp. 35–58, https://doi.org/10.1086/650207.

Galileo, "Dialogues Concerning the Two Chief World Systems: The Second Day", in: Matthews (ed.), **The Scientific Background to Modern Philosophy….**, pp. 61–81 (first published in 1632).

Galileo, "The Assayer", in: Matthews (ed.), **The Scientific Background to Modern Philosophy…**, pp. 56–61 (first published in 1623).

Galileo, **Dialogue Concerning the Two Chief World Systems: Ptolemaic and Copernican**, trans. Stillman Drake, *Modern Library Science*, Modern Library, New York 2001.

Johnston Victor S., **Why We Feel: The Science of Human Emotions**, Perseus Books, Cambridge 1999.

Koch Christof, **The Quest for Consciousness: A Neurobiological Approach**, Roberts & Company Publishers, Englewood 2004.

Kuhn Thomas S., **The Structure of Scientific Revolutions**, 2nd Edition, Chicago University Press, Chicago — London 1970.

Lakatos Imre and Musgrave Alan (eds.), **Criticism and the Growth of Knowledge**, *Proceedings of the International Colloquium in the Philosophy of Science*, Vol. 4, Cambridge University Press, London 1970.

Lakatos Imre, "Methodology of Scientific Research Programmes", in: Lakatos and Musgrave (eds.), **Criticism and the Growth of Knowledge…**, pp. 91–196.

Lipton Peter, "Truth, Existence, and the Best Explanation", in: Derksen (ed.), **The Scientific Realism…**, pp. 89–111.

Lyons Timothy D., “Explaining the Success of a Scientific Theory”, *Philosophy of Science* 2003, Vol. 70, No. 5, pp. 891–901, https://doi.org/10.1086/377375.

Matthews Michael R. (ed.), **The Scientific Background to Modern Philosophy: Selected Readings**, Hackett, Indianapolis 1989.

Mill John Stuart, “On Liberty”, in: Morgan (ed.), **Classics of Moral…**, pp. 1010–1068 (first published in 1859).

Morgan Michael L. (ed.), **Classics of Moral and Political Theory**, 4th Edition, Hackett Publishing Co., Indianapolis — Cambridge 2005.

Munévar Gonzalo, **A Theory of Wonder: Evolution, Brain, and the Radical Nature of Science,** *Philosophy of Science,* Vernon Press, Wilmington — Malaga 2021.

Munévar Gonzalo, **Evolution and the Naked Truth: A Darwinian Approach to Philosophy**, *Avebury Series in Philosophy*, Ashgate Publishing Ltd, Aldershot 1998.

Newton Isaac, **Principia**, in: Matthews (ed.), **The Scientific Background to Modern Philosophy…**, pp. 137–153 (first published in 1687).

Piaget Jean, **The Psychology of Intelligence**, Adams & Co., Littlefield 1972.

Popper Karl R., **Objective Knowledge: An Evolutionary Approach**, Oxford University Press, Oxford — New York 1972.

Psillos Stathis, **Scientific Realism: How Science Tracks Truth**, *Philosophical Issues in Science Routledge*, Routledge, London — New York 1999.

Putnam Hilary, **Mathematics, Matter and Method**, Cambridge University Press, Cambridge 1975.

Schilpp Paul Arthur (ed.), **Albert Einstein: Philosoph–Scientist**, *The Library of Living Philosophers*, Vol. VII, MJF Books, New York 1951, p. 665–688.

Tadin Duje, Park Woon Ju, Dieter Kevin C., Melnick Michael D., Lappin Joseph S. and Blake Randolph, “Spatial Suppression Promotes Rapid Figure-Ground Segmentation of Moving Objects”, *Nature Communications* 2019, Vol. 10, article number: 2732, https://doi.org/10.1038/s41467-019-10653-8.

Toulmin Stephen (ed.), **Physical Reality: Philosophical Essays on Twentieth-Century Physics**, Harper & Row, New York 1970.

Wimmer Ralf D., Schmitt Ian L., Davidson Thomas J., Nakajima Miho, Deisseroth Karl, and Halassa Michael M., “Thalamic Control of Sensory Selection in Divided Attention”, *Nature* 2015, Vol. 526, No. 7575, pp. 705–709, https://doi.org/10.1038/nature15398.

Listy do redakcji

Letters to the Editor

ISSN 2299-0356

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**
Philosophical Aspects of Origin s. 233–238

https://doi.org/10.53763/fag.2022.19.2.202

LIST DO REDAKCJI / LETTER TO THE EDITOR

Bradley Monton
Wuhan University

How Can an Atheist Defend Intelligent Design?

Received: August 30, 2022. Accepted: September 6, 2022. Published online: September 22, 2022.

In 2009, when I was a philosophy professor at University of Colorado Boulder, I published a book with Broadview Press, **Seeking God in Science: An Atheist Defends Intelligent Design**. [1] In the book, I show respect for what the proponents of intelligent design are up to. I engage with them as intellectually respectable fellow inquirers, not as opponents in a culture war. In the first decade of the 2000s, the topic of intelligent design had so much heightened emotion and vitriol associated with it — I'd like to think that my book played a role in calming the tensions.

But at the time my book was published, it made a lot of people mad. My philosopher of science colleague at the time, Carol Cleland, had a strongly pro-science attitude, and considered herself "NASA's philosopher". Her attitude toward me was one that many science-minded non-religious philosophers had — paraphrasing, the attitude was: "what were you thinking? How could you give cover to the enemy like this? This is a culture war and you're on the wrong side".

In this letter, I will answer that question "what were you thinking?". But let's go back to 2009 and set the stage more first.

Carol Cleland wasn't the only colleague who was unhappy with me. My metaphysician colleague at the time, Michael Tooley, got fixated on the fact that, when I give an extemporaneous talk to about 300 people as part of our department's "popular philosophy" series, I said "evolution is most likely true". He, having

[1] Bradley Monton, **Seeking God in Science: An Atheist Defends Intelligent Design**, Broadview Press, Peterborough 2009.

a strongly pro-science attitude, thought that this was a horrible thing to say, and wrote a long email to the whole department about how I shouldn't have said it. What was my sin? According to Tooley, I should have said that evolution is *extremely* likely to be true. I tried to respond by saying those two claims are actually compatible — evolution being most likely true is compatible with evolution being extremely likely to be true — but Tooley wasn't having it. He thought that on conversational implicature grounds, I should have made the more specific claim that evolution is extremely likely to be true.

Though tenure provides very limited protection in the state of Colorado, that was a time when I was glad I had it, because had I been on some sort of renewable position, I'm confident that my position would not have been renewed. I'm even more confident my position would not have been renewed had I told my colleagues what I really think, which is that I don't think evolution is extremely likely to be true. Part of the issue is my fault — I don't know enough biology to have that degree of confidence in evolution. But part of the issue is that I find the biology-based intelligent-design reasoning to have some force. I see their point that it is prima facie surprising that some "irreducibly complex" biological systems (like the bacterial flagellum) have evolutionarily developed, when it doesn't seem like the individual parts of the system could have any evolutionary purpose.

I'm not an evolutionary biologist — perhaps evolutionary biologists do have a compelling story to tell about how such complex systems have arisen (though I've looked and haven't seen it). Really, the story they tell would be just a guess though — we don't have access to enough data about the past to fully figure out how evolution of each individual biological system happened, assuming it did. It would be like a "just-so" story that the evolutionary psychologists tell, where for pretty much any given behavior, we can take a guess as to how evolution would have led to that behavior.

I didn't get further into biological details like this in my book, in part because I endorse a very different sort of response to that sort of biology-based intelligent-design reasoning. My response is based on physics. I think that the universe is most likely (but not extremely likely) to be spatially infinite, with an infinite number of stars and planets. In principle, that doesn't yield diversity — in principle, every planet could be exactly the same. But based on the part of the universe we can observe, we do see lots of diversity, and so this leads me to hypothesize that there continues to be diversity across the infinite universe. As a result, even an event that is extremely unlikely to happen on a particular planet is likely to happen somewhere in the universe. If the probability of some event happening on a particular planet is 10^{-1000}, but you look at a collection of 10^{1001} different planets, it's likely that the event happens on at least one of those planets. My hypothesis is that there aren't just 10^{1001} planets, there are an infinite number of planets. So this extremely unlikely event probably occurs an infinite number of times (since there are an infinite number of different collections of 10^{1001} planets). These extremely unlikely events can include the evolutionary arising of irreducibly complex biological systems.

This, by the way, gets to the crucial mistake of William Dembski's 2001 book **No Free Lunch: Why Specified Complexity Cannot Be Purchased without Intelligence**, [2] and the crucial mistake of many related pro-intelligent-design arguments. Dembski just focuses on the *observable* universe, and hence assigns a small number to the availability of complexity on the basis of that limited slice of our universe. But there's no reason to focus on the observable universe, unless we have some weird metaphysical view that the observable universe is the universe. What we can observe is an arbitrary epistemic limitation; it's plausible to think that the universe is way larger. In fact, for complex physics-based reasons, it's plausible to think that the universe is spatially infinite — measurements of the large-scale curvature of the universe suggest that, as far as we can tell, it's flat.

So, back in the first decade of the 2000s, I concluded that Dembski was wrong, but I thought he was wrong in a philosophically interesting way. Other atheist-minded philosophers gave bad arguments against him, which bothered me for multiple reasons. Sometimes, the atheist-minded philosophers would misrepresent his argument as weaker than it is, which is always unfair to one's opponent. (In fact, the charitable thing to do is to help one's opponent in making their argument stronger, before explaining why even the strengthened version of the argument doesn't work. It's surprisingly rare how often I see that happen in philosophy – too often, people are just looking to score points). But sometimes, the atheist-minded philosophers would evince fundamental misunderstandings of the relationship between science and philosophy. I thought this was embarrassing, for the people who are defending the ultimate conclusion I support (that there is no God) to be giving such fundamentally bad arguments. So all this made me sympathetic to the proponents of intelligent design — it's like being sympathetic to the kid you see bullied on the school yard, especially when you are ideologically affiliated with the bullies.

One such fundamental misunderstanding that some atheist-minded philosophers evinced is that they said that science couldn't possibly provide evidence for

---

[2] William A. Dembski, **No Free Lunch: Why Specified Complexity Cannot Be Purchased without Intelligence**, Rowman & Littlefield Publishers, Lanham 2001.

the existence of God. A philosopher who infamously did this is Robert Pennock, author of the 1999 book **Tower of Babel: The Evidence against the New Creationism**.[3] When I pointed out how mistaken Pennock's arguments were in a paper draft that I posted online, Pennock tried to bully me into taking down the paper by angrily making veiled legal threats against me. I found this appalling enough that I discussed it all in my book, and thankfully I haven't heard from him since. Those who use anger and bullying in a philosophical debate — not to mention legal threats — are most likely revealing to us that they don't have anything better to offer.

So one way I defended intelligent design is in this limited, "in principle" way: in principle, contra confused philosophers like Pennock, science could provide evidence for the existence of God. For example, science could provide evidence that the universe is spatially (and temporally) finite, and that there are complex biological systems that would be highly unlikely to arise via evolutionary processes in this finite universe. Maybe we just got lucky and they did arise and gave rise to us. But whenever there's an appeal to "luck", it makes sense to look for alternate explanations.

A key reason I deem the existence of God unlikely is that I think the universe is spatially infinite. (That in itself is interesting, right? It's not a claim you normally see at the core of pro-atheism arguments). But even if we discovered the universe is spatially finite, I wouldn't necessarily conclude that God exists. I'd be more likely to conclude that a designer exists, but that designer does not have features that would lead us to think of the designer as a traditional God. I'd be more likely to conclude that the designer is natural, not supernatural. This is another way that an atheist could defend intelligent design.

What sort of evidence could we get for a natural intelligent designer? Here's just one example. Consider the fine structure constant, which measures the strength of the electromagnetic force. This is a dimensionless fundamental constant of physics; its value doesn't change with a change of units. It's currently estimated to be 1/137.035 999 206, with some uncertainty about what those last two digits are. So far, it's been measured to 12 significant digits. Suppose that future physicists are able to measure the constant much more precisely — out to say 1000 significant digits. And suppose that, after 16 significant digits, the numbers are all zeros — so the fine structure constant looks like this: 1/137.035 999 206 346 400 000 000 000 000 000 000 ... 000. This would be surprising, right? Why

[3] Robert T. Pennock, **Tower of Babel: The Evidence against the New Creationism**, The MIT Press, Cambridge — London 1999.

would a dimensionless fundamental constant of physics only be specified to 16 significant digits?

In the face of this evidence, I would conclude that we are most likely living in something akin a computer simulation, or perhaps a physical reality that was designed by finite beings utilizing a binary computer. The traditional God, being all-powerful, wouldn't have the need to truncate the digits of the fine structure constant at 16. But if you're an intelligent but finite computer programmer designing a universe, and you have to type in the value of one of the fundamental constants, you aren't going to type forever — a natural thing to do would be to type some digits and then stop.

That's just one example of scientific evidence that could lead me to conclude that intelligent design is most likely true — but it's still true in a way that doesn't lead me to question my atheism. I already think that there are intelligent aliens in existence elsewhere in our universe — in fact, I already think that there are an infinite number of them. (Alas, most likely they are all too far away for us to communicate with them, given relativity theory and the constraint of the speed of light). And I already think that some of these aliens are vastly more intelligent than us. (With an infinite number of alien species in existence, it would be hubris to think otherwise). But with that hypothetical fine-structure evidence, I'd be learning something new — that not only are there super-intelligent aliens elsewhere in our universe, but there are also super-intelligent aliens that were involved in the design of our universe. (Here's a fun aside: maybe they know that, in the universe they're living in, there are super-intelligent aliens involved in the design of their universe too. And so on? There is an interesting philosophical question here, about whether there has to be a fundamental metaphysical ground).

This hypothetical fine-structure evidence doesn't provide evidence for the Christian God. It doesn't provide evidence for an omnipotent being. It doesn't even provide evidence for a being that is worthy of worship or love. (At least, I wouldn't choose to worship the intelligent aliens who designed our universe, though I guess I'd be thankful that they created this system that gave rise to me. Given all the bad things that happen to innocent people, I certainly wouldn't view the intelligent aliens as being worthy of my love).

But what the hypothetical fine structure evidence does provide is evidence of an intelligent designer. Moreover, it's evidence of an intelligent designer that doesn't lead me to question my belief that nowhere in reality is there such a being that theists are talking about when they say they believe in God.

That's just one example of how future science could develop, such that we get scientific evidence for intelligent design. And once we're open to this line of thinking, we can see that there are many other ways future science could develop that would lead us to conclude that intelligent design theory is true. I readily acknowledge that some of those ways would provide evidence for a being that is closer to the traditional God that theists believe in.

I don't see the evidence now, but science is an ongoing process. The key reason I wrote my book — my answer to the question "what were you thinking?" — is that I wanted to promote the view that we should be open to the possibility that we get such evidence in the future. Moreover, there's nothing intellectually or culturally wrong with being open to the possibility that we get such evidence in the future — there's nothing wrong with seeking God in science. This is something that theists and atheists alike should be able to agree on.

Bradley Monton

References

DEMBSKI William A., **No Free Lunch: Why Specified Complexity Cannot Be Purchased without Intelligence**, Rowman & Littlefield Publishers, Lanham 2001.

MONTON Bradley, **Seeking God in Science: An Atheist Defends Intelligent Design**, Broadview Press, Peterborough 2009.

PENNOCK Robert T., **Tower of Babel: The Evidence against the New Creationism**, The MIT Press, Cambridge — London 1999.

ISSN 2299-0356

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**
Philosophical Aspects of Origin s. 239–247

https://doi.org/10.53763/fag.2022.19.2.209

LIST DO REDAKCJI / LETTER TO THE EDITOR

Michael Denton✉

The Inference to Intelligent Design is Independent of Any Religious Claim: The Wonder of Water

Received: November 28, 2022. Accepted: December 12, 2022. Published online: December 20, 2022.

In this short letter I explain, as someone agnostic about most religious claims, why I find the inference to design or ID very hard to refuse, on any consideration of the evidence of environmental fine-tuning for life as it exists on Earth. I describe here various properties of water that convey an irresistible impression of having been fine-tuned specifically for life as it exists on Earth. These include the various unique properties of water which make possible the hydrological cycle (which in turn makes terrestrial life possible), water's unique fitness for forming both the medium of the circulatory system and the matrix of the cell — including the latter's hydrophobic property, which plays an essential role in generating the higher-order supramolecule structures in the cell — and its various unique thermal properties, which make possible warm-blooded organisms and play a vital role in climatic amelioration. This truly amazing ensemble of instances of fitness manifest in the properties of water can have only one reasonable explanation: intelligent design.

It is important to state unambiguously at the outset that the inference to design is not, as is sometimes claimed, in any way based on religious belief, although it has, of course, religious implications, and has been alluded to by apologists in defence of theism over the past four centuries that have elapsed since the scientific revolution (i.e. by Newton, Paley, Alfred Russell Wallace, by many others, and by present day advocates of ID). As many supporters of ID have pointed out, the inference to design is embraced in many different disciplines, and with respect to many different phenomena. Researchers in archaeology and criminology, or scientists seeking evidence of intelligent life in outer space, must in many instances judge an artifact, particular pattern, or occurrence to be the result of design rather than chance. In such cases — *self evidently* — inference to design has absolutely nothing to do with religious belief. In my view there is, in fact, not the slightest difference between the sort of inference to design employed in various secular disciplines and that made by fellows of the Discovery Institute.

On a personal note, although through most of my life I have been relatively agnostic as regards the claims of many of the world's leading faiths, and while I do not currently belong to any church or attend any religious services, I believe the inference to intelligent design to be inescapable on any sensible consideration of the fine-tuning of the environment for life as it exists on Earth. I should point out, however, that I do not think it supports any of the various religious claims made with respect to the nature of that intelligence — such as whether or not, for example, that intelligence is providential, as is claimed by apologists for the specifically Judeo-Christian conception of God. This point was also stressed by Bradley Monton, in his recent paper "How Can an Atheist Defend Intelligent Design". [1]

Incidentally, without entering into a detailed review of Monton's paper, I do agree with his view that if the universe is infinite, then this poses a severe challenge to intelligent design. However, at present I am not aware of any convincing evidence for the claim that it is so. Unless the universe is indeed infinite, then I would argue that given the evidence of the extraordinarily exact environmental fine-tuning for life evident in so many natural phenomena (such as the suitedness of water for so many diverse ends, as described below), design rather than chance is the only rational option.

I consider here several of the very remarkable ways in which the properties of water are fine-tuned for life — not just simple cellular life, but also beings of our biological design — which I believe can only be explained by ID in a finite universe, irrespective of any prior philosophical or theological beliefs.

Consider, first, water's unique fitness for the hydrological cycle, a cycle vital to all terrestrial life on Earth (including ourselves). To begin with, it is *the only sub-*

[1] Bradley Monton, "How Can an Atheist Defend Intelligent Design?", *Filozoficzne Aspekty Genezy* 2022, Vol. 19, No. 2, pp. 233–238, https://doi.org/10.53763/fag.2022.19.2.202.

stance which is capable of existing in three material states — liquid, gas and solid — in the ambient temperature range on the Earth's surface. It is this unique capacity that enables the grand hydrological cycle, enabling liquid water to evaporate from the sea as a gas (water vapor), condense into drops of water in the clouds, and fall to the ground as rain (liquid water) or snow (solid water), before eventually flowing back via rivers of liquid water or glaciers (rivers of solid water) to the sea.

Thus, because of its *unique capacity to exist in the three material states* under the ambient conditions obtaining on the surface of the Earth, water is uniquely fitted to enable the hydrological cycle, and thus to provide a continual supply of water for terrestrial life.

Nevertheless, life on land requires, in addition to water, a continuous supply of the essential elements of life. The four main atoms of organic matter — C, H, O and N — are derived from the atmosphere, but the other essential atoms, including Na, P, S, Cl, K, Ca, V, Cr, Mn, Fe, Co, Ni, Cu and Zn, must be leached from the rocks (which are their only source for land-based life) as the rivers return to the sea, and distributed to the terrestrial hydrosphere, making them available to land-based life. But what is *truly amazing* — these words are carefully chosen — is that water possesses an additional ensemble of properties that are profoundly suited to eroding the rocks and leaching the essential minerals from them.

These additional elements of fitnes include: (1) water's being an excellent solvent; (2) its possession of a low viscosity (close to the lowest of any liquid) and consequent high mobility which, in conjunction with the tiny flakes of rock it carries, promotes erosion of the rocks; (3) its having a high surface tension (one of the highest of all the fluids we are familiar with) which draws water into the crevices in the rocks, where (4) in higher latitudes and altitudes water's expansion on freezing (itself virtually unique) causes more cracking of the rocks, further assisting the erosional process; (5) when water reacts with CO_2 in the air a mild acid solution (carbonic acid) is formed, which further promotes the dissolution and weathering of the rocks. [2]

[2] See Michael DENTON, **The Wonder of Water: Water's Profound Fitness for Life on Earth and Mankind**, 1st edition, *The Privileged Species Series*, Discovery Institute Press, Seattle 2017, Chapter 1,

(Editor's note) This book has been translated into Polish and will soon be published by Fundacja En Arche.

Even so, this is not the end of the extraordinary ensemble of elements of suitedness for terrestrial life manifested in the hydrological cycle. The delivery of water enriched with the minerals of life would be of no avail without water retaining soils that are *essential for the growth of all plants and trees* that need a reliable and continuous supply of water. In water-retaining soils, the water is held in the micropores (preventing rapid drainage and loss of ground water) thanks to water's high surface tension (which, as was mentioned above, already plays a role in enhancing erosion by being drawn into narrow crevices and cracks in the rocks).

It is simply beyond belief that *the same erosional process* which ultimately leaches the minerals from the rocks *also generates* at the same time the *water-retaining soils* that hold the vital water, enriched with the necessary nutrients for life, in the soil, making plant life possible. And what physical force holds the water in the micropores in the soil? None other than the high surface tension of water itself!

Finally, perhaps the most remarkable aspect of the cycle is that the unique elements of suitedness of water for erosion and weathering of the rocks can only be exploited because of a *prior element of fitness*: namely, water's unique capability of existing in three material states under the ambient conditions on Earth. And again, the fitness of water's retention of the soils so essential for plant life can only be exploited because of *the prior fitness of water for the erosion of the rocks.*

What this means is that the properties of water which are exploited in the hydrological cycle form what is, in effect, a teleological hierarchy of fitness, where *one unique property of water enables the exploitation of a subsequent ensemble of properties to achieve a vital life-giving end*. I can think of *no single set of facts in all of science more suggestive of design.*

Curiously, another vital cycle — the circulation of blood in the body of complex organisms — is also dependent on various unique properties of water, which forms the basic medium of blood. Its excellence as a solvent is no less important as regards its role in the circulation than when it comes to leaching the minerals from the rocks in the hydrological cycle. And again, as was mentioned above, its low viscosity, which confers mobility on water in the hydrological cycle (enhancing the rates of erosion), is also another vital element of its fitness for the circulation — one which, together with the relatively low density of water, enables the heart to pump the blood through the capillary bed. Self-evidently, if the viscosity of blood were even just slightly greater, making it similar to that of many other fluids, then pumping the blood through the capillary bed would be impossible. As it is, the energy that must be devoted to pumping the blood through the circulatory system is about 10 percent of the energy "budget" in man and many other vertebrates.

Consider, next, the suitedness of water to forming the matrix of the cell. This ensemble again includes its low viscosity (which provides a highly fluid medium for the rapid movement of molecules inside the cell), and its excellent powers as a solvent (enabling it to carry in solution a vast inventory of molecular species). But it also has another vital property — less well known, but essential for the generation of the higher structural order of the cell: water's hydrophobic property (or force) arising from the electronegativities of hydrogen [H] and oxygen [O], which differ considerably, leaving the oxygen atom in the water molecule [H_2O] negatively, and the hydrogen atoms [H_2O] positively, charged.

This results in water being a highly polar compound, and leads in turn to the formation of a highly polar hydrogen-bonded network which extends throughout every contiguous body of liquid water, including the matrix of the cell. Although polar and charged compounds can readily fit into the network and *are liked*, soluble, non-polar hydrocarbon chains (which are non-polar because the electronegativities of carbon [C] and hydrogen [H] are similar) occurring in phospholipids and in the side chains of many amino acids are *not liked* and cannot "fit into" the hydrogen-bonded network, with these rendered insoluble and forced to clump together in hydrophobic complexes away from contact with water.

It is this force — the hydrophobic force — which causes the formation of the lipid-bilayer cell membrane by forcing the insoluble (non-polar) hydrocarbon chains of the phospholipids into the centre of the cell membrane, away from the aqueous phase inside and outside of the cell. It is the same force which forces the non-polar side chains of amino acids to clump together in the centre of proteins during folding and stabilizes the mature native form after folding. The hydrophobic force is also responsible for stabilizing the DNA helix, [3] as well as many en-

[3] Bobo Feng, Robert P. Sosa, Anna K.F. Mårtensson, Kai Jiang, Alex Tong, Kevin D. Dorfman, Masayuki Takahashi, Per Lincoln, Carlos J. Bustamante, Fredrik Westerlund, and Bengt Nordén, "Hydrophobic Catalysis and a Potential Biological Role of DNA Unstacking Induced by Environment Effects", *Proceedings of the National Academy of Sciences* 2019, Vol. 116, No. 35, pp. 17169–17174, https://doi.org/10.1073/pnas.1909122116.

zyme-substrate complexes. [4]

The importance of the hydrophobic force in ordering membranes and other higher-order structures in the cell can hardly be exaggerated. For it is hard to imagine how the higher structural order of membranes, proteins and DNA, etc., which arises spontaneously out of the action of the hydrophobic force, could be achieved in any other way. In other words, life, and indeed *the very existence of the carbon-based cell*, is critically dependent on water's *dislike* of hydrophobes or non-polar compounds. The protein chemist Charles Tanford was not exaggerating when he said that "[t]he hydrophobic force is the *energetically* dominant force for containment, adhesion, etc., in all life processes", adding that "[t]his means that the *entire* nature of life as we know it is a slave to the hydrogen-bonded structure of liquid water". [5]

Water's fitness to form the matrix of the cell is, as far as we know, completely unique. There is no other liquid we are aware of that could replace it in this role. In 3.5 billion years, no other liquid has been utilized for the matrix of the cell. If water did not possess the exact set of properties it does, *no carbon-based cell would exist and Earth would certainly be devoid of life*.

Now consider another completely different vital phenomenon, endothermy, which confers many advantages for advanced terrestrial life forms such as ourselves. [6] This is critically dependent on a set of unique thermal properties of water.

Firstly, its high specific heat (one of the highest of all the fluids we are familiar with) buffers the body against changes in temperature — a vital element of fitness for any warm-blooded organism that maintains its body temperature at a fixed

[4] "The hydrophobic effect is responsible for the separation of a mixture of oil and water into its two components. It is also responsible for effects related to biology, including: cell membrane and vesicle formation, protein folding, insertion of membrane proteins into the nonpolar lipid environment and protein-small molecule associations. Hence the hydrophobic effect is essential to life. Substances for which this effect is observed are known as hydrophobes". "Hydrophobic Effect", *Wikipedia: The Free Encyclopedia*, https://tiny.pl/w5ncb [15.12.2022].

[5] Charles Tanford, "How Protein Chemists Learned about the Hydrophobic Factor", *Protein Science* 1997, Vol. 6, No. 6, p. 1365 [1358–1366] https://doi.org/10.1002/pro.5560060627 [emphasis in the original].

[6] See Michael Denton, **The Miracle of Man: The Fine Tuning of Nature for Human Existence**, *The Privileged Species Series*, Discovery Institute Press, Seattle 2022, Chapter 7.

level (37–40°C in birds and mammals), given that water makes up about 60 percent of the mass of the body.

Secondly, there is water's high latent heat of evaporation — *the highest of any molecular substance*. This is another vital element of fitness wherever the environmental temperature rises above body heat, as occurs in many geographical areas, and not just in the tropics. Why is water's high latent heat of evaporation so vital? Because the only way of reducing body temperature when the environmental temperature is above 37°C is through the cooling effect of the evaporation of water on the skin. Over vast areas of the Earth, life is only possible because of the cooling effect of the evaporation of water.

And, if this is not sufficiently remarkable, the other thermal property of water, its heat-conducting capacity, is one of the highest among common fluids — an element of fitness which assists in the transport of heat from the tissues to the capillaries, and from the capillaries to the skin at the periphery. So these three thermal properties of water are each in turn profoundly and uniquely fitted to enabling endothermy in advanced terrestrial vertebrates including ourselves.

Is it not *beyond remarkable* that, as well as possessing a unique fitness for the hydrological cycle, for the circulatory system, and for the matrix of the cell, water also possesses just the right properties for endothermy? Are there any more disparate phenomena than these?

One might be tempted to imagine that these three thermal properties of water enabling endothermy would have exhausted the number of thermal properties of water fit for life. But *no*, there is another thermal property which plays a completely different vital role for life on our planet: the expansion of water below 4°C, which brings the coldest water to the surface and which, in conjunction with the expansion of water on freezing (another almost unique property of liquid water), prevents water from freezing from the bottom up — and hence enables the existence of marine and freshwater life in the higher latitudes.

There are many other ways in which the properties of water play an essential role in vital processes and phenomena which enable life to flourish on Earth. Many of these are reviewed in my monograph *The Wonder of Water.* These include the way in which its thermal properties create the great atmospheric and oceanic currents that bring heat from the tropics to the cooler higher latitudes, ameliorating the climate of the planet. Then again, there is the fact that the tectonic recycling of the crustal rocks which ensures (and has ensured for billions of years) that the source of minerals for terrestrial life is continuously replenished is only possible because of a softening of the lithosphere by water, which lowers its viscosity and renders it mobile, enabling its upthrusting above subduction zones and the mid-oceanic ridges.

In conclusion, it is the sheer diversity and multiplicity of the elements of water's fitness for life on Earth that proves so compelling. What we have in the properties of water is surely one of the most extraordinary ensembles of fitness serving a particular end — in this case that of life on Earth — in all of nature.

Not one, but innumerable properties of water are supremely suited to fulfilling the diverse ends critical for life on Earth: from the matrix of the cell to the softening of the crustal rocks, from the circulation of blood to the erosion of rocks. *I rest my case*.

No matter what one's philosophical or theological bias happens to be, the facts speak for themselves. There is no rational escape from the inference to design. The universe, as Freeman Dyson put it some time ago, "must have known in some sense we were coming". [7] Surely Dyson was correct. The only explanation which makes any sense of the facts is that the properties of water were intelligently fine-tuned for life on Earth — including for beings of our biological design.

Michael Denton

References

Denton Michael, **The Miracle of Man: The Fine Tuning of Nature for Human Existence**, *The Privileged Species Series*, Discovery Institute Press, Seattle 2022.

Denton Michael, **The Wonder of Water: Water's Profound Fitness for Life on Earth and Mankind**, 1st edition, *The Privileged Species Series*, Discovery Institute Press, Seattle 2017, Chapter 1.

Dyson Freeman J., "Energy in the Universe", *Scientific American* 1971, Vol. 224, No. 3, pp. 50–59.

Feng Bobo, Sosa Robert P., Mårtensson Anna K.F., Jiang Kai, Tong Alex, Dorfman Kevin D., Takahashi Masayuki, Lincoln Per, Bustamante Carlos J., Westerlund Fredrik, and Nordén Bengt, "Hydrophobic Catalysis and a Potential Biological Role of DNA Unstacking Induced by En-

[7] Freeman J. Dyson, "Energy in the Universe", *Scientific American* 1971, Vol. 224, No. 3, pp. 50–59.

vironment Effects", *Proceedings of the National Academy of Sciences* 2019, Vol. 116, No. 35, pp. 17169–17174, https://doi.org/10.1073/pnas.1909122116.

"Hydrophobic Effect", *Wikipedia: The Free Encyclopedia*, https://tiny.pl/w5ncb [15.12. 2022].

Monton Bradley, "How Can an Atheist Defend Intelligent Design?", *Filozoficzne Aspekty Genezy* 2022, Vol. 19, No. 2, pp. 233–238, https://doi.org/10.53763/fag.2022.19.2.202.

Tanford Charles, "How Protein Chemists Learned about the Hydrophobic Factor", *Protein Science* 1997, Vol. 6, No. 6, p. 1358–1366, https://doi.org/10.1002/pro.5560060627.

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**
Philosophical Aspects of Origin s. 249–251
https://doi.org/10.53763/fag.2022.19.2.211
ISSN 2299-0356
LIST DO REDAKCJI / LETTER TO THE EDITOR

Cornelius Hunter
William Jessup University

What Monton Seems to Miss?

Received: December 16, 2022. Accepted: December 27, 2022. Published online: January 5, 2023.

Atheist philosopher Bradley Monton recently chronicled the harsh treatment he received — including the threat of legal action — from many of his fellow philosophers when he allowed that scientific evidence could, in principle, support Intelligent Design. [1] Monton argues that his proposition is defensible and robust from a philosophical perspective, and he provides an example to make his point: What if the fine structure constant, when measured in the future to a thousand significant digits, was found to be all zeros beyond the sixteenth digit? This would suggest a finite designer. As Monton explains, "The traditional God, being all-powerful, wouldn't have the need to truncate the digits of the fine structure constant at 16. But if you're an intelligent but finite computer programmer designing a universe, and you have to type in the value of one of the fundamental constants, you aren't going to type forever — a natural thing to do would be to type some digits and then stop". Satisfied with his defense, Monton concludes that although he finds no scientific evidence for design, "we should be open to the possibility that we get such evidence in the future. Moreover, there's nothing intellectually or culturally wrong with being open to the possibility that we get such evidence in the future — there's nothing wrong with seeking God in science. This is something that theists and atheists alike should be able to agree on". But Monton's defense will not satisfy his detractors. For although Monton has received harsh criticism

[1] Bradley Monton, "How Can an Atheist Defend Intelligent Design?", *Filozoficzne Aspekty Genezy* 2022, Vol. 19, No. 2, pp. 233–238, https://doi.org/10.53763/fag.2022.19.2.202.

from evolutionists, he has not understood it at a fundamental level.

According to Monton, the criticism he received is generally erroneous and the result of bad philosophy. In other words, his detractors are laboring under some rather basic misunderstanding, and his straightforward example of the fine structure constant should help to clear things up. But what Monton seems to miss is that the origins topic in general, and the random-chance-versus-design debate in particular, are long-standing and metaphysically laden with recurring theological themes and convictions. Yes, there certainly are basic misunderstandings along the way evinced by participants, but they are resting on strong, deeply held religious traditions. [2]

Monton has stepped into a complex arena. The harsh criticism he received was not merely a consequence of some basic misunderstandings. Monton ran afoul of many powerful and enduring religious traditions. Monton easily concludes that "there's nothing wrong with seeking God in science", but this is not at all obvious to many theists, and hypothetical examples of patterns in nature, such as Monton's fine structure constant example, will not easily reverse this thinking. Importantly, Monton seems oblivious to how contemporary evolutionary theory entails and is mandated by such metaphysics.

Theology's power and influence can be subtle. Consider even Monton's fine structure constant example, which he proposes as a straightforward philosophical argument. Yet, as he explains, "[t]he traditional God, being all-powerful, wouldn't have the need to truncate the digits of the fine structure constant at 16". That is a theologically-laden claim, upon which his point rests.

Monton calls for theists and atheists alike to agree on his claim that science can, in principle, provide evidence for design. But at bottom this is not a disagreement between theists and atheists. This is a more nuanced, theologically-driven debate, reaching at least back to the Epicureans and Stoics in antiquity. Its resolution will first require recognizing these fundamentals.

Cornelius Hunter

[2] Cornelius Hunter, "The Theological Structure of Evolutionary Theory", *Religions* 2022, Vol. 13, No. 9, article number 774, https://doi.org/10.3390/rel13090774.

References

HUNTER Cornelius, "The Theological Structure of Evolutionary Theory", *Religions* 2022, Vol. 13, No. 9, article number 774, https://doi.org/10.3390/rel13090774.

MONTON Bradley, "How Can an Atheist Defend Intelligent Design?", *Filozoficzne Aspekty Genezy* 2022, Vol. 19, No. 2, pp. 233–238, https://doi.org/10.53763/fag.2022.19.2.202.

Recenzje książek

Book Reviews

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**
Philosophical Aspects of Origin s. 255–275
https://doi.org/10.53763/fag.2022.19.2.201
ISSN 2299-0356
RECENZJA / BOOK REVIEW

Hicham Jakha
The John Paul II Catholic University of Lublin

From Mind to Body and Back

Janet Levin, **The Metaphysics of Mind**, *Cambridge Elements in Philosophy of Mind*, Cambridge University Press, New York 2022, pp. 72.

Received: May 30, 2022. Accepted: June 21, 2022. Published online: September 8, 2022.

Without doubt, one of the most important questions that has kept philosophers busy, at least ever since the ancient Greeks, is the nature of the *mind*. Grappling with this question for ages, thinkers from various fields of inquiry have put forward their views concerning the mind and its nature. An interdisciplinary approach to the human mind has emerged in our contemporary era, where philosophy continuously supplements, *inter alia*, neurobiology and cognitive science with fresh perspectives on this issue. Philosophy's role in advancing the debate surrounding it has certainly been central, and should be regarded as so by non-philosophers as well.

In a work recently published as part of the *Cambridge Elements* series, [1] Janet Levin brings together the most important contemporary theories that attempt to answer the question of the mental. In her book, **The Metaphysics of Mind** (2022), she acknowledges that the metaphysical questions surrounding the mind should be distinguished from the epistemological and moral ones. While taking into consideration the implications of the epistemological and moral questions for the metaphysics of mind, Levin focuses primarily on the metaphysical questions.

[1] Published online on February 10th, 2022. Published in print on March 10th, 2022.

To accomplish the task at hand, she analyzes *Dualism*, *Type-Identity Theory*, *Role Functionalism*, *Russellian Monism* and *Eliminativism* (or Illusionism). As she makes clear at the outset of her book, the aim of her text is not to argue for or against a certain metaphysical theory of mind, but rather to assess the merits and demerits of each theory objectively. A good metaphysics of mind should account for certain elements that are taken to be key to the controversy over the mental. These elements range from the qualitative character of sensations and perceptual experiences, the outer-directedness of intentional states (beliefs, desires, etc.) to — basically — the space the mind occupies in nature as a whole. In the following, I shall try to review each theory of mind separately, as approached by Levin. Then I will conclude my review with some critical remarks about the book.

I. Dualism

In its most basic form, *Dualism* is the theory that mental and physical states are two distinct phenomena. The main argument for this basic version posits that if the world were to be comprised merely of physical properties, "there would be no creatures with thoughts, sensations, volitions, or any other sort of mental states". [2] It follows from this argument that the world is comprised of some elements that go beyond the merely physical. This is what different versions of Dualism try to establish in their accounts. One variant of Dualism, *Substance Dualism*, proposes a demarcation between the physical world (including the body) and the mental world. This is the mind–body distinction. According to this version, the being of mental and physical states is tied to the being of immaterial substances or minds (sometimes also called souls), which are capable of thinking and willing. So, the body on its own cannot think or will. Substance Dualism is what René Descartes upheld in his **Meditations**, [3] drawing a borderline between the thinking self and the body. According to the French philosopher, self-existence can be understood without resorting to the body containing it, and for that it is safe to assert that the self (mind) exists *independently* of the body. And, if the self exists independently of the body, then the self and body must be two distinct entities. In

[2] Janet Levin, **The Metaphysics of Mind**, *Cambridge Elements in Philosophy of Mind*, Cambridge University Press, New York 2022, p. 5.

[3] René Descartes, "Meditations on First Philosophy", in: **The Philosophical Writings of Descartes**, Vol. 2, trans. John Cottingham, Robert Stoothoff, and Dugald Murdoch, Cambridge University Press, New York 1984, pp. 3–62.

short, Substance Dualism generally advocates a view in which immaterial substances lack spatial extension, with the latter being reserved for material, bodily things. There are, however, varieties of Substance Dualism that hold immaterial substances to be spatially extended. [4] There have been a number of objections to Descartes' Cogito argument, with its premises eliciting a backlash from philosophers. One can deny the logical validity of Descartes' reasoning, but the importance of the Cogito argument is certainly undeniable. Descartes' Substance Dualism, if proven to be true, would back the long-standing intuition that conscious mental states are fundamentally distinct from physical states, and that the former cannot be reduced to the latter. David Chalmers would later term this "the hard problem of consciousness". [5] Nonetheless, Substance Dualism raises a number of issues that undermine its philosophical coherence. Levin argues that Substance Dualism brings to the table a new, controversial type of substance, immaterial minds (or souls), which require a Herculean effort on the part of philosophers in order to explain how (and when) they came into existence, whether they are destructible or not, and how we can account for the apparent harmony between mind and body, *vis-à-vis* the physically caused feelings and sensations that we experience. Indeed, one of the main arguments against Substance Dualism is that it does not adequately accommodate the problem of "intermingling" (i.e. the interplay running in both directions between physical and mental states). It is not clear how an immaterial substance could cause a physical phenomenon, or how a physical phenomenon could bring about a mental state. Descartes failed to provide a satisfactory answer to this question, and this has forced proponents of Dualism to abandon his claim that mental and physical states are causally connected. Instead of conceding a causal relation between mental and physical states, some dualists argue that it is God's design that the mental and physical run in perfect parallel to each other, without there being any causality involved (*Parallelism*). Another group of dualists (inspired by Malebranche) argue that what we conceive of as a physical event causing a mental state is nothing but God devising the occurrence of a physical event as an occasion to set in motion a mental state (*Occasionalism*). However, invoking God to do away with the causal relation between physi-

[4] See William D. Hart, **The Engines of the Soul**, Cambridge University Press, Cambridge 1988; Noa Latham, "Substance Physicalism", in: Carl Gillett and Barry M. Loewer (eds.), **Physicalism and Its Discontents**, Cambridge University Press, Cambridge 2001, pp. 152–171.

[5] David J. Chalmers, "Facing Up to the Problem of Consciousness", *Journal of Consciousness Studies* 1995, Vol. 2, No. 3, pp. 200–219, https://tiny.pl/9vv8d [01.04.2022].

cal and mental states faces the same problems Descartes faced with God and the malicious demon. This argument is more of a theological argument than a philosophical one.

Another important question that warrants an explanation from Substance Dualism has to do with minds, and whether they are only possessed by humans. Descartes answered the latter positively, appealing to humans' capacity to communicate linguistically and respond to various social scenarios. Consequently, if only humans possess both minds and bodies, animals and any non-human creatures possess only bodies. This, of course, has been criticized heavily, especially following reports of animal communication and environmentally appropriate responses. Machines also furnish certain examples of non-human entities that can be expected to communicate linguistically and respond to their environments. Furthermore, if minds are immaterial substances, and are accessible only to the individuals possessing them, then how can we say for sure, or with confidence, that someone is experiencing happiness, pain, or any other state that we usually ascribe to people? This is where another variety of Dualism comes in: namely, *Property Dualism*. This version of Dualism abandons the thesis of immaterial substances altogether, contending that there are only physical substances, which possess physical as well as *irreducibly* mental properties. The latter encompass properties with a phenomenal character (i.e. what it is like to have a certain feeling, or experience a certain quality), the representational character of volitions, thoughts, beliefs, and so on. By preserving the mental–physical distinction, and eliminating immaterial substances, Property Dualism has successfully averted the problems raised by Substance Dualism. With that said, Property Dualism does not do justice to the complexity of mental states. As construed by many property dualists (such as Huxley), mental states are causally powerless (or *epiphenomenal*), but this is obviously overstretched: "I feel pain in my hand, say 'ouch', and move it away from the burner; I want some ice and believe there is some in the freezer, and so I walk over to the freezer and open the door". [6] Describing these truths as merely illusionary is insufficient. All in all, while they have their merits, both Substance Dualism and Property Dualism raise serious issues. One problem they both seem to bring about revolves around mental properties and their alleged possession only by humans — or the claim that they first appear in humans. As was proposed by Descartes, only humans possess mental states, and God is to be credited with

[6] Levin, **The Metaphysics of Mind...**, p. 12.

humans' conscious mental states. Huxley, a proponent of Property Dualism, reckons that mental properties occur in humans by way of evolution. *Panpsychism* addresses exactly this problem. According to this version of Dualism, mental properties are not solely possessed by humans, and do not make their first appearance in the latter: they have been here all along, just like physical properties. The causal relation between physical and mental properties is also accounted for in this view. If mental and physical properties occur hand in hand, then they are responsible for the events that take place in the universe, including human behavior. But Panpsychism still advocates a world of two kinds of properties, physical and mental, and the main challenges that it faces concern "combination problems". In other words, "it must explain how microscopic glimmers of consciousness combine to produce the familiar sensations and perceptual experiences of our everyday mental lives, and also how microscopic subjects with glimmers of consciousness combine to produce macroscopic subjects like ourselves". [7]

II. The Type-Identity Theory

A fierce opponent of Dualism, *Physicalism* (or Materialism) contends that the world only contains one kind of properties, physical properties; hence, it reduces mental properties to mere physical ones. In this chapter, Levin explores the merits and demerits of a central theory within Physicalism, namely the *Type-Identity Theory*. Contemporary accounts of this variety posit that "for each type of mental state or process *M*, there is a type of brain state or process *B* such that *M* is identical with *B* (e.g. *pain* is the *stimulation of C-fibers*)". [8] But is the Type-Identity Theory logically plausible? Invoking Leibniz's law (if $A = B$, then *A* and *B* must possess the same properties), it appears that the Type-Identity Theory does not obey this law. Even if we assume that subjective, introspective reports are indeed identical with data from brain scans, it is still inconceivable that there could be a relation of identity with respect to properties obtaining between subjective experiences and brain-scan data, given that the latter are publicly accessible and spatially extended, whereas the former are accessible only subjectively and lack spatial extension. A stronger argument has been raised against Type-Identity Theory, the "Distinct Property Objection", which adopts Frege's semantic principle to put for-

[7] Levin, **The Metaphysics of Mind...**, p. 13.

[8] Levin, **The Metaphysics of Mind...**, p. 14.

ward an argument against mental-state–brain-state identity statements: “the only way that a posteriori identity statements of the form *A* = *B* can be true is for both *A* and *B* to denote their common referent *R* by being conceptually connected to descriptions that pick out distinct properties of that referent, properties whose existence ensures the truth, respectively, of «*R* is *A*» and «*R* is *B*»”. [9] It has been argued that while this principle can be satisfied by “scientific identity statements”, the same cannot be said for “mental–physical identity statements”. Some physicalists suggest that mental-state terms be translated into “topic-neutral” statements. [10] A different problem raised against the Type-Identity Theory has to do with its scope, as it is argued that this variety neglects the psychological similarities between humans and non-human creatures who may share our mental states. [11] A number of solutions have been suggested to this argument. For instance, it has been argued that mental states can be characterized in terms of a “disjunction” of physical properties (e.g., “pain is identical with *either* C-fiber stiulation *or* the relevant type of silicon-based state *or* the relevant type of electronic circuitry”). [12] But this theory still remains “chauvinistic” (Block), as it excludes other creatures who don’t have the same internal state types as we do, even if they share our behavior.

III. Role Functionalism

A popular response among Physicalists to the aforementioned problem, *Role Functionalism*, suggests that mental states be identified “with the (higher-level) property of *being in some internal state or other* that plays a certain role, or functions in a certain way, in a cognitive system”, [13] instead of identifying them (i.e. mental states) with a type or disjunction of physical properties. Role Functionalism is regarded as a further development of Philosophical Behaviorism, which

[9] Levin, **The Metaphysics of Mind…**, p. 16.

[10] See David Armstrong, “The Causal Theory of the Mind”, in: David J. Chalmers (ed.), **Philosophy of Mind: Classical and Contemporary Readings**, Oxford University Press, New York 2002, pp. 80–87; David Lewis, “Psychophysical and Theoretical Identifications”, *Australasian Journal of Philosophy* 1972, Vol. 50, No. 3, pp. 249–258, https://tiny.pl/9vvbc [04.04.2022].

[11] See Ned Block, “Troubles with Functionalism”, in: Ned Block (ed.), **Readings in Philosophy of Psychology**, Vol. 1, Cambridge University Press, Cambridge 1980, pp. 269–305.

[12] Levin, **The Metaphysics of Mind…**, p. 19.

[13] Levin, **The Metaphysics of Mind…**, p. 20.

proposes that mental states should not be identified with physical or non-physical states, but rather with the behavior that results from them (e.g., "«*S* has a pain in her toe» is to be understood as «*S* is disposed (all things being equal) to wince, grimace, rub her toe, and ask for aspirin»". [14] This view has many advantages: among others, it allows non-human creatures to have the same mental states as we do, even if they differ physically from us. It can also explain how we draw conclusions about others' mental states through merely observing their behavior. Nonetheless, Philosophical Behaviorism has its own downsides. Putnam [15] has levelled a well-articulated argument against this view, pointing to the possibility of a society (of "super-Spartans") whose members have learned to suppress any feelings of pain, and hence exhibit no behavioral indications of it at all. We can also imagine a society of "perfect actors" who fake feelings of pain. In response, proponents of Role Functionalism argue that to regard an individual as having certain mental states is tantamount to saying that they possess lower-order mental states that behave in exactly the same ways. It should be noted that Role Functionalism does not rule out the idea that the states playing certain roles are nonphysical, which raises the following question: Is Role Functionalism a variety of Physicalism, or a position opposed to the latter? Depending on the perspective one adopts, it can be either. On the one hand, it does not prevent nonphysical states from fulfilling the roles of mental states and, as such, cannot be admitted as a variety of Physicalism. On the other hand, while leaving the door open as regards their existence, it rejects the idea that nonphysical states can produce physical states. Therefore, nonphysical states cannot cause or change individual behavior, and this also means that there cannot be creatures endowed with nonphysical states fulfilling the same roles as our physical ones. As such, this version of Role Functionalism can be seen as a variety of *Nonreductive Physicalism*, which indicates that "each particular instance (or token) of a mental state is identical with an instance (or token) of some physical state or other, even though these instances are not tokens of the same physical type". [16] However, while we may grant that Role Functionalism avoids many of the problems discussed previously, it is

[14] Levin, **The Metaphysics of Mind...**, p. 21.

[15] See Hilary Putnam, "Brains and Behavior", in: Ronald J. Butler (ed.), **Analytical Philosophy: Second Series**, Basil Blackwell, Oxford 1965, pp. 1–19.

[16] Levin, **The Metaphysics of Mind...**, p. 23.

also subject to serious criticisms. A major argument against it is what Kim [17] referred to as the "Causal Exclusion Argument", which states that the causal efficacy of mental states is ignored in the behavioral manifestations of individuals: "if every physical event has a complete, sufficient physical cause — as is now generally believed — then my saying «ouch» and pulling my hand away must be caused by the physical, presumably neural, state that realizes pain in me. But then, it seems, it is the lower-level neural state that is doing all the causal work, and my being in pain, if this is identified with being in a higher-order functional state, is causally irrelevant". [18] Moreover, Role Functionalism faces another difficult challenge: namely, its preparedness in terms of resources to distinguish various types of mental states. This is especially directed toward the Lewisian commonsensical theory of mind, the argument being that a simplistic theory of mind, such as relies on our common "platitudes" concerning topic-neutral relations and causal roles, does not have the necessary tools to establish complex distinctions within mental states.

IV. Does Consciousness Have a Place in Nature?

In this section, Levin explores two types of arguments against Physicalism: Conceivability Arguments and Knowledge Arguments. Against Identity Theory, for instance, the *Modal Argument*, developed by Kripke, [19] construes the modal status of possible worlds in such a way as to then be able to argue that a possible world where *C-fiber stimulation is not linked to pain* is conceivable; therefore, in that world, *pain is C-fiber stimulation* is false. A similar Conceivability Argument has been put forward by Chalmers, [20] whose *Zombie Argument* threatens all varieties of Physicalism. According to Chalmers, zombies are conceivable, which makes them metaphysically possible, which then entails that Physicalism is false. Although they differ in some details, both Kripke's and Chalmers's arguments assert that "we can genuinely conceive of the existence of mental states in the absence of physical states (and vice versa), whereas we cannot genuinely conceive of the de-

[17] See Jaegwon Kim, **Mind in a Physical World: An Essay on the Mind-Body Problem and Mental Causation**, MIT Press, Cambridge 1998.

[18] Levin, **The Metaphysics of Mind…**, p. 24.

[19] See Saul Kripke, **Naming and Necessity**, Harvard University Press, Cambridge 1980.

[20] See David J. Chalmers, **The Conscious Mind**, Oxford University Press, New York 1996.

nials of other scientific identity statements — and genuine conceivability provides evidence for possibility". [21] The second type of argument, the Knowledge Argument, proceeds from the premise that knowledge of the mental cannot be derived from knowledge of the physical, and that the mental is something over and above the physical. Two main versions of this have gained widespread recognition. There is the *Bat Argument* of Nagel, [22] which assumes that *there is something it is like to be a bat*, but, because of bats' and humans' different perceptual mechanisms, we cannot have the same world experiences. Nagel argues that no knowledge of the physical mechanisms of a bat can tell us what it is like to be a bat. If that is the case, then there is something that goes beyond the physical, which, consequently, makes Physicalism false. In the similar Knowledge Argument put forward by Jackson, [23] Mary, though possessing all the physical-functional data about color experience prior to her leaving the white-and-black room, fails to know *what it is like to see red*. As Jackson's argument concludes, if there is a fact concerning human color experience that does not conform to the physical-functional, then Physicalism is false. There have been a number of responses to these arguments, but, as Levin points out, they all fail to adequately address the issues raised. There is even a divide, as regards the physical attainability of *intentional* states, which, like phenomenal states, pose serious difficulties for Physicalism.

V. Intentional States

Statements like *I believe my cat is sick* and *I would love to visit Norway* express "intentional" (also representational/propositional) attitudes. They represent something in the world (e.g., my sick cat, and Norway). Put briefly, they are *about* something. This is what Brentano [24] established in his seminal account of intentionality. This theory of intentionality raises a central argument against Physicalism: namely, as Brentano argues, the directedness of consciousness toward mind-

---

[21] Levin, **The Metaphysics of Mind…**, p. 31.

[22] See Thomas Nagel, "What Is It Like to Be a Bat?", *Philosophical Review* 1974, Vol. 83, No. 4, pp. 435–450, https://tiny.pl/9vbqx [04.04.2022].

[23] See Frank Jackson, "Epiphenomenal Qualia", *The Philosophical Quarterly* 1982, Vol. 32, No. 127, pp. 127–136, https://tiny.pl/9vbql [04.04.2022].

[24] See Franz Brentano, **Psychology From an Empirical Standpoint**, Routledge Press, Oxfordshire 2014.

independent objects is exclusively characteristic of the mental (the "mark of the mental"). Therefore, no physical states can be said to possess intentionality. This is *Brentano's Thesis*. Accordingly, we can distinguish between two types of intentionality: *internalist* and *externalist*. A prominent internalist theory, Conceptual Role Semantics (CRS), maintains that "the representational content of an intentional state can be identified with the role it plays in theoretical and practical reasoning". [25] This theory points to a crucial component in intentional states, the varying of their representational content, tracing that to the varying roles they play in theoretical and practical reasoning. For instance, my belief that my cat is sick and my desire to visit Norway have two different representational contents, in the sense that they have different effects on my inferences and my behavioral response. There are, however, major problems that CRS must deal with. For example, it is argued that the conceptual role cannot capture any distinctions in the varying things that intentional states represent. Even if the thoughts we have when I say "I'm tired" and when you say "I'm tired" are, based on the role they play in our reasoning, the same, they do not capture the same intentional content, because you and I are different. In addition, Putnam [26] has developed a physicalist argument against the internalist conception of intentionality, arguing that meaning "ain't in the head", based on the Twin Earth argument. In response to this and other similar arguments, two types of representational content have been established: *narrow* (covering the psychological similarities between ourselves and others), and *wide* (evaluating whether intentional states are true, realized, etc.). Nevertheless, this (or any) "two-factor" view of representational content faces the difficulty of specifying the narrow content. A problem for internalist and externalist conceptions of intentionality alike revolves around the wide representational states, as regards the relations between an individual and the world. The externalists assert that meaning occurs in nature; thus, what "natural signs", for instance, convey can be found in nature. However, there are many problems with this view, too, and this has prompted some philosophers to reject both Physicalism and Dualism about intentional and phenomenal states. They propose instead a different kind of theory: *Russellian Monism*.

[25] Levin, **The Metaphysics of Mind...**, p. 40.

[26] See Hilary Putnam, "The Meaning of «Meaning»", in: Keith Gunderson (ed.), **Language, Mind, and Knowledge**, University of Minnesota Press, Minneapolis 1975, pp. 131–193.

VI. Russellian Monism

In this section, Levin moves on to an exploration of a different approach to the problem of the mental: *Russellian Monism*. So far, varieties of both Dualism and Physicalism have been briefly analyzed. Dualism is the thesis that the world is composed of two types of things, mental and physical. Physicalism contends that the world is composed of mere physical things. Therefore, Physicalism is a *Monist* account. The monist counterpart of Physicalism is *Idealism*, the thesis that the world is fundamentally mental. Levin acknowledges that a detailed investigation of Idealism would divert her attention from a proper metaphysics of mind, in that to analyze the scope of Idealism one would have to analyze how mere mental properties can give rise to ordinary things in the world (tables, chairs, etc.). However, this should not be understood as stating that these problems are completely unrelated. It is a major problem within the metaphysics of mind whether or not mental states are fundamental constituents of the world. Some philosophers suggest *Neutral Monism* as an alternative to both Physicalism and Idealism: "the thesis that the fundamental elements of the world are *neither* mental *nor* physical, but rather a "neutral" set of properties that can be combined in one way to produce physical objects". [27] In stating that the mental and the physical are comprised of the same elements that can be arranged in different ways, Neutral Monism proves to be more economical than Dualism. In addition, this view accounts for the causal relation between minds and bodies, and vice versa, since the two types of entities are derived from the same basic principles. As is the case with every theory of mind thus far, Neutral Monism faces some difficulties as regards its ability to establish that the basic elements are themselves definitely neutral, and not physical or mental. Many contemporary philosophers turn to a different version of Monism, namely Russellian Monism, for its ability to solve the mind-body problem and the hard problem of consciousness. Russellian Monism appeals to a distinction between *dispositional* properties and *categorical* properties. To elaborate, viewing a thing as physical means that it is fully describable by the laws of the physical sciences. The latter only describe the "structure and dynamics" (dispositions) of things. But the world cannot consist merely of dispositional properties. There must also be categorical properties that ground the dispositional properties. However, these categorical properties cannot be physical, since they are not

[27] Levin, **The Metaphysics of Mind...**, pp. 49–50.

fully describable by physical laws. Therefore, non-physical properties exist. Philosophers who oppose this distinction argue that it is perfectly conceivable to have ungrounded dispositional properties. Other philosophers maintain that both dispositional and categorical properties are physical, understood broadly. [28] Proponents of this distinction even go so far as to state that categorical properties are directly involved in the phenomenal character of experiences. As has been previously claimed, Russellian Monism is said to have the capacity to solve the hard problem of consciousness. But, if we hold the categorical properties to be mere "thumbtacks" (properties whose sole role is to ground the dispositional properties), then it is not clear how this view can solve the hard problem of consciousness. The categorical properties must do more. [29] Some philosophers argue that the categorical properties have some phenomenal character, which, if they are combined in a certain way, can give rise to phenomenal experiences, such as feeling pain or seeing purple. This is a version of Panpsychism, and it is debatable whether elementary particles have any phenomenal character at all. All things considered, Russellian Monism, although questioned by some — especially as regards its affinities with Dualism and Physicalism — puts forward a tenable distinction between properties. The distinction between dispositional and categorical properties is believed by many to be the right path toward solving the mind-body problem and the hard problem of consciousness.

VII. Eliminativism

In light of the strong arguments raised against Dualism, Physicalism and Russellian Monism, some philosophers have decided to adopt an *eliminativist* stance toward the problem of the mind. That is, proponents of *Eliminativism* argue that mental states do not exist. There is, however, a dispute among Eliminativists concerning the range of mental states, and what elements are to be eliminated, with *qualia* and mental states being among those widely viewed as having a question-

[28] See Alexander Bird, **Nature's Metaphysics: Laws and Properties**, Oxford University Press, Oxford 2007; Daniel Stoljar, "Two Conceptions of the Physical", *Philosophy and Phenomenological Research* 2001, Vol. 62, No. 2, pp. 253–281, https://tiny.pl/9vb7b [05.04.2022].

[29] See David J. Chalmers, "Panpsychism and Panprotopsychism", *The Amherst Lecture in Philosophy* 2013, Lecture 8, pp. 1–35, https://tiny.pl/9vbrt [05.04.2022]; Philip Goff, William Seager, and Sean Allen-Hermanson, "Panpsychism", in: Edward N. Zalta (ed.), **The Stanford Encyclopedia of Philosophy**, Winter 2021 Edition, https://tiny.pl/wm1tg [05.04.2022].

able status. The so-called Qualia Eliminativists direct their skepticism toward the alleged distinctive "feel" of mental states, and not mental states themselves. (That is, they are skeptical about the *quale* of seeing purple or feeling pain). [30] But even if conscious experiences lack qualia, we can still talk about something it is like to have them. Physicalists, who argue that the mental is nothing over and above the physical, must account for qualia in a purely physical world. In response, Frankish [31] provides a more recent eliminativist account of qualia, in which he posits that qualia are *misrepresentations* of certain properties. What we think is a distinctive feature of seeing purple or feeling pain is nothing but a "quasi-phenomenal" experience, where physical properties are misrepresented as phenomenal properties following an *introspective illusion*. However, this account of Illusionism sounds more reductionist than eliminativist. If it reduces qualia to physical properties, then it is a version of Physicalism, not Eliminativism. Apart from the threat they pose to Physicalism, Eliminativists have an extra motivation to eliminate qualia and mental states: namely, "skepticism about the possibility of explaining human behavior as the product of beliefs, desires, and the other intentional states that figure in our commonsense theory of mind". [32] A prominent figure as regards *Intentional Eliminativism* is Churchland, [33] who criticizes the attempts of our Folk Psychological theory to explain behavior by referring to mental states. Folk Psychology, as an empirical theory, has proven to be faulty, especially if contrasted with the findings of neurophysiology. Churchland's elimination of intentional states in favor of a physical theory of behavior has been contested by many. For instance, Baker [34] and Fodor [35] uphold the essential role of intentional folk psy-

[30] See Daniel C. Dennett, "Quining Qualia", in: Anthony Marcel and Edoardo Bisiach (eds.), **Consciousness in Contemporary Science**, Oxford University Press, Oxford 1988, pp. 42–77; Georges Rey, "Sensational Sentences", in: Martin Davies and Glyn W. Humphreys (eds.), **Consciousness: Philosophical and Psychological Essays**, Blackwell, Oxford 1993, pp. 240–257.

[31] See Keith Frankish, "Illusionism as a Theory of Consciousness", *Journal of Consciousness Studies* 2016, Vol. 23, No. 11–12, pp. 11–39, https://tiny.pl/9vbkm [05.04.2022].

[32] Levin, **The Metaphysics of Mind…**, p. 57.

[33] See Paul M. Churchland, "Eliminative Materialism and the Propositional Attitudes", *The Journal of Philosophy* 1981, Vol. 78, No. 2, pp. 67–90, https://tiny.pl/9vbk4 [05.04.2022].

[34] See Lynne R. Baker, **Saving Belief: A Critique of Physicalism**, Princeton University Press, Princeton 1987.

[35] See Jerry A. Fodor, **Psychosemantics: The Problem of Meaning in the Philosophy of Mind**, MIT Press, Cambridge 1987.

chology. Meanwhile, Davidson [36] suggests folk psychology be regarded as a normative theory instead of an empirical one. Dennett [37] defends Folk Psychology's role, indicating that it is useful as long as it equips us with "patterns" with which we can understand human behavior, and which can be further explained by lower-level accounts in the future. There are even philosophers who maintain that Folk Psychology is empirically founded and supported. [38] These philosophers argue that Churchland's criticism of Folk Psychology as failing to provide explanations for certain phenomena is unjust, as those phenomena do not fall within the explanatory scope of Folk Psychology ("creative imagination, intelligence differences between individuals, the psychological function of sleep, and motor skills", etc.). They also point to a number of what count now as commonsense explanations, but which were originally derived from empirical investigations. Further, these philosophers argue that cognitive psychology, which tries to explain behavior by appealing to the relation between states and representational content, is better suited to accounting for generalizations pertaining to the causation of behavior than neurophysiology. "Thus, if the generalizations of Folk Psychology are approximations of at least a fragment of cognitive psychology, then it can be a genuinely explanatory theory". [39] More arguments have been raised as regards the explanatory role played by intentional folk psychology. Levin concludes this section with an open question: Will the novel ways of approaching intentional states be absorbed into our commonsense psychology someday? This would disprove Churchland's argument that Folk Psychology runs contrary to empirical psychology.

VIII. Some Further Questions

Levin brings her informative book to a close with some further, more recent

[36] See Donald Davidson, "Mental Events", in: Lawrence Foster and Joe W. Swanson (eds.), **Experience and Theory**, Clarendon Press, Oxford 1970, pp. 207–224.

[37] See Daniel C. Dennett, "True Believers: The Intentional Strategy and Why It Works", in: Anthony F. Heath (ed.), **Scientific Explanations**, Oxford University Press, Oxford 1981, pp. 150–167.

[38] See e.g. Patricia Kitcher, "In Defense of Intentional Psychology", *The Journal of Philosophy* 1984, Vol. 81, No. 2, pp. 89–106, https://tiny.pl/9vb8l [05.04.2022]; Terence Horgan and James Woodward, "Folk Psychology Is Here to Stay", *The Philosophical Review* 1985, Vol. 94, No. 2, pp. 197–226, https://tiny.pl/9vb86 [05.04.2022]; Fodor, **Psychosemantics…**.

[39] Levin, **The Metaphysics of Mind…**, p. 58.

questions concerning the problem of the mental. Clark and Chalmers [40] raise a thought-provoking question about the possibility of Extended Minds (i.e., minds that are outside the brain or head). They seek to determine whether cognitive processes can exist outside of the brain, and they give smartphones as an example of storing and information-retrieving devices that could be said to exist outside of it. As Levin notes, it is still too early to assert that retrieval devices, acting as extended mental states, have what is needed to function as standard mental states. Indeed, one objection to this is that the similarities between the two types of mental states are less than what some believe them to be. In response, proponents of the Extended Minds Thesis contend that, with accelerating technological developments, differences between extended and standard mental processes will be undermined, leaving only irrelevant differences intact. A further question that Levin highlights in this section has to do with "collective intentionality" — the thesis that entire communities can possess collective mental states that are irreducible to the states of the communities' individuals. Investigating this problem may prove fruitful not only for the metaphysics of mind, but also for questions surrounding self-knowledge, knowledge of other minds, and moral assessment, as beliefs and desires lead to actions and it is a question whether collective communities or individuals should be held accountable for the consequences of their actions.

Critical Remarks

With all its merits, Levin's book leaves a number of serious theories of mind either unaddressed or under-represented. As I mentioned at the outset of this review, philosophy has been in close collaboration with the cognitive sciences. Issues that have been predominantly raised by the philosophy of mind are now tackled by the latter. For instance, Levin's book could have explored *Bayesian* models of the mental as instances of a cognitivist account of the mind built upon the findings presented by philosophers. To quote: "«Bayesian» is meant to be a placeholder for a set of interrelated principles, methods, and problem-solving procedures, which are unified by three tenets. First: uncertainty should be captured by a real-valued function that measures degrees of belief. Second: degrees

[40] See Andy Clark and David J. Chalmers, "The Extended Mind", *Analysis* 1998, Vol. 58, No. 1, pp. 7–19, https://tiny.pl/9vbs2 [06.04.2022].

of belief, at any given time, ought to satisfy the axioms of probability theory. Third: degrees of belief, represented by determinate probabilities, ought to be updated in the light of new information, typically by the canonical rule of conditionalization". [41] One of the main Bayesian theories of mind is what is known as Predictive Processing, according to which the mind is essentially concerned with "prediction error minimization". In other words, what the mind attempts to do is minimize the margin of "mismatch" between predictions of sensory inputs that are engendered internally and the real sensory inputs that are engendered externally. [42]

In addition, Levin's book fails to explore a number of related Bayesian theories of mind. For instance, she does not explore the Free-Energy Principle (FEP), a pioneering theory that attempts to explain the mechanisms underlying all living systems. FEP was first put forward by Karl Friston, who has striven to establish a universal theory that purports to have the capacity to unravel the mysteries of all living systems, relying on physics. FEP suggests that "any self-organizing system that is at equilibrium with its environment must minimize its free energy". [43] An important concept here is "surprise", which governs the way living organisms maintain their physical states. That is to say, a biological organism, such as the brain, has to keep its states within certain bounds, and thus maintain some sort of "homeostasis". Put differently, this means that an organism needs to *minimize* the average surprise associated with the states it visits, and "[i]n the context of neuroscience, this implies that the brain becomes a model of the world in order to evaluate surprise in relation to model-based predictions". [44] There are other noteworthy Bayesian theories of mind also absent from Levin's book, including the

[41] Matteo Colombo, Lee Elkin, and Stephan Hartmann, "Being Realist about Bayes, and the Predictive Processing Theory of Mind", *The British Journal for the Philosophy of Science* 2021, Vol. 72, No. 1, p. 188 [185–220], https://tiny.pl/9vb6t [20.05.2022].

[42] See Colombo, Lee Elkin, and Stephan Hartmann, "Being Realist about Bayes…", p. 188; Andy Clark, "Whatever Next? Predictive Brains, Situated Agents, and the Future of Cognitive Science", *Behavioral and Brain Sciences* 2013, Vol. 36, No. 3, pp. 181–204, https://tiny.pl/9vbv7 [20.05.2022]; Jakob Hohwy, **The Predictive Mind**, Oxford University Press, Oxford 2013.

[43] Karl Friston, "The Free-Energy Principle: A Unified Brain Theory?", *Nature Reviews Neuroscience* 2010, Vol. 11, p. 127 [127–138], https://tiny.pl/9vbvk [20.05.2022].

[44] Philipp Schwartenbeck, Thomas FitzGerald, Raymond J. Dolan, and Karl Friston, "Exploration, Novelty, Surprise, and Free Energy Minimization", *Frontiers in Psychology* 2013, Vol. 4, No. 710, p. 1 [1–5], https://tiny.pl/9vbv3 [20.05.2022].

Higher-Order State Space Approach,[45] the Winning Hypothesis Account,[46] and Predictive Global Neuronal Workspace Theory, to name just a few.[47]

Another influential theory of mind not covered by Levin is *Enactivism*. Proponents of this theory view "mentality as rooted in engaged, embodied activity as opposed to detached forms of thought".[48] If that is correct, then our behavior and acting can tell us more about our minds than mere thinking does. In its initial conception, Enactivism aims to provide an alternative to the prevalent view that cognition consists in representation of an independent world (i.e. one independent of our cognitive and perceptual faculties) by means of a cognitive system whose existence is not bound to the world. For enactivists, cognition is "embodied action".[49] Enactivism puts forward a number of theses, of which the most important are: (a) that "the nervous system is an autonomous dynamic system", in that it is not *computational* with regard to its processing of information, yet creates meaning; (b) that cognition is the practice of "skillful know-how" in the context of embodied action; and (c) that the world of cognitive beings is not an external world represented internally by their brains, but rather a "relational domain" enacted by their autonomous agency.[50]

---

[45] See Stephen M. Fleming, "Awareness as Inference in a Higher-Order State Space", *Neuroscience of Consciousness* 2020, Vol. 2020, No. 1, pp. 1–9, https://tiny.pl/9vbb7 [20.05.2022].

[46] See Jakob Hohwy, Andreas Roepstorff, and Karl Friston, "Predictive Coding Explains Binocular Rivalry: An Epistemological Review", *Cognition* 2008, Vol. 108, No. 3, pp. 687–701, https://tiny.pl/9vbbp [20.05.2022]; Jakob Hohwy, "Attention and Conscious Perception in the Hypothesis Testing Brain", *Frontiers in Psychology* 2012, Vol. 3, No. 96, pp. 1–14, https://tiny.pl/9vbb2 [20.05.2022]; Hohwy, **The Predictive Mind…**.

[47] See Hohwy, **The Predictive Mind…**; Jakob Hohwy, "Prediction Error Minimization, Mental and Developmental Disorder, and Statistical Theories of Consciousness", in: Rocco J. Gennaro (ed.), **Disturbed Consciousness**, MIT Press, Cambridge 2015, pp. 293–324; Christopher J. Whyte, "Integrating the Global Neuronal Workspace into the Framework of Predictive Processing: Towards a Working Hypothesis", *Consciousness and Cognition* 2019, Vol. 73, article number: 102763, https://tiny.pl/9vbzd [20.05.2022]; Christopher J. Whyte and Ryan Smith, "The Predictive Global Neuronal Workspace: A Formal Active Inference Model of Visual Consciousness", *Progress in Neurobiology* 2021, Vol. 199, article number: 101918, https://tiny.pl/9vbzl [20.05.2022]. It should be noted that these Bayesian theories of mind focus primarily on consciousness.

[48] Daniel D. Hutto, "Enactivism, From A Wittgensteinian Point of View", *American Philosophical Quarterly* 2013, Vol. 50, No. 3, p. 281 [281–302], https://tiny.pl/9vbzs [20.05.2022].

[49] Francisco J. Varela, Evan Thompson, and Eleanor Rosch, **The Embodied Mind: Cognitive Science and Human Experience**, MIT Press, Cambridge 1991, p. xx.

[50] Evan Thompson, **Mind in Life: Biology, Phenomenology, and the Sciences of the Mind**, Har-

These critical remarks are not meant to detract from Levin's book. Given the latter's length, it is quite understandable that its author has not delved more deeply into the issues mentioned above. Hence, the philosophical rigor and depth of this (relatively) short book certainly merit praise. The theories and arguments tackled there are of the utmost importance to the metaphysics of the mental. By and large, the book is both a comprehensive introduction to the mind–body problem, and a helpful guide to further, advanced research in this field.

Hicham Jakha

References

Armstrong David, "The Causal Theory of the Mind", in: Chalmers (ed.), **Philosophy of Mind…**, pp. 80–87.

Baker Lynne R., **Saving Belief: A Critique of Physicalism**, Princeton University Press, Princeton 1987.

Bird Alexander, **Nature's Metaphysics: Laws and Properties**, Oxford University Press, Oxford 2007.

Block Ned (ed.), **Readings in Philosophy of Psychology**, Vol. 1, Cambridge University Press, Cambridge 1980.

Block Ned, "Troubles with Functionalism", in: Block (ed.), **Readings in Philosophy of Psychology…**, pp. 269–305.

Brentano Franz, **Psychology From an Empirical Standpoint**, Routledge Press, Oxfordshire 2014.

Butler Ronald J. (ed.), **Analytical Philosophy: Second Series**, Basil Blackwell, Oxford 1965.

Chalmers David J., "Facing Up to the Problem of Consciousness", *Journal of Consciousness Studies* 1995, Vol. 2, No. 3, pp. 200–219, https://tiny.pl/9vv8d [01.04.2022].

Chalmers David J., "Panpsychism and Panprotopsychism", *The Amherst Lecture in Philosophy* 2013, Lecture 8, pp. 1–35, https://tiny.pl/9vbrt [05.04.2022].

Chalmers David J. (ed.), **Philosophy of Mind: Classical and Contemporary Readings**, Oxford University Press, New York 2002.

Chalmers David J., **The Conscious Mind**, Oxford University Press, New York 1996.

vard University Press, Cambridge 2007, p. 13.

Churchland Paul M., "Eliminative Materialism and the Propositional Attitudes", *The Journal of Philosophy* 1981, Vol. 78, No. 2, pp. 67–90, https://tiny.pl/9vbk4 [05.04.2022].

Clark Andy, "Whatever Next? Predictive Brains, Situated Agents, and the Future of Cognitive Science", *Behavioral and Brain Sciences* 2013, Vol. 36, No. 3, pp. 181–204, https://tiny.pl/9vbv7 [20.05.2022].

Clark Andy and Chalmers David J., "The Extended Mind", *Analysis* 1998, Vol. 58, No. 1, pp. 7–19, https://tiny.pl/9vbs2 [06.04.2022].

Colombo Matteo, Elkin Lee, and Hartmann Stephan, "Being Realist about Bayes, and the Predictive Processing Theory of Mind", *The British Journal for the Philosophy of Science* 2021, Vol. 72, No. 1, pp. 185–220, https://tiny.pl/9vb6t [20.05.2022].

Davidson Donald, "Mental Events", in: Lawrence Foster and Joe W. Swanson (eds.), **Experience and Theory**, Clarendon Press, Oxford 1970, pp. 207–224.

Davies Martin and Humphreys Glyn W. (eds.), **Consciousness: Philosophical and Psychological Essays**, Blackwell, Oxford 1993.

Dennett Daniel C., "Quining Qualia", in: Marcel and Bisiach (eds.), **Consciousness in Contemporary Science…**, pp. 42–77.

Dennett Daniel C., "True Believers: The Intentional Strategy and Why It Works", in: Heath (ed.), **Scientific Explanations…**, pp. 150–167.

Descartes René, "Meditations on First Philosophy", in: **The Philosophical Writings of Descartes…**, pp. 3–62.

Fleming Stephen M., "Awareness as Inference in a Higher-Order State Space", *Neuroscience of Consciousness* 2020, Vol. 2020, No. 1, pp. 1–9, https://tiny.pl/9vbb7 [20.05.2022].

Fodor Jerry A., **Psychosemantics: The Problem of Meaning in the Philosophy of Mind**, MIT Press, Cambridge 1987.

Foster Lawrence and Swanson Joe W. (eds.), **Experience and Theory**, Clarendon Press, Oxford 1970.

Frankish Keith, "Illusionism as a Theory of Consciousness", *Journal of Consciousness Studies* 2016, Vol. 23, No. 11–12, pp. 11–39, https://tiny.pl/9vbkm [05.04.2022].

Friston Karl, "The Free-Energy Principle: A Unified Brain Theory?", *Nature Reviews Neuroscience* 2010, Vol. 11, pp. 127–138, https://tiny.pl/9vbvk [20.05.2022].

Gennaro Rocco J. (ed.), **Disturbed Consciousness**, MIT Press, Cambridge 2015.

Gillett Carl and Loewer Barry M. (eds.), **Physicalism and Its Discontents**, Cambridge University Press, Cambridge 2001.

Goff Philip, Seager William, and Allen-Hermanson Sean, "Panpsychism", in: Zalta (ed.), **The Stanford Encyclopedia of Philosophy…**, https://tiny.pl/wm1tg [05.04.2022].

GUNDERSON Keith (ed.), **Language, Mind, and Knowledge**, University of Minnesota Press, Minneapolis 1975.

HART William D., **The Engines of the Soul**, Cambridge University Press, Cambridge 1988.

HEATH Anthony F. (ed.), **Scientific Explanations**, Oxford University Press, Oxford 1981.

HOHWY Jakob, "Attention and Conscious Perception in the Hypothesis Testing Brain", *Frontiers in Psychology* 2012, Vol. 3, No. 96, pp. 1–14, https://tiny.pl/9vbb2 [20.05.2022].

HOHWY Jakob, "Prediction Error Minimization, Mental and Developmental Disorder, and Statistical Theories of Consciousness", in: GENNARO (ed.), **Disturbed Consciousness…**, pp. 293–324.

HOHWY Jakob, **The Predictive Mind**, Oxford University Press, Oxford 2013.

HOHWY Jakob, ROEPSTORFF Andreas, and FRISTON Karl, "Predictive Coding Explains Binocular Rivalry: An Epistemological Review", *Cognition* 2008, Vol. 108, No. 3, pp. 687–701, https://tiny.pl/9vbbp [20.05.2022].

HORGAN Terence and WOODWARD James, "Folk Psychology Is Here to Stay", *The Philosophical Review* 1985, Vol. 94, No. 2, pp. 197–226, https://tiny.pl/9vb86 [05.04.2022].

HUTTO Daniel D., "Enactivism, From A Wittgensteinian Point of View", *American Philosophical Quarterly* 2013, Vol. 50, No. 3, pp. 281–302, https://tiny.pl/9vbzs [20.05.2022].

JACKSON Frank, "Epiphenomenal Qualia", *The Philosophical Quarterly* 1982, Vol. 32, No. 127, pp. 127–136, https://tiny.pl/9vbql [04.04.2022].

KIM Jaegwon, **Mind in a Physical World: An Essay on the Mind-Body Problem and Mental Causation**, MIT Press, Cambridge 1998.

KITCHER Patricia, "In Defense of Intentional Psychology", *The Journal of Philosophy* 1984, Vol. 81, No. 2, pp. 89–106, https://tiny.pl/9vb8l [05.04.2022].

KRIPKE Saul, **Naming and Necessity**, Harvard University Press, Cambridge 1980.

LATHAM Noa, "Substance Physicalism", in: GILLETT and LOEWER (eds.), **Physicalism and Its Discontents…**, pp. 152–171.

LEVIN Janet, **The Metaphysics of Mind**, *Cambridge Elements in Philosophy of Mind*, Cambridge University Press, New York 2022.

LEWIS David, "Psychophysical and Theoretical Identifications", *Australasian Journal of Philosophy* 1972, Vol. 50, No. 3, pp. 249–258, https://tiny.pl/9vvbc [04.04.2022].

MARCEL Anthony and BISIACH Edoardo (eds.), **Consciousness in Contemporary Science**, Oxford University Press, Oxford 1988.

NAGEL Thomas, "What Is It Like to Be a Bat?", *Philosophical Review* 1974, Vol. 83, No. 4, pp. 435–450, https://tiny.pl/9vbqx [04.04.2022].

PUTNAM Hilary, "Brains and Behavior", in: BUTLER (ed.), **Analytical Philosophy…**, pp. 1–19.

PUTNAM Hilary, "The Meaning of «Meaning»", in: GUNDERSON (ed.), **Language, Mind, and Knowledge…**, pp. 131–193.

REY Georges, "Sensational Sentences", in: DAVIES and HUMPHREYS (eds.), **Consciousness…**, pp. 240–257.

SCHWARTENBECK Philipp, FITZGERALD Thomas, DOLAN Raymond J., and FRISTON Karl, "Exploration, Novelty, Surprise, and Free Energy Minimization", *Frontiers in Psychology* 2013, Vol. 4, No. 710, pp. 1–5, https://tiny.pl/9vbv3 [20.05.2022].

STOLJAR Daniel, "Two Conceptions of the Physical", *Philosophy and Phenomenological Research* 2001, Vol. 62, No. 2, pp. 253–281, https://tiny.pl/9vb7b [05.04.2022].

The Philosophical Writings of Descartes, Vol. 2, trans. John Cottingham, Robert Stoothoff, and Dugald Murdoch, Cambridge University Press, New York 1984.

THOMPSON Evan, **Mind in Life: Biology, Phenomenology, and the Sciences of the Mind**, Harvard University Press, Cambridge 2007.

VARELA Francisco J., THOMPSON Evan, and ROSCH Eleanor, **The Embodied Mind: Cognitive Science and Human Experience**, MIT Press, Cambridge 1991.

WHYTE Christopher J., "Integrating the Global Neuronal Workspace into the Framework of Predictive Processing: Towards a Working Hypothesis", *Consciousness and Cognition* 2019, Vol. 73, article number: 102763, https://tiny.pl/9vbzd [20.05.2022].

WHYTE Christopher J. and SMITH Ryan, "The Predictive Global Neuronal Workspace: A Formal Active Inference Model of Visual Consciousness", *Progress in Neurobiology* 2021, Vol. 199, article number: 101918, https://tiny.pl/9vbzl [20.05.2022].

ZALTA Edward N. (ed.), **The Stanford Encyclopedia of Philosophy**, Winter 2021 Edition.

ISSN 2299-0356

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**
Philosophical Aspects of Origin s. 277–282
https://doi.org/10.53763/fag.2022.19.2.200

RECENZJA / BOOK REVIEW

Albert Łukasik
Uniwersytet Mikołaja Kopernika w Toruniu

Człowiek zwierzęciem zróżnicowanym

Jacek Neckar, **Ewolucyjna psychologia osobowości. O psychologicznej naturze człowieka w ujęciu darwinowskim**, Wydawnictwo Akademickie SEDNO, Warszawa 2018, s. 267.

Received: May 17, 2022. Accepted: July 12, 2022. Published online: September 1, 2022.

Psychologiczna natura człowieka jest przedmiotem sporów między przedstawicielami różnych nauk, począwszy od nauk społecznych, takich jak psychologia (w szczególności psychologia ewolucyjna) czy antropologia, a kończąc na naukach przyrodniczych, takich jak biologia i chemia. Trudności w sformułowaniu teorii w pełni wyjaśniającej psychologiczną naturę człowieka wynikają między innymi z występujących wśród ludzi różnic indywidualnych i odmiennych typów osobowości. Ewolucyjnej genezy tych różnic szuka Jacek Neckar. Jego książka **Ewolucyjna psychologia osobowości. O psychologicznej naturze człowieka w ujęciu darwinowskim** zawiera analizę najważniejszych hipotez wyjaśniających psychologiczną naturę człowieka w perspektywie socjobiologii i psychologii ewolucyjnej, a także propozycję syntezy teorii ewolucji, biologii i współczesnej psychologii jako sposobu wyjaśniania psychologicznej natury człowieka.

Autor w monografii stawia trzy zasadnicze cele. Pierwszym jest szczegółowy, krytyczny przegląd wszystkich ważniejszych stanowisk w biologii ewolucyjnej wraz z analizą ich przydatności w ewolucyjnym kontekście psychologii ze szczególnym uwzględnieniem darwinizmu i nowej syntezy. Podobna analiza dotyczy również socjobiologii i psychologii ewolucyjnej. Istotnym elementem tej części rozprawy Neckara jest podkreślenie wspólnych założeń wymienionych stanowisk i dyscyplin naukowych, które następnie będą stanowić fundamenty proponowanej przez autora syntezy. Drugim celem jest analiza dotychczasowych wyników, prób i propozycji wyjaśnienia zjawisk w psychologii osobowości w kontekście ewolucyjnym. Autor przyjmuje podział na ogólne i różnicowe badanie osobowości oraz przykłada dużą wagę do zjawiska adaptacji. Ze względu na szeroki obszar omawianej tematyki autor deklaruje, że analizie zostają poddane jedynie te propozycje teorii osobowości, które są uwzględnianie przez psychologów ewolucyjnych. Trzecim i najważniejszym celem jest synteza autorskich propozycji poruszanych przy okazji realizowania dwóch poprzednich celów i własna propozycja koncepcji osobowości.

Monografia składa się z sześciu rozdziałów, w których systematycznie realizowane są postawione przez autora cele. Rozdział pierwszy został poświęcony historycznemu przekrojowi najważniejszych, z perspektywy biologii ewolucyjnej, propozycji koncepcji rozwoju człowieka. Autor szczegółowo omawia darwinizm i jego znaczenie dla nowej syntezy. Zwraca tu szczególną uwagę na spór dotyczący genezy zróżnicowania cech osobowości wśród przedstawicieli tego samego gatunku i możliwe wyjaśnienia tej genezy za pomocą hipotez spontanicznych bądź indukowanych środowiskowo mutacji i doboru naturalnego.

Drugi rozdział skupia się na analizie psychologii ewolucyjnej, uwzględniając jej metodologię i paradygmaty. Omówione są również liczne propozycje wyjaśniania społecznych zachowań zwierząt z perspektywy ewolucyjnej. Autor zadbał o to, żeby uwzględnić przedstawione przez Herberta Spencera przeddarwinowskie ujęcie rozwoju umysłu człowieka. Czytelnik znajdzie w tym rozdziale obszerne informacje na temat wszystkich najważniejszych postaci, które wpłynęły na pojawienie się i rozwój nauk powiązanych z psychologią ewolucyjną, takich jak etologia i socjobiologia, wraz z uzasadnieniem trafności krytyki behawioryzmu jako sposobu wyjaśniania zachowań zwierząt. Szeroko omówiony został także wpływ socjobiologa Roberta Triversa na obecny stan psychologii ewolucyjnej dzięki wprowadzeniu pojęcia altruizmu i teorii doboru krewniaczego. Następnie zostaje poruszona kwestia mechanizmu adaptacji zarówno pod kątem terminologicznym (jak definiować adaptację), jak i klasyfikacyjnym (jakie warunki musi spełniać zjawisko, by zostało uznane za adaptację). Rozdział zamyka dyskusja na temat potrzeby uznania psychologii ewolucyjnej i socjobiologii za osobne dziedziny, uwzględniając zarówno ich wspólne, jak i odrębne elementy.

Rozdział trzeci autor poświęcił zagadnieniu modularności w perspektywie biologicznej i psychologicznej. Modularność, służąca biologii i psychologii za narzędzie rozdzielające bardziej złożone zjawiska na prostsze elementy, jest w tym rozdziale opisywana pod kątem podziału na typy osobowości (wraz z uwzględnieniem koncepcji wielkiej piątki [1]) oraz rozwijanych w toku ewolucji mechanizmów adaptacyjnych. Pojęcie modułu posiada liczne definicje, które autor dokładnie analizuje, odwołując się między innymi do Herberta Simona schematu systemu modularnego, Rudolfa Raffa ujęcia właściwości modułów rozwojowych oraz schematu modułu według Guntera Wagnera i Lee Altenberga. Każdej propozycji modułu towarzyszy omówienie zarówno mocnych, jak i słabych jej stron.

W czwartym rozdziale autor prezentuje wiodący motyw książki, czyli omówienie teorii osobowości z perspektywy ewolucyjnej. Rozważania koncentrują się na ogólnym ujęciu psychologii osobowości przy uwzględnieniu jej trzech najważniejszych elementów, którymi są: subiektywne doświadczanie świata, motywacja oraz procesy emocjonalne. Na początku przedstawiono kwestie zasadnicze, dotyczące analizy osobowości z perspektywy psychologicznej, takie jak czynniki społeczne, emocjonalne i poznawcze. Następnie omówiono pierwszy element należący do psychologii osobowości, czyli subiektywne doświadczanie świata i siebie samego w perspektywie koncepcji Dana McAdamsa. Kolejny element — motywacja — został omówiony w psychologicznej perspektywie nadawania celu działaniom człowieka w środowisku społecznym. Autor skupił się na pięciu zasadniczych relacjach zaproponowanych przez Daphne Bugental: (a) przywiązaniu, (b) dominacji, władzy i hierarchii, (c) tworzeniu koalicji, (d) wzajemności, (e) szukaniu partnera/ partnerki i tworzeniu z nim/nią więzi.

Po omówieniu psychologicznej koncepcji motywacji następuje analiza koncepcji ewolucyjnej, w której autor zwraca szczególną uwagę na znaczenie teorii dostosowania łącznego sformułowanej przez Williama Hamiltona, a następnie przedstawia związane z nią problemy w świetle funkcjonowania człowieka współczesnego w dynamicznie zmieniającym się otoczeniu. Zwraca tam uwagę na problematykę egzaptacji, czyli nowo wyodrębnionej funkcji cechy, która we wcześniejszym toku ewolucji posiadała inną funkcję. Autor poruszył tutaj problem powoływania się na mechanizm egzaptacji lub adaptacji. Jego zdaniem problem ten

---

[1] Wielka piątka (*Big Five*) to pięcioczynnikowy model osobowości, którego autorami są Paul Costa i Robert R. McCrae. Model ten obejmuje następujące czynniki osobowości: neurotyczność, ekstrawersję, otwartość na doświadczenie, ugodowość i sumienność.

pojawia się w ramach psychologii ewolucyjnej jako następstwo bezkrytycznego przyjmowania stanowiska adaptacjonistycznego, zwłaszcza w kontekście doboru płciowego.

Trzecim omawianym elementem osobowości są emocje. Poruszono tu najważniejsze ewolucyjne koncepcje emocji, powołując się na propozycje Roberta Plutchika, Jaaka Pankseppa oraz Johna Tooby'ego i Ledy Cosmides. Analizie poddano także zagadnienie podstawowych i złożonych emocji, zestawiając ewolucyjną rolę emocji jako szybkich i bezrefleksyjnych reakcji oraz ich rolę w funkcjonowaniu społecznym. Rozdział zamyka szczegółowy opis problemu ewolucji samoświadomości i Ja. Poruszono w nim kwestie dotyczące samoświadomości u ssaków naczelnych, roli języka w kształtowaniu samowiedzy, a także potrzeby interdyscyplinarnego ujęcia ewolucji człowieka.

Piąty rozdział rozwija zagadnienie ewolucjonistycznego ujęcia osobowości, koncentrując się na „poziomie różnicowym", czyli poziomie dotyczącym różnic indywidualnych ujmowanych w perspektywie psychologicznej i ewolucyjnej. Autor zwraca uwagę na szeroki zakres czynników różnicujących, dlatego, podążając za przedstawicielami psychologii osobowości, celem uporządkowania tematyki, dzieli różnice indywidualne na dwa rodzaje: grupowane wedle cech (poznawcze, afektywne i charakteryzujące zachowanie) i motywu (dążenia i cele). Autor akcentuje tu problematykę ujęcia różnic indywidualnych w kontekście ewolucyjnym ze względu na odziedziczalność cech niemających na pierwszy rzut oka znaczenia adaptacyjnego, co da się zauważyć w różnicach indywidualnych zarówno w genotypie, jak i fenotypie człowieka. Jako jedno z potencjalnych wyjaśnień powstałego problemu autor przywołuje badania Roberta Plomina z zakresu genetyki zachowania, w których podejmuje się próbę wyjaśniania niektórych cech ludzkich jako przypadkowych mutacji przekazywanych z pokolenia na pokolenie. Istotną propozycją biologicznego wyjaśnienia różnic indywidualnych są cztery typy zmienności wprowadzone przez Tooby'ego i Cosmides: (a) zmienność powierzchowna (odmienne mechanizmy pełniące tę samą funkcję); (b) ograniczona zmienność funkcjonalna (stopniowe zmiany części bądź całości mechanizmu); (c) zmienność destrukcyjna (niszcząca integralność funkcjonalną danego mechanizmu); (d) skoordynowana zmienność funkcjonalna (równoczesna zmiana kilku niezależnych komponentów).

Następnie autor kontynuuje biologiczne wyjaśnienia zmienności indywidualnej, odwołując się do mechanizmów opisywanych przez genetykę zachowań.

Ostatnie strony rozdziału poświęcone zostały dwóm kwestiom: teorii historii życia opisującej wpływ doboru naturalnego na kształtowanie organizmów celem przeżycia i osiągnięcia sukcesu reprodukcyjnego oraz aktualnie obowiązującym modelom, które wyjaśniają genezę różnic indywidualnych. W podsumowaniu rozdziału autor formułuje dwie propozycje. Pierwszą z nich jest ujęcie kierunkowego doboru naturalnego w relacji do cech osobowości. W myśl tego ujęcia, niektóre cechy osobowości mogły się wyłonić w odpowiedzi na wymagania ze strony środowiska. Druga propozycja dotyczy uznania endofenotypów (mechanizmów funkcjonujących na poziomie emocjonalnym, poznawczym i tym podobnych) za elementy umożliwiające klasyfikację poszczególnych typów osobowości. Ma to na celu pogodzenie kilku ujęć osobowości i stworzenie bardziej usystematyzowanej ramy dla analizowania osobowości w perspektywie psychologii ewolucyjnej.

Ostatni rozdział jest próbą syntezy psychologii ewolucyjnej i psychologii osobowości. Autor skupił się w nim na najważniejszych problemach związanych z połączeniem psychologii osobowości z teorią ewolucji. Jeden z nich dotyczy samej psychologii osobowości, gdyż w jej ramach istnieje wiele różnych koncepcji stanowiących próbę dokonania podziału na konkretne typy osobowości. Autor zwrócił tutaj uwagę na fakt, że niektóre koncepcje osobowości są przestarzałe, a mimo to wciąż funkcjonują w obecnej psychologii bądź służą za filar systematyzowania koncepcji osobowości. Kolejny problem dotyczy psychologii ewolucyjnej. Autor przywołuje tu wspomnianą już koncepcję modularności w jej skrajnej postaci. Główny cel rozdziału, czyli próba syntezy, realizowany jest za pomocą przedstawienia trzech poziomów analizy ewolucyjnej psychologii osobowości: metateoretycznego, teoretycznego i metodologicznego. Na każdym z poziomów analizy autor podnosi kwestie problematyczne, takie jak ryzyko skrajnego redukcjonizmu oraz potrzeba opracowania adekwatnej metodologii. Jednocześnie proponuje rozwiązania, takie jak konieczność uwzględnienia najnowszych postępów technicznych w neuronaukach, a także uwzględnienie procesów nieświadomych w ludzkiej ontogenezie i kształtowaniu osobowości.

Ewolucyjna psychologia osobowości Jacka Neckara jest monografią bogatą w treść merytoryczną. Porusza najważniejsze kwestie z psychologii ewolucyjnej i psychologii osobowości. Autor wykazał się doskonałą znajomością tematyki, a jego oryginalna próba syntezy licznych teorii osobowości z wyjaśnieniami ewolucyjnymi jest dokładnie przemyślana, gdyż uwzględnia wiele problemów metodologicznych i formułuje szereg sugestii dotyczących rozwiązania tych ostatnich.

Autorowi należą się wyrazy uznania za przedstawienie w przystępny sposób tak obszernej tematyki jak zagadnienia osobowości, różnic indywidualnych i teorii ewolucji, a także za nadanie treści monografii uporządkowanej struktury.

Albert Łukasik

ISSN 2299-0356

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**

Philosophical Aspects of Origin s. 283–284

https://fag.ifil.uz.zgora.pl/index.php/fag/issue/view/22/55

Lista recenzentów tomu (Volume Reviewers)

Published online: February 2, 2023.

Douglas Axe — Biola University;

Janet Browne — Harvard University;

George Couvalis — Flinders University;

Piotr Daszkiewicz — Muséum National d'Histoire Naturelle;

Wojciech Daszkiewicz — Katolicki Uniwersytet Lubelski Jana Pawła II;

Richard Delisle — University of Lethbridge;

Radosław Kazibut — Uniwersytet im. Adama Mickiewicza w Poznaniu;

Jerzy Kojkoł — Akademii Marynarki Wojennej;

Anna Lemańska — Uniwersytet Kardynała Stefana Wyszyńskiego w Warszawie;

Andrzej Łukasik — Uniwersytet Marii Curie-Skłodowskiej;

William G. Lycan — University of North Carolina;

Krzysztof Maślanka — Instytut Historii Nauki PAN im. Ludwika i Aleksandra Birkenmajerów;

Andrzej Myc — University of Michigan;

Ted Parent — Nazarbayev University;

Marek Rembierz — Uniwersytet Śląski;

Zenon Roskal — Katolicki Uniwersytet Lubelski Jana Pawła II;

William M.R. Simpson — University of Cambridge;

Phillip R. Sloan — University of Notre Dame;

Tibor Solymosi — Westminster College;

Mariusz Tabaczek — Pontifical University of Saint Thomas Aquinas;

Józef Zon — Katolicki Uniwersytet Lubelski Jana Pawła II.

ISSN 2299-0356

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**
Philosophical Aspects of Origin s. 285–286
https://fag.ifil.uz.zgora.pl/index.php/fag/issue/view/22/56

Rada Naukowa
(Advisory Board)

Published online: February 2, 2023.

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**
Philosophical Aspects of Origin s. 287–298
https://fag.ifil.uz.zgora.pl/index.php/fag/issue/view/22/57
ISSN 2299-0356

Zasady przyjmowania artykułów do czasopisma

Published online: February 2, 2023.

Filozoficzne Aspekty Genezy (tytuł angielski: *Philosophical Aspects of Origin*) (ISSN 2299-0356) to wąskotematyczne, specjalistyczne internetowe czasopismo filozoficzne, poświęcone problematyce genezy — Wszechświata, pierwszego życia, późniejszych form życia, człowieka, psychiki, świadomości, języka, teorii naukowych, religii i tym podobnym. Profil czasopisma obejmuje również filozoficzne bądź metodologiczne rozważania nad teoriami lub poglądami dotyczącymi problemu genezy.

Przyjmujemy do publikacji teksty polskojęzyczne, a od 2014 roku również anglojęzyczne — artykuły, polemiki, przekłady, recenzje książek i listy do redakcji. Od 2022 roku czasopismo funkcjonuje jako półrocznik.

Teksty należy nadsyłać na adres elektroniczny zastępcy redaktora naczelnego (g.malec@fag.ifil.uz.zgora.pl). Można też skorzystać z naszej platformy do przesyłania tekstów (https://fag.ifil.uz.zgora.pl/index.php/fag/about/submissions). Do tekstu polskojęzycznego należy dołączyć streszczenia oraz słowa kluczowe w dwóch językach: polskim i angielskim, jak również tytuł artykułu w języku angielskim. Autorzy tekstów anglojęzycznych powinni dołączyć streszczenie i słowa kluczowe wyłącznie w języku angielskim.

W *Filozoficznych Aspektach Genezy* proces recenzji przebiega na zasadzie *double-blind review* — ani recenzenci nie znają tożsamości autora, ani autor nazwisk recenzentów. To autor musi się jednak postarać o przygotowanie tekstu w taki sposób, aby jego tożsamości nie można było się domyślić na podstawie treści tekstu (treści zdradzające tożsamość autora można dołączyć do tekstu po przyjęciu go do druku). Nazwiska wszystkich recenzentów danego tomu podawane są zbiorczo w ostatnim numerze tomu.

Wszystkie nadesłane teksty po wstępnej akceptacji redaktora naczelnego wysyłane są do dwóch niezależnych recenzentów spoza jednostki naukowej, do której afiliowany jest autor. Na podstawie opinii recenzentów redakcja podejmuje decyzję o przyjęciu bądź nieprzyjęciu tekstu do druku. Teksty przyjęte do druku odsyłane są, po składzie i łamaniu komputerowym, do autorów w celu dokonania korekty autorskiej. *Nieodesłanie korekty w wyznaczonym przez redakcję terminie uznawane jest za zgodę autora na publikację tekstu w jego dotychczasowej postaci*.

Redakcja *Filozoficznych Aspektów Genezy* podejmie starania, by przyjęty tekst jak najszybciej znalazł się w Internecie w wersji pdf. Należy jednak pamiętać, że ostateczną kolejność tekstów w danym tomie ustala się dopiero po jego zamknięciu, w związku z czym numeracja stron poszczególnych tekstów jest do tego momentu tymczasowa.

W trosce o zachowanie podstawowych zasad rzetelności naukowej redakcja *Filozoficznych Aspektów Genezy* podejmuje starania o przeciwdziałanie zjawiskom *ghostwriting* i *guest autorship*. *Ghostwriting* polega na nieujawnianiu nazwiska osoby, która wniosła istotny wkład w powstanie publikacji, była rzeczywistym autorem lub współautorem pracy. *Guest autorship* to uwzględnianie jakiejś osoby jako współautora pracy, mimo że jej wkład w publikację był znikomy albo nawet zerowy. Obie postawy są przejawem nieuczciwości naukowej, dlatego też wszelkie wykryte nieprawidłowości będą przez redakcję demaskowane i dokumentowane. Redakcja będzie też powiadamiała o tym odpowiednie podmioty, w tym instytucje naukowe zatrudniające autorów, inne ośrodki naukowe bądź czasopisma. Wszyscy potencjalni autorzy proszeni są zatem o ujawnianie rzeczywistego wkładu — własnego i innych osób — w powstanie tekstu. Odpowiedzialność spada przede wszystkim na autora. Wszelkie uwagi prosimy kierować na ten adres: info@fag.ifil.uz.zgora.pl.

Autorzy zgłaszający teksty zobowiązani są potwierdzić dane zawarte w formularzu zgłoszeniowym. Przy określeniu ról autora i współautora korzystamy z definicji wypracowanej przez The International Committee of Medical Journal Editors. Wszystkie osoby związane z naszym czasopismem są wykluczone z możliwości decydowania o publikacji własnych tekstów lub tekstów, w przypadku których może wystąpić konflikt interesów. Wszelkie uwagi prosimy kierować na ten adres: info@fag.ifil.uz.zgora.pl.

Decyzja o przyjęciu bądź odrzuceniu tekstu podejmowana jest przez redakcję po zakończeniu procesu recenzji. Decyzja ta jest ostateczna i podlega odwołaniu tylko w wyjątkowych sytuacjach — na przykład gdy występuje uzasadnione przypuszczenie o wystąpieniu konfliktu interesów lub uzasadnione podejrzenie nieobiektywności recenzentów. W takim przypadku redaktor naczelny może wystąpić o dodatkową opinię, na podstawie której tekst zostanie przyjęty lub odrzucony. Każda skarga i uwaga zostanie rozpatrzona przez redakcję w najszybszym możliwym terminie. Wszelkie uwagi prosimy kierować na ten adres: info@fag.ifil.uz.zgora.pl.

Wszystkie osoby biorące udział w procesie wydawniczym — autorzy, współautorzy, redaktorzy tematyczni, recenzenci i każdy członek redakcji — bezwzględnie powinni wskazać okoliczności mające wpływ (lub mogące mieć wpływ) na obiektywność w referowaniu określonego tematu (dotyczy głównie autorów i współautorów) czy też ocenie prac (dotyczy głównie recenzentów). Wszelkie konflikty interesów lub sytuacje mające znamiona takich konfliktów powinny być niezwłocznie zgłaszane. Każdy konflikt interesów zostanie rozpatrzony przez redakcję w najszybszym możliwym terminie. Redakcja prosi autorów także o podanie informacji na temat ewentualnych źródeł finansowania badań, których efektem jest nadesłany tekst, oraz wskazanie podmiotów finansujących. Autorzy muszą również zaświadczyć, że nadesłane przez nich artykuły są oryginalne i nie były wcześniej publikowane oraz że nie występuje konfliktów interesów związany z finansowym powiązaniem autora z osobami lub instytucjami, które mogłyby wywrzeć niepożądany wpływ na rezultaty ich badań. Wszelkie uwagi prosimy kierować na ten adres: info@fag.ifil.uz.zgora.pl.

Wszystkie materiały publikowane w czasopiśmie *Filozoficzne Aspekty Genezy* są opatrzone licencją Uznanie autorstwa-Użycie niekomercyjne 4.0 Międzynarodowe (CC BY-NC 4.0). Licencja ta zapewnia wolny dostęp do naszych materiałów pod warunkiem właściwego oznaczenia źródła i podania rodzaju licencji, na podstawie której dany tekst został opublikowany. Licencja CC BY-NC 4.0 nie pozwala na komercyjne wykorzystanie naszych materiałów. W sprawach komercyjnego użycia tekstów opublikowanych w *Filozoficznych Aspektach Genezy* prosimy pisać na ten adres: info@fag.ifil.uz.zgora.pl.

Zasady cytowania (wersja skrócona)

Odnośnik do przypisu (numer) umieszcza się **PO**, a nie przed znakiem interpunkcyjnym (czyli po kropce lub po przecinku).

Adresy internetowe pełnych wersji cytowanych tekstów należy podawać w formie skróconej, wykorzystując do tego celu platformy do skracania linków, na przykład https://tiny.pl/ czy https://cutt.ly (skrócone adresy wyglądają tak: https://cutt.ly/LvvW49N [24.11.2019]; https://tiny.pl/r82b2 [24.11.2019]. Po dołączeniu skróconego adresu należy dodać informację o ostatnim dostępie w formacie [dd.mm.rok], czyli na przykład [24.11.2019].

A. Cytowanie książek

a) pierwsze cytowanie: imię i nazwisko autora (nazwisko kapitalikami), tytuł fontem pogrubionym; jeśli książka jest tłumaczeniem z języka obcego, to po tytule informacja o tłumaczu: przeł. Jan Kowalski; jeśli książkę wydano w serii, to kursywą nazwa serii wydawniczej i — po przecinku — bez kursywy numer tomu, następnie wydawnictwo, miejsce i rok wydania, numer strony/numery stron. Przykłady:

Karin Knorr-Cetina, **The Manufacture of Knowledge**, Pergamon, New York 1981, s. 395–396; Richard Dawkins, **Ślepy zegarmistrz, czyli jak ewolucja dowodzi, że świat nie został zaplanowany**, przeł. Antoni Hoffmann, *Biblioteka Myśli Współczesnej*, Państwowy Instytut Wydawniczy, Warszawa 1994, s. 48.

b) kolejne cytowania: nazwisko autora (kapitalikami), skrót tytułu (bądź cały tytuł, jeśli jest krótki) zakończony wielokropkiem (który traktujemy jako znak zastępujący wszystkie pozostałe dane bibliograficzne tekstu, a nie tylko dalszą część tytułu), numer strony/numery stron. Przykłady:

Knorr-Cetina, **The Manufacture...**, s. 395–396; Dawkins, **Ślepy zegarmistrz...**, s. 48.

B. Cytowanie artykułów, recenzji i tym podobnych

a) pierwsze cytowanie: imię i nazwisko autora (nazwisko kapitalikami), tytuł w cudzysłowach, jeśli jest to przekład, to skrót „przeł." oraz imię i nazwisko tłumacza, nazwa czasopisma kursywą i rok, numer tomu, zeszyt lub część tomu, numer strony/numery stron, w nawiasie kwadratowym pierwsza i ostatnia strona tekstu; jeśli artykuł ukazał się w pracy zbiorowej, to po tytule (ewentualnie po nazwisku tłumacza) imię i nazwisko redaktora (nazwisko kapitalikami), w nawiasie okrągłym skrót „red." lub jego odpowiednik w innych językach, tytuł pracy zbiorowej, wydawnictwo, miejsce i rok wydania, numer strony/numery stron, w nawiasie kwadratowym pierwsza i ostatnia strona tekstu. Przykłady:

Kenneth R. Miller, „Wielki projekt życia", przeł. Adam Grzybek, *Filozoficzne Aspekty Genezy* 2004, t. 1, s. 12 [9–30]; Gonzalo Munévar, „Dopuszczanie sprzeczności w nauce", przeł. Kazimierz Jodkowski, w: Kazimierz Jodkowski (red.), **Czy sprzeczność może być racjonalna?**, *Realizm. Racjonalność. Relatywizm*, t. 4, Wydawnictwo UMCS, Lublin 1991, s. 210 [209–214].

b) kolejne cytowania: nazwisko autora (kapitalikami), skrót tytułu zakończony wielokropkiem, numer strony/numery stron. Przykłady:

Miller, „Wielki projekt życia…", s. 12; Munévar, „Dopuszczanie sprzeczności w nauce…", s. 210.

Wielokropek przy powtórnym cytowaniu wskazuje, że pominięto część danych bibliograficznych.

C. Cytowanie fragmentów cudzych prac naukowych

Jeśli fragment jest dość długi, to zaleca się wyodrębnianie cytatu za pomocą lewostronnego indentu z niewielkim odstępem u góry i u dołu, czcionką 10 pkt, oraz z pojedynczą interlinią. Przykładem takiego zapisu jest poniższy tekst:

> Pozwala to osiągnąć pewien efekt wizualny. Tekst nie jest monotonny, a zróżnicowany. Cudze myśli są wyodrębnione, łatwiej je znaleźć przy późniejszym szukaniu.

Jeśli jednak cytat jest krótki, wystarczy umieszczenie go w cudzysłowach, bez wydzielania go z całości akapitu. Przy dłuższym cytacie cudzysłowy są niepotrzebne, gdyż tę funkcję pełnią indent i pozostałe cechy tekstu.

D. Sporządzenie bibliografii

Pozycje bibliografii powinny być sortowane alfabetycznie od nazwisk autorów (które również zapisujemy kapitalikami). Przykłady:

Boyer Pascal, „Religion: Bound to Believe?", *Nature* 2008, Vol. 455, s. 1038–1039.

Darwin Karol, **O powstawaniu gatunków drogą doboru naturalnego, czyli o utrzymaniu się doskonalszych ras w walce o byt**, przeł. Szymon Dickstein i Józef Nusbaum, *Arcydzieła Wielkich Myślicieli*, Ediciones Altaya Polska & DeAgostini Polska, Warszawa 2001.

Zasady cytowania (wersja rozszerzona, z wyjaśnieniami)

W nadsyłanych tekstach należy stosować tak zwany zielonogórski system cytowania, którego autorem jest założyciel czasopisma *Filozoficzne Aspekty Genezy* — prof. Kazimierz Jodkowski. Poniżej przykłady, a po przykładach uzasadnienia.

Przede wszystkim odnośnik do przypisu (numer) umieszcza się **PO**, a nie przed znakiem interpunkcyjnym (czyli po kropce lub po przecinku). Odchodzimy tu więc od tak zwanego standardu PWN-owskiego, w którym odnośnik do przypisu umieszcza się przed znakiem interpunkcyjnym, tuż za ostatnim słowem. Standard PWN-owski w kilku przypadkach prowadzi do nieporozumień lub śmiesznych sytuacji. Oto przykłady takich przypadków:

a) Załóżmy, że chcemy postawić odnośnik do przypisu po zdaniu kończącym się frazą: „… w roku 44 p.n.e.” Gdzie w takiej sytuacji postawić odnośnik do przypisu? Przed kropką? Ale ta kropka pełni jednocześnie dwie funkcje w zdaniu — kończy je oraz decyduje o skrócie. Odnośnika do przypisu nie można postawić przed kropką, ponieważ likwidujemy wówczas tę drugą funkcję. Problem znika, gdy zdecydujemy, że odnośniki do przypisów stawiamy po kropce, przecinku i tym podobnych.

b) Przypuśćmy, że chcemy postawić odnośnik do przypisu po zdaniu, które kończy się informacją na przykład o liczbie atomów we Wszechświecie: „… wynosi 10^{80}.” Jeśli teraz wstawimy, jak wymaga tego standard PWN-owski, odnośnik do przypisu przed kropką, doprowadzimy do nieporozumienia, bowiem zdanie to będzie wyglądać tak: „… wynosi 10^{805}.” (gdzie ^{5} jest odnośnikiem do przypisu). W standardzie zielonogórskim problem ten nie istnieje, gdyż odnośnik do przypisu jest umieszczony po kropce. Mamy więc: „… wynosi $10^{80}.^{5}$”

Adresy internetowe pełnych wersji cytowanych tekstów należy podawać w formie skróconej, wykorzystując do tego celu platformy do skracania linków, na przykład https://tiny.pl/ czy https://cutt.ly (skrócone adresy wyglądają tak: https://cutt.ly/LvvW49N [24.11.2019]; https://tiny.pl/r82b2 [24.11.2019]. Można również używać innych stron do skracania adresów, ale należy się upewnić, że po skopiowaniu linku zostaniemy bezpośrednio przeniesieni do cytowanego tekstu. Po dołączeniu skróconego adresu należy dodać informację o ostatnim dostępie w formacie [dd.mm.rok], czyli na przykład „[24.11.2019]".

A. Cytowanie książek

a) pierwsze cytowanie: imię i nazwisko autora (nazwisko kapitalikami), tytuł fontem pogrubionym; jeśli książka jest tłumaczeniem z języka obcego, to po tytule informacja o tłumaczu: przeł. Jan Kowalski; jeśli książkę wydano w serii, to kursywą nazwa serii wydawniczej i — po przecinku — bez kursywy numer tomu, następnie wydawnictwo, miejsce i rok wydania, numer strony/numery stron. Przykłady:

Józef Marceli Dołęga, **Kreacjonizm i ewolucjonizm. Ewolucyjny model kreacjonizmu a problem hominizacji**, Akademia Teologii Katolickiej, Warszawa 1988, s. 17; Kazimierz Jodkowski, **Metodologiczne aspekty kontrowersji ewolucjonizm-kreacjonizm**, *Realizm. Racjonalność. Relatywizm*, t. 35, Wydawnictwo UMCS, Lublin 1998, s. 395–396; Richard Dawkins, **Ślepy zegarmistrz, czyli jak ewolucja dowodzi, że świat nie został zaplanowany**, przeł. Antoni Hoffmann, *Biblioteka Myśli Współczesnej*, Państwowy Instytut Wydawniczy, Warszawa 1994, s. 48.

b) kolejne cytowania: nazwisko autora (kapitalikami), skrót tytułu (bądź cały tytuł, jeśli jest krótki) zakończony wielokropkiem (który traktujemy jako znak zastępujący wszystkie pozostałe dane bibliograficzne tekstu, a nie tylko dalszą część tytułu), numer strony/numery stron. Przykłady:

Dołęga, **Kreacjonizm i ewolucjonizm…**, s. 17; Jodkowski, **Metodologiczne aspekty…**, s. 395–396; Dawkins, **Ślepy zegarmistrz…**, s. 48.

B. Cytowanie artykułów, recenzji i tym podobnych

a) pierwsze cytowanie: imię i nazwisko autora (nazwisko kapitalikami), tytuł w cudzysłowie, jeśli jest to przekład, to skrót „przeł." oraz imię i nazwisko tłumacza, nazwa czasopisma kursywą i rok, numer tomu, zeszyt lub część tomu, numer strony/numery stron, w nawiasie kwadratowym pierwsza i ostatnia strona tekstu; jeśli artykuł ukazał się w pracy zbiorowej, to po tytule (ewentualnie po nazwisku tłumacza) imię i nazwisko redaktora, w nawiasie okrągłym skrót „red." lub jego odpowiednik w innych językach, tytuł pracy zbiorowej, wydawnictwo, miejsce i rok wydania, numer strony/numery stron, w nawiasie kwadratowym pierwsza i ostatnia strona tekstu. Przykłady:

Kenneth R. Miller, „Wielki projekt życia", przeł. Adam Grzybek, *Filozoficzne Aspekty Genezy* 2004, t. 1, s. 12 [9–30]; Gonzalo Munévar, „Dopuszczanie sprzeczności w nauce", przeł. Kazimierz Jodkowski, w: Kazimierz Jodkowski (red.), **Czy sprzeczność może być racjonalna?**, *Realizm. Racjonalność. Relatywizm*, t. 4, Wydawnictwo UMCS, Lublin 1991, s. 210 [209–214].

b) kolejne cytowania: nazwisko autora (kapitalikami), skrót tytułu zakończony wielokropkiem, numer strony/numery stron. Przykłady:

Miller, „Wielki projekt życia…", s. 12; Munévar, „Dopuszczanie sprzeczności w nauce…", s. 210.

Dlaczego akurat tak, a nie według któregoś z częściej spotykanych sposobów?

Niektórzy w tekście głównym (lub w przypisie) odnoszą się do publikacji, wymieniając autora i rok wydania publikacji, na przykład: Feyerabend 1965, albo: Feyerabend [1965], lub też: [Feyerabend 1965]. Po przecinku lub dwukropku dodają też numer strony/numery stron, na przykład [Feyerabend 1965, s. 34] lub [Feyerabend 1965:34]. Pełne dane bibliograficzne czytelnik znajduje wówczas w spisie bibliograficznym umieszczonym na końcu publikacji. Niektórzy idą jeszcze dalej i pozbywają się nawet nazwiska autora, zastępując je numerem pozycji w spisie bibliograficznym, na przykład [34, s. 17] lub [34:17]. Ten sposób cytowania w jego rozmaitych wariantach jest dla humanistów najgorszy — ma kilka wad, które zostaną tu omówione.

1) Sposób ten jest dobry w publikacjach dotyczących nauk przyrodniczych, gdzie ważne jest tylko, kto i kiedy dokonał jakiegoś odkrycia udokumentowanego publikacją, a nie to, jaki tytuł miała publikacja. W naukach humanistycznych jednak oprócz autora i roku ważny jest też tytuł publikacji. Wyobraźmy sobie referat, w którym mówimy: „Jak wykazał Popper 1959, a z czym się nie zgodził Kuhn 1962…". Dziwacznie, prawda? Mówimy bowiem tak: „Jak wykazał Popper w **Logice odkrycia naukowego**, a z czym się nie zgodził Kuhn w **Strukturze rewolucji naukowych**…".

2) Sposób ten ma też wielką wadę: niezwykle łatwo popełnić tu błąd. Łatwo o pomyłkę przy wpisywaniu roku albo też liter a, b, c i tak dalej, gdy zaznaczamy publikacje pochodzące z tego samego roku. Gdy natomiast zrobimy literówkę, normalnie pisząc tytuł, nadal mimo błędu będzie on możliwy do zidentyfikowania. Autor jednego z tekstów w naszym czasopiśmie w oryginale używał właśnie omawianej metody cytowania. Przy zamianie stylu cytowania na zielonogórski ujawnił

się szereg błędów i autor stanął przed problemem, jak je usunąć. Wada ta nie ujawnia się w tekstach przyrodników, gdyż najczęściej ich teksty są krótkie i cytowanych jest kilka lub kilkanaście publikacji — w rezultacie względnie łatwo jest się ustrzec przed popełnieniem błędu. Teksty humanistyczne są jednak kilkakrotnie dłuższe, a i bibliografia znacznie obszerniejsza.

3) Trzecia wada to dziwaczny wygląd tekstów dawnych autorów. Możemy bowiem otrzymać zapis: Arystoteles 1985, Platon 2003 i tym podobne. Przytaczanie zaś, jak proponujemy w systemie zielonogórskim, tytułu lub skrótu publikacji wygląda naturalnie bez względu na epokę, w której żył cytowany autor. Wada ta nie ujawnia się w tekstach przyrodników, gdyż cytują oni tylko najnowsze publikacje. Przyrodnika najczęściej nie interesuje, co w omawianej sprawie sądzili Kopernik czy Newton.

4) Ostatnia wada krytykowanego systemu, na którą należy zwrócić uwagę, dotyczy cytowania tych autorów, którzy posiadają „popularne" nazwiska. Czasami trzeba zacytować kilka osób o tym samym nazwisku (na przykład Hintikkę czy Nagela). Nie da się wówczas uniknąć podania imienia, a wtedy ten sposób cytowania staje się niekonsekwentny — raz jest imię, kiedy indziej go nie ma.

Wszystkich tych wad unikamy, gdy cytując, podajemy imię, nazwisko, tytuł i pozostałe dane bibliograficzne publikacji.

Dlaczego imię, a nie — jak się powszechnie stosuje — inicjał imienia? Po pierwsze, dlatego, że imię pozwala rozpoznać płeć autora, a niekiedy też jego narodowość (należy unikać tłumaczenia imion na ich odpowiedniki polskie, chyba że jest to utrwalony zwyczaj, na przykład Karol Darwin). Jeżeli na okładce książki **The Reach of Science** znajduje się imię Henryk (Henryk Mehlberg), to wiadomo, że niezależnie od pochodzenia autora i miejsca zamieszkania czuł się on Polakiem. Poza tym warto znać imiona autorów, skoro tak często w humanistyce mówimy o osobach (przyrodnicy raczej mówią o problemach).

Dlaczego nazwisko autora kapitalikami? Z dwu powodów.

Po pierwsze, czasami czytelnik nie wie, co jest imieniem, a co nazwiskiem. Na przykład słynny ewolucjonista John Maynard Smith uchodzi wśród niewtajemniczonych za Smitha, który ma dwa imiona, John i Maynard. Naprawdę jednak jest to MAYNARD SMITH o imieniu John. Kapitaliki uniemożliwią tego rodzaju nieporozumienie.

Po drugie, czasami publikacje są pisane przez kilku autorów, a dodatkowo w tytule są wymieniane nazwiska. Przykład: Andrzej Łodyński, Thomas S. Kuhn, Paul K. Feyerabend i problem niewspółmierności teorii naukowych, *Studia Filozoficzne* 1980, nr 5, s. 19–40. Jeśli nazwisko autora/nazwiska autorów napiszemy kapitalikami (Andrzej Łodyński), to rozstrzygniemy problem, czy to sam Łodyński napisał artykuł o Kuhnie i Feyerabendzie, czy też artykuł o Feyerabendzie napisali razem Łodyński i Kuhn. Prawdą jest to pierwsze, ale nie zawsze prawda musi być tak oczywista jak w powyższym przypadku. Prawidłowe cytowanie powinno więc wyglądać tak: Andrzej Łodyński, „Thomas S. Kuhn, Paul K. Feyerabend i problem niewspółmierności teorii naukowych", *Studia Filozoficzne* 1980, nr 5, s. 19–40.

Dlaczego tytuł książki czcionką pogrubioną, a artykułu — niepogrubioną?

W najbardziej rozpowszechnionym systemie cytowań, w tak zwanym systemie PWN-owskim, zarówno tytuły książek, jak i artykułów zapisywane są kursywą. Podstawową wadą tego zapisu jest jednak to, że utrudniają one identyfikację rodzaju publikacji (książka czy artykuł?). Wprawdzie przy pierwszym cytowaniu ten problem nie istnieje — jeśli jest wydawnictwo, miejsce i rok wydania, to wiadomo, że chodzi o książkę; jeśli jest tytuł czasopisma i numer tomu, to oczywiste, że chodzi o artykuł. Co jednak przy każdym następnym cytowaniu? Jest ono skrótowe, nie powtarzamy wszystkich danych bibliograficznych, a wtedy, gdy zawiedzie nas pamięć, możemy mieć trudności z odróżnieniem książki od artykułu. Czasami jednak nawet i dobra pamięć nie pomoże. Dennett napisał i książkę, i artykuł pod tym samym tytułem: **Darwin's Dangerous Idea**. Przy skróconym cytowaniu tylko rodzaj czcionki pozwoli nam odróżnić książkę od artykułu Dennetta. Autor zielonogórskiego stylu cytowania prof. Jodkowski przygotowuje książkę **Twarde jądro ewolucjonizmu**, a opublikował już artykuł „Twarde jądro ewolucjonizmu". W systemie PWN-owskim przy skróconym cytowaniu obie te publikacje będą nie do odróżnienia.

Gdyby cytowanie dotyczyło jedynie przypisów, można by zrezygnować z proponowanego w systemie zielonogórskim umieszczania tytułów artykułów w cudzysłowach. Ale czasami tytuł artykułu chcemy podać w tekście głównym. Wówczas, jeśli nie umieścimy go w cudzysłowie, będzie się zlewał z sąsiednim tekstem. Trudność tę usuwamy, pisząc tytuły artykułów w cudzysłowach. W takim razie konsekwentnie stosujmy cudzysłowy także i w przypisach.

Z tego samego powodu — wyróżnienia w tekście głównym — tytuł czasopisma należy zapisywać kursywą.

Istnieje jeszcze jedna wada systemu PWN-owskiego. Wymaga on, by słowa i wyrażenia obce pisać kursywą. Jednocześnie tytuły publikacji według tego systemu też należy pisać kursywą. Problem pojawia się wtedy, gdy w tytule publikacji występują wyrażenia obcego pochodzenia. Jak zaznaczyć „kursywę w kursywie"? Problem ten nie istnieje w zapisie zielonogórskim. Przykład: Nicholas Tiho Mirov, **The Genus *Pinus***, Ronald Press Co., New York 1967.

Przy pierwszym cytowaniu podajemy nie tylko numer strony/numery stron, ale i w nawiasach kwadratowych pierwszą i ostatnią stronę artykułu. Jest to niezwykle pomocne dla piszącego. Nie musi on powtórnie sięgać do źródeł, gdy po napisaniu całej pracy przygotowuje bibliografię. Pozwala też czasami zidentyfikować powstały błąd.

Wielokropek przy powtórnym cytowaniu wskazuje, że pominięto część danych bibliograficznych.

C. Cytowanie fragmentów cudzych prac naukowych

Jeśli fragment ten jest dość długi, to zaleca się wyodrębnianie cytatu za pomocą lewostronnego indentu z niewielkim odstępem u góry i u dołu, czcionką 10 pkt, oraz z pojedynczą interlinią. Przykładem takiego zapisu jest niniejszy tekst.

> Pozwala to osiągnąć pewien efekt wizualny. Tekst nie jest monotonny, a zróżnicowany. Cudze myśli są wyodrębnione, łatwiej je znaleźć przy późniejszym szukaniu.

Ale jeśli cytat jest krótki, wystarczy umieszczenie go w cudzysłowie bez wydzielania go z całości akapitu. Przy dłuższym cytacie cudzysłowy są niepotrzebne, gdyż tę funkcję pełnią indent i pozostałe cechy tekstu.

Osobną sprawą jest cytowanie prac nieprzetłumaczonych na język polski. Cytowanie fragmentów w brzmieniu oryginalnym, a jeszcze bardziej: i w polskim, i w oryginalnym — jest naganne. Od tej zasady istnieje wyjątek: można, a nawet należy cytować tekst w brzmieniu oryginalnym, jeśli istnieje ważny powód, by tak czynić. Na przykład tekst oryginalny posiada pewną ważną cechę, której nie daje się odtworzyć w polskim tłumaczeniu (może być dwuznaczny lub aluzyjny i polski przekład tę dwuznaczność lub aluzyjność gubi; gdy występuje gra słów, a tej z reguły nie można odtworzyć w języku polskim i tym podobne). Takim ważnym powodem może być też polemika z innym autorem, który odnosił się do cytowanego fragmentu i naszym zdaniem popełnił błąd. Wtedy trzeba zacytować tekst oryginalny, żeby czytelnik uwierzył nam, a nie autorowi, z którym polemizujemy. Jeszcze innym powodem może być smaczek oryginalnego tekstu, zgrabne brzmienie, dosadny sens i tym podobne, co powoduje, że warto fragment zacytować w oryginale. Cytat taki, zależnie od wagi, umieszczamy bądź w tekście głównym, bądź w przypisie.

D. Sporządzenie bibliografii

Pozycje bibliografii powinny być sortowane alfabetycznie od nazwisk autorów (które również zapisujemy kapitalikami). Przykłady:

Boyer Pascal, „Religion: Bound to Believe?", *Nature* 2008, Vol. 455, s. 1038–1039.

Darwin Karol, **O powstawaniu gatunków drogą doboru naturalnego, czyli o utrzymaniu się doskonalszych ras w walce o byt**, przeł. Szymon Dickstein i Józef Nusbaum, *Arcydzieła Wielkich Myślicieli*, Ediciones Altaya Polska & DeAgostini Polska, Warszawa 2001.

Krzysztof J. Kilian

ISSN 2299-0356

Filozoficzne Aspekty Genezy — **2022, t. 19, nr 2**

Philosophical Aspects of Origin s. 299–310

https://fag.ifil.uz.zgora.pl/index.php/fag/issue/view/22/58

Publishing Policy

Published online: February 2, 2023.

Philosophical Aspects of Origin (Polish title: *Filozoficzne Aspekty Genezy*) (ISSN 2299-0356) is an online philosophical journal devoted to the problem of origin — of the universe, the first life, subsequent life forms, man, mind, consciousness, language, scientific theories, religions etc. The scope of the journal also covers philosophical or methodological analysis of theories or beliefs related to the problem of origin.

We accept submissions written in Polish and, starting from 2014, in English: this includes articles, polemics, translations, book reviews and letters to the editor. In 2022, the journal became a biannual.

Manuscripts should be sent to the deputy editor-in-chief's e-mail address (g.malec@fag.ifil.uz.zgora.pl). You can also use our online submission system (https://fag.ifil.uz.zgora.pl/index.php/fag/about/submissions). Manuscripts written in Polish should be accompanied with a summary and keywords, in both Polish and English, and an English title should also be provided. Authors of manuscripts written in English should include a summary and keywords in English only.

The reviewing process in *Philosophical Aspects of Origin* is based on the *double-blind* principle, where neither the reviewers nor the author know each other's personal details. It is, however, the responsibility of an author to compose the manuscript in such a way so as to conceal his or her identity. Any content that might reveal an author's identity can be added later, after the manuscript has been accepted for publication. The names of all of the reviewers who contributed to a given volume are provided in the last issue of each volume.

All submitted manuscripts, after initial acceptance by the editor-in-chief, are sent to two independent reviewers affiliated at academic institutions different to that of the author. Based on the opinions of the reviewers, the editorial board will decide whether or not to accept the text in question for publication. Accepted manuscripts, after the typesetting and text makeup processes have been completed, will be sent back to the author(s) as proofs for final adjustment. *Where no proofread version of an article has been sent back by the specified deadline, it will be assumed that the author agrees that no corrections are necessary and that the article can be published as is.*

The editorial board of *Philosophical Aspects of Origin* will do their utmost to publish the accepted PDF version of the article online as quickly as possible. It should be kept in mind, however, that the order of articles in a given volume is decided only after the volume has been closed to further submissions; hence, until then the page numbering of the articles should be treated as temporary.

Ensuring that good scientific practices are being promoted, the editorial board of *Philosophical Aspects of Origin* actively opposes *ghostwriting* and *guest authorship*. *Ghostwriting* is related to not mentioning the name of an individual who has contributed significantly to the article and should be considered the author or a co-author. *Guest authorship* means mentioning an individual as a co-author despite the fact that his or her contribution is negligible or nonexistent. The above are examples of scientific misconduct; hence, any improprieties of this sort that are uncovered will be appropriately documented and publicized. The editorial board will contact the relevant authorities, including the institutions employing the authors of the manuscript in question, as well as other relevant academic institutions or journals. Therefore, all prospective authors are hereby asked to provide appropriate information about who contributed to the work being submitted, and to what extent this was the case. Authors are responsible for ensuring that any such information is true and correct. All queries pertaining to such matters should be addressed to: info@fag.ifil.uz.zgora.pl.

Authors submitting their work are required to confirm the relevant data in our Submission Preparation Checklist. We accept the definitions of "author" and "contributor" formulated by The International Committee of Medical Journal Editors. All those involved in the running of our journal are excluded from decisions relating to their own texts, and from activities leading to situations in which a conflict of interest may be expected to arise. All queries pertaining to such matters should be addressed to: info@fag.ifil.uz.zgora.pl.

All decisions concerning the acceptance or rejection of submitted texts are to be made by our editorial board after completion of a double-blind process of peer-review. Any such decision will be final and only subject to revision in special cases — e.g., when it transpires that there is a reasonable basis for supposing that a conflict of interest is involved, or that reviews exhibit bias. In such situations, the editor-in-chief can be asked to supply an additional evaluation, and the text will then be accepted or rejected on that basis. Each and every complaint or appeal will be considered by our editorial board as promptly as possible. All queries pertaining to such matters should be addressed to: info@fag.ifil.uz.zgora.pl.

All parties involved in the publication process — authors, co-authors, subject editors, reviewers and all members of the editorial board — should in every instance disclose any circumstances potentially affecting their capacity to adopt an objective standpoint when considering a specific topic or evaluating works by others. Any conflict of interest, or situation that might be considered to constitute such a conflict, should be reported immediately. Each and every case of this sort will be considered by our editorial board as promptly as possible. The editorial board also asks authors to provide the details regarding the funding schemes or funding bodies connected to the submitted manuscript. Submitted manuscripts must be original work and not previously published. Also, there can be no conflicts of interest relating to the financial ties of authors with individuals or institutions such as could negatively influence their research findings. All queries about such matters should be addressed to: info@fag.ifil.uz.zgora.pl.

All materials published in *Philosophical Aspects of Origin* fall under the Creative Commons Attribution-NonCommercial 4.0 International Public License (CC-BY-NC 4.0). Under this kind of license you are free to use all our material, but must give appropriate credit, provide a link to the license, and indicate if changes have been made. You may not use such material for commercial purposes. If you would like to make use of our materials for commercial purposes, please contact us at: info@fag.ifil.uz.zgora.pl.

Citation Rules (abridged version)

Citation numbers should be placed **AFTER** punctuation marks, rather than before (i.e., after a full stop, semi-colon, or comma).

When providing a link to the full, online version of the cited text, you should shorten the link using one of the internet platforms such as https://tiny.pl/ or https://cutt.ly. Shortened links should look like this: https://cutt.ly/LvvW49N [24.11.2019]; https://tiny.pl/r82b2 [24.11.2019]. The link should be followed by the date of the last access, written in [dd.mm.year] format: i.e. [24.11.2017].

A. Quoting Books

(a) First citation: author's name (surname in small caps); title in bold typeface; if the book is translated from a foreign language, then the translator's name should be indicated after the title; if the book has been published as a part of a series, then the name of the series ought to be written in italics, while its number should be written in normal typeface after the comma; publisher; publication location; year; page number(s). Examples:

Karin Knorr-Cetina, **The Manufacture of Knowledge**, Pergamon, New York 1981, pp. 395–396; Richard Dawkins, **The Blind Watchmaker: Why the Evidence of Evolution Reveals a Universe without Design**, Norton & Company, London & New York 1986, p. 142.

(b) Subsequent citations: author's last name (in small caps); abbreviated title (or the whole title when it is short) ending with an ellipsis (which is treated as a punctuation mark substituting all the other bibliographical data of the text, rather than only the further part of the title); page number(s). Examples:

Knorr-Cetina, **The Manufacture…**, pp. 395–396; Dawkins, **The Blind Watchmaker…**, p. 48.

B. Quoting Articles, Reviews, etc.

(a) First citation: author's name (last name in small caps); title in inverted commas; in the case of a translation, "trans." followed by the translator's name; the name of the journal in italics and the year of publication; the number of the volume, issue or part of the volume; the page number; the first and last page of the text in square brackets; if the article appeared in a collective work, the citation should list the name of the editor followed by the abbreviation “ed.” (in brackets) or its equivalent in other languages after the title or after the name of the translator; title of the collective work; publisher; place and year of publication; page (the first and the last page of the text in square brackets). Examples:

Dieter Münch, “Minds, Brains and Cognitive Science”, in: Armin Burkhardt (ed.), **Speech Acts, Meaning and Intentions: Critical Approaches to the Philosophy of John R. Searle**, De Gruyter, Berlin 1990, p. 372 [367–390]; Gonzalo Munévar, “Allowing Contradictions in Science”, *Metaphilosophy* 1982, Vol. 13, No. 1, p. 76 [75–78].

(b) Subsequent citations: author’s last name (in small caps); abbreviated title ending with an ellipsis; page number(s). Examples:

Münch, “Minds, Brains…”, p. 373; Munévar, “Allowing Contradictions in Science…”, p. 77.

C. Quoting Excerpts from Other Authors’ Scientific Papers

If the excerpt extends beyond just a few words, separating it from the rest of the text as an indented block quote is highly recommended: use left-side indentation combined with a small space at the top and bottom, change the font size to 10 points, and apply single-line spacing. This paragraph serves as an example of said format:

> This allows us to achieve a certain visual effect. The text becomes less monotonous and more nuanced and appealing. Excerpts taken from other people’s work are highlighted and, consequently, easier to find again later.

However, if the quote is short, it will suffice to put it in quotation marks. In the case of longer excerpts, inverted commas should not be used, as the indentation and other typesetting changes produce the same effect.

D. References

The list of references should be sorted alphabetically by authors’ last names. It should look like this:

Boyer Pascal, “Religion: Bound to Believe?”, *Nature* 2008, Vol. 455, pp. 1038–1039.

Munévar Gonzalo, “Allowing Contradictions in Science”, *Metaphilosophy* 1982, Vol. 13, No. 1, pp. 75–78.

Citation Rules (full version, explanations included)

Submitted texts should use the so-called “Zielona Góra Citation System” developed by Professor Kazimierz Jodkowski, the founder of *Philosophical Aspects of Origin*. Here we provide examples of the proper use of that system, and explain them further down below.

First and foremost, citation numbers should be placed **AFTER** punctuation marks, rather than before (i.e., after a full stop, semi-colon, or comma). This is where our system deviates from the so-called PWN (Polish Scientific Publishers) standard, according to which the superscript numeral is placed before the punctuation mark, after the last word. Unfortunately, the PWN standard can sometimes engender misunderstandings and silly situations, such as these:

(a) Let us suppose that we want to put a citation number at the end of a sentence that ends like this: “[…] in the U.S.”. Where, in such a case, should we put it? Before the full stop? This would clash with one of the functions of the full stop, because not only does it end the sentence, but it also indicates an abbreviation; hence, putting the superscript numeral in front of it will undermine the latter function and make the sentence opaque. On the other hand, this problem disappears when we put it after the punctuation mark.

(b) Let us suppose that we want to put such a number at the end of a sentence discussing the number of atoms in the universe, whose closing words are “[…] is 10^{80}”. Adhering to the PWN standard, we should put the citation number before the full stop, thus generating a faulty statement: “[…] is 10^{805}”. In the Zielona Góra System this problem does not exist, as the citation numeral comes after the punctuation mark, giving us “[…] is 10^{80}. [5]”

When providing a link to the full, on-line version of the cited text, you should shorten the link by means of internet platforms such as https://tiny.pl/ or https://cutt.ly. Shortened links should look like this: https://cutt.ly/LvvW49N [24.11.2019]; https://tiny.pl/r82b2 [24.11.2019]. The link should be followed by the date of the last access, written in [dd.mm.year] format: i.e. [24.11.2017].

A. Quoting Books

(a) First citation: author’s name (surname in small caps); title in bold typeface; if the book is translated from a foreign language, then the translator’s name should be indicated after the title; if the book has been published as a part of a series, then the name of the series ought to be written in italics, while its number should be written in normal typeface; publisher; publication location; year; page number(s). Examples:

Richard Dawkins, **The Blind Watchmaker: Why the Evidence of Evolution Reveals a Universe without Design**, Norton & Company, London & New York 1986, p. 142; Paul K. Feyerabend, **Against Method**, Verso, London 1993, p. 211.

(b) Subsequent citations: author's last name (in small caps); abbreviated title (or the whole title when it is short) ending with an ellipsis (which is treated as a punctuation mark substituting all the other bibliographical data of the text, rather than only the further part of the title); page number(s). Examples:

Dawkins, **The Blind Watchmaker…**, p. 142; Feyerabend, **Against Method…**, p. 211.

B. Quoting Articles, Reviews, etc.

(a) First citation: author's name (last name in small caps); title in quotation marks; in the case of a translation, "trans." followed by the translator's name; the name of the journal in italics and the year of publication; the number of the volume; the number or part of the volume; the page number; the first and last page of the text in square brackets; if the article appeared in a collective work, the citation should list the name of the editor followed by the abbreviation "ed." (in brackets) or its equivalent in other languages after the title or after the name of the translator; title of the collective work; publisher; place and year of publication; page (the first and the last page of the text in square brackets). Examples:

Dieter Münch, "Minds, Brains and Cognitive Science", in: Armin Burkhardt (ed.), **Speech Acts, Meaning and Intentions: Critical Approaches to the Philosophy of John R. Searle**, De Gruyter, Berlin 1990, p. 372 [367–390]; Gonzalo Munévar, "Allowing Contradictions in Science", *Metaphilosophy* 1982, Vol. 13, No. 1, p. 76 [75–78].

(b) Subsequent citations: author's last name (in small caps); abbreviated title ending with an ellipsis; page number(s). Examples:

Münch, "Minds, Brains…", p. 372; Munévar, "Allowing Contradictions in Science…", p. 76.

Why do we prefer this method over more conventional ones?

Some authors, when referring to a given publication in the main text or a footnote, give the name of the author and the year of publication. To do so, they may use such formats as: Feyerabend 1965, Feyerabend [1965] or [Feyerabend 1965]. They add page number(s) after a comma or a colon: [Feyerabend 1965, p. 34] or [Feyerabend 1965: 34]. Full bibliographical details are then provided in the bibliographic index at the end of the publication. Some authors go even further and get rid of the author's name altogether, replacing it with the number of the entry in the bibliographic index, i.e. [34, p. 17] or [34: 17]. This citation system, together with its many variants, is arguably the worst possible one for researchers in the humanities; it has some serious flaws that I will now proceed to set out.

1) The method is good for citing works in the area of the natural sciences, where the only important thing is to pinpoint when, and by whom, a given discovery was documented in a publication, and not what the publication's title was. However, in the humanities, apart from the author's name and the year of publication, the title is also relevant. Let us imagine an essay which states: "As Popper showed in 1959, though it was contested by Kuhn in 1962…". It sounds bizarre, doesn't it? That is because we would normally phrase it like this: "As Popper showed in **The Logic of Scientific Discovery**, though it was contested by Kuhn in **The Structure of Scientific Revolutions**…".

2) Another major flaw of this method is that it is extremely easy to make a mistake. A finger might slip and we end up with a wrong date or a wrong letter (a, b, c, etc.) differentiating multiple publications by the same author during one year. On the other hand, when we make a small mistake in the title it is still recognizable. An author publishing a text in our journal had originally employed the method in question. When trying to adjust his work to comply with the Zielona Góra standard, he encountered difficulties due to errors that became apparent and hard to correct. This particular flaw is more forgiving towards works in the area of the natural sciences, as they tend to be shorter and cite less sources. As a result, it is much easier to avoid committing errors. However, texts in the humanities can be up to several times longer and contain many more bibliographical sources.

3) The third defect of the PWN standard is that it makes the footnotes for ancient writers appear quite odd: Aristotle 1985, Plato 2003, and so on. Providing the title of a publication or its abbreviation in accordance with Zielona Góra system appears natural regardless of the era in which the cited author lived. This

flaw is not as striking in works from the natural sciences, as they most frequently refer only to relatively recent publications. Usually, a physicist or astronomer will not be concerned with what Newton or Copernicus had to say about a given subject.

4) The last flaw of this system that we want to point out pertains to citations of authors who have "common" last names. Sometimes one needs to cite several people of the same name (e.g., Hintikka, or Nagel). It then becomes impossible to avoid mentioning the name, and so the approach becomes inconsistent: on one occasion the name is given, on another not.

All of the defects listed above can be avoided by simply providing the first and last name, title, and other bibliographical data for the publication, while quoting.

Why the first name and not, as is usually the case, just the initial? Firstly, because sometimes the name allows us to recognize the gender of the author, and on occasion even their nationality. (We recommend that authors avoid translating names into their Polish equivalents, unless they have already entered common use, as is the case with, for example, Karol Darwin.) If the name Henryk (Henryk Mehlberg) appears on the cover of the book **The Reach of Science,** it is clear that regardless of the author's origin and place of residence, he identified as a Pole. Besides, it is simply worth knowing the names of the authors, as people are so frequently the object of our discussions in the humanities (as opposed to in the natural sciences, which deal mainly with problems for their own sake).

Why should the author's last name be in small caps? For two reasons.

Firstly, sometimes the reader does not know what corresponds to the person's first name, and what to their last name. For example, John Maynard Smith, the famous evolutionist, may pass among those who lack the necessary knowledge as a Smith with two Christian names: John and Maynard. However, his full last name is in fact MAYNARD SMITH, and his first name is John. Small caps prevent these misunderstandings.

Secondly, sometimes publications are written by several authors, and some names are also mentioned in the title. To give an authentic example: Joseph Agassi, Tristram Shandy, Pierre Menard, and All That: Comments on **Criticism and the Growth of Knowledge**, *Inquiry* 1971, Vol. 14, pp. 152–164. If we write the surname(s) of the author(s) in small caps, as in Joseph AGASSI, "Tristram Shandy, Pierre Menard, and All That: Comments on **Criticism and the Growth of**

Knowledge", *Inquiry* 1971, Vol. 14, pp. 152–164, then we disambiguate more clearly between Agassi alone writing an article on Shandy and Menard, and Agassi and Shandy and Menard jointly penning one that is exclusively about comments concerning **Criticism and the Growth of Knowledge**.

Why should the title of a book be in bold, and the title of an article not?

In the most popular Polish citation system — the so-called PWN standard — both book and article titles are written in italics. The primary disadvantage of this approach is that it makes it more difficult to identify the type of the publication (is it a book or an article?). Although it does not pose any problems in the first citation — if the publisher, place and year of publication are present, then we know we are dealing with a book, whereas if we see the title of a journal and then the issue number it suggests an article. But what happens with each subsequent citation? It is abbreviated: we do not repeat all the bibliographical details and so, if our memory fails us, we will have trouble deciphering whether we are dealing with an article or a book. Sometimes even a good memory won't help! Dennett wrote a book and an article with the same title: **Darwin's Dangerous Idea**. With an abbreviated citation, only the typeface will allow us to distinguish between the book and the article. Under the PWN System, these two publications are indistinguishable.

If citation rules applied exclusively to footnotes, then we might desist from placing article titles in inverted commas as recommended under the Zielona Góra Citation System. However, we sometimes want to include the title of an article in the main text. In such cases, if we do not put the title in inverted commas, then it will get mixed up with the rest of the text. We eliminate this difficulty by putting the titles of articles in inverted commas — and so, for the sake of consistency, should also do so in footnotes.

For the same reason — that of being rendered distinctive in the main text — journal titles should be written in italics.

An additional disadvantage of the PWN System is that it requires foreign words and expressions to be italicised, even as its norms demand that article titles be likewise written in italics. This leads to a problem when the publication title contains foreign expressions. How to mark italics within italics? This problem is solved by the Zielona Góra System. An authentic example: Nicholas Tiho Mirov, **The Genus *Pinus***, Ronald Press Co., New York 1967.

In the first citation, aside from the specified page number, the first and the last page of the article should be indicated in square brackets. Experience shows that it is extremely helpful from the author's perspective — they do not then need to revisit their sources when preparing their bibliography. It can also, on some occasions, help to identify errors.

In subsequent citations, an ellipsis is employed to indicate that some of the bibliographical data has been omitted.

C. Quoting Excerpts from Other Authors' Scientific Papers

If the excerpt extends beyond just a few words, separating it from the rest of the text as an indented block quote is highly recommended: use left-side indentation combined with a small space at the top and bottom, change the font size to 10 points, and apply single-line spacing. This paragraph serves as an example of said format:

> This allows us to achieve a certain visual effect. The text becomes less monotonous and more nuanced and appealing. Excerpts taken from other people's work are highlighted and, consequently, easier to find again later.

However, if the quote is short, it will suffice to put it in quotation marks. In the case of longer excerpts, inverted commas should not be used, as the indentation and other typesetting changes produce the same effect.

Quoting works not translated into Polish is another important issue here. Quoting a text in its original language is strongly discouraged, and quoting both the original and the translation even more so. There is one exception to this rule: authors can, and even should, quote the original text if there exists an important reason to do so — e.g., if the original has some important features that cannot be properly translated into Polish (such as a certain ambiguity or allusiveness that could get lost in translation, or perhaps a play on words that usually cannot be reproduced in other languages, etc.). Another such reason might be that we are arguing against some author who referred to the passage in question and, in our opinion, was mistaken. In this case, we need to quote the original so that the reader believes us rather than the author we are arguing against. Yet another reason could be that the original text possesses some unique quality we wish readers to savour, such as its particularly deft phrasing or the acuity with which it puts across some point, such that the excerpt merits being quoted in its original version. Depending on the length of such quote, we may include it in the main text or as a footnote.

D. References

The list of references should be sorted alphabetically by authors' last names. It should look like this:

Boyer Pascal, "Religion: Bound to Believe?", *Nature* 2008, Vol. 455, pp. 1038–1039.

Munévar Gonzalo, "Allowing Contradictions in Science", *Metaphilosophy* 1982, Vol. 13, No. 1, pp. 75–78.

Krzysztof K. Kilian

www.fag.ifil.uz.zgora.pl

CZASOPISMO INTERNETOWE/ONLINE JOURNAL
ISSN 2299-0356

Filozoficzne Aspekty Genezy

Philosophical Aspects of Origin

PÓŁROCZNIK/BIANNUAL
2022
tom
vol. 19(2)