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COLONISATION OF THE FUTURE, THE TIME OF THE ÉMIGRÉ, THE HISTORY OF THE EARTH: IGNACY DOMEYKO'S *MOJE PODRÓŻE* [MY TRAVELS]

Abstract

This article refers to the memoirs of Ignacy Domeyko, a nineteenth-century geologist and emigrant who spent much of his life in Chile. Basing on a monographic reading of his *Moje podróże* [My Travels], it addresses three broader issues that extend beyond Domeyko's individual experience and typify the period. The first is the standardisation of time, control over it, and planning as a form of 'colonising' the future. The second is the émigré condition with the attendant experience of limited agency and unpredictability, in contrast to the figure of the 'modern man' endowed with varied agency and command over time. The third is the perspective of geological time tied to Domeyko's professional experiences of exploring Earth's history and, thus, of measures of time extending beyond the human scale and control.

Keywords: Ignacy Domeyko, modernity, Great Emigration, history of geology, history of Polish science

The nineteenth century was a century of standardisation. Time, space, bodies, and identities were subjected to norms and increasingly unified.[1] Traditional units of measurement gradually fell out of use and were replaced with official ones, while practical knowledge gave way to the encroaching standards: the universal standard of time or the ever-expanding metric system.[2] The nineteenth century also provided

[1] For a broader analysis of these phenomena as the defining features of the nineteenth century, see Jürgen Osterhammel, *The Transformation of the World: A Global History of the Nineteenth History*, transl. Patrick Camiller (Princeton, 2014).

[2] For more on the unevenness of this process, see e.g. Wacław Forajter, '"Blask" i "cień". O czasie, przestrzeni i doświadczeniu w drugiej połowie XIX wieku', *Pamiętnik Literacki*, 2 (2023), 45–64.

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new definitions of the norms of the body; after all, this was the period that brought humanity standardised measurement of shoes and clothes. Identity became increasingly attached to the document that confirmed it, whose most important feature was the image – a photograph, likewise standardised. All of these are vast subjects of inquiry rich in local variety: the processes involved took different paths in Tsarist Russia than in Imperial Britain, and even more so in China or the states of the Americas. Addressing these distinctions, making them make sense, and interpreting the social processes that accompanied them is the purview of potential future studies; meanwhile, I will allow myself to begin this text with a vastly generalised introduction of a mere few sentences, for regardless of local distinctions, these standardisation processes were global in scope. As far as time is concerned, this specific question – of its unification and standardisation – seems to be of key significance for the nineteenth century.[3]

However, I believe it is a fairly complex matter and that the time experience in the century was heterogeneous. Aside from the newly 'organised' time, the nineteenth century also opened other perspectives, associated with the intensely expanding new branches of knowledge – archaeology and geology/mineralogy – which I believe to have played a crucial part in moulding the notion of temporality.

EMIGRATION: AGENCY AND SUSPENDED TIME

In this article, I would like to focus on the case of Ignacy Domeyko and his memoir writings, which provide captivating material for the study of various aspects of nineteenth-century temporality.[4] While

[3] See e.g. Steven Kern, *Culture of Time and Space, 1880–1918* (Cambridge, MA, 1983); Edward Sudgen, *Crossings in Nineteenth-Century American Culture: Junctures of Time, Space, Self and Politics* (Edinburgh, 2022); Wolfgang Shivelbush, *The Railway Journey: The Industrialization of Time and Space in the Nineteenth Century* (Oakland, 2014), Asa Briggs, Peter Burke, *A Social History of the Media* (Cambridge–Oxford–Boston–New York, 2009); Hannu Salmi, *Nineteenth-Century Europe: A Cultural History* (Cambridge–Oxford–Boston–New York, 2008). In Poland, these issues have been consistently addressed by Wojciech Tomasik, see e.g. Wojciech Tomasik, *Pociąg do nowoczesności. Szkice kolejowe* (Warszawa, 2014); *id.*, *Rozkład jazdy* (Warszawa, 2018); *id.*, *Inna droga: romantycy a kolej* (Warszawa, 2012); *id.*, *Nie wszystkie podróże Sienkiewicza. Szkice z geografii humanistycznej* (Bydgoszcz, 2023).

[4] Ignacy Domeyko, *Moje podróże (pamiętniki wygnańca)*, i: *1831–1838* (Wrocław–Warszawa–Kraków, 1962), ii: *1839–1845* (Wrocław–Warszawa–Kraków, 1963),

an individual perspective is at stake here, it seems to correspond to a broader social experience in many layers. Much is suggested not only by the sheer wealth of reminiscence but also by Domeyko's situation as an émigré and mineralogist.[5] I believe that these two roles are crucial for understanding nineteenth-century developments in the perception of temporality.

Having participated in the failed November Uprising of 1830–1, Ignacy Domeyko left Polish lands (eventually, in 1832), reaching France, where he and other members of the rebellious forces were quartered. From there, he moved to Paris without authorisation, embarking on a path distinct from the typical fate of an émigré, outlined in Alina Witkowska's *Cześć i skandale. O emigracyjnym doświadczeniu Polaków* [Honour and Scandal: On the Polish experience of emigration].[6] This work of a scholar of Romanticism paints a gloomy picture of the community of ex-Novembrists – of people waiting for life to pass by until another liberatory burst, an impoverished, conflicted people incapable of work or education. However, more recent scholarship of that émigré society is not entirely in agreement concerning the universality of these attitudes. Nevertheless, even if it is accepted that some émigrés engaged in efforts toward new stability and tried to inhabit their new homeland (through employment, studies, and family unions), Domeyko's path remains an exception.

Mineralogy had attracted Domeyko's interest before. Though he completed his studies at the Department of Physics and Mathematics of the University of Vilnius, devoting his master's thesis to problems of differential equations, he remained under the influence of his uncle, Józef Domeyko, student of esteemed mineralogist and geologist Abraham Gottlob Werner – incidentally, a participant in the disputes on the age of the Earth, who sought to reconcile the Biblical narrative with the findings of natural history. Major stops on Ignacy Domeyko's

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iii: *1846–1888* (Wrocław–Warszawa–Kraków, 1963). The article's references to this work are marked with MP, volume number, and page number(s). The memoirs have also been published in Spanish as Ignacio Domeyko, *Mis viajes: memorias de un exiliado*, transl. Mariano Rawicz (Santiago de Chile, 1978).

[5] The life of Domeyko, and especially his experiences as a traveller, are discussed in Beata Mytych-Forajter, *Latająca ryba. Studia o podróżopisarstwie Ignacego Domeyki* (Katowice, 2014).

[6] Alina Witkowska, *Cześć i skandale. O emigracyjnym doświadczeniu Polaków* (Gdańsk, 1997), see esp. chap. 'Kultura samotnych mężczyzn'.

émigré journey included Freiberg (notably, a place associated with Alexander v on Humboldt), where he visited the silver mines and the city's Bergakademie. In France, he chose to pursue these interests, which resulted in his graduation in 1837 from the École des mines de Paris. Having completed his studies, he received a letter from the professor of his alma mater, Pierre Armand Dufrénoy, offering him the position of lecturer in chemistry and mineralogy in Coquimbo, Chile. However, Domeyko nearly did not make it there, which he describes as follows:

> I came alive! Alive with the passion for distant travel I had harboured since I was a child. Without much thought, I wrote back approvingly and, on another leaf of paper, wrote Mrs. Köchlin that I was going to America. I sent the letters to be mailed and went into the forest. On my way home, I lost the letter from Mr. Dufrénoy, and for a month, I had no clue where I was headed, having forgotten the name Coquimbo. (MP I 221)

Eventually, though, Domeyko did depart for Chile, where he would spend 51 years – or his entire adulthood – engaging in successful mineralogical work and public activity. He became an esteemed scholar and lecturer, taking part in the reform of higher education in Chile, and in 1876–83, he occupied the position of rector of the university in Santiago de Chile.[7] He also established a family in the country, marrying Enriquetta Sotomayor Guzmán, 33 years his junior. Only once did he revisit Europe – and briefly, in 1884. He died in Chile in 1889. His life and work are a matter of historical record in the country, meaning that he may be remembered more fondly by Chileans than Poles. His achievements are commemorated in the mineral domeykite, the geographical designations Cordillera Domeyko, Cerro Domeyko, and Pueblo Domeyko, and palaeozoological and botanical findings: the ammonite *Ammonites domeykanus*, the nautiloid *Nautilus domeykus*, the brachiopods *Terebratula ignaciana* and *Terebratula domeykana*, the pterosaur *Domeykodactylus*, the fish *Domeykos*, the spider *Lycinus Domeyko*, or the cactus *Maihueniopsis domeykoensis*.

[7] His contributions to higher education in Chile are related synthetically on the website of the Universidad de Chile: 'Ignacio Domeyko Ancuta', Universidad de Chile, https://uchile.cl/presentacion/historia/rectores-de-la-u-de-chile/ignacio-domeyko-ancuta-1867-1883 [Accessed: 9 Nov. 2024].

Told 'back to front', this story resembles a well-executed plan. It contains a lot of Faustian overtones: the achievement of ever newer goals, a constant progression that brings change to the world.[8] This model of personality was valued very highly in the nineteenth century, developed both within Romanticism – as expressed in *Childe Harold's Pilgrimage*: "With thee, my bark, I'll swiftly go | Athwart the foaming brine; | Nor care what land thou bear'st me to, | So not again to mine".[9] A local, Polish equivalent of that call can be found in a fragment of 'Ode to Youth', a cult poem authored by a virtual prophet of the generation, Adam Mickiewicz: "Brave youth, reach outward far beyond thy sight, Crush what mere human reason cannot harm!".[10] Hand in hand with these expressions of Romantic sensibility and faith in the nearly boundless agency and strength of the individual went the normative narrative so typical of capitalism, enshrined in Samuel Smiles's eternal *Self-help* – the somewhat later story of 'their own masters', men of action who broke every barrier, not through desperation and passion, but the force of character, decisiveness, and diligent labour.[11]

Domeyko's reminiscences, however, point us toward a different perspective: one where the event (or lack thereof) is purely accidental. The scholar treated his trip to Chile as a temporary change of place, actually plotting to return to Europe once he had fulfilled his tasks. As it happened, this return was pushed farther and farther ahead for a variety of reasons, and these circumstances did not always stem from deliberate choices. In some cases, it was the very lack of choice, a state of suspension that, with time, gradually morphed into an event, action, *fact*, perceived as a causal chain only *ex post*.

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[8] See: Marshall Berman, *All That Is Solid Melts into Air: The Experience of Modernity* (New York, 1988), esp. chap. 'Goethe's *Faust*: The Tragedy of Development'.

[9] [George Gordon Byron], *The Works of George Byron*, vol. i (Leipsick, 1818), 16.

[10] Adam Mickiewicz was one of the most popular Polish romantic poets. 'Oda do młodości' [Ode to Youth] appeared in 1827 and is considered a formative text of Polish culture, a manifesto of the new, Romantic sensibility. The translation into English is taken from the UNESCO publication *Adam Mickiewicz, 1798–1855. In Commemoration of the Centenary of His Death* (UNESCO, 1955).

[11] Samuel Smiles, *Self-help; with illustrations of Character and Conduct* (London, 1859). Polish translations/adaptations of the work and their social significance are discussed in considerable detail by Joanna Kubicka [Zięba], *Na przełomie. Pozytywiści warszawscy i pomoc własna* (Warszawa, 2016).

In 1846, Domeyko completed his eight-year tenure in Chile as a teacher of mineralogy and looked forward to a return to Europe. In November, he travelled to Valparaíso to take up a seat on a steamer headed to the Old Continent. However, it transpired that no steamer showed up, and there was no indication of when one would arrive. The estimated time of travel proved to have been longer than anticipated, and with no communication between the ship and the port, it was impossible to obtain any hard facts.

Writer Henryk Sienkiewicz relates a similar experience in his *Listy z Afryki* [Letters from Africa]:

> The French ship of the Messageries Maritimes company, which was supposed to carry me to the Red Sea and the Indian Ocean, left us all bitterly disappointed. At the agencies, we were told to expect it in Suez on January 19th; meanwhile, it came and went on the 18th. How this was received by those who, having bought their tickets ahead of time, continued to freely enjoy their time in Cairo or on trips outward up until the 19th, assured of the date of departure, that I cannot say. … Though I did think to myself: apparently, these ships are not alike to railways that respond to strict timetables of hours and even minutes, as publicly advertised; let us, therefore, go to Suez and ask for those times there.[12]

It would certainly have been easier to plan a railway journey, but what was at stake here was an ocean crossing, which – in spite of various efforts – proved impossible to make as predictable.

Domeyko himself had experienced something similar even before his disappointment at Valparaíso: "I waited four days for a steamer", he writes, describing his 1842 journey from Santiago to the southern *cordilleras*, "collecting conchs and herbs and tracing the geology of the granite stones on the seaside; … I am bored, waiting for the steamer" (MP II 354). The steamer that eventually arrived also turned out not to be the one that was expected; the ship, *Chile*, came in late, barely scraping through to evade a maritime disaster. It stopped a bit off of the roadstead and began to sink. Boats had to be sent over to carry the passengers to shore; those of the crew who could swim were left to their own devices. It was clear, though, that Domeyko could no longer entertain the idea of continuing – and other prospective

[12] Henryk Sienkiewicz, letter from Cairo, 18 January 1891, in *id.*, *Listy z Afryki* (Warszawa, 1949), 24.

trans-oceanic passengers, of starting – any journey out. It all seemed more like a catastrophe than an organised venture, and events followed their own path, rather than a pre-determined course.

In 1846, Domeyko again found himself waiting for a steamer, certain that his Chilean adventure had come to an end. News came in that the ship was a week away yet, so the mineralogist decided to visit his friend General Aldunate,[13] who convinced Domeyko (without much actual effort) to stay in Chile for another few months, in view of the impending reform of universities, which the Polish geologist was invited to play a lead role in. In spite of some reservations, the scholar accepted, contenting himself with the thought that Chile was a mineralogist's paradise: "Still I hesitate. I receive letters from the country and diaries of the Galician slaughter,[14] the dilemmas of the Émigrés, and the death of my uncle, who cared for me in my childhood. Willingly or not, unbothered by how long it might take, I open the chemistry course" (MP III 29).

Events seemed to go their own way afterwards: plans emerged for a highly enticing field trip into the Chilean interior, so the return to Europe was put off until the summer of 1847. In February 1847, Domeyko received a gloomy missive from Aleksander Jełowiecki,[15]

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[13] Most likely General José Santiago Aldunate Toro (1796–1864).

[14] The Galician Peasant Uprising of 1846, also known as Galician Slaughter [*rabacja galicyjska]* was a revolt of peasants in Western Galicia (part of Polish territory under Austrian administration) against the gentry [*szlachta*]. Though the uprising lasted only a few days, it greatly impacted social relationships in the significantly socially stratified Polish community. Among the gentry, it was remembered as an exceedingly bloody and brutal event (the number of victims being assessed at between 1,200 and 3,000), whereas among the peasants – at least to some degree – it was seen as a revolt against the landowners. In Domeyko's times, it undoubtedly figured as a social shock. In later years, it often re-emerged in memoirs, literary texts, theatrical pieces of crucial significance for the Polish imaginary, and more recently – as a subject of the so-called 'popular turn' [*zwrot ludowy*] in Polish historiography. For more, see Thomas J. Simons, Jr., 'The Peasant Revolt of 1846 in Galicia: Recent Polish Historiography', *Slavic Review*, xxx, 4 (1971), 795–817; Ryszard Jamka, *Panów piłą. Trzy legendy o Jakubie Szeli* (Warszawa, 2023).

[15] Aleksander Jełowicki (1804–1877), participant in the November Uprising. After its collapse, he remained active among the Polish émigrés in France. Close to the milieu of Adam Mickiewicz in the early period of the poet's activity in emigration, he contributed significantly to the publication of part III of *Dziady* [The Forefathers' Eve], *Księgi narodu polskiego i pielgrzymstwa polskiego* [Books of the Polish Nation and the Polish Pilgrims], and *Pan Tadeusz* [Master Thaddeus]. As a clergyman,

who shared with him news of the foul state of the émigré community, beset by poverty and infighting, as well as enmity from the French authorities and depressing accounts of the Galician Slaughter. The prospect of a return thus proved yet again far less enticing. One might indeed question if the term is truly adequate here – for can one 'return' to emigration? Domeyko continued to receive offers of employment in Chile; even as he continued to consider leaving the country, he also recognised that, at 47, he was finding greater interest in leading a peaceful and fruitful life.

Thus, the wait for the waylaid steamer somehow took him into the year 1850. Domeyko married Enriquetta Sotomayor Guzmán. A week after the marriage, he received a letter from Ludwik Zejszner,[16] geologist and populariser of the science, offering him the post of instructor in "chemistry, physics, or any other branch of natural science" at the Academy of Krakow. The letter took six months to arrive in Chile from Krakow. For Domeyko, this was a lifelong dream: a position at the Academy of Krakow seemed more than a "dream come true", for he had never anticipated such an opportunity might actually eventuate. Yet, he could not accept this wonderful proposition because he had just (or perhaps, in the meantime) formed a family in Chile (with the Enriquetta mentioned above), and no such journey was to be entertained.

What temporal perspectives emerge in an autobiography that intertwines so many aspects of life, where the true meanings of terms like 'departure' or 'return', 'plan' or 'accident', and 'action' or 'delay' are no longer clear? Furthermore, when considering the circulation of information, it becomes difficult to distinguish what is 'now' versus 'then', and what is 'immediate' versus 'afterwards'. Lest we forget,

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he engaged in ministry among the émigrés and had a perfect knowledge of the socio-economic situation they found themselves in.

[16] Ludwik Zejszner (Zeuschner, 1805–1871) was a Polish geologist active in the first half of the nineteenth century. He led research into the geology of the Carpathian Mountains, the area of Wieliczka, and the Tatra Mountains. Chair of the Department of Mineralogy and Geology at Jagiellonian University in Krakow (1829–33). As a scholar, he never ceased to popularise geological knowledge and something that we may term "geological thinking', or, a reflection that combines the history of man and the history of the Earth. His efforts are betokened by his popular, highly accessible 'lectures' for non-expert readers, such as *Geologia do łatwego pojęcia* [Geology for easy understanding, 1856].

the urgent letter containing a message that could change Domeyko's life took half a year to reach him. His response could take just as long to traverse the meridians and parallels; the answer to the response, yet another few months; 'urgent' changing into 'years long'.

The émigré experience can be said to constitute a peculiar mixture of the intensity of political time and the timelessness of private life – a life lived with a slight teleological slant, in which an uncertain moment on the horizon lights up with the promise of a future where one could finally 'be at home' and 'live a real life', not one of unpredictability and delay. Here is where Domeyko's fate and his account of his life betray their unique aspect. It is difficult not to see determination and belief in one's own agency in a man who learned Spanish in three months to teach in the language, and whose presence – whether in the university circles or on field trips – is consistently typified by his elevated work ethic.

Such entanglements in grand history seem to abound in biographies of modern men, often confident and conscious of their own agency, for their declarations usually result from having taken a side, participated in uprisings, revolutions, wars, and coups. Domeyko could hardly be perceived as an incidental figure swept up by events of public history – not nearly Voltaire's Candide, Jaroslav Hašek's good soldier Švejk, nor a Piotr Niewiadomski from Józef Wittlin's *Salt of the Earth*, to name a handful of literary attempts to write a life entangled in history, but essentially denied agency. Domeyko's youth saw him become involved in the affair of the Philomath Society [*filomaci*], resulting in his imprisonment, trial, and the threat of exile;[17] then, he

[17] The Philomath Society and the significance of the ideal of friendship for the generation that came of age in the 1820s are the subject of Roman Koropeckyj, *Adam Mickiewicz: The life of a romantic* (Ithaca, 2008). Established by a group of students bound by ties of friendship, the Philomath Society was based on the Parisian Société philomathique de Paris and the Prussian Tugenbund. According to Koropeckyj: "The aims of the society … are best summed up by the opening paragraph of its statute for the 1819/1820 academic year: *To calculate among Polish youth feelings of pure morality; to maintain among them a love for things native; to awaken in them the desire for learning; to support them in the difficult avocation of intellectual improvement by providing all possible mutual help to further strengthen the salutary ties engendered by coincidence in age and upbringing to raise, to the best of one's power, the level of national education, and in this way work for the good and prosperity of the land*" (p. 16). In 1823, the society was disbanded by Tsarist authorities, most of its members ending up in prison and forcibly exiled to Siberia for engaging in revolutionary activity.

willingly joined the November Uprising; afterwards, he moulded his experiences as an émigré into engagement in education and the work of an engineer (a rare case where a metaphor reflects biographical reality).

However, as one reads his *My Travels*, in spite of the firmly declarative style of a typical memoir rich in verbs of action (*I voyaged*, *I undertook*, etc.), evidence of individual agency seems rather scarce. Domeyko's life also shared the common features of the life of an émigré: suspension, waiting, lack of clarity over the future, randomness, being stuck in the here and now as pieces of the life one used to live on the other side of the ocean become locked in some different temporality – for that is the meaning of the story of Zejszner's letter, which simply took a long time to arrive, but appeared to have been addressed to some other Domeyko. At stake here is not the technical side of things – the fact that the letter could not but travel a long time, or that the sender and recipient inhabited different time zones – but rather the characteristic modern tension that the émigré situation highlights more forcefully than a 'normal life', stable and conducted along well-established lines, without much turmoil. This tension emerges between the agency coveted by the protagonists of modernity, the desire to command the matter of existence, including time (as indicated by the use of terms such as 'plan', 'perspective', or 'future'), on the one hand, and the indeterminacy imposed by the intractable and disorderly world, also perceived exclusively in physical terms, on the other. The recognition that time is an element – unpredictable and uncontrollable – registers, for instance, in Percy Bysshe Shelley's poem 'Time': "Unfathomable Sea! whose waves are years, | Ocean of Time, whose waters of deep woe | Are brackish with the salt of human tears! | Thou shoreless flood, which in thy ebb and flow | Claspest the limits of mortality!"[18] There is cruelty in this diagnosis, but so is there promise – cruelty, because 'diagnosis' suggests serious and potentially bad news; promise, because a diagnosis of a crisis also implies the possibility of its resolution, also beyond the individual perspective. It is a window that opens to a vision of a new world. "Man's yesterday may ne'er

[18] Percy Bysshe Shelley, *Posthumous Poems*, ed. John and Henry L. Hunt (London, 1824), 142. The volume was published thanks to the efforts of Mary Wollstonecraft Shelley (whose name is not included on the cover) and provided with an introduction of her authorship.

be like his morrow; | Nought may endure but Mutability", writes Shelley in another poem, capturing in two brief verses the experience of an entire generation.[19]

The nineteenth century was an era of unprecedented mobility.[20] As a result, this experience of suppression, suspension, of being locked into several temporal regimes – a pre-emigration 'then', a post-emigration 'now' experienced through the lens of the 'then' as much as through the imagined future return to the place abandoned for political or economic reasons – was shared by many groups and individuals. Such is one of the paradoxes of modernity: the high value it attached to an agency, the attempts to wrest control over the future, and the disparate mythologies of self-made men developed and took hold of imaginations at a time when people were exposed to the trials of emigration as they never were before when instead of active subjects, they were more likely to be the bit-part actors in their own lives.

THE MINERALOGIST: THE PAST OF THE EARTH

Domeyko was a mineralogist, and the perspective on the world and experience of its temporality established by this science seems to offer an interesting counterpoint to the émigré experience with its aforementioned suspensions and breaks. "Time was conceived in geology", writes Henry Faul, describing the process of discovery and virtual negotiation of the age of the Earth. "I mean the absolute, continuous, endless time in which the history of planets and stars is reckoned".[21] In the late eighteenth century, ideas about the age of our planet were strictly tied to the span of human existence and as closely interconnected with the 'Biblical arithmetic' of attempts at calculations inspired by the Book of Genesis. Observations of nature, as much as new discoveries concerning energy resources and humanity's entirely new

[19] Percy Bysshe Shelley, 'Mutabilty', in *id., Alastor, or the Spirit of Solitude and Other Poems* (London, 1816).

[20] Osterhammel, *The Transformation of the World*, esp. chap. 'Space: Where Was the Nineteenth Century?'.

[21] Henry Faul, 'A History of Geologic Time. "It is perhaps a bit indelicate to ask of our Mother Earth her age…" (Arthur Holmes, 1913)', *American Scientist*, lxvi, 2 (1978), 159–65.

requirements in that regard in the wake of the Industrial Revolution, radically advanced the process of redefining the chronology of the Earth.

Let us cite the primary findings concerning the age of the Earth that came under extreme scrutiny during the nineteenth century. Over the course of 100–150 years (between the mid-eighteenth century and the early twentieth century), scientific horizons in this area broadened to a rather astounding extent. Midway through the eighteenth century, Buffon had established that the Earth was 75,000 years old. The works of Jon Jolly, who based his studies on measurements of the salinity of the oceans, allowed him to date the Earth to 80–100 million years. Research conducted by Lord Kelvin led him toward an estimation of 24–400 million years (a fairly light-hearted approach to geological eras, one might say). The discovery of radioactivity and its uses for dating led to another breakthrough: not millions, but billions. By 1907, there was already talk of a value beyond 1.6 billion years.[22]

The more this perspective broadened, the more insignificant the presence of the human species and human civilisations seemed to be. Under Buffon's estimations, one could still assume that 'we were almost always there' with the pyramids and Gilgamesh. No, of course not quite so, for these achievements date back only thousands of years, not tens of thousands, but the order of magnitude remained the same, making the history of the Earth easier to imagine, to encompass for the mind of a human. The nineteenth century also brought about advances in archaeology, with an increase in the number of discoveries of various 'antiquities' of different civilisations. These are familiar stories that the everyday reader could learn about from such works as the popular study by C.W. Ceram.[23] Whatever the case, these discoveries allowed a past undefined to speak, to become visible. Mythical time became a time of civilisation in its different contours – already registered in the time of history. Of course, references to the findings made in 1650 by Archbishop James Ussher based

[22] The process of discovery of subsequent 'deposits of Earth's time' is the main subject of Faul, 'A history of Geologic Time'. See also Cherry Lewis, *The Dating Game: One Man's Search for the Age of the Earth* (Cambridge, 2012).

[23] C.W. Ceram [Kurt Wilhelm Marek], *Götter, Gräber und Gelehrte. Roman der Archäologie* (Leipzig 1949). The book became an 'archaeological bestseller', being translated into nearly thirty languages and published in over 5 million copies. To this day, it numbers among the most popular books on the relationship between archaeology and imagination.

on the Bible remained common. According to calculations published in popular calendars, even at the very end of the nineteenth century, the Earth was created on 23 October 4004 BC,[24] and creationism is alive and well even in our times. However, the scientific consensus had shifted considerably in the interim.

As archaeological discoveries progressed, however, a history of civilisation was being written; what has been (and remains) problematic was the establishment of genealogies and legacies. With respect to ancient Greece, Western societies simply assumed the role of inheritors; the same could be said, to a degree, about ancient Egypt or Sumer. Perhaps they acted more as a custodian than an inheritor, but it sufficed to justify and excuse the transportation of ever more mummified Egyptian aristocrats and their cats, of the Ishtar Gate, or of the Rosetta Stone to major museums in Europe. However, as the age of the Earth moved further and further back, the perspective ceased to be human and escaped intelligibility. In the eyes of a human, the difference between 40 and 100 million years, between 1.6 billion and 3 billion years, is practically nought: none of these numbers have anything to do with our presence on this Earth. Within such a scale, all human achievements pale into insignificance and cease to serve as guideposts.

However, the answer that modernity offered seemed far removed from that. As the 'expansion of time' of the history of the Earth went on – in the very same nineteenth century – small time intervals began to gain unprecedented recognition. Differences of a minute or a second began to matter. One might say that the more the geological time expanded beyond the human capacity of understanding, the greater significance was attached to minute movements on the dial. It is not a mystery where they came to matter: in meanings and values (predictability and punctuality), and in prestige and capital (sports records, transport efficiency, information transmission, precision and stability of timetables and other temporal regulations).

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[24] One of many available examples is the *Sunlight Year Book*, a calendar for 1898. It includes information about British aristocratic houses, the best ways to feed poultry, great floods, states of the world, the manner of cutting a side of pork, as well as crucial events in world history, the first of which is the "Creation of the World as given in the English Bible" in the year 4004 BC.

Considerations on the contrast and breadth between geological time and the temporal perspective of a human being also involve another issue. The project of the Romantic anthropology/civilisation developed during the first half of the century generated the concept of *Natura Loquitur*: thinking and feeling nature, a living being communicating with (and through) humans. Its language was accessible and intelligible for philosophers, and especially poets. Polish Romantics had looked to the examples of Campanella and Paracelsus, but of their contemporaries, they also referred to Novalis, who, as is well known, was a mining engineer. Within the framework that they advanced, reading the Earth and exploring its depths became an activity akin to astronomy as much as astrology – the reading of signs in the sky. The notion of living nature inspired the Romantic fascination with mineralogy, 'earth science', and 'knowledge of the earth'. "You [miners] are well-nigh inverted astrologers", says Novalis in *Henry of Ofterdingen*.[25] Thus, the signs of the earth can be read, and the Earth itself transforms into a Great Tome of All; All, and thus "sober emblem of human life".[26]

Romantic texts tend to dwell in the obscure, internal contradictions, and ambiguities due to their reliance on the poetics of the dream. However, I find that *Henry of Ofterdingen* gives clear evidence that the notion of the 'forge of nature' took shape precisely during that period. Journeys into the depths of the Earth, and practices of mining (itself not a nineteenth-century discovery, but one that underwent a rapid transformation at the time), were not understood within this project as instances of brutal exploitation commanded by the fetish of productivity, but an effort to uncover the secrets of the Earth:

> [I]t must be that mining is blessed by God; for there is no art, which renders those who are occupied in it happier and nobler, which awakens a deeper faith in divine wisdom and guidance, or which preserves the innocence and childlike simplicity of the heart more freshly. Poor is the miner born, and poor he departs again. He is satisfied with knowing where metallic riches are found, and with bringing them to light; but their dazzling glare has no power over his simple heart. Untouched by the perilous delirium, he is more pleased in examining their wonderful formation and the peculiarities of their origin and primitive situation than in calling himself their possessor.

[25] Novalis, *Henry of Ofterdingen. A Romance* (Cambridge, 1842), 111.
[26] *Ibid.*

> When changed into property, they have no longer any charm for him, and he prefers to seek them amid a thousand dangers and travails, in the fastnesses of the earth, rather than to follow their vocation in the world, or aspire after them on the earth's surface, with cunning and deceitful arts. These severe labors keep his heart fresh and his mind strong; he enjoys his scanty pay with inward thankfulness, and comes forth every day from the dark tombs of his calling, with new-born enjoyment of life. He now appreciates the pleasure of light and of rest, the charms of the free air and prospect; his food and drink are right refreshing to one, who enjoys them as devoutly as if at the Lord's Supper; and with what a warm and tender heart he joins his friends, or embraces his wife and children, and thankfully shares the delights of heart-felt intercourse.[27]

Even before his departure for Chile, where Domeyko was to engage in the actual study of the treasures of the Earth, in marking its layers for exploitation, but also in satisfying the curiosity of their geological past, he clearly established his attitude:

> There is little I can say about London's museums. Among their finest masterpieces, I numbered not the sculptures or the paintings, but the formidable fossils – the excavated skeletons of ichtyosora, plesiosora, pterodactyls, and so many other such extinct monstrosities, discovered and secured for posterity with great artfulness and skill by English geologists. It is a thing worthy of the seeing, those dwellers of the ancient world before man: looking at them, one senses the time of creation expand as much as when space expands for an astronomer when he gazes into the infinite worlds. These curious souvenirs of the former organisation of animals can be found in the British Museum, together with a collection of minerals, statues freshly brought from Greece, monuments of Egyptian antiquity, and many other curiosities. (MP II, 15, note from 6 February 1838)

Travels through the Chilean interior gave Domeyko an opportunity to observe a 'geological theatre' with his own eyes. The landscape of the *cordilleras* seemed to him frozen in time, the process of geological formation suddenly arrested, monumental, highly dramatic, a clash of enormous forces. Here, I shall mention one note, but similarly--inflected fragments appear frequently throughout the memoirs:

> Here, on the sheer slopes of this vale along which we had slid to the very bottom, driving back up over an equally steep pathway, my attention was

[27] *Ibid.*, 92.

> drawn to three levels of sediment, mirrored on both sides, carved as if in the manner of massive steps that perchance some giant of prehistoric times could have walked over. From under the edges of each step in the slopes, there emerged layers of white conchs, so well preserved as if only *yesterday* had a stormy sea cast them ashore [emphasis mine – M.L.D.]. These were, indeed, the remnants of bygone, ancient shorelines of a sea that can still be heard here, where its waves were stopped by the Creator; only the land grows taller, driving the edge of the ocean slowly upwards from the watery depths, carrying the weight of the mighty Cordilleras on its back. I had seen the same tripartite layering carved in the shape of steps in Coquimbo, in Limari, in Tongoya, etc., and the selfsame levels were discovered and measured by [Auguste] Bravais in the icy shores of the Finnmark; the very same can be seen in the shores of Scotland or England. At the sight of these unquestionable monuments of earth's antediluvian revolution of an era geologists call Tertiary, I stood dumbfounded atop my calm steed, and it seemed to me that I felt the ground we call stable rise, carrying me like a raft on the Nemunas [Niemen] river, when the impatient arriero nudged me and cried: "Señor! Vamos", let us go now to reach our lodgings before nightfall and collect our reward of water and grass for the horses. (MP II, 181)

This fragment involves several temporal planes: the monumental landscape is experienced as a record of the most ancient history of the Earth, which still persists – but it is an unfinished history. Its pace has slowed down, eschewing the spectacular aspect of the past, and yet it goes on. The Tertiary era has gone by; in the knowledge of the day, the geological past of the earth was comprised of large-scale periods.[28] However, the gradual, slow transformation of land and sea continues even today – a fact that Domeyko reflects upon in real-time, and the experience of this 'calcified landscape' is at once knowledge and a vision in the spirit of Genesis. As Juliusz Słowacki puts it:

> Here, with my back to the heat of golden and silver stones inlaid with mica, alike to the enormous shields dreamed by Homer; here, where the firing sun washes my shoulders in its fire, and the hum of the sea resonates with the sound of Chaos working toward form; here, where spirits follow the path I take today up the Jacob's ladder of existence; over these waves where my spirit had so often sailed toward unconscious horizons, searching

[28] The division of geological periods – Cambrian, Ordovician, Silurian, Devonian, Carboniferous, Permian – was accepted at the time, appearing, among others, in the popular handbook of geology authored by Ludwig Zejszner.

> for new worlds: let me, oh Lord, childishly whimper the ancient labour of life and glean it from the forms that are inscriptions from my own past.[29]

The distance between a scientifically- and rationally-inclined geologist and a Romantic visionary may seem to be oceanic in breadth – but which ocean does indeed divide them? Clearly not the ocean of time: there are only six years between Domeyko's note from his journey across Chile (1838) and Słowacki's *Genezis z ducha* [Genesis from the Spirit, 1844]. Between the intellectual formation of the two authors, one might perhaps trace certain distinctions, but – as Michał Kuziak keenly observes – Domeyko's fascination with the underground world, with deposits and the hidden past of the Earth, exhibits many similarities with the sensibility of Novalis,[30] and more generally, with the Romantic sensibility, and Domeyko's youthful involvement in the Philomath Society may also be seen as pertinent. The interaction between the Romantic imagination and nineteenth-century science has already been explored in various studies, so the setting of the geologist's notes with the vision of a Romantic poet is not a particularly innovative gesture.[31] However, I believe that this community of imagination is still a fruitful object of study.

Domeyko's conclusions concerning geological history as one that also happens here and now (there and then) enable the recognition that the questions addressed by geological study boil down to two issues: first, the mystery of 'timelessness', the unprecedented expansion of the horizon toward the past; and second, the past and questions of its possible contours with regards to continuing geological processes and shifts – sluggish, but large-scale. In the backdrop of these considerations, one can see two aforementioned concepts at work: the history

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[29] Juliusz Słowacki, *Genezis z Ducha* (Warszawa, 1911), 18.

[30] See Michał Kuziak, 'Romantyczne górnictwo. Między mistyką, nauką i przemysłem', *Wiek XIX. Rocznik Towarzystwa Literackiego im. Adama Mickiewicza*, viii (l) (2015), 39–56.

[31] I addressed this question elsewhere, e.g.: Małgorzata Litwinowicz, 'Indukcje i przepływy. Michael Faraday – mikrostudium o romantycznej nauce', *Wiek XIX. Rocznik Towarzystwa Literackiego im. Adama Mickiewicza*, viii (l) (2015), 89–102. See also Marek Bieńczyk, 'Pismo katastrofy w XIX wieku. Wstęp do rozważań', *ibid.*, 9–26; and Elżbieta Dąbrowicz, 'Potop. Między historią naturalną a wyobraźnią historyczną (1795–1830)', in Jerzy Fiećko, Jens Hertlh, and Krzysztof Trybuś (eds), *Katastrofizm polski w XIX i XX wieku: idee, obrazy, konsekwencje* (Poznań, 2014), 9–29.

of the Earth as a continuum and the history of the Earth as a series of ruptures and catastrophes. Prior to geology, it is unlikely that any science proved to humans (of course, only those with access to its findings) that, with all likelihood, they inhabit a ship without a captain, a planet whose geological activity is beyond human control. In accordance with the spirit of the era, one had to take matters into one's own hands and carefully plan the future. In light of geological knowledge, especially in its catastrophic guise, these plans lost some validity if they did not diminish beyond any significance.

Domeyko engaged Humboldt's perspective in his geological observations, treating the Earth as a whole, indivisible into regions or nations.[32] This concept grew equally out of the spirit of Enlightenment universalism as from Romantic particularity – so eager to invest in the original, exceptional, and inimitable: regionally, nationally, or individually.

EXPLOITATION

How did the world respond – both to the thought that stemmed from Humboldt's perspective and to the (unsettling) realisation that the Earth and the continuing process of its formation cannot be easily controlled? It seems that the first reaction was to engage in short-term pragmatism: to trade the 'natural philosophy' of deep insight into the planet and the processes it was subjected to, established on the knowledge gained in the very same period, for a narrow, fragmentary gaze. In this perspective, regardless of the vast time-scales opening up in the thought on both the Earth's past and its future, the planet came to be defined primarily as a source of resources for mining: valuable metals (in the case of Chile) or mineable energy resources (coal, and toward the end of the century – oil).[33]

Here is how Domeyko recounts his encounter with the Cerro Blanco mountain and his conversation with a miner employed there:

> La Rosa was proud of the impression that this more than two-thousand-metre-tall mountain rising from the sea and cut through with veins made

[32] See Andrea Wulf, *The Invention of Nature: Alexander von Humboldt's New World* (New York, 2015).

[33] See e.g. Vaclav Smil, *Energy and Civilisation. A History* (Cambridge, 2017).

> on me. "It must get very cold here", I say to my companion. "Ah, dear sir", he replies, "once, in the days of the king, this mountain was savage, evil (brava), it wouldn't allow foreign people to plunder it and would lay frost and snow on them, and the miners would die. But then, it let itself be *broken*, *tamed* (amanzar), and now you can comfortably work here throughout the winter". (MP II 239, emphasis in original)

The 'breaking' and 'taming' that Domeyko speaks of could obviously be accounted for from various perspectives: of natural and ethnographic study (miner mythologies, poetical and uncanny stories, also recounted in *My Travels*) as well as of the national narrative. One finds more such examples in the earlier writings of Stanisław Staszic, whose geological research coincided with his search for the roots of the nation, the deposits and stones becoming the bearers of Sarmatism or Polishness.[34] This approach would incidentally persist to our times, encumbering mountain ranges and underground sediments (like the Tatra Mountains or the Wieliczka and Bochnia salt mines[35]) with the weight of the national spirit as proof of its eternal presence within the given territory. One can also follow Domeyko in appending stories of the signs that the native inhabitants of a continent left behind to narratives about resources. There are to be found on the rocks "Indian hieroglyphics painted in black and red, known as *pintadas* or *piedras pintas*, perhaps the remnants of an Incan culture … . All unequivocally attach to them a date before the partitions, very ancient, from pre-Hispanic times, perhaps the time before these provinces were conquered by the Incas … . The simple folk sees in these hieroglyphics some kind of mystery and do not enjoy conversing about them with foreigners" (MP II 185). Yet another layer of time.

However, all these layers coincide, as if by accident, in the search for silver- and copper-bearing formations. The supra-human perspective

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[34] Stanisław Staszic, *O ziemiorództwie gór dawniej Sarmacji, a później Polski* (Warszawa, c. 1805).

[35] The Tatra Mountains are a minor, but tall range within the Carpathian Mountains, a significant part of which lies in Polish territory. During the nineteenth century, the range began to be incorporated into the social imaginary of the Poles, becoming in time one of the most recognisable "landscapes of Polishness"; Wieliczka and Bochnia are the oldest salt mines in Polish lands, serving in the nineteenth century not only as places where specific resources were mined, but also as crucial spaces for the social imaginary and memory. See 'Wieliczka and Bochnia Royal Salt Mines', UNESCO, https://whc.unesco.org/en/list/32/ [Accessed: 9 Nov. 2024].

on the past and future opened by the study of nature could fuel aesthetic and cognitive heights, but ultimately, Earth was only a resource: entirely current, with its cheap nature and mountains that eat men.[36]

In the case of Domeyko, one finds a meeting point between many strains that typify the era of modernisation. His memoirs form a part of a crucial strain of literary production in the period – 'stories of one's own self', living consciously through one's life, its events and emotions, and consistently producing a written record of it. This scholar's life extends between Central Europe, Western Europe, and the so-called New World; they speak of a variety of times and inscribe themselves into the history of colonialism. The findings of the geologist open up an entirely different dimension: of non-anthropocentric time, of the grand history of the Earth – an invaluable resource for our time, as well.

Translated by Antoni Górny

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[36] See Jason W. Moore (ed.), *Anthropocene or Capitalocene?: Nature, History, and the Crisis of Capitalism* (Oakland, 2016); Ander Izagirre, *The Mountain that Eats Men*, transl. T. Gutteridge (London, 2019).

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