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Special Issue Reprint

Images of Nature

From the Middle Ages to (Non-)Western Modernities

Edited by
Jon Mathieu and Simona Boscani Leoni

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Images of Nature—From the Middle Ages to (Non-)Western Modernities

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About the Editors

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Images of Nature: Introduction to the Special Issue

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1. Starting Point

This Special Issue on ‘Images of Nature’ in the *longue durée* has its origins in a historical conference on ‘Nature’ at the University of Geneva in the summer of 2022 (6th Swiss History Days, 29 June–1 July 2022). The suggestion to organize a panel there came from Sophie Ruppel, who recently published a detailed study on ‘botanophilia’ in bourgeois Enlightenment society. She vividly shows how European perceptions of nature changed in the 18th century and how the world of plants became an important field of popular education and occupation from about 1780 onward. Religious, scientific, and early ecological ideas contributed to these new practices. Around 1800, for example, people discussed a possible kinship among all living beings and even spoke of a ‘plant soul’. This raises fundamental questions about the human–nature relationship at the transition to modernity (Ruppel 2019).

Of course, we did not quite agree on how to frame and understand these phenomena. For many decades, there have been various proposals from various authors and disciplines—history, anthropology, philosophy, literary studies, and ecology—both in terms their disciplinary traditions and interdisciplinary combinations. The scholarly discussion has intensified in recent years, as was also obvious in Geneva. In order to gain more clarity on some issues in a pluralistic way, we decided to organize a call for papers after the conference and see what we could learn from the studies submitted. In this, we also received support from Simona Boscani Leoni, who has a lot of experience in the field (Boscani Leoni 2024) and who volunteered to be a co-guest editor.

When debates around a term seem so diverse and convoluted, it is useful to remember that terms rely on words and that these can have a specific starting point: *Natura* is a polysemic Latin noun that has accompanied the historical development of the West for centuries, spreading around much of the globe with colonialism and imperialism. It has been adopted or replicated in numerous languages, and it has taken on new meanings in different contexts over time and across regions. Our relationship with that abstract, fuzzy ‘nature’ has become a highly charged issue at least since the ecological turn around 1970. One reason for its politicization lies in the fact that it is not only about the human–environment relationship but also about the relationship of people to each other.

In our call for papers, we mentioned three factors affecting the long-term history of ‘Images of Nature’ that we would like to cover:

- The impact of *religion* since the Middle Ages: Christianity spread a peculiar view of nature, which was varied in many ways in theological debates; other faiths that were represented in the West could also be possible topics.
- The impact of *science* since the early modern period: Research in natural history has given an enormous boost to the imagery of nature since the 16th and 17th centuries, which continued and intensified during the Enlightenment and further on.
- The impact of *environmentalism* since decolonization: The increasing critique of Western society, religion, and science, brought a turn to ecology and, at the same time, to Indigenous peoples, who often functioned as postcolonial models.

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2. Authors and Topics

The papers submitted addressed all these points and were remarkably well distributed over time. The selection for this Special Issue can be presented in four chronological and thematic groups: late medieval/early modern scholarship; transition to modernity ('Sattelzeit'); western alternatives; and global outreach.

2.1. Late Medieval/Early Modern Scholarship

1. Camille Schneiter (*Changing Natures: On Theory and Practice of Breeding in the European Middle Ages*) mainly deals with Albertus Magnus' commentary about animals, which is based on Aristotle and written between 1256 and 1268. The paper suggests that various concepts usually attributed to the early modern period such as 'race' and 'ancestry' had their origin in late medieval times.

2. Karsten Engel (*Man as Image of Nature in Magnus Hundt: The Perspective of a Thomist ca. 1500*) explores a treatise on human dignity published in 1501 by the Leipzig scholar Magnus Hundt. The treatise pays special attention to the human body—not as a prison of the soul but as a perfectly balanced physical counterpart to it.

3. Gabriel Müller (*Daniel Sennert's Corpuscularian Reforms to Natural Philosophy*) shows how the well-known physician and professor Daniel Sennert, in his publications from 1619 on, inserted atomistic views into the anti-atomistic writings of Aristotle. This had serious consequences for the theoretical understanding of natural substances.

2.2. Transition to Modernity ('Sattelzeit')

4. Sophie Ruppel (*Nature as a Huge Organism: Gottfried Reinhold Treviranus (1776–1837) and Early Ecology in German Romantic Science*) portrays a founder of modern biology who turned away from earlier classification efforts in empirical research. His natural philosophy adapted traditional ideas and yet seems ecologically relevant today.

5. Joachim Eibach (*Naturmenschen? Alexander von Humboldt and Indigenous People*) uses a large corpus of Humboldt's writings to examine his views on Indigenous peoples. Unlike many contemporaries, the famous German naturalist was repeatedly reluctant to reproduce pejorative colonialist opinions and criticized them on occasion, based on personal experience.

2.3. Western Alternatives

6. Milo Probst (*A Political Ecology of the Body: Nature in French Anarchist Pedagogy around 1900*) shows that for anarchists around 1900, 'nature' was not stable, ahistorical, or preordained. Their political struggle and their pedagogy were directed toward saving human and nonhuman nature from its oppression by capitalism, religion, and the state.

7. Isabella Schlehaidler (*'Apart from the Experiences of Subjects There Is Nothing, Nothing, Nothing, Bare Nothingness'—Nature and Subjectivity in Alfred North Whitehead*) presents the British process philosopher and his concept of subjectivity. In the 1920s and 1930s, he began to view subjectivity as part of nature, which was radically different from prevailing Western philosophies.

2.4. Global Outreach

8. Jon Mathieu (*How Great Was the 'Great Divide of Nature and Culture' in Europe? Philippe Descola's Argument under Scrutiny*) looks at the way the French anthropologist presents European history from the 16th to the 19th centuries in his global theory. With good reasons, he argues, one could also reverse the overall trend traced by Descola.

9. Regina M. Bichler (*Harm and Harmony—Concepts of Nature and Environmental Practice in Japan*) explores the Japanese 'love of nature', one of the country's hallmarks. She outlines and explains the discrepancies between discourse on nature and physical engagement with nature in the long run and with reference to Western impact, particularly from the 19th century on.

3. The Long-Term Perspective

While each article has its specific points and ideas, when read together, more aspects of nature imagery emerge. Some of these aspects are briefly presented here in free succession, along with some further notes, but with few additional references. The complete bibliographies are given in the articles.

3.1. Languages

Accustomed to today's public discourse on nature, we often tend to forget that for a long time in history, 'nature' was a learned word used by only a fraction of the European population. It was small academic circles that exchanged ideas and inserted this ancient noun into Latin and later vernacular texts and gave it different meanings depending on the context. A revealing case of this inside story is the 1688 proposal by the British scholar Robert Boyle to eliminate the word from the vocabulary altogether or rigorously restrict its use and replace it with 'mechanism'. (Boyle 1688; Zedler 1740, column 1036) In the run-up to the French Revolution, 'nature' became politicized and gained broader appeal. But still around 1900, it seems to have been mostly an elite word that ordinary persons seldom verbalized—unless they needed a taboo word (learned from physicians) for sexual matters.¹ These questions of dissemination and popularization are still among the poorly studied topics that deserve more attention.

Well-documented translation processes can be helpful for this. How was the notion, for example, introduced in Japan? A Dutch–Japanese dictionary from 1796 rendered Dutch *natuur* as Japanese *shizen*. But effectively, there were many culturally specific expressions in the semantic horizon of *natuur* in pre-modern Japan. They are usually translated as 'mountains and waters', 'heaven and earth', 'something that is so given by heaven', 'vegetation growing in ten thousand forms', etc. The fact that *shizen* became the word connected to 'nature' may have been favored by its abstractness. It had been adapted centuries ago from Chinese with the meaning 'what is so of itself'. Until the 19th century, it denoted a universe consisting of humans and physical environments as equal, inseparable parts. With the connection to Western 'nature' becoming stabilized and increasingly important, however, *shizen* later turned into an opposite term relative to 'culture' and other human-related notions.²

3.2. Traditions

The academic circles that dealt with 'nature' in Europe since the rise of population and towns in the Middle Ages were mainly composed of physicians and theologians. Although it is a random selection, the first group of articles gathered in this Special Issue gives a nice impression thereof. Schneider begins in the 13th century with Albertus Magnus working on the recovered writings of Aristotle. Engel picks up the thread in the 1500s with a German scholar who uses Aristotle, Albertus Magnus, and his student Thomas Aquinas. Müller treats an early 17th-century scholar who stands in front of a similar ancestral gallery but finds a new twist under the broad umbrella of this tradition. These (exclusively male) specialists were scholastic natural philosophers working in the context of small universities, using books based on Aristotle and the Bible for teaching and research and viewing their study of nature as truth-producing science. (Schneider 2023; Engel 2023; Müller 2023)

In our series of articles, the embedding of naturalists in Christian precepts ends at the turn of the 18th and 19th centuries. As Ruppel notes, God is not mentioned in the extensive writings of Gottfried Reinhold Treviranus (died 1837). Creation was replaced by nature, but the biologist used the old idea of a 'great chain of being': that is, nature as a vast network of interconnected life, powerful in pre-modern times and then often combined with theology. Treviranus instead supplemented it with the romantic idea of a 'vital force' behind all organisms. One can regard it as an example of the vitalistic current in late Enlightenment. (Ruppel 2023) While theology was only left aside by Treviranus, European anarchists, a hundred years later, saw it as a political enemy to be actively fought. Probst illustrates this on the example of French-speaking anarchist educators and schools. 'Returning to nature' for them meant promoting a self-regulated, holistic life, unmolested by the old clerical

repression—a new life in which freedom, equality, autonomy, and solidarity were inherent values (Probst 2023).

3.3. Dualisms

In the older European past, we find ‘nature’ in opposite relationships to a variety of notions: God, spirit, history, art, custom, etc. The dominant divisions were certainly produced by theology. Mankind was created in the image of God. In his son, he had himself become a man. Therefore, humans were the worthiest of all creatures. The cosmic hierarchy had several main levels: God the lord, then the human race, and finally the rest of creation. It was a pronounced anthropocentric vision that sharply divided the human and nonhuman spheres (Thomas 1983, pp. 17–50; Koselleck 1995, pp. 244–58; Engel 2023).

Today, we almost exclusively talk about nature and culture being opposed to each other. After all, the two words sound similar and trip off the tongue. But historically, this pair of opposites is young. We do not encounter it in the early modern period, if only because ‘culture’ as a general term was still emerging. As suggested by Mathieu, the trajectory of the nature–culture dualism was related to overarching power relations. In the age of high imperialism, it was a hegemonic weapon that placed the ‘cultured’, ‘civilized’ West above all others. In a second phase, with decolonization and Indigenous empowerment, it was turned against the hegemons. At present, the dualism is widely considered a handicap that should be overcome by uniting the two parts (Mathieu 2022).

The countertrend was certainly also fueled by dissenting, innovative voices in the West. When did it start? This question does not seem to have been studied systematically. Alfred North Whitehead in the interwar period was probably among the early but not the earliest exponents. Schlehaider shows how his non-anthropocentric, pluralistic concept of subjectivity radically dissolved the nature–culture dualism. Whitehead opposed what he called the ‘bifurcation of nature’ (Schlehaider 2023). This bifurcation, in a sense, had to be distilled from the past by himself. He identified it with the ‘new science’ of Newton and others in the late 17th century. One can suppose that the technical and scientific revolutions of Whitehead’s own lifetime supported his choice.³

3.4. Souls

Interesting clues to the complex field of hierarchical classifications are given by the notion of soul. The attribution of a soul resembled mostly a certificate of dignity. In pre-modern history, we encounter a fascinating variety of statements. In our sample of articles, the subject comes up several times. Magnus Hundt in 1501 put the body on a par with the soul and thus related to the divine sphere (Engel 2023). Daniel Sennert later spoke of ensouled atoms and of vegetative, sensitive, and rational souls for plants, animals and human beings, respectively (Müller 2023). In the 1630s, René Descartes pictured the bodies of humans and animals as machine-like automata. Only humans, however, possessed an immaterial soul. In modern times, he was often used as a key witness for Western dualisms. However, it is uncertain how many people shared his opinion, and for how long, in the 17th and 18th centuries (Müller 2023; Ruppel 2023; Mathieu 2022).

Of course, in the early modern period, there was also a discussion whether women, children, and Indigenous people were endowed with souls. Ironically, since the late 19th century, the Indigenous have been inundated with the Western soul, as the anthropological term ‘animism’ (from Latin *anima*, soul) made the rounds. Now, it was no longer primarily about their own endowment but about the way they viewed the world. Edward Tylor, one originator of the term, first wanted to speak of spiritualism, but he then saw that this could be confused with the European spiritualism of the period and decided on the transcultural use of ‘anima’ (Harvey 2005, p. 7). Anthropologists have been struggling with this transmission ever since. Like other concepts, animism has had its ups and downs in scholarly popularity. Sometimes the doubt runs right through a researcher’s biography. Philippe Descola, an important protagonist of the nature–culture debate, rejected the

concept in his thesis. Later, in his main work, he reconciled with it and expanded it further (Descola 1994, pp. 98–99; Descola 2013, pp. 129–43).

3.5. Symmetry in the Anthropocene

Among the key claims of recent scholarship in the humanities is the idea of ‘symmetry’: Symmetry on all sides—for the nature–society relationship, for the interaction with Indigenous peoples and nations, even for the connections between present and past (Arni 2018; Arni and Teuscher 2020). The call for symmetry is certainly justified and corresponds to an old ideal of academic balance. Balances can easily become tilted and need to be realigned frequently.

However, this cannot always be realized in the same way. In historical research, the source material plays a preeminent role, and it is often unbalanced. Historians can counteract this to a certain extent by focusing on weak voices. But in the case of voices that cannot be heard at all, any amplification is pointless—pure invention violates the rules of truth-seeking. In his article, Eibach is able to examine Alexander von Humboldt’s remarks about Indigenous people in a very fine, nuanced way because the German naturalist left so many texts, which are now also accessible in a digital corpus. His utterances can be compared to the loud contemporary Euro-American chorus with its unabashedly colonialist and racist slant. (Eibach 2023) But how should we know, in the sense of postcolonial symmetry, what Indigenous persons thought of Humboldt if there are almost no documents about it?

Is there also a symmetrical relationship between images of nature and environmental behavior? An interesting case in point is again Japan with its flourishing ‘love of nature’ expressed in a variety of culturally valued metaphors. Bichler shows in her long-term overview that practical environmental behavior evolved quite independently of them. Pollution and environmental damage were already evident in pre-modern Japan. In the late 19th century, they increased massively and soon reached critical levels through the introduction of modern technology from the West. It was not the adaptation to Euro-American images of nature in the first place that caused this unprecedented damage but the political goal of catching up with technology under the slogan ‘enriching the nation, strengthening the army’. The introduction of the nature–culture dualism with the new twist of the term *shizen* (mentioned at the beginning) can rather be seen as a parallel development or a by-product of this change (Bichler 2023).

The example can help us think about the general place of the studies in nature imagery. *Ceci n’est pas une pipe*—‘This is not a pipe’, the Belgium artist René Magritte famously wrote under the painting of an ordinary pipe in 1929. Up to the present day, many observers are puzzled when they see it for the first time. And even upon reflection, it is not that easy to pinpoint the relationships between the written sentence, the painted canvas, and the everyday object visible on it. Images are, and remain, a challenge for good scholarship.

Conflicts of Interest: The author declares no conflict of interest.

Notes

- ¹ (Mathieu 2022, p. 545) mainly based on (Schweizerisches Idiotikon. Wörterbuch der schweizerdeutschen Sprache 1901, columns 845–50).
- ² (Bichler 2023) based on (Marcon 2017, pp. 16–23) and other authors.
- ³ The early 20th century saw the formation of the new discipline of history of science, linked to the idea of progress and driven by technological and social developments (a key text is Sarton 1913); at the same time, there were various currents of cultural pessimism and anti-modernism among intellectuals.

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Essay

Changing Natures: On Theory and Practice of Breeding in the European Middle Ages

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Abstract: While throughout modern history it has been shown how thoroughly biological discourses were shaped by conceptions originating in the theory and praxis of breeding, for the medieval period similar studies are mostly absent. This paper offers a symmetrical history of theory and praxis of breeding by asking to what extent they shaped medieval conceptions of human ‘race’ and ‘ancestry’ in Europe. For scholarly knowledge of breeding, the analysis relies on Albertus Magnus’ extensive Aristotelian work *De animalibus*. For the practical knowledge of the breeders, scattered indications from the secondary literature are compiled and promising primary sources are outlined for further research. The paper finds that various concepts and practices whose origins are commonly placed in the early modern period were already present in the Middle Ages, including the concept of reproductive heredity and the view that creation diversified over time through reproductive ancestry. Breeding practices, thus, existed before the rise of genetics in modern biology. The medieval conceptions of ‘race’ and ‘ancestry’ underwent conceptual transfers from the non-human into the human sphere, collapsing the qualitative distinction of the two spheres into one quantitatively graded overarching image of nature.

Keywords: history of biology; symmetrical history; medieval breeding; race; ancestry; Aristotelianism; Albertus Magnus; practical knowledge

1. Introduction

Breeding animals and plants is a fundamental component of modern-day agriculture. To write the history of breeding practices of the European Middle Ages, however, is by no means self-evident. Before Mendel first discovered that traits are inheritable in the 19th century and, thus, laid the foundation of genetics, interfering with the reproductive process of plants and animals to change their natures might well have seemed like an odd pursuit.

It should prick up one’s ears, then, when historians discuss the ‘agricultural domain of animal breeding that was already well known in the ancient and medieval worlds’ (Nirenberg 2009, p. 236). Was there really breeding of plants and animals before genetics? Interestingly, the context in which medievalist David Nirenberg points toward medieval breeding practices is an early instance of the conception of ‘race’. He argues that ‘[t]he topic of medieval knowledge about animal breeding is only now beginning to be studied. [. . .] The well-known contribution of knowledge about animal breeding to the development of biological discourses about evolution in the eighteenth and nineteenth century suggests that for our purposes, the topic would merit further research’ (Nirenberg 2009, p. 251).

With this paper, I aim to take up this research gap by asking to what extent conceptions of human ‘race’ and ‘ancestry’ in the European Middle Ages were influenced by the breeding of animals and plants.

Pursuing this research question is important in light of the conceptual history of the term ‘race’. The term first appeared as *raza* in Castilian sources of the early 15th century to refer to an equine hoof disease, and it was soon taken up by breeders to express what we understand today as a ‘pedigree’ or ‘genealogical table’. The etymology of ‘race’ was also

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analysed in this direction—deriving from *haraz/haras*, which means ‘the breeding of horses’ or ‘the stallion’s deposit’ (Nirenberg 2009, p. 248).

Thus, embarking onto the history of theory and praxis of medieval breeding promises to shed light on how conceptions of ‘ancestry’ and ‘race’ first emerged. Additionally, it allows insights into practical agricultural knowledge that, for the most part, escapes the grasp of historical approaches. Shedding light on subaltern knowledge in medieval Europe, consequently, constitutes a significant task of this paper.

A great benefit of conducting this task lies in the fact that I can draw on research with similar approaches that cover later periods, analysing how biological discourses were shaped by conceptions originating in the theory and praxis of breeding. The literature on medieval breeding practices is extraordinarily scarce. The only contemporary historical work devoted entirely to medieval breeding covers horses alone (Gladitz 1997). Apart from that, some contributions on the medieval human–animal relationship dealt with breeding practices in passing (Epstein 2012; Aberth 2013), or at least allowed conclusions to be drawn as to where it might be fruitful to look for them (Teuscher 1998; Giese 2007, 2008, 2010, 2017). For the Early Modern period, historical research connecting knowledge on breeding practices to conceptions of ‘race’ and ‘ancestry’ is more abundant (Russell 1986; Renton 2019). It is when focusing on the 18th and 19th centuries, however, that biological discourses have been scrutinised the most in regard to thinking with ‘race’ and ‘ancestry’ (Orel and Wood 2001; Müller-Wille and Orel 2007; Ratcliff 2007; Wood 2007; Müller-Wille and Rheinberger 2012).

2. Symmetrical History of Breeding

In order to shed light on subaltern knowledge of the Middle Ages, it is crucial to engage with medieval knowledge in its own right without presupposing our own modern scientific knowledge as superior. In doing so, this paper employs the method of a symmetrical history (Arni and Teuscher 2020).

A chief prerequisite of a symmetrical history of breeding is to clarify what exactly we are searching for in the Middle Ages when we discuss ‘breeding’ from a contemporary point of view. In its modern usage, the term encompasses the raising of animals and plants by a human breeder who intervenes in the development of these respective species by interfering with their reproduction in order to optimise them according to the breeder’s needs (Duden 2023).

By applying this concept to a time before the emergence of a biology based on reproduction and heredity, four further research questions arise. First, on the conceptual level, it should be clarified whether an optimisation of creatures—or, even more fundamentally, the mutability of creatures in general—was considered possible. This leads to a second conceptual question: if mutability was conceivable, was human intervention a possible cause for it? Thirdly, it raises the question of whether this eventual mutability was linked to the reproduction of creatures or whether it was entirely different influences that were held responsible for it. Finally, on a practical level, the question arises of whether breeding in the sense of optimisation—irrespective of its conceptual possibility—was practised in the Middle Ages.

The analytical separation between a theoretical and a practical level of breeding implied in these questions will determine the structure of this paper. This is based on the hypothesis that medieval conceptions of ‘race’ and ‘ancestry’ were not homogeneous but rather that decisive differences existed between scholarly traditions and practical knowledge of breeders (Cohen 1993, p. 109).

Identifying these differences can, on the one hand, help to shed light on the two levels themselves—which, in the case of practical knowledge on breeding, already means entering a largely unresearched territory. On the other hand, it could manifest dynamics of knowledge transfers between scholarly and practical knowledge—a field that has proven to be particularly interesting in regard to conceptions of ‘race’ and ‘ancestry’ in later periods (Ratcliff 2007, p. 221).

3. Scholarly Theory—Albertus Magnus

To access the medieval theory of breeding, we will turn to the monumental work *De animalibus* by the Dominican universal scholar Albertus Magnus from the middle of the 13th century. '[I]n the period between Aristotle and the sixteenth century there is no other work which comes close to Albert's in its attempts to provide a descriptive and experimental approach to biological phenomena' (Shaw 1975, p. 56). Albertus Magnus was one of the most influential representatives of the medieval line of thought called 'Aristotelianism.'

This philosophy emerged in Latin Europe in the 12th and 13th centuries. Representatives of Aristotelianism were 'operating under the assumption that nature is intelligent and works towards an end or goal (*telos*)' (Kitchell and Resnick 1999, p. 28). Thus, they assumed that natural phenomena were only understandable through observing nature itself—an assumption strikingly similar to the empiricism of modern-day science.

'Albert both helped to introduce Aristotle's philosophy of science to the medieval world and challenged prevailing conceptions of nature' (Kitchell and Resnick 1999, p. 26). Moreover, Albertus Magnus' work had an enormous influence on later lines of thought both in the Middle Ages and the Renaissance (Kitchell and Resnick 1999, p. 56). With this author, therefore, we have before us an appropriate representative of the medieval scholarly tradition which should serve as an access point to theoretical knowledge about the influence of breeding animals and plants on conceptions of 'race' and 'ancestry'.

3.1. *De animalibus*—Source Criticism

Since *De animalibus* was penned by an author of whom it can be said that it was 'not exaggerate[d] [...] that Albert was in all likelihood the most prolific author of the whole of the Middle Ages' (Kitchell and Resnick 1999, p. 18), it will benefit our interpretation of the source to first acquaint ourselves more closely with his gigantic work—more than 20,000 pages of a manuscript—and the man behind it. Albertus, who is honoured with the epithet *Magnus* ('the Great'), spent his time on Earth from between 1193–1207 to the 15th of November, 1280.

We know little of his origins (which can in itself be read as an indication of the conception of 'ancestry' at the time), however, there are hints that his family belonged to the knighthood (Kitchell and Resnick 1999, p. 4). As a young man, Albertus joined the Dominican Order, which was still relatively new at the time. Under the wing of the Dominicans, he completed his theological studies in Cologne and then embarked on a steep clerical career, beginning as a *lector* in Paris and ending as Provincial of the Order's chapter in Worms. In addition to the tasks that fell to Albertus throughout these positions—for example, the sermon for participation in the last crusade—he wrote countless writings on theology, philosophy, and the contemplation of nature—to such an extent that 'he was criticized by some who claimed that his interest in natural science was excessive' (Kitchell and Resnick 1999, p. 21). One of the objectives of Albertus' extensive activity as an author which he pursued at the request of the Dominican Order was the systematic presentation and interpretation of the works of Aristotle. These had first been translated into Latin via Arabic in the 12th century. Over the course of the 13th century, Aristotelian writings that had been unknown to Latin Europe until then appeared continuously.

De animalibus represented one of Albertus' efforts to integrate such newly translated writings of Aristotle into medieval ontology. Albertus was and remained one of the only scholastics to tackle Aristotle's *De animalibus* and the pseudo-Aristotelian work *De plantis*. For this purpose, he worked with a translation from the Arabic version, which was produced approximately in 1217. In addition to this function as a commentary on Aristotle, Albertus also integrated the literary traditions of the *Physiologus* and the *Bestiaries* into his *De animalibus*. These different influences are also reflected in the structure of our source, which can be divided into three parts: the first and most extensive part is the commentary on Aristotle (books 1–19), the second part contains the conclusions Albertus draws from his own observation of nature (books 20–21), and the third part functions as a bestiary

(books 22–26). It is not certain when *De animalibus* was written but research suggests a date of composition between 1256 and 1268 (Kitchell and Resnick 1999, p. 35). More than 40 manuscript copies of *De animalibus* survived to this day, most likely including the well-preserved but difficult-to-read manuscript of Albertus Magnus himself. This sheer number points to the widespread reception of the work in the Middle Ages and, thus, to the importance of the author, whose ‘teaching achieved an authority in the schools of Christendom that placed him on a level equal to that of the ancients’ (Kitchell and Resnick 1999, p. 1).

3.2. *The Genealogy of Creation?*

In order to identify influences of breeding animals and plants concerning the scholar’s conceptions of ‘race’ and ‘ancestry’ in his substantial *De animalibus*, we shall be guided by my four sub-questions. As a first step, this leads us to the hierarchical character of creation. For Albertus Magnus not only wrote *de animalibus* (on animals) in the narrow sense but rather on ‘the body of everything generated.’¹ He presented this body as arranged in a strictly hierarchical manner according to the criterion of ‘perfection’: ‘From these things, then, it is clear that there can be no more perfect animal than a human’² [. . .] ‘Every other animal, however, lacks something according to more or less, and a defect arises from the lack of something pertaining to perfection.’³

The human that we find here not only implicitly mentioned as one creature among many but moreover explicitly counted as an animal stood at the upper end of the hierarchy of creation. That Albertus granted perfection only to humans is remarkable, for he thereby portrayed the rest of ‘God’s work’ as imperfect.⁴ At this point, the question arises of whether an eventual optimisation of animals and plants in this ontology would mean bringing them closer to human beings. Albertus’ depiction of the creatures following directly after humans in the hierarchy of creation could speak in favour of this: ‘Some, moreover, flourish so much in the instruction of hearing that they even seem to signify their intentions to one another, as does the pygmy, which speaks, although it is an irrational animal, nevertheless. For this reason the pygmy seems to be the most perfect animal, in terms of animal virtues, after the human.’⁵ [. . .] ‘Still, monkeys more than other animals seem to have this sagacity: they are capable of instruction from sensibles.’⁶ [. . .] ‘And this is the reason that these genres of animals are called ‘human likenesses’.’⁷

The high rank of the pygmies (which today we credit to fables rather than to creation (Friedrich 2009)) and the monkeys were granted to them due to their capacity to be disciplined by humans. We can understand this form of optimisation as a non-reproductive form of breeding, which started only after the birth of a creature and was an explicitly feasible practice for humans. The question of whether in addition to this non-reproductive optimisation, reproductive optimisation was also considered possible, becomes clearer if we follow the hierarchy to its lowest end: ‘Those animals, however, which seem to be imperfect throughout their genus [. . .] are certain genres of vermin, like those which we call earthworms [. . .] Avicenna opines that eels are generated from these [. . .] And if this is true, then it is necessary that these creatures are the material seeds and eggs, as it were, for the generation of eels.’⁸

Here, we are confronted with a conception of ‘ancestry’ that clearly implies the mutability of creatures: Eels originated from earthworms. Remarkably, to integrate this view of Avicenna into his ontology, Albertus invoked the theme of reproduction. This conceptual linking of reproductive ancestry with the hierarchy of creation urges us to reflect on the temporal dimension of creation: Was it a singular act that could be taxonomically represented in its completeness, or rather an ongoing process that could be read as a genealogy? For eels, at least, Albertus seems to have tended towards the latter. This is remarkable because the translation of the order of species into a sequence and, thus, into the dimension of time is regarded by current research as the essential conceptual innovation of the 18th century toward modern biology (Klapisch-Zuber 1991, p. 122f.; Weigel 2006, p. 212; Ratcliff

2007, p. 221). To verify this finding, it is crucial to check whether Albertus' other taxonomic units were presented as stable over time.

By focusing on his taxonomic units, the author's conception of 'race' comes into play. The terms he uses to order creation are 'genus' and 'species': 'We must now understand that these powers, divided from each other according to being and subject, constitute the *differentia* of genus and species among those beings which are animate. [...] we see that the bodies of plants [...] belong to an entirely different genus than that of animals [...] In the same way it is also clear that animals differ from one another in species.'⁹

Following medievalist David Nirenberg in the assumption that we can analyse any division ascribed to biology and reproduction as 'race', we could settle these lines as Albertus' conception of 'race' (Nirenberg 2009, p. 235). However, he added a few thoughts, specifically in regard to the taxonomic order of human beings: 'He therefore differs in more than species from the brutes and he seems to have a certain difference in kind [*genus*] over them [...] If, however, someone should object that a genus encompasses many species and that thus a human ought to have many species, it will carry no weight.'¹⁰

Even if we accept 'species' as a medieval conception of 'race', Albertus Magnus explicitly excluded humans from any further taxonomic subdivision. Interestingly, he justified the special position of humans by classifying them as a genus (rather than a species). Consequently, our results on the mutability of creatures through breeding can only be applied to human beings if not only species but also entire genera are found to be unstable over time.

3.3. Monstrous Inheritance

Since Albertus Magnus linked the question of the stability of species and genera over time with the theme of reproduction, we should take into account a concept usually only considered relevant for conceptions of 'ancestry' as of the 18th century: heredity (Müller-Wille and Rheinberger 2012, p. 41). Contrary to this conventional view of research, the 13th-century scholar actually reflected extensively on the relationship between 'ancestry' and 'heredity': 'The cause of resemblance of the young to its father or mother or to one of its ancestors, as well as the cause of any lack of resemblance to them, is also derived from these causes. [...] The reason for all these things is taken from the harmonic proportion of the complexion of the sperm to the nature of the conceived and vice versa.'¹¹

Albertus assumed here that genera and species remained stable over time if it was the case that, at the time of reproduction, the sperm 'prevails and bounds perfectly, due either to the power of the sperm considered in and of itself, or because it is reduced through age to a tempered state, or for some other reason.'¹²

In regard to my question on the possibility of human intervention in the reproductive mutability of animals and plants, these lines open up the interesting perspective that under different conditions, sperm produced offspring with a different degree of resemblance to the father. These conditions—such as the age of the father at the time of reproduction mentioned here—were controllable by humans and could, thus, have represented a practice of breeding.

Important in light of an eventual optimisation of species and genera is that in the above statement, Albertus perceived these practices of breeding as positive only if they brought about the greatest possible resemblance to the parents. In this ontology, therefore, breeding practices that brought about change represented less of an 'optimisation' as opposed to a degeneration.

An additional contrast to the 18th-century concept of optimisation can be found in Albertus' ideas on ancestry encompassing heredity. The optimisation of the 18th century, which was 'known as 'grading' or 'grading up', was based on a *proportionate* concept of heredity, as a fraction of the blood. It probably had a long history' (Wood 2007, p. 231). Certainly, this long history does not go back to Albertus Magnus, who argued against the view that heredity resulted from a proportional mixing of paternal and maternal predispositions and instead advocated a competition between the sexes for heredity.¹³

Which parent would win the competition was unpredictable in this logic. However, through the choice of a strong father and a weak mother, human beings could, again, potentially promote the conditions favouring the preferred ancestry.

Yet, another factor of heredity remained standing: ‘Sometimes, it will not only be male like the father [. . .] but it has a resemblance with respect to genealogy. In this way, some resemble their near parents and some their remote. This generation of resemblance occurs when generation is accomplished in an essential and not in an accidental way. [. . .] For the power of the ancestors is in the members of the great grandchildren up to the fourth generation and occasionally further. [. . .] The power of the ancestors is thus present potentially in the bodies of those generating and when it is helped by resemblance either of food or of place, it functions in actuality.’¹⁴

These lines provide us with answers to several of my questions: First, they clearly show that the conception of ‘ancestry’ encompassing heredity linked creatures to their genealogy. Secondly, it clarifies the third sub-question of whether the mutability of creatures was linked to their reproduction or whether it was entirely different influences that were held responsible for it; it was not a question of either-or but of both-and. For our scholar, reproduction created a potential for stable offspring through heredity. However, this potential could only be fully realised if, in addition to ancestry encompassing heredity, the food and locality of the offspring remained the same. Soil—as the common denominator of food and locality—did not produce stable species over time *per se* (an idea we will encounter in the section on practical knowledge) but only if, additionally, ancestry encompassing heredity was in place.

Strange and all the more fascinating about this ontology, which appears modern in so many respects, is the finding that, for Albertus, in contrast to the 18th century, it was precisely *not* this ancestry encompassing heredity that represented the origin of the diversity of creation. Nor was it the Christian God whom the scholar named as its origin. Instead, he located the origin of the diversity of creation in ancestry *without* heredity: ‘Perhaps that which has been stated is the only cause of diversity, namely, that that which is generated by something else does not take on a likeness of one of its ancestors due to being related to it.’¹⁵

The most fundamental conclusion that this sentence allows us to draw is simultaneously the answer to my first sub-question: a mutability of creatures was considered possible. The fact that it was mentioned here by Albertus as the *sole* cause of diversity suggests that we are indeed dealing with a genealogy of creation. However, as stated above, he did not conceptualise this change as an optimisation but as a degeneration.

It was nature that he placed as the origin of the diversity of creation. For nature acted as the creator of those beings that exhibited an ancestry *without* heredity: ‘Sometimes too they resemble neither of their parents but still preserve the shape of the species in that they are humans. But at other times they do not even retain a human shape or that of those that generated them, but take on instead a monstrous and wondrous form. An offspring which is in no way like its parent, either in the nature of the species or individual shape, is monstrous and is called a wonder of nature.’¹⁶

Thus, it was monsters that through the non-existence of an inheritance contributed to the (degenerative) diversification of creation over time. With regard to practices of breeding, this means: Mutability should have been possible, but always resulted in monsters. Such a breeding of monsters was hardly predictable because change did not result from rules but from exceptions.

Whether these results imply that human beings disposed over mutability through a lack of ancestry as well—perhaps allowing for breeding into different ‘races’—must be examined in light of the mutability of genera rather than species, as seen above. Albertus had a clear answer to this: ‘At still other times it is not to the species, but is only to the genus of animal. It keeps this resemblance at a minimum, for no animal is found which has ever given birth to a plant or a stone, but at a minimum the genus is preserved in all things

which are generated.¹⁷ Since human beings were conceptualised as a genus in their own right, a stable ancestry of humanity was sacrosanct.

3.4. *The Lesson of the Hawks*

Turning towards breeding practices in which human interventions were possible, leads us, finally, to Albertus' bestiary. We will approach this bestiary through Albertus' reflections on hawks, which are the most frequently translated part of *De animalibus*, for they were used as a manual on falconry throughout the remainder of the Middle Ages (Kitchell and Resnick 1999, p. 33).

These practically applied pages of Albertus are interesting with regard to our results on the theoretical knowledge of the scholarly tradition, because they seem to contradict all the statements given above. For example, as he tried to explain the variety of hawk species (of which he distinguished 17)¹⁸: 'Since any one of these genuses can be interbred with any other, many genuses of falcons are created. [. . .] The peregrine falcon often interbreeds with the one with hyacinth-blue feet [. . .] The young which is produced reflects the father, although a bit of the azure color is scattered over its feet. [. . .] Their seeds become mixed and they move, change, and complete each other.'¹⁹

In these few lines, Albertus Magnus contradicted, on the one hand, his previously lengthy differentiation between species and genera, on the other hand, his view, defended at length against other authors, that offspring can only ever inherit the dispositions of *one* parent and, finally, even his fundamental view that the origin of the diversity of creatures lies precisely *not* in heredity.

Instead of all this, he introduced a completely new concept: *permiscere*, to mix, which was translated into English as 'to interbreed', and which we could interpret in the passive form *permiscetur* used here as the source term for 'to breed'. Albertus made it particularly clear, that he regarded this newly introduced concept of mixing as the main cause of the diversity of the hawks, and not the influences of locality that he had previously mentioned: 'Although we have said that four genuses of such interbreedings of falcons have come down to us, reason demands that there are many and that more genuses of falcons can be formed on a daily basis. We think this is why such diverse genuses of falcons are found in diverse regions. For while climata can diversify the behaviors and colors of animals, it is the interbreeding of which we spoke that especially causes the diversity among species so similar. This is just as we have seen happen in the genuses of geese, dogs, and horses in our time.'²⁰

These words of Albertus seem as if his empirical observations of real hawks had taught him to deviate from his theoretical knowledge as a scholar and to replace it with knowledge that could be experienced practically. This was all the more so as he extended the application of these lessons of the hawks to geese, dogs, and horses, the diversification of which he himself had witnessed 'in his time'. It does not seem implausible that this statement by Albertus Magnus points to a direct influence of practical knowledge from breeders (Wood 2007, p. 230)—a possible transfer of knowledge, whose starting point deserves a closer evaluation.

4. Breeders' Practice—A Research Outlook

Should we interpret the possible influence of practical knowledge from breeders on Albertus Magnus in the direction that the medieval theory and praxis of breeding were not so different after all? Whether these two forms of knowledge stood in an exchange with each other or were decisively distinct—which would hardly be directly reflected in the scholarly sources but might surface in descriptions of concrete practices (Teuscher 1998, p. 359)—it is clear in any case that the practices of breeding themselves are largely unknown to contemporary research. In the following, I aim to compile the scattered information on medieval breeding practices, specifically in light of connections to conceptions of 'race' and 'ancestry'. In particular, I will propose promising sources for further research in the field.

4.1. The Identity of the Breeders

The first step in our search for medieval practices of breeding must be to consider *who* practised the breeding of animals and plants in the first place. The most obvious guess from today's point of view is the farmers: 'how for thousands of years rural people outside books had found another way to make like produce like' (Epstein 2012, p. 25).

It is, thus, surprising to learn of incidents such as the revolt of the secret peasants' league *Armer Konrad*, which started out in certain villages as a peasant plundering campaign against so-called 'dog houses' (Teuscher 1998, p. 363). These dog houses—which present likely spaces of breeding practices—were not under the control of the peasant population until the late Middle Ages and the early modern period (Giese 2010, p. 117). Instead, we encounter the two estates of the clergy and the nobles as actors in breeding and keeping dogs.

For instance, the so-called *Hundsauftockung* (dog increasing)—a source term worthy of follow-up research—was subordinate to monasteries and *Stifte* from the 8th century onwards by the decree of Charlemagne (Giese 2010, p. 114). The medievalist Martina Giese points out the remarkability of encountering the keeping and breeding of dogs in monasteries of all places (Giese 2010, p. 110). Just as remarkable is the fact that legal regulation of breeding was apparently of interest to medieval authorities. In the 12th century still 'planned breeding policies of the French kings' were being developed (Gladitz 1997, p. 141).

What is intriguing about this revised perspective on the identity of the breeders is the implied shift of source material to a field more promising for finding breeding practices. The focus now lies on the service law of cathedrals (Giese 2010, p. 115f.), correspondences between clergymen (Giese 2017, p. 234), and treatises of monastery dog and sow servants (Giese 2010, p. 119). This is a genre, where we find, for instance, a manual titled *Wie man jûng laithûndt sol ziechen* (How to breed/raise young lead dogs) by a Peter Zaler discussing the mating of dogs, which suggests specialisation of dog and sow servants specifically in breeding (opposed to one in educating) and provides us with the interesting source term *ziechen* (to breed/raise) as worthy of further investigation (Giese 2010). Furthermore, urban histories hold good prospects for future research, as, in some cases, local dog keeping was recorded quantitatively (Giese 2010, p. 115). In addition, legislation on breeding practices and the resulting surveys of royal and knightly studs (Gladitz 1997, p. 165ff.) might prove fruitful sources. An interesting starting point for further investigation might be found in *The Chronicles of the Royal Borough of Woodstock*, published in the 19th century (Ballard 1896). For the Anglo-Saxon area, so-called 'administrative rolls' are an interesting prospect in general. For Prussia, the archives of the studs of the Teutonic Order should be revisited for questions on medieval breeding (Rûnger 1925).

Furthermore, our revised notion of the identity of medieval breeders is significant regarding the finding that the actors of practical and theoretical knowledge of breeding do not seem to have been so far apart from each other—certainly not spatially, if not socially, either. This could imply a direct influence of breeding practices on the conceptions of 'race' and 'ancestry' of the nobles.

That a conceptual link existed between the breeding of animals and plants and the 'breeding' of humans, is suggested by several findings. For example, '[t]he Teutonic knights attached great importance to heredity and line-breeding' (Gladitz 1997, p. 201f.) of their horses. Furthermore, the advocates of the principle of 'nobility by blood' (the view that nobility was acquirable solely by inheritance through blood) based their argumentation on the 'literature on the breeding of dogs and falcons' (Müller-Wille and Rheinberger 2012, p. 48). An interesting source for further investigating this conceptual link can be found in a popular manual on equine care from approximately 1430 by Manuel Dies that was later taken up by Alonso de Cartagena as an argument for a 'deep heritability' of nobility (Nirenberg 2009, p. 259).

On this basis, the process of ennoblement (as well as its opposite) can be analysed as 'mutability': in the sense of a mobility contingent to ancestry allowing for advancement

(or descent) on the hierarchy of creation, which at its upper end merged into the social hierarchy of the order of estates (Freedman 2002, p. 38f.).

This outlook brings the question of whether not only noble conceptions of ‘ancestry’ were merging from the non-human into the human tier of creation but also noble conceptions of ‘race’. For the non-human tier, so-called ‘dog taxonomies,’ can be named as representative of noble conceptions of ‘race’ (Teuscher 1998, p. 354). If these conceptions merged into the upper tier of creation, should we—taking the perspective of the nobles—understand ‘estates’ as human ‘pseudo species’ (Schlee 2007, p. 270) and, thus, as a conception of ‘race’?

Interestingly, for the early modern period, we know of similar conceptual transfers between human and non-human spheres: The conception of ‘race’ was first introduced into early modern breeding practices by a nobleman, who ‘used many words derived from the language of noble genealogies, such as ‘offspring’ (*postérité*), ‘head of the tree’, ‘branches of the same house’, and ‘genealogical tree’” (Ratcliff 2007, p. 218).

For the Middle Ages, the existence of such a conceptual transfer of the conception of ‘race’ could cast a quite different light on academic debates explicitly comparing the classification of nobles to one of dogs: ‘At the university of Paris, for example, a number of satirical arguments pursued the question of whether noblemen, like the races of some dogs, were characterized by long ears’ (Müller-Wille and Rheinberger 2012, p. 58).

4.2. Practices of Breeding

To finally turn to the concrete breeding practices that are likely to have shaped medieval conceptions of ‘race’ and ‘ancestry’, we first have to answer my fourth sub-question: was breeding in the sense of optimisation—irrespective of its conceptual possibility—actually practiced in the Middle Ages?

According to Charles Gladitz, the answer is relatively simple: ‘In the periods with which the present work is concerned [the Middle Ages] there was, at least sporadically, an intentional application of controlled breeding for a variety of purposes’ (Gladitz 1997, p. 21f.).

Such purposes will have mainly included the functions of animals and plants in regard to human usage because the functions for human usage presented the main criterion for subdividing animals and plants into ‘species’ (Atran 1990, p. 33; Teuscher 1998, p. 354). However, phenotypes as well seem to have been considered normative goals of breeding selection (Teuscher 1998, p. 355). This is evidenced by a certificate recording the obligation of a monastery to deliver two phenotypically identical dogs to the authorities (Giese 2010, p. 119).

It is misguided, however, to infer on this basis that breeding practices depended on the reproductive heredity of external features. Even though phenotypes, as already noted for Albertus Magnus, seem to have been associated with the act of procreation during mating, it was mostly the circumstances of this act that were considered relevant: the age of the parents, as well as their health or even their emotional state (Gladitz 1997, p. 178ff.).

In addition, phenotypes were not conceptualised as stable but rather as malleable by external influences during the lifespan of an individual.²¹ Thus, medieval breeding practices should rather be searched in the provision of optimal conditions—both for expecting parents and for the offspring themselves—rather than in human manipulation of reproduction.

Given that the existence of breeding for phenotypes implied no reference to the ‘ancestry’ or ‘race’ of those being bred, we should finally turn to breeding practices where an influence on conceptions of ‘race’ and ‘ancestry’ seems more likely. This brings us back to a view we have already encountered regarding the theoretical knowledge of breeding: over time, shared soil leads to stable species through uniform food and locality.

Similar views have been accounted for by anthropology for various ontologies: in the case of the Hagen people of Papua New Guinea, for instance, ‘[t]erritory is soil upon which people are grown and a common source of sustenance produces in people a common social

identity' (Strathern 1980, p. 195). Similar views have been attested for the Amerindian indigenous peoples of the Amazon (Viveiros de Castro 2013) and for the Rofaifo of Papua New Guinea (Atran 1990, p. 75). 'Comparable views were probably expressed in the Middle Ages, since they were rigorously refuted by academics such as Thomas Aquinas' (Teuscher 2013, p. 86).

Against this background, I will point to three groups of breeding practices that I consider likely to provide us with promising sources for my research question. The first group consists of practises of commensality. The diet of animals, demonstrably, played a major role in medieval breeding (Gladitz 1997, p. 179; Giese 2010, p. 128). Consequently, it seems quite possible that these views on breeding may have shaped conceptions of 'race' and 'ancestry' to include an understanding of shared food as building a common substance. The establishment of 'race' and 'ancestry' would, thus, not be restricted to the reproductive act but would happen gradually and cumulatively through a common diet (Schlee and Trillmich 2007, p. 386).

The second group encompasses practices of sharing a common land. Commons might have had a crucial impact on conceptions of 'ancestry' and 'race': 'uncertainties could arise about the siring of the offspring in the absence of adequate controls, and disputes about the ownership of stock where several owners were involved' (Gladitz 1997, p. 170). Questioning sources of such disputes as to whether argumentations relied on conceptions of 'ancestry' seems like a very promising endeavour. In particular, the question of whether some form of testing was practised to check the ancestry of animals kept on common land could be extremely fruitful for an investigation of conceptions of 'ancestry' (Lane 1980, p. 20; Gladitz 1997, p. 169f.; Orel and Wood 2001, p. 36).

The third group, finally, is made up of practices of delocalisation and mobility of animals and plants. Should it be true 'that an animal's own nature and 'external' nature were somehow interconnected' (Wood 2007, p. 230), the question arises of what transregional mobility conceptually meant for the 'race' of a creature. The prevailing view of research that such delocalisation of animals and plants became a common practice only from the 17th century onward must be challenged at this point (Orel and Wood 2001, p. 44). There are plenty of practices providing ample evidence for the mobility of animals and plants in the Middle Ages. For instance, the practice of circulating dogs as gifts (Teuscher 1998, p. 361), the geographically dispersed housing of dogs belonging to a single owner (Giese 2010, p. 115), the periodic exchange of stock between studs (Gladitz 1997, p. 169), and the import of animals from distant countries (Gladitz 1997, p. 211; Teuscher 1998, p. 360). Whether such mobility was accompanied by a shift in the appreciation of the creatures concerned, as was often the case for delocalised human groups, would be worth examining with regard to medieval concepts of 'race'. It would also be interesting to see in future research whether such practices—especially for nobles, who could often be classified as delocalised themselves—represented a shift away from the conceptual importance of locality for identity formation toward an emphasis on 'ancestry'.

5. Conclusions

The theory and praxis of breeding in medieval Europe proved to be interconnected with the early history of the conceptions of 'ancestry' and 'race' in several ways. By approaching both scholarly and practical knowledge on breeding symmetrically through a set of four sub-questions, I was able to carve out a form of breeding inspiring a biological discourse quite different from the modern scientific one.

We learned that the mutability of creatures was theoretically considered possible through reproductive ancestry over time. However, it was conceived rather as a degeneration than as an optimisation. Alongside reproduction—which only involved the potential, not the necessity for heredity—other logics were always employed to explain mutability: for instance, the conditions at the time of conception (age, health, emotional state of the parents), or the soil from which the creatures descended via food and locality. These external conditions, thus, represent the most likely access for human intervention in the form of

practices of breeding. Breeding seems to have been practiced primarily with the objective to achieve certain specific functions of animals and plants for human usage. Nevertheless, phenotypes were targeted by medieval breeding practices as well.

Remarkably, the history of medieval breeding revealed various concepts and practices whose origins are usually situated by researchers in the early modern period: the existence of the extensive mobility of animals and plants; the concept of reproductive heredity; the view that ancestry (*without* heredity) was the only cause of the diversity of creation—not the Christian God; and the implied temporal dimension of creation.

The extent to which medieval biological discourses were influenced by the breeding of animals and plants is significant. Even though in theory a conceptual transfer of ‘mutability’ from non-human ‘species’ to the human ‘genus’ was illicit, in praxis similar transfers existed. The significance of commensality, for instance, is evident not just for breeding animals but for Christian religious practices too, and delocalisation is known in the context of animals and plants as well as nobles.

As a result of such conceptual transfers of the conceptions of ‘race’ and ‘ancestry’ from the non-human into the human sphere, we should question the qualitative distinction of these two spheres for the European Middle Ages. What we encountered instead was a quantitatively graded hierarchy of creation featuring earthworms at its lowest end and, at its upper end, the social hierarchy of the three estates. The image of nature depicted by medieval breeding is, thus, overarching the modern dichotomy between ‘nature’ and ‘culture’.²²

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Notes

- ¹ Albertus Magnus: On Animals, p. 1358. Cf. Albertus Magnus: *De animalibus*, p. 1273.—‘omne generatorum corpus’.
- ² Albertus Magnus: On Animals, p. 1410. Cf. Albertus Magnus: *De animalibus*, p. 1322.—‘Ex hiis igitur patet non posse esse perfectius animal homine’.
- ³ Albertus Magnus: On Animals, p. 1413. Cf. Albertus Magnus: *De animalibus*, p. 1325.—‘omne autem aliud animal deficit secundum plus vel minus, et defectus est ex carentia alicuius ad perfectionem pertinentis’.
- ⁴ Albertus’ treatment of the Christian God in *de animalibus* is generally remarkable, as he mentions him only in a few places in the entire work (Atran 1990, p. 147; Kitchell and Resnick 1999, p. 1439).
- ⁵ Albertus Magnus: On Animals, p. 1416. Cf. Albertus Magnus: *De animalibus*, p. 1328.—‘Quaedam autem in tantum vigent in disciplina auditus quod etiam sibi mutuo suas intentiones significant, sicut pigmeus qui loquitur, cum tarnen sit irrationabile animal: et ideo quantum ad animales virtutes, post hominem videtur pigmeus esse perfectius animal’.
- ⁶ Albertus Magnus: On Animals, p. 1419. Cf. Albertus Magnus: *De animalibus*, p. 1329f.—‘videntur symiae prae ceteris animalibus sagacitate habere eam quod disciplinabiles sunt sensibilibus’.
- ⁷ Albertus Magnus: On Animals, p. 1422. Cf. Albertus Magnus: *De animalibus*, p. 1332.—‘Et haec est causa quod haec genera animalium similitudines hominis vocantur’.
- ⁸ Albertus Magnus: On Animals, p. 1438. Cf. Albertus Magnus: *De animalibus*, p. 1347f.—‘Ea autem quae secundum suum genus imperfecta esse videntur [. . .] sunt vermium quaedam genera sicut ea quae lumbrici terrae vocantur [. . .] Ex hiis autem aestimat Avicenna cum iuxta aquas limosas sunt, anguillas generari: et si hoc est verum, tunc oportet ista quasi materialia semina et ovalia esse ad anguillarum generationem’.
- ⁹ Albertus Magnus: On Animals, p. 1407. Cf. Albertus Magnus: *De animalibus*, p. 1319.—‘Est autem adhuc intelligendum quod istae potestates divisae ab invicem secundum esse et subiectum, constituunt differentiam generum et specierum eorum quae sunt

animata. [...] nos videmus corpora plantarum [...] esse omnino alterius generis quam animalium [...] Per hoc idem autem patet quod etiam animalia a se invicem specie sunt differentia.'

10 Albertus Magnus: On Animals, p. 1407. Cf. Albertus Magnus: *De animalibus*, p. 1319f.—'Plus igitur quam specie differt a brutis, et videtur ad ipsa quamdam habere generis differentiam [...] Si quis autem opponat quod genus plures ambit species et sie homo plures deberet habere species, non valet.'

11 Albertus Magnus: On Animals, p. 1295. Cf. Albertus Magnus: *De animalibus*, p. 1205f.—'Ex hiis etiam causis accipitur causa similitudinis nati cum patre vel matre vel aliquo avorum et causa dissimilitudinis. [...] Causa autem omnium istorum accipitur ex armonica proportione complexionis spermatis ad naturam concepti et e contrario.'

12 Albertus Magnus: On Animals, p. 1295. Cf. Albertus Magnus: *De animalibus*, p. 1206.—'est perfecte vincens et terminans aut propter virtutem spermatis in se consideratam, aut quia per aetatem reducitur ad temperamentum aut propter aliam aliquam causam'.

13 Cf. Albertus Magnus: On Animals, p. 1298. Cf. Albertus Magnus: *De animalibus*, p. 1209.

14 Albertus Magnus: On Animals, p. 1296. Cf. Albertus Magnus: *De animalibus*, p. 1207.—'Aliquando enim non tantum non erit mas sicut est pater [...] sed habet similitudinem ad genealogiam et secundum hunc modum quidam sunt similes parentibus propinquis et quidam remotis. Et haec generatio similitudinis fit quando generatio fit modo essentiali et non accidentali [...] Virtus enim avorum est in membris pronepotum usque ad quartam generationem, et aliquid amplius [...] et sie virtus avorum est in potentia in corporibus generantium: et quando aut per similitudinem eibi aut temporis adiuvatur, agit secundum actum'.

15 Albertus Magnus: On Animals, p. 1300. Cf. Albertus Magnus: *De animalibus*, p. 1211.—'Et forte tanta causa diversitatis haec quae dieta est, quod id quod generatur ab aliquo, non accipit similitudinem alieius avorum de cognatione illa.'

16 Albertus Magnus: On Animals, p. 1295. Cf. Albertus Magnus: *De animalibus*, p. 1205f.—'Aliquando etiam nulli parentum assimilantur, sed tamen retinent figuram speciei, ita quod sunt homines. Aliquando etiam non retinent formam humanam sive speciei generantium, sed accipiunt formam monstruosam et mirabilem. Filius enim qui in nullo similis est parentibus nec secundum speciei naturam neque secundum individui figuram, est monstrum et mirabile naturae vocatum.'

17 Albertus Magnus: On Animals, p. 1303. Cf. Albertus Magnus: *De animalibus*, p. 1214.—'aliquando autem non ad speciem, sed ad genus tantum animalis: et hanc ad minus retinet similitudinem: quoniam non invenitur animal quod in partu plantam vel lapidem enixum umquam fuerit, sed genus in omnibus generatis ad minus est salvatum.'

18 Cf. Albertus Magnus: On Animals, p. 1577. Cf. Albertus Magnus: *De animalibus*, p. 1457.

19 Albertus Magnus: On Animals, p. 1592. Cf. Albertus Magnus: *De animalibus*, p. 1470.—'Dum autem quodlibet horum generum cuilibet permiscetur, multa fiunt falconum genera. [...] falco enim peregrinus frequenter permiscetur ei qui est pedum iaccinctinorum [...] et efficitur partus patrem imitans, licet parum coloris azurini respargatur in pedibus. [...] semina permixta se invicem movent et convertunt et complent.'

20 Albertus Magnus: On Animals, p. 1592. Cf. Albertus Magnus: *De animalibus*, p. 1470.—'et licet dixerimus quatuor genera taliter permixtorum falconum ad nos devenisse, ratio tamen exigit multa esse et plura cotidie posse fieri talia falconum genera: et hanc putamus esse causam quod tam diversa genera falconum in diversis regionibus inveniuntur. Quamvis enim climata mores et colores animalium diversificent. tamen specierum tam similibus diversitatem causat praecipue permixtio quam diximus. sicut et in generibus anserum et generibus canum et equorum fieri vidimus temporibus nostris.'

21 Cf. Albertus Magnus: On Animals, p. 1300. Cf. Albertus Magnus: *De animalibus*, p. 1211.

22 Concluding a symmetrical history of medieval breeding must involve taking the principle of symmetry to heart and, thus, allowing the past to question the present at last. Both the conception of 'race' and the conception of 'species' scrutinised for their medieval implications in this paper, represent concepts that legitimise ongoing discriminatory practises in our modern scientific ontology. In the Middle Ages, both 'human' and 'estate' exceptionalism were based in a quantitative grading, rather than in a qualitative difference characteristic for modern discriminations on the basis of 'species' and 'race'. While we should not aspire to adopt medieval ontologies, we should allow them to show us the specificities of how our own conceptions are flawed. In doing so, we learn that one great challenge for of our time has to be overcoming thinking with modern concepts such as 'species' and 'race' that build qualitative differences into our view of the world.

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Article

Man as Image of Nature in Magnus Hundt: The Perspective of a Thomist ca. 1500

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Abstract: This paper draws on a late medieval example to show that images of nature can also be images of the human body. It presents the *Anthropologium de hominis dignitate* by the Leipzig magister Magnus Hundt (1449–1519). The *Anthropologium* is a text that prominently integrates the human body into its conception of man and its account of human dignity. The body is not presented as a prison of the soul, but as a perfectly balanced physical counterpart to the soul. The paper shows how Hundt’s reflections were influenced by his commitment to the Thomistic school. Moreover, it reveals how the elevated Imago Dei thesis provides a justification for the study of the human body. Hundt is shown to offer nothing less than a theological–philosophical legitimation for practising medicine. In doing so, he also incorporates images of nature in a literal sense, insofar as he includes images of the human body in his book.

Keywords: scholasticism; image of man; Thomism; medieval medicine; anthropology; Magnus Hundt; human body

1. Introduction

Nowadays, human beings have a strange connection to their natural environment. In thinking about the relationship between humans and nature, it has often been emphasised that everything that has been affected by humans becomes part of their ‘cultural’ world. Only that which has remained largely untouched by humans can still be called nature. In this understanding, nature is that which remains distant from humanity.¹

The Middle Ages did not have this distinction between nature on the one hand and culture on the other. ‘Natura’ was the word that stood for the essence of a thing—whether it was the essence of plants, of arts or of humans. For example, according to the Aristotelian tradition, the nature of human beings was that they were rational animals. Therefore, in the Middle Ages, nature was not ‘the other’, but the essence of a thing.

From the aforementioned definition of the nature of human beings, one can already see that, according to medieval understanding, they have two essential components: First, they are animals and therefore have some characteristics in common with other animals. Secondly, humans are gifted with rationality, which distinguishes them from all other corporeal beings.

Historically, when philosophers thought about human beings, the emphasis was very often on those specificities which distinguish them from other living beings. Of course, it is precisely these that make humans so unique. In this context, much has been said in the history of philosophy about the human intellect, mind and reason. Magnus Hundt, the Thomistic thinker who is the subject of this paper, was very interested in the connection between both the intellectual and the ‘animal’ part of the human. He will therefore be introduced here.

Hundt first became known as a philosopher before 1500, but then subsequently studied at the medical faculty of the University of Leipzig (Worstbrock 2008). Despite institutional barriers, his *Anthropologium de hominis dignitate* (Hundt 1501) served as a bridge that helped to integrate the physical component of the human being into the overall conception of man.

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In addition to his great praise for the human soul in this work, one cannot help but observe the enormous potential he attributes to the human body. The dignity of the human being, which is one of the stated themes of the treatise, is thereby explained with reference not only to the soul, but also to the particularities of the human body. In other words, an image of the bodily nature of the human being is strongly connected to an image of man.²

The aim of the present paper is to present this Renaissance approach to thinking about the human being, which focuses not only on the soul and reason, but also on his physical aspect, i.e., his ‘natural creatureliness’. Previously, the soul, which in the medieval understanding is in much closer contact with God than the body is, had often been understood as the bridge by means of which we can reach a better understanding of God. However, on Hundt’s account, it is also by perceiving himself as a corporeal being and by examining the body that an individual learns about God and his intentions in creation.

Moreover, in becoming more familiar with their bodily needs, human beings are also studying what, in a certain way, connects them with other creatures. Hundt’s anthropology, which will be presented in more detail here, stands within this dialectic, which deals with the special dignity of the human being, on the one hand, and his physical commonalities with other living beings, on the other.

2. Magnus Hundt’s *Anthropologium* and His Image of Man

Magnus Hundt has been so far quite rarely the subject of research. However, more recently his treatises on anthropology (Santing 2020), medicine (Lanska 2022), grammar (Kneepkens 2017) or logic (Hoenen 2023) have been analysed in more detail. We know that Magnus Hundt was a magister at the Saxon University of Leipzig from 1486 and achieved fame mainly as a logician and teacher in the faculty of arts. By 1500 at the latest, however, he became increasingly well known for his work on natural philosophy, theology and anthropology. It is documented that Hundt had taken up the study of theology and medicine in the 1490s, completing his medical studies with a baccalaureate in 1499 and his theological studies with a doctorate in 1505 (Worstbrock 2008, col. 1176).³ His anthropological work, which is the subject of this article, was published in Leipzig in 1501 by the printer Wolfgang Stöckel. Its title proclaims that it is an ‘Anthropologium on the dignity, nature and properties of man; on the elements, parts and members of the human body; what is beneficial and harmful to them and their accidents, infirmities, remedies and physiomy; on the excretions and discharges; on the human mind, its nature, parts and creations and on the human soul and its appendages’.⁴

The title says it all: in a good 230 pages, Hundt compiles what he considers to be the most important scientific findings about man that had been expressed by philosophers and physicians up to that time. Moreover, as the title announces, the book not only makes general statements about humanity’s position in the world, but also deals with, for example, the individual organs, hair, nerves and intestines (Figure 1) in a thoroughly medical manner. The anatomical drawings that can be found on certain pages are intended to help the reader to understand and mentally process the material (see Sudhoff 1909, p. 119; Santing 2020; Lanska 2022).

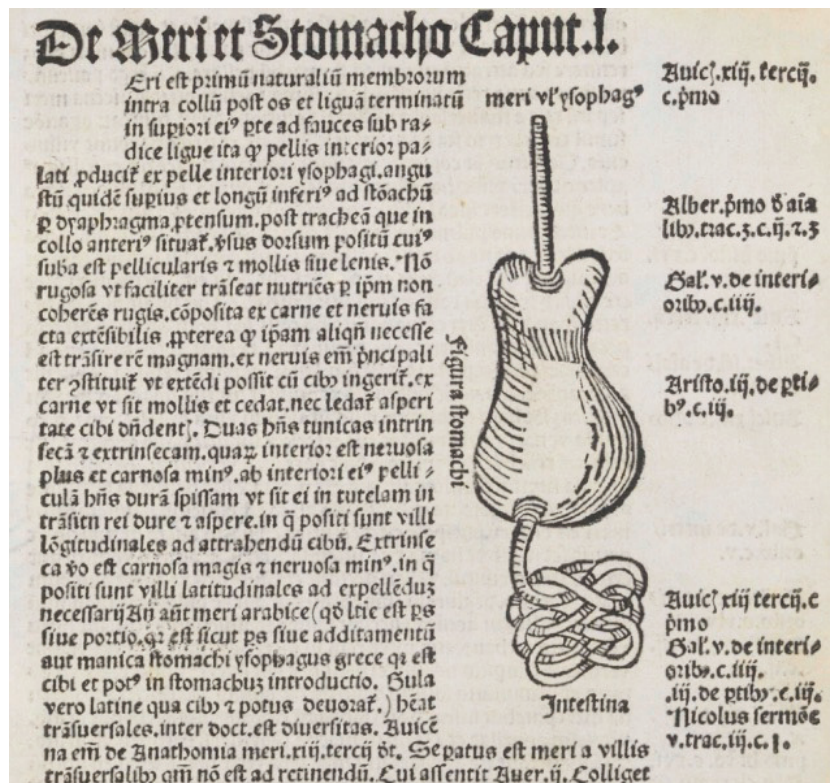


Figure 1. Hundt's illustration of the stomach and intestines (Hundt 1501, fol. O Vr).⁵

The first chapter of the text, which deals with the 'dignity of the superior human nature', gives us a somewhat more comprehensive overview of Hundt's conception of man. Even though human beings are afflicted with deficiencies as regards both their bodies and their souls, they were created in the image of God and are therefore the worthiest of all creatures. After all, God himself had become a man.⁶

Furthermore, man could also be understood as the knot between the divine world and the earthly one: on the one hand, man possesses the divine intellect in his rational soul; on the other, he is part of the earthly world in virtue of his body. Possessing both characteristics, he is the optimal intermediary between God and the earthly sphere.⁷

At the same time, Hundt also distinguishes man from God. Both God and man are creators, but what God creates (including humans) are natural things, while what man creates are artificial things that only imitate nature. Human creation is a mere imitation of God's creation.⁸

In a series of superlative characterisations, Hundt presents the most important features of his conception of man in didactically memorable omnia formulas: 'homo est omnia' (man is everything), 'homo continet omnia' (man contains everything), 'homo est finis omnium' (man is the purpose of everything), 'homo cognoscit omnia' (man recognises everything), 'homo potest omnia facere' (man can make everything), 'ad hominem omnia tendunt' (everything strives for man).⁹ These formulas are elucidated very extensively in the course of the text and are supported by arguments (cf. Haedke 1961, p. 37).

The reason why the human being 'is' everything, for example, is grounded in the fact that the soul can 'carry' all species within itself. Just as God carries all things within himself, because he possesses the ideas that underlie these things, in virtue of which he can

directly know their essence, the human soul carries perceptible things in itself by means of the senses and intellectually comprehensible things by means of the intellect.¹⁰ This also explains how man can ‘know’ all things.¹¹

The reason why man can ‘do’ everything has both a physical and a mental dimension. On the one hand, he can reproduce all intelligible things (in the intellect) through the ‘intellectus agens’ and ‘intellectus possibilis’; on the other hand, he is also capable of creating physical things. For the hand, which is the executive organ of the soul and serves as its tool, is the organ of the organs (*organum organorum*), by means of which man can produce all material things.¹² This is also the reason why man is born naked, because he himself can produce everything he needs to live, while nature provides him with everything he needs for this.¹³

Moreover, in a certain way, the human being also ‘contains’ all creatures, because these can all be found in some way in the human being: the inanimate ones simply in virtue of their being, the animate ones due to the fact they are alive, the animal ones with regard to their sensory abilities and, finally, the spiritual and separate substances with regard to the intellect.¹⁴ In this respect, man is also to be understood as a world in miniature: everything that can be found in the world is also mirrored in human beings—a *topos* that reappears in relation to the human being as a reflection of the divine principle of order and creation in the world.

In this account, it is precisely in the human being that all the elements and parts composed of elements, which elsewhere do not fit together very well, are united in ‘unanimity’ and harmonise wonderfully. Because this phenomenon can also be seen throughout the entire universe, it is even easier to understand why human beings represent the entire world in miniature.¹⁵

A little later, it is even said that ‘everything strives towards man and according to him the heaven and all nature are ordered’.¹⁶ Hundt refers to Albertus Magnus, according to whom the universe is ordered not only in relation to God and itself, but also in relation to man. Man is ultimately the goal (*finis*) of all creatures and the one to whom all things render their service (*subministrant*).¹⁷ This view is justified by man’s higher degree of perfection as compared to other creatures: ‘The more perfect things are the purpose of the others’.¹⁸ Just as God is the purpose of the optimal human being, the optimal human being is also the purpose of other human beings.¹⁹ In addition, human beings in general are the purpose of other creatures, and so on.

It should be clear by this point that, in his argumentation for the special dignity of the human being, Hundt repeatedly refers to the bodily dimension of the human being, and not only to the mental-intellectual one. In other passages, he makes this even more explicit, painting a picture of human nature in which the body also plays an important role. These will be examined in greater detail in the following sections.

3. The Emphasis on the Human Body

The aim of the *Anthropologium* is primarily to present the superior dignity of the human being. As we have seen, Hundt pursues the goal of substantiating this dignity by means of arguments. He devotes a considerable part of his text to deriving this dignity from the human body. At first glance, the body has certain shortcomings (just like the soul, incidentally), and Hundt emphasises that it is to a large extent subject to various necessities and needs. The reason for this is original sin.²⁰ Nevertheless, Hundt is able to prove in his *Anthropologium* that it is the body of the worthiest creature on earth (cf. Figure 2).

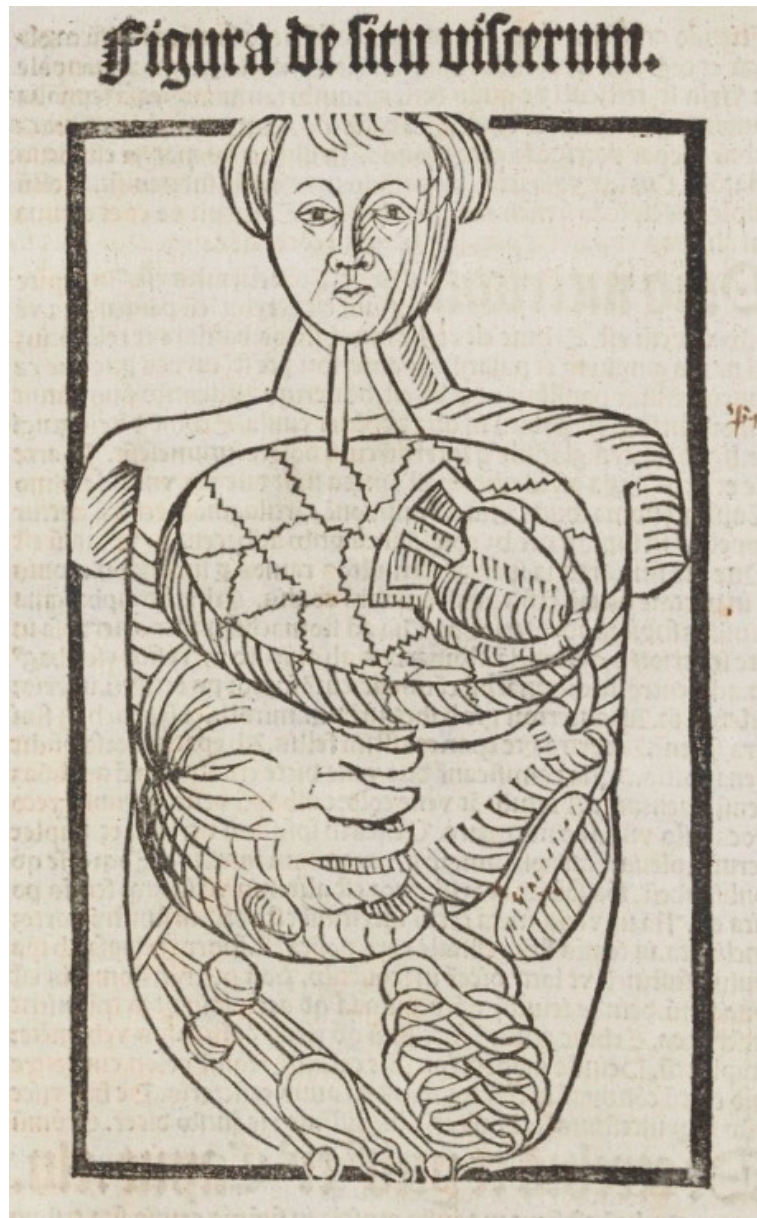


Figure 2. Hundt's illustration of the location of the viscera (Hundt 1501, fol. L Iir).²¹

What at first glance sounds like a typical humanist project turns out, on closer look, to be a compilation of a wide variety of scholastic ideas. It is true that Hundt, especially at the beginning, shows off his knowledge of classical authors such as Ovid or Horace and also important humanist authors such as Marsilio Ficino and Giovanni Pico della Mirandola. Nevertheless, not only is the style typically scholastic but also the majority of the sources Hundt consults for the *Anthropologium*. He makes use of many standard medical works of the Middle Ages and relies, for example, on Petrus de Abano, Avicenna and Averroes (Santing 2020, pp. 471–75). The main ideas of how the dignity of man is shown in his body

look like humanist ideas, but actually come from Albertus Magnus. Hundt's interest in depicting the human being in a certain way may well have been influenced by a humanist mindset. However, the arguments and ideas he consults are predominantly medieval-scholastic. Hundt does not hide these roots, but rather highlights them. This is also evident, for example, when he describes the properties and functioning of the body in the words of Albertus Magnus.

Hundt shows that man has a special dignity, which is seen, for example, in his upright posture, a feature that distinguishes him from other creatures. Hundt writes: 'Man is the noblest creature [. . .] with regard to his posture, because he has an upright stature which is directed towards heaven.'²² The head of man—so the reasoning goes—in which the intellectual and living powers are understood to reside is placed above the body in view of its leadership role and is formed with regard to its position within creation and the order of the entire world.²³ Therefore, Hundt emphasises again the Aristotelian insight that the human being is a 'miniature world' (minor mundus).²⁴ This motif is also found in the statement that the order of the world is established by God, i.e., metaphorically speaking: 'from above'. According to this principle, it is only coherent that the head, which also directs and guides the body, is positioned above it.²⁵ Man's upright posture is thus a symbol of the 'ruler's role' that God has bestowed on his most worthy creature, elevating it above the others.

In this context, Hundt also emphasises that if humans did not walk upright, like other animals, they would not have had both hands free for various activities. The hands are, in fact, the most important tools of the human body in the medieval understanding. They are, as already indicated above, 'organa organorum', because, with them, man can produce anything that he wants and that his intellect commands him to. The hands are, in a special way, the executive organ of the intellect and the guarantor that man can produce everything he needs for himself. While animals can only rely on the original tools given to them at creation, man can produce these tools (e.g., weapons for hunting or protection) on his own, using his intellect together with his hands, which carry out the former's commands. In this respect, the hands are also the 'signs of the intellect'.²⁶ Later, when he describes the physiology of the hand, Hundt returns to this fact.²⁷ If humans had to use their hands for locomotion like other animals, the organ of organs would be constantly impeded and could only perform this important executive function of the intellect to a very limited extent. This is why man was created by God as an upright walking being.²⁸

That said, not only man's upright gait, but also his proportions reflect human excellence. They express very well his beauty and elegance, which are also a reflection of his spiritual powers. Hundt shows this in great detail with reference to the three different masses of the body, i.e., its length, width and depth. In humans, these masses are in perfect proportion with each other. They correspond most perfectly to the 'natural' masses. The length of a body, for example, must always exceed its width. While humans and, for example, worms fulfil this criterion, the ratio of length and width in worms is not well proportioned. In humans, by contrast, it is. Hundt admittedly presents these kinds of considerations about the measurements of humans in more detail in his text.²⁹ However, this may suffice to give an insight into the ways in which the dignity of the human body is justified.

In addition to the upright gait and distinctive proportions of the human body, the mixture of elements and fluids of the body is also used to make clear the special dignity of the human being. The human body is said to be perfectly mixed in the same way, namely that it is one of the most intelligent living beings and that God can influence the world through it.³⁰ In the background here is a medical tradition that assumes that different natural objects are composed of different elements. Thomas Aquinas had already stated this in his *Summa contra gentiles*. In this context, Aquinas emphasises—just like Hundt—that man has the body that represents the best mixture of these different elements. No other

body is so well mixed that a spiritual substance can be united with it. This is only possible in the human body.³¹

In Hundt's understanding, the soul is also the ruler of the body and brings it 'into form' (informatio).³² However, even if the soul is much more perfect and the body is sometimes afflicted with shortcomings, it is nevertheless 'tempered' just right to ensure the optimal functioning of a rational living being. This particular insight is shared by Thomas Aquinas and Magnus Hundt.

4. A Thomist's Project?

The view that the body is an important tool of the soul and that corporeality is at the same time an essential component of the image of man is not at all surprising for a Thomist such as Hundt. In both the classical Aristotelian tradition and, subsequently, the Thomistic one, a balanced answer had always been given to the problem of body and soul, i.e., the question of how the soul and the body were connected and which part of the human being was superior. Unlike in the Platonic tradition, for example, the body was always an important part of the human being for both Aristotle and Thomas (see, for example, among many others, Rapp 2003).

It is therefore not surprising that Thomas, like Hundt many years later, writes: 'Now the next purpose of the human body is the rational soul and its activity. For the material is chosen because of the form, and the tools because of the intended activity. God has therefore fitted the human body in such a way that it may serve such a form of being and the corresponding activities. Additionally, if anything defective is really observed in the arrangement of the body, it must be considered that such a defect follows the substance with necessity, inasmuch as some things are therefore required in order that the due relation of the substance to the form of being and to the corresponding activities may exist.'³³

Thomas Aquinas thus concludes that the human body, despite its occasional defects, is a very good—and even the only possible—'shell' for the soul. This claim also aligns with the conclusions of the Thomists of the 15th century, who adopted the teachings of Thomas Aquinas. Researchers have been able to demonstrate the philosophical–theological motives in light of which the followers of Thomas Aquinas considered not only the soul, but also the human body, so worthy of investigation (Hoenen 2001).

This point becomes particularly clear through a contrast with the competing school of Albertism. Albertists were scholars who primarily followed the writings and thoughts of Albertus Magnus. When asked how the cognition of the essence of a thing functions in humans, Albertus Magnus answers with a reference to Plato. He claims that those things that a person wants to know can be grasped primarily through ideas. According to the Albertists, these ideas are insights that were imprinted in people at the time of their creation and are therefore already present in the soul. Intellectual cognition is thus an incorporeal activity and therefore not necessarily dependent on sense data (Heymericus de Campo (1496), foll. H III^r-H IV^r; cf. Hoenen 2001).

Unlike the Albertists, Thomists such as Hundt seem to attach particular importance to the physicality of human beings in their capacity for cognition.³⁴ Many Thomists of this time agreed that cognition also takes place to a good extent through abstraction from individual things. In particular, the recognition of form takes place in an abstract way (cf. Seidl 1988, esp. pp. 106ff.). For such abstraction, however, sensual perception—and thus also the physicality of the perceiver—is indispensable. Intellectual cognition is thus only possible if the soul also has a body through which it can obtain the sensual 'information' (cf. Hoenen 2001).³⁵ Hundt had previously emphasised in his writing that the soul comes into the world 'naked' and without an understanding of species, habits or forces.³⁶ Only sensory perception, which is bound to the physicality of the human being, thus gives the soul 'working materia'. As a convinced Thomist, Hundt accepts this claim. It is therefore obvious that, in his anthropology, he is particularly interested in the functioning of the eyes, the ears and the nose.

Even though Hundt quotes Albertus Magnus in extenso in the first chapter of the *Anthropologium*, the whole project is a fundamentally Thomistic endeavour for this reason. The body, which is so central here—this is the Thomistic insight—helps the soul to progress with intellectual knowledge. This is where human dignity lies.

Hundt also cites the reincarnation of God as another argument for the special role of the body. Jesus Christ came to earth in the physical form of a human being. God not only created man in his image, but also became man so that he, in turn, could become God.³⁷ Hundt thus uses God's incarnation to bring the special dignity of the human body to the fore. The underlying idea is that by studying his own body more intensively, man can better find out what intentions and characteristics God may have had and still has.

In contrast to the Albertist doctrine presented above, man can be located much further 'towards nature' from Hundt's Thomistic perspective. Not only the examination of his soul, but also that of the body thus help us to better understand God and thereby indirectly also the functioning of the world. It can be seen that Hundt's Thomistic understanding of the human body can be interpreted as a reading of the book of nature. This observation reminds of the important findings that James Bono made some years ago about the scientific changes of the sixteenth and seventeenth centuries. People began to interpret the biblical narratives in such a way that they understood nature as the word of God that could be read like a book (Bono 1995, esp. p. 72).

To make this plausible, Hundt adopted a seemingly strange hybrid position between medical, philosophical and theological literature in his *Anthropologium*. For example, in addition to the first chapter on human dignity in general, there are also accounts of the functioning of the digestive tract (Figure 1), the necessity of body hair, female menstruation and sweat. As we have seen, this is no coincidence, but fits precisely into this picture.

To a certain extent, the human being is thus more 'naturalised'. He is an 'image of nature'. Hundt's approach, which involves claiming that the image of man is to a certain extent an image of nature, is very clearly reflected in the interesting drawings of the human body that can be found in his text (Figure 1, Figure 2 and Figure 3).

5. Example: The Eye

In order to obtain a clearer idea of the extent to which the image of man in Magnus Hundt's Thomistic worldview is also an image of nature, a medical example will now be examined in more detail.

In chapter 33, Hundt discusses the eye and its parts (Hundt 1501, foll. H IVr–H IVv). According to Hundt, the main sources for his explanations were Galen, Averroes, Avicenna and Albertus Magnus. However, he also quotes directly from Aristotelian and pseudo-Aristotelian texts.

In characterising the eye, Hundt first states that it is the organ of sight. It is also watery and has a round surface. It is found on the upper front part of the head, consists of seven tissue layers and three fluids, and is moved by six muscles, one, two or three of which also support it (Figure 3).³⁸ This brief characterisation of the most important features of the eye is followed by a more detailed explanation of these points.³⁹

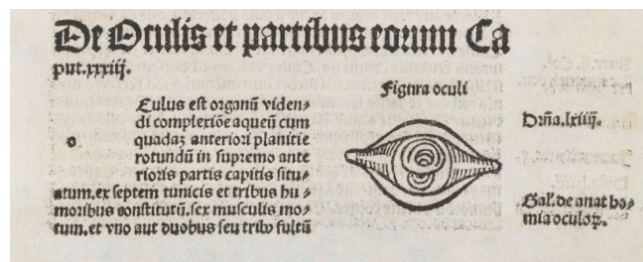


Figure 3. Hundt's illustration of an eye, beginning of chapter 33 (Hundt 1501, fol. H IVr).⁴⁰

For example, Hundt cites an interesting debate about the location of the eye. Avicenna and Galen supposed that the eyes were located in the upper part of the body, insofar as they can be compared to the guardians of a city. The head therefore has such an elevated position in the body because of the eyes. From this vantage point, it is possible to see particularly far and to recognise dangers from a distance.⁴¹ As should already be clear from the above-mentioned interpretation of man's upright posture as being oriented towards the heavens, Hundt himself does not necessarily accept this interpretation, instead citing a pseudo-Aristotelian text that claims the opposite, a position Hundt seemingly endorses, albeit without saying exactly what this opposite (oppositio) consists of.

In addition to other medical explanations, Hundt emphasises the parts of which the eye is composed. Essentially, the eye is made up of ten parts: three different aqueous parts and seven others. In addition to these main parts, there are other 'adjunctive' parts, which are in turn of two types: intrinsic and external. The adjunctive intrinsic parts are, for example, the optic nerves, veins, arteries and muscles. The external parts include the eyebrows, eyelashes, eyelids, eye sockets and lacrimal fluid.⁴²

A little later, Hundt describes the structure and functioning of the retina in great detail, incidentally noting that the word 'retina' comes from the fact that it looks like a net. One by one, the various functions that the retina fulfils are enumerated. The fourth tissue layer of the retina is the so-called 'aranea', on which colours and shapes are imprinted during sensory perception. This function of the retina is also the main goal of the visual process. Thus, the aranea layer of the retina is also the actual tool of the sense of sight.⁴³

Hundt also describes the diversity of eyes found in different people, including large, small and medium-sized eyes. What is certain, however, is that a person always has two eyes—just as the other sense organs are always present in duplicate.⁴⁴

In contrast to the ears, however, the eyes are directly adjacent to each other, so that the visual activity can be carried out more perfectly. This is why the optic nerves are crossed.⁴⁵ Hundt had previously described in great detail how exactly the optic nerves run from the retina to the brain and where the optical information is processed.

In addition to all these remarks, however, the chapter also deals with various other anatomical and psychological *topoi* about eyes that were part of the classical medical tradition. In humans, for example, the eyes would indicate the will of the heart and soul to a particular degree (Hundt 1501, fol. H Vv). Hundt also explains how the pupils move and how tears are formed. Finally, eye diseases and their treatment are discussed. The chapter also includes a small drawing of an eye, which makes it easier for the observer to better understand its different layers and muscles (Figure 3).

The eye thus serves as one of many examples that can be cited to illustrate Hundt's special interest in the human body. Here, too, the same applies as has already been mentioned above: The Renaissance, with its special interest in seeing, in light and thus also in the eye, probably also influenced Hundt's studies. Similar to the humanist Lorenzo Ghiberti's third commentary (Ghiberti 1986), which takes a closer look at optics and the functioning of the eye, Hundt demonstrates an affinity for this subject. However, the sources he consults to inform himself and his readers are primarily standard medical works of the Middle Ages. Avicenna's *Canon medicinae* (Avicenna 1902) should be mentioned first and foremost.

6. Conclusions

The question of how human beings understand their relationship to nature and other living beings is connected not least to the question of how they understand themselves. The image that humans have of themselves—the so-called 'image of man'—has frequently been the subject of controversy. As medieval as most of the sources of the *Anthropologium* are, what is shown here is a compilation of medical and philosophical knowledge that is quite fruitful for the debate of the 'image of man' and the northern Alpine history of ideas in general. It marks an important milestone for the transformation process into the modern era. Hundt's work not only helps to give a name to a discipline that was still unknown at

the time. He also contrasts knowledge about one part of natural creatures (that of humans) with knowledge about other natural creatures. He, thus, becomes, to a certain extent, the name and impulse giver of the discipline of anthropology.

In the Middle Ages, it was clear that the image of man always oscillated to some extent between his two essential parts, namely the physical and the mental. However, there was little agreement concerning the weight to be attached to these respective parts. Whereas some of Magnus Hundt's contemporaries focused primarily on the exquisiteness of the human soul when characterising man, Hundt points out that he was also created, at least in part, as a physical being. While he does concede a certain superiority to the soul, he also takes his insight into the importance of the body very seriously. In his *Anthropologium*, he examines the human body in extenso. This is the component of the human being that can be studied following the same standards as when studying the nature of other creatures.

The *Anthropologium* is, in fact, first and foremost a philosophical–medical treatise whose argument can certainly be interpreted as ascribing dignity not only to the soul of the human being, but also to every single organ in his body. Even though Hundt does not explicitly refer to this idea in every subsequent chapter, but rather speaks about dignity primarily in the first chapter, the reader is already given the impression from the beginning that the composition of the human body is not the product of pure chance. On the contrary, it was conceived with careful deliberation. Hundt thus makes clear right from the start that its physical components, such as the mass of the body, its upright posture, its composition out of the elements and so on, also point to its dignity and a certain resemblance to God. These should therefore also be understood as part of the image of man.

This paper has shown that Hundt's underlying Thomistic programme explains this unique approach to the human body. The Thomists of his time had a special interest in the human body, because they took Thomas Aquinas' statements on epistemology to mean that all knowledge—including knowledge of God and the world—is based on sensory experiences, which the intellectual component of the body needs in order to arrive at this knowledge. Sensory experience is, however, only possible if the soul has a body that can produce these experiences for it. This means, therefore, that its physical, natural component is very closely related to the soul. Man's relationship to the world and to God is only possible in virtue of his physical nature. Hundt also illustrates how flexible Thomism was. On the one hand, Thomism was able to incorporate the knowledge especially collected by Albertus Magnus and make it part of the Thomistic project. On the other hand, Thomists such as Hundt were capable of responding to the new needs and humanistic interests of the Renaissance, which had become popular at the time, both inside and outside universities. In both respects, the enormous potential of late medieval Thomism becomes clearer.

Moreover, God had chosen to come to Earth as a human. After all, Jesus Christ had appeared on Earth in human form. If one wishes to better understand God's intentions, the study of the human body helps reveal what was important to God. Learning more about the human body therefore also means understanding better God's intentions on Earth.

Finally, Hundt also captures this human nature in images, namely in the images of nature in which man represents himself as a natural being. From the eye to the digestive tract, Hundt's Thomistic worldview is revealed in the form of images: in a very special way, the image of man is also an image of nature.

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Conflicts of Interest: The authors declare no conflict of interest.

Notes

- ¹ For an ethnological and anthropological study that is also influential in the historical sciences, see Descola (2005).
- ² There is a certain terminological difficulty with the word ‘nature’ or its Latin equivalent ‘natura’ in the Middle Ages. In the texts of Hundt and his contemporaries, ‘natura’ is used to refer to the essence of a thing. Thus, ‘Homo est animal rationale’ was used to define the nature of man. In this context, the nature of man includes both his physical component, which he has in common with other living beings, and his intellectual component. Today, however, when we speak of the ‘natural side’ of man, we tend to mean his physical side. In this paper, the meaning oscillates somewhat between these two senses. However, I have tried to indicate as clearly as possible what is meant in each case.
- ³ See Buchwald (1920), for more information on Hundt’s life.
- ⁴ The original title of Hundt 1501 reads: ‘Antropologium de hominis dignitate, natura, et proprietatibus, de elementis, partibus, et membris humani corporis, de iuvementis nocumentis, accidentibus, vitiis, remediis, et physionomia ipsorum, de excrementis et exeuntibus, de spiritu humano eiusque natura, proprietatibus, et operibus, de anima humana et ipsius appendiciis’.
- ⁵ Reproduction from the Universitätsbibliothek Basel, Le VI 27.
- ⁶ Hundt 1501, fol. A IV^v: ‘Tametsi hominum natura multipliciter serva est [. . .] ex parte corporis [. . .] et ex parte animae [. . .] ipsa tamen post deum [. . .] cuncta excellit sua dignitate creata, quoniam non solum ad dei imaginem factus est homo, propter quem deus factus est homo, ut ipse rursus deus fieret.’
- ⁷ Hundt 1501, fol. B II^v: ‘Et haec est anima rationalis, quae cum corpore humano hominem constituit. Sic itaque solus homo est dei et universi totius nexus, caelestium et terrestrum unicum et nodus [. . .]’
- ⁸ Hundt 1501, fol. B III^v: ‘In hoc autem a deo differt, qui omnia facit in esse naturali, homo autem in esse artificiali, quod naturam imitatur’. Cf. Aristotle, *Physics*, 194a21–22.
- ⁹ These formulas are essentially printed marginalia of the ‘Anthropologium’. They are also mirrored at the beginning of the chapter, Hundt 1501, fol. A IV^v in the following formulation: ‘[Homo existit, K.E.] omnia ens, omnia continens, omnia cognoscens, potens et arte perficiens, ad quem omnia ordinantur, in quo omnia communicant, propter quem omnia facta sunt.’ For this, cf. also Haedke (1961, p. 37).
- ¹⁰ Hundt 1501, fol. B II^v: ‘[A]nima est omnia secundum species, quas in se habet, nam omnia sensibilia secundum sensum et intelligibilia secundum intellectum.’ Cf. Aristotle, *De anima*, 431b21. Hundt 1501, fol. B II^v therefore also speaks at this point of man being the measure of all things: ‘Homo est mensura omnium’.
- ¹¹ Hundt 1501, fol. B III^f: ‘Cognoscit [. . .] homo omnia sensibilia per sensum et spiritualia sive intelligibilia per intellectum abstrahendo species rerum, quae sunt in anima.’
- ¹² Hundt 1501, fol. B III^v: ‘Et manus est organum organorum, qua homo potest omnia materialia facere.’ Cf. Albertus Magnus (1916–20), lib. 21, tract. 1, cap. 1, vol. 2, p. 1324 and Aristotle, *De anima*, 432a1f.
- ¹³ Hundt 1501, fol. B III^v: ‘Natura autem da[t] homini membra, quibus potest omnia facere.’
- ¹⁴ Hundt 1501, fol. B II^v: ‘Ex hinc inferitur, quod homo continet omnia, quia [. . .] omnes creaturae mundi quodammodo inveniuntur in eo [. . .] inanimata secundum esse, vegetabilia ratione vegetationis, animalia quo ad sensum, spiritus et seperata quo ad intellectum.’ Cf. also Thomas de Aquino (1889), prima pars, q. 91, art. 1; p. 390f. which Hundt cites for this. On fol. B III^f it then reads: ‘Ex his liquet hominem omnia continere tanquam ex omnibus constitutum.’ The formulation that in man all things come together is similar in meaning to ‘in homo omnia communicat’ (Hundt 1501, fol. B IV^r). In this context, however, it is primarily a matter of the arrangement of the elements and humours in the creatures.
- ¹⁵ Hundt 1501, fol. A VI^r: ‘[Homo] mundus minor dicitur’. Cf. Hamesse (1974, p. 156, no. 206); Aristotle, *Physics*, 252b26f.
- ¹⁶ Hundt 1501, fol. B III^v: ‘Ad hominem praeterea omnia tendunt et ordinata sunt caelum et tota natura.’
- ¹⁷ Hundt 1501, fol. B III^v: ‘Tribus enim ordinibus universum ordinatur secundum Albertum in de homine in fine, scilicet in deum, in se et ad hominem. [. . .] Ad hominem autem, quia est finis omnium creaturarum, cui omnia subministrant, qui de omnibus participat, unde ad ipsum omnia ordinantur et tendunt.’ Cf. Albertus Magnus (2008), p. 595, ll. 4–35; cf. also Hundt 1501, fol. B II^v.
- ¹⁸ Hundt 1501, fol. B III^v-B IV^r: ‘Perfectiora enim sunt fines aliorum.’ Cf. Aristotle, *De partibus animalium*, 645a25–36.
- ¹⁹ Hundt 1501, fol. B III^v: ‘Sicut enim deus est finis optimi hominis, ita optimus homo est finis aliorum.’ Cf. Aristotle, *Nicomachean Ethics*, 1094a22–24, 1102a1–4, 1101b12–18; Aristotle, *Physics*, 194a29–33.
- ²⁰ Hundt 1501, fol. A IV^v: ‘Hominum natura serva est [. . .] ex parte corporis, quod multis et variis subiectum est necessitatibus et indigentis ob legis praevaricationem.’ For a contextualisation of the original sin and its implications, see (Hoenen 2023).
- ²¹ Reproduction from the Universitätsbibliothek Basel, Le VI 27.
- ²² Hundt 1501, fol. B V^v: ‘Homo est nobilissimum animatum [. . .] quoad figuram, quia habet erectissimum figuram tendentem ad caelum.’ Cf. Albertus Magnus (1916–20), lib. I tract. 2 cap. 26., vol. 1, p. 179.
- ²³ Hundt 1501, fol. A VI^r: ‘Hominis enim caput, in quo sunt virtutes intellectuales et animales, positum est supra totum corpus regimine et situ secundum creationem et situm mundi totius.’
- ²⁴ Hundt 1501, fol. A VI^r: ‘[Homo] mundus minor dicitur’. Cf. Hamesse (1974, p. 156, no. 206); Aristotle, *Physics*, 252b26f.

- 25 Hundt 1501, fol. B I^r: ‘Et quia homo superius sui corpori, quod est caput, versus superius mundi habet, et inferius versus mundi inferius, ideoque optime est dispositus secundum dispositionem totius mundi.’
- 26 Hundt 1501, fol. B III^r: ‘Et manus est organum organorum, quia homo potest omnia materialia facere, [. . .] Homo autem, quia inter omnia animalia intelligentiam habet et cognitionem in omnibus modis, fuit ei datum instrumentum, in quo conveniunt omnia instrumenta, dabantur igitur illi manus loco omnium, cum ita utatur eis loco modorum armorum. Et ideo lenis corpore et nudus nascitur, quia omnia sibi facere potest [. . .] Est praeterea manus signum, quod homo omnibus dominatur animatis, ut declarat Albertus in *De animalibus*.’ Hundt refers here, among others, to Galen, *De juvenientis membrorum*. Cf. Albertus Magnus (1916–20), lib. XIV tract. 2 cap. 2., vol. 2, p. 965f.
- 27 Hundt 1501, fol. I IV^v: ‘Manus signum intellectus et organum existens organorum, in quo omnia conveniunt instrumenta, [est, K.E.] a deo datum hominibus.’
- 28 Hundt 1501, fol. A VI^v-B I^r: ‘Solum igitur corpus humanum ad mundi ordinationem situatur erigendo caput sursum versus caelum, [. . .] quia locutio impediretur, quae est homini propria, si caput inclinatum haberet aut manuum usus ad diversa opera cessaret.’
- 29 Hundt 1501, fol. B V^v: ‘[H]omo est nobilissimum animatum [. . .] ratione quantitatis, quia diametri tres omne constituunt corpus perfectum, primo caeli, quare naturalius et perfectius erit corpus quod diametrorum naturalium mensuram participat. Diameter autem longitudinis mensurat a sursum in deorsum, et in solo homine idem est sursum, quod est sursum mundi, et idem deorsum, quod est deorsum mundi. Similiter est de latitudinis diametro, quia solus inter omnia animalia latum habet corpus secundum mensuram suae quantitatis latitudine proportionata, quamvis quidam vermes lati sint non tamen latitudinem habent longitudini proportionatam. Longitudo enim in corpore naturali semper debet vincere latitudinem, si non sit vitium naturae. Quadrupedia autem habent spissiora corpora quam lata. Homo etiam solus diametrum profunditatis minorem habet ceteris diametris.’ Santing (2020, p. 6), adds that there is a longer so-called ‘physico-philosophical’ tradition, in which philosophical and medical considerations are very closely connected. The hope was that some moral, economic or political insights about human beings could be gained from the study of physical characteristics.
- 30 Hundt 1501, fol. A VI^v: ‘Solum igitur corpus humanum ad mundi ordinationem situatur [. . .] gratia mixtionis perfectae.’ Cf. also foll. B I^r and B IV^r. Hundt 1501, fol. B IV^v: ‘Mixtum praeterea humanum corpus existit temperatissimum, quia deus donavit homini complexionem temperationem, quam in hoc mundo foret possibile invenire cum suarum virtutum, quibus agit aequidistantia’. In 1490, Hundt had published a pseudo-Thomastic text on the composition of the elements under the title ‘De mixtione elementorum’ (Hundt 1490).
- 31 Thomas de Aquino (1918), lib. 2, cap. 90, p. 549: ‘Complexio autem maxime aequalis est complexio corporis humani. Oportet igitur, si substantia intellectualis uniat alicui corpori mixto, quod illud sit eiusdem naturae cum corpore humano. Forma etiam eius esset eiusdem naturae cum anima humana, si esset substantia intellectualis. Non igitur esset differentia secundum speciem inter illud animal et hominem.’ Cf. Fitzpatrick (2017, chp. 3, fn. 89).
- 32 The soul as ruler in the body is discussed in Hundt 1501, fol. A VI^v: ‘Praeterea: sicut se habet in nave nauta, in curro auriga, in choreis choraula, in civitate lex, in agmine dux, ita deus in mundo et anima in corpore humano’. The ‘informatio’ is mentioned in Hundt 1501, fol. B IV^r: ‘constantiatio totius corporis cum anima, quae dici potest informatio’.
- 33 Thomas de Aquino (1889), prima pars, q. 91, art. 3, c.; p. 393: ‘Finis autem proximus humani corporis est anima rationalis et operationes ipsius: materia enim est propter formam, et instrumenta propter actiones agentis. Dico ergo quod Deus instituit corpus humanum in optima dispositione secundum convenientiam ad talem formam et ad tales operationes. Et si aliquis defectus in dispositione humani corporis esse videtur, considerandum est quod talis defectus sequitur ex necessitate materiae, ad ea quae requiruntur in corpore ut sit debita proportio ipsius ad animam et ad animae operationes.’
- 34 For the distinction between the schools in the 15th century, and especially between Albertism and Thomism, see (Hoenen 1993a, 1993b, 1996, 1997).
- 35 For another Thomistic reference, see Lambertus de Monte (1498, fol. 60^rb).
- 36 Hundt 1501, fol. A IV^v: ‘[N]atura hominum [. . .] serva est [. . .] ex parte animae, quae nuda sine specibus, habitibus et virtutibus creatur.’
- 37 Hundt 1501, fol. A IV^v: ‘[T]amen post deum, qui est prima omnium causa, [homo, K.E.] cuncta excellit sua dignitate creata, quoniam non solum ad dei imaginem factus est homo, propter quem deus factus est homo, ut ipse rursus deus fieret.’
- 38 Hundt 1501, fol. H IV^v: ‘Oculus est organum videndi complexione aqueum cum quadam anteriori planitie rotundum in supremo anterioris partis capitis situatum, ex septem tunicis et tribus humoribus constitutum, sex musculis motum, et uno aut duobus seu tribus fultum.’
- 39 With regard to the aqueous composition of the eye, Hundt refers, for example, to the Aristotelian text *De sensu et sensato*. Cf. Hamesse, p. 196, no. 9; Thomas de Aquino (1985), tr. 1, cap. 2, p. 22f.; Aristotle, *De sensu et sensato*, 438a12–14.
- 40 Reproduction from the Universitätsbibliothek Basel, Le VI 27.
- 41 Hundt 1501, fol. H IV^v: ‘Sursum locatur sicut custodes civitatis. Unde Avicenna et Galenus volunt caput esse creatum et elevatum propter oculos; cuius oppositum dictum est et patet ex *differentia XL*.’
- 42 Hundt 1501, fol. H IV^v: ‘Oculi partes sunt duplices: Essentiales, quae sunt constituents, quarum sunt decem, scilicet tres humores et septem particuli. Et coadiuvantes sive circumiacentes, quae sunt duplices, scilicet intrinsece et forinsice. Coadjuvantes

intrinsicae sunt nervi optici, vene, arterie, musculi, caro alba et piguedo. Extrinsece vero sunt supercilia, cilia et palpebre, orbita et lachrymalia.’

- 43 Hundt 1501, fol. H IV^v: ‘Quarta [sc. tunica, K.E.], quae dicitur aranea, oritur a prima posteriori, quae est ultimi puriditatis et luciditatis, quia colores et forme imprimuntur in ipsam. Unde ista tela est proprium visus instrumentum vel per se vel per adiutorium crystallini humoris.’
- 44 Hundt 1501, fol. H V^r: ‘Quantitas oculi diversificatur, nam quidam sunt magni, quidam parvi, quidam mediocres. Numerus est binarius sicut in aliis organis sensuum.’
- 45 Hundt 1501, fol. H V^r: ‘Situavit natura eos in homine propinquos ut perfectius perveniret ex eis videndi actus, propter eandem causam nervi optici cruciantur.’

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Article

Daniel Sennert's Corpuscularian Reforms to Natural Philosophy

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Abstract: Daniel Sennert (1572–1637), professor of medicine and natural philosophy in Wittenberg, defended a highly unusual philosophical system. This paper examines Sennert's vision of natural philosophy within the context of the rapidly changing environment of the seventeenth century and relates his philosophical innovations to his methodology. The main result is that Sennert's postulation of corpuscles with substantial forms, though it takes place within the framework of Aristotelian natural philosophy, directly influences his philosophical view of qualities.

Keywords: natural philosophy; seventeenth century; atomism; corpuscles; Aristotelianism

1. Introduction

At the time of his death in July 1637, Daniel Sennert had been serving as a physician in and around Wittenberg for more than 35 years. Like so many of his contemporaries, he died of the plague, to which he had often been exposed in his work. While he was also a practicing physician in his chosen home of Wittenberg (he had been born in Wrocław), to the rest of Europe he was better known as a scholar and professor. At the university of Wittenberg, he taught the higher-level courses in medicine, but also more general classes in natural philosophy. Many of his published works reflect his teaching duties in so far as each of them contains a systematic account of a single discipline, starting from the most general principles. The *Institutiones medicinae*, for example, do this for theoretical medicine. Sennert also wrote works on controversial topics directed at a more critical and international audience, of which the late *Hypomnemata physica* (*Physical Memories*) is the clearest example. His work earned him lasting renown in both medicine and natural philosophy, as evidenced by the fact that his collected works were printed four times between 1641 and 1676 (almost 40 years after his death), in Paris, Venice, and Lyon. The works mentioned can be found in volumes one and two of (Sennert 1676). Sennert was also influential on one of the most famous philosophers and scientists of the late seventeenth century, Robert Boyle, and his conception of ensouled atoms was at least an indirect inspiration for Gottfried Wilhelm Leibniz. On the connection to Boyle, see (Clericuzio 2000, p. 77; Newman 1996; 2006, pp. 157–75). On Sennert and Leibniz, see (Arthur 2018, p. 113); an explicit reference to Sennert by Leibniz can be found in a letter to Thomasius, in (Leibniz 1875, vol. I, p. 15).

The biography printed in the frontmatter of Sennert's collected works gives an impression of his daily occupations and the circumstances of his passing. In terms of academic achievements, the text notes especially that Sennert was awarded a degree in medicine in 1601 and that he was the first to introduce the discipline of *chymia* to Wittenberg. Otherwise, his activities as a physician are emphasized above his duties as a lecturer and researcher: The biographer reports that between 1602 and 1637, Wittenberg and surroundings had been ravaged by the plague at least seven times. Sennert's death at the age of 55 on July 21 was quick and unexpected, a fact that only reinforces to what great danger he had been exposing himself in the intervening years, during which he never moved a foot from the observance of his duties. The Latin reads as follows: "[...] pro Licentia disputavit, die 3. Julii, anno 1601 & anno eodem 10. Septembris cum iis gradu Doctoris a Collegio Medico ibidem ornatus

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fuit. [...] Chymiam primus in Academiam Wittenbergensem introduxit [...] Quantum periculi, peste septies, imo saepius Wittebergae & in vicinis locis, ab anno 1602, usque ad diem mortis, satis vehementer grassante, necnon aliis serpentibus crebro contagiosis morbis sustinuerit, obitus ejus insperatus simul atque celer denique testatur. Quibus tamen temporibus ipse nunquam pedem loco moverit: utut sui juris undiquaque, minimeque obstrictus fuit. [...] At vero noster hic diem suum obiit, & in Christo placide acquievit die 21. Juli, anno 1637 quo ipso tempore etiam suis contagium vehementer grassabatur, & ipsum mors haec peremit, rebusque humanis exemit, aetatis suae 55" (Sennert 1676, pp. 10*b–11*a). For a more detailed biography, see (Lüthy and Newman 2000, pp. 262–66).

In this essay, I am mostly interested in one among Sennert's interconnected personas, that of the natural philosopher. I believe that the flexibility and staying power of that early modern intellectual discipline are well demonstrated by the reforms Sennert undertakes within it. I hope to show two things: The first is that though Sennert was a genuinely innovative thinker, scientist, and natural philosopher, his innovations are built upon a deep appreciation and knowledge of the Aristotelian tradition. The second is that Sennert played a part in reforming both the methodology and the content of natural philosophy, and that these two aspects are intimately connected. Methodologically, Sennert's most important contribution lies in furthering the integration of empirical evidence from chemistry and biology into the highly theoretical discipline of natural philosophy. As we shall see in more detail below, this integration of the empirical into the theoretical is made possible by a very unusual conjunction of claims in Sennert's philosophy, in particular in his matter theory. In short, it is a combination of the Aristotelian theory of the substantial form with the ideas of atomism, producing atoms with substantial forms. What is more, even though Sennert is challenging fundamental notions of Aristotelian philosophy, the problems he is engaged in solving had long been discussed by Aristotelian scholastics.

I begin from the methodological side, by describing how Sennert fits into the landscape of natural philosophy in his time and place. As will become apparent, he was a typical natural philosopher in many ways, though of a certain type: An Aristotelian scholastic natural philosopher and professor of medicine, working in a Lutheran context. I then move on to explain the various non-Aristotelian visions of natural philosophy that were current in early seventeenth-century Europe and that influenced Sennert. This leads into a discussion of one of the main points of opposition between Aristotelians and atomists, namely the constitution of the so-called mixed bodies from the four elements. With the benefit of all this context, I am then able to explain why Sennert's matter theory is at once very innovative and rooted in Aristotelian tradition.

2. Sennert's Natural Philosophy in Context

The division of his collected works may give an indication of Sennert's interests: Of the six tomes that comprise the *Opera omnia* published in Lyon in 1676, only the first one deals with natural philosophy in the narrow sense. Volume two contains two works on theoretical medicine, while the entirety of volumes three to six is taken up by treatises on practical medicine (the monumental *Medicina practica*, together with shorter works on particular diseases like the plague and arthritis). As this division suggests, the topics treated in the first volume (which on its own is 300 folio-sized pages thick) are both introductory and fundamental: They give Sennert's audience, i.e., the medical students of Wittenberg, a framework within which to situate the medical knowledge that was the objective of their studies. At the same time, Sennert also directs these more general works in natural philosophy at his international audience. This double character is particularly evident in the *Epitome naturalis scientiae*, which began its life as a series of student disputations supervised by Sennert in the academic year 1599/1600: This "proto-*Epitome*" (Newman 2006, p. 87) was then revised multiple times and extended into a full-length course in natural philosophy, dedicated to principal physician to the king of Bohemia, Severino Schato of Schattenthal. In the preface to the reader, Sennert describes the book as "that juvenile work"—"laborem hunc juvenilem", a set of student exercises held "almost twenty

years ago”—“ante annos quasi viginti”, which he has now edited and made available to the public after correcting some of its errors (Sennert 1618, pp. 10*–11*). In fact, the revisions between the first two editions are substantial, since the edition of 1618 introduces the textbook structure that subsequent editions follow. Two further editions of the *Epitome* were published during Sennert’s lifetime: One in 1624 and one in 1633. In both of these, the dedication and preface from 1618, as well as the concluding paragraphs at the very end of the work, were reprinted without comment, but Sennert did make some revisions and additions to the main text with each edition. The most complete overview of Sennert’s writings and their chronology is given by (Lüthy and Newman 2000; cf. also Michael 2001, p. 339). A comprehensive comparison of all the changes between the various editions of the *Epitome* does not yet exist.

In the editions from 1618 onwards, the first chapters of the *Epitome* examine the nature of philosophy in general and of natural philosophy in particular. This is followed by sections on the philosophical concepts that are needed to grasp the natural world: The Aristotelian principles of form and matter, quality and quantity, space, time, and motion. The subsequent books and chapters after these preliminaries consist in a systematic account of all natural bodies. The text is structured on the basis of two fundamental distinctions, namely those between simple and composite bodies, on the one hand, and between living and non-living things, on the other. Simple bodies are either the four elements or the celestial bodies, so these two categories are treated first. All non-celestial bodies are composed of the four elements, so the treatment of these composites is further divided into sections on non-living and on living things. The non-living bodies include *meteora*, i.e., phenomena taking place between the surface of the earth and the moon, and minerals, gems, and metals below the earth. Having treated all of these bodies, Sennert then spends the second half of the *Epitome* discussing animated things, that is, plants, animals, and humans. He moves through these three realms in ascending order from the simplest organisms (mosses and mushrooms, in his opinion) to the most complex ones (humans). In between, he has occasion to discuss such details as the distinction between cabbages and sorrel, the formation of butterflies, and the existence of basilisks (Sennert 1676, vol. I, pp. 3, 66, and 80). Since the three types of living things are distinguished by the kinds of souls they have, Sennert begins each section with an introduction on the specific soul in question: The section on plants is prefaced by a discussion of the vegetative soul, that on animals with one on the sensitive soul, and the section on humans begins with a short treatise on the rational soul. Overall, therefore, Sennert’s introduction to natural philosophy begins with a brief look at the very top of the Great Chain of Being, the celestial bodies, but then proceeds methodically from the bottom up, from the most basic and ignoble types of body to the human rational soul.

The vision of natural philosophy expressed in the structure of the *Epitome* is not unusual for the time and place in which it was written. In medieval and Renaissance Europe, the men who wrote about nature *ex professo* were scholastic Aristotelian natural philosophers, meaning that they worked in the context of the medieval university, used textbooks based on Aristotle’s writings to structure their teaching and research, and viewed their investigation into nature as a *scientia* producing universal necessary truths. Strictly speaking, the natural philosopher is only occupied with one half of a proper Aristotelian investigation of nature, namely the causal structure of the world. It is accompanied by natural history, which is tasked with establishing what things actually exist (Pliny the Elder being the most important reference for natural history).

In theory, the subject matter of natural philosophy encompasses absolutely everything and is designed to provide a complete map of the physical universe: everything that there is (or can be) has its place in the system and can be assigned a specific set of powers and properties that make its relations to other created things transparent. From a modern perspective, however, natural philosophy in its scholastic Aristotelian form provides a rather limited image of nature, despite its pretension to universal necessary knowledge. Firstly, its objects are almost exclusively located within relatively close proximity to human

experience, and the phenomena that natural philosophy is set up to explain are roughly identical to those that can be observed with the unaided senses. As a consequence, the celestial or superlunar realm (i.e., everything above the moon) was taken to be so perfect and regular that its associated science, astronomy, was seen as a branch of mathematics. The second way in which Aristotelian science is limited, as has often been noted, is that there is an anthropomorphic stamp on it: The distinction between the unchanging, perfect heavens and the changing realm below the moon is linked to a cosmology that puts humans at the literal center of the universe. Living beings and humans in particular are also the paradigmatic subject of scientific investigation for Aristotle. This last aspect is apparent from the fact that the teleological structure of human and animal behavior is part of the basic and most general scheme for understanding all of nature, since explaining a physical process according to the standards of Aristotelian natural philosophy includes giving a so-called final cause, i.e., an account of the aims for which that process occurs (Dear 2019, pp. 24–30).

This worldview was almost universally accepted in the medieval university, and it was still pervasive enough in 1632 for Galileo Galilei to spoof it in the person of Simplicius in his *Dialogo*. For example, this is how Simplicius introduces the natural motions upward and downward, ridiculously using unnecessary Latin phrases without actually explaining anything: “Now who is there so blind as not to see that earthy and watery parts, as heavy things, move naturally downward—that is to say toward the center of the universe, assigned by nature itself as the end and terminus of straight motion *deorsum*? Who does not likewise see fire and air move directly upward toward the arc of the moon’s orbit, as the natural end of motion *sursum*? This being so obviously seen, and it being certain that *eadem est ratio totius et partium*, why should he not call it a true and evident proposition that the natural motion of earth is straight motion *ad medium*, and that of fire, straight *a medio*?” (Galilei 1967, p. 32; 1890, vol. VII, p. 57).

When, how, why and with what this worldview was replaced are some of the most debated questions in the history of philosophy and science. One way to capture the long-term development of early modern thinking about nature is to view it as a shift in the professional personas involved. Under that perspective, it is a shift from the scholastic Aristotelian natural philosophy as practiced in the medieval universities to norms of education and research within which one can be a distinguished natural scientist without being a philosopher, and vice versa. Though there is still much overlap between these personas even in the eighteenth and early nineteenth century, eventually, Aristotelianism in particular and even natural philosophy in general fell from the status of unquestioned orthodoxy to that of relics. By about 1750, few philosophers and scientists of any note were either scholastics or Aristotelians or natural philosophers, at least not in the same sense. Aristotelianism as a scheme for education was kept for much longer in some places, for example at the *Academia Juliana* in Helmstedt.

In the interim period, however, some of the most important contributions to natural philosophy continued to be made by authors who retained part of the characteristics of medieval science, that is, they either still based themselves substantially on Aristotle’s writings, still worked in universities, or still followed a deductive model for natural philosophy undivorced from experimental science. Throughout the seventeenth century, and especially in its earlier decades, some of the most successful new approaches to nature let go of only one or two of the three ideas that seem so closely entwined in medieval science. In particular, the mounting critique of Aristotelianism did by no means always carry with it an attack on the discipline of natural philosophy itself. One notable example is provided by Descartes and his followers. Descartes himself, despite his opposition to Aristotelianism in many questions of philosophy and methodology, conceptualizes the aspiration of natural philosophy in a way with which Aristotle would not have disagreed: The ultimate aim is to give deductions of the causal structure of the natural world, endowed with metaphysical necessity. Not all Cartesians followed Descartes in this: When Christiaan Huygens and Jacques Rohault prepared their respective systems in the 1660s, for instance,

they chose to conceptualize the principles of physics, which Descartes had wanted to prove as necessarily true, as mere hypotheses. But others, like Pierre-Sylvain Régis, carried on the metaphysical ambition for natural philosophy (Dear 2019, pp. 151–58). One clear example of the “deductive” type of Cartesianism is (du Roure 1654; cf. Schmaltz 2018, p. 580). Cartesianism also illustrates another fact about philosophical innovation in the seventeenth century, namely that it did not always take place outside the university. Among other things, Cartesianism is a movement toward new standards of university education; for some time, there even existed such a thing as a Cartesian scholastic. See (Cellamare and Mantovani 2022) for a number of contributions to the interactions between Cartesian philosophy and teaching institutions. For the Dutch reception of Descartes, see (van Bunge 2001, chp. 2) and (Verbeek 1992). At the same time, the existing scholastic traditions continued to produce diverse and influential works, as evidenced by the current flourishing of studies of post-medieval scholasticism—see e.g., (Dvořák and Schmutz 2019).

In other words, the developments of the seventeenth century, while they certainly constituted a deep transformation of natural philosophy, were not its abolition. Especially in the earlier parts of that transformation, there was a dizzying amount of variety, a proliferation of competing, incompatible models for how natural philosophy should be conducted. Many of these new models were not based on Aristotle’s writings in the same way as it had been standard at the medieval university, though the influence of Aristotle’s writings on higher education of all kinds was still great. On an institutional level, some (but not all) of the most influential new models were formulated by writers outside the universities. On the whole, the development was a widening of the spectrum: Non-Aristotelian, non-scholastic natural philosophies were introduced, without replacing the previously existing ones.

3. Aristotelian and Paracelsian Matter Theory

What is Sennert’s place within the widening spectrum of natural philosophy at the beginning of the seventeenth century? In some respects, he would seem to be closer to the medieval scholastics than to Galileo. Firstly, he is a scholastic, simply in virtue of his position as a professor of medicine at a Lutheran university: The city of Wittenberg was a center of the Lutheran scholasticism introduced by Philipp Melanchthon. Despite some changes in the organization of the universities, the textbooks and the curricula in the sixteenth century, many of the teaching methods, disciplinary boundaries and foundational texts remained the same as in previous centuries (Wisse et al. 2010; Omodeo and Wels 2019; see also Omodeo 2023). Furthermore, as we have seen, even a cursory look at the table of contents of Sennert’s *Epitome naturalis scientiae* shows that he is also an Aristotelian philosopher, with the basic metaphysical and methodological assumptions this entails. Mary Patricia Reif’s study of seventeenth-century scholasticism still provides a good overview of a reasonable selection of the most influential natural philosophy textbooks, among which she also counts Sennert’s *Epitome* (Reif 1969).

At the same time, however, Sennert also defends some opinions that are in conflict with those of both the historical Aristotle and the major currents of scholastic philosophy. If the structure, content, and style of the *Epitome* reflect Sennert at his most scholastic, this is much less so with the other two larger treatises contained in the first volume of the *Collected Works*, namely the *On the Consensus and Dissensus of the Chymists with the Aristotelians and the Galenists* (*De chymicorum cum Aristotelicis et cum Galenicis consensu ac dissensu*) and the previously mentioned *Physical Memories* (Sennert 1619, 1636). The former examines questions at the boundaries of natural philosophy, chymistry and medicine, while the latter is a collection of essays on controversial questions and first appeared only in 1636, one year before the author’s death. It is these two works that have found the most attention on the part of modern scholars, because in them Sennert explains and defends two of his most intriguing and unconventional positions. The first of these dominated his reception in the twentieth century: He defends the existence of atoms. This would seem to be at odds with his Aristotelianism since Aristotle himself was in opposition to the ancient atomists in

multiple ways. Studies in the last two decades have accomplished much to explain why from Sennert's perspective, including atoms in a broadly Aristotelian view of nature, is not only possible but also very useful. Since the fundamental work of Kurd Lasswitz, who introduced Sennert and a number of other early modern authors to modern scholarship at the end of the nineteenth century, one thing that has been clear is that the kind of atomism one finds in the early moderns is not a simple revival of the positions of the ancient atomists (Lasswitz [1890] 1984, vol. I, pp. 436–54). In addition to ever closer examinations of Sennert's works, progress on the path indicated by Lasswitz has been enabled by growing understanding of the intellectual currents that were united in early modern neo-atomism or corpuscularianism generally and in Sennert's context specifically. These currents naturally include developments within Aristotelian natural philosophy but also a wide variety of other influences. Important studies of Sennert in the context of the history of atomism are (Gregory 1966; Clericuzio 2000, pp. 9–33; Lüthy 2005). Emily Michael has shown that the central philosophical condition that enables Sennert to formulate his synthesis of atoms and substantial forms has antecedents in scholastic natural philosophy (Michael 1997, 2001). William Newman has contributed more than anyone to situate Sennert in the history of chemistry and alchemy (Lüthy and Newman 2000; Newman 2001, 2006, 2012). Newman was also the one to introduce the terms “chymical” and “chymistry” to refer to early modern chemistry and alchemy without distinction, since the actors generally do not draw one either (Newman and Principe 1998). For a confrontation of Sennert's matter theory with those of contemporary Paracelsians, as well as an appreciation of Sennert's impact on eighteenth-century chemistry, see (Klein 2014).

A number of scholars with an interest in the history of medicine have shown that there is a second question on which Sennert is both innovative and influential, namely that of the origin of life. What is more, recent research has shown that the two issues that are closest to Sennert's heart as a philosopher, corpuscular explanations and the living body, are connected: On the one hand, he leverages his moving corpuscles to solve difficult questions about the origin of animal and human souls; on the other, his account of the structure of the fundamental corpuscles is itself modeled on that of living beings. The influence between Sennert's corpuscularianism and his views on questions in the life sciences therefore runs in both directions. On Sennert's theory of life and the role of corpuscles therein, see especially (Hirai 2012) and (Blank 2011a) and, with a stronger emphasis on medical theory in the narrow sense, (Moreau 2018). (Arthur 2006) and (Blank 2011b) connect Sennert's theory of the living body with that of Leibniz. (Nejeschleba 2015) is a study of the views of Sennert and his teacher Joachim Jungius on the concept of sympathy, which has its origin in medical theories. For a combination of the medical perspective with a discussion of the possible confessional motivation, see (Stolberg 1993, 2003), and (Hirai 2021) for a discussion of the accusations of heresy leveled against Sennert by Johannes Freitag of Groningen.

Sennert's defense of atoms is closely linked to the way in which he integrated chemical theory and experimentation into his natural philosophy. The early modern science or art of alchemy was created in the intellectual environment of the Paracelsians. An essential feature of these theories is that they posit what they call the *tria prima* of Sulphur, Salt, and Mercury. According to the Paracelsians, it was these three substances, and not the four elements fire, air, water, and earth, that were the fundamental building blocks of the corporeal world. They used these blocks in descriptions of experiments and early laboratory equipment. The Paracelsian approach is an analytic one, in the sense that they aim to explain features and powers of bodies exclusively in virtue of their parts. Paracelsus' own term for this process is *spagyria*, division. This method would seem to be diametrically opposed to that of the Aristotelians, who tend to explain bodily properties “top-down” as springing from the substantial form of the whole body. In historical fact, however, the opposition was never as sharp as that since there is also a tradition of alchemy in scholastic circles. This tradition has its roots in the writings of the philosopher himself. Aristotle had been almost universally hostile to atomism, but there is one exception: In the fourth book of his *Meteorology*, he leans far more closely to corpuscular explanations. These remarks

and others by Aristotle allowed scholastics that were interested in the transformation of materials to discuss and endorse views that came close to atomism, while still claiming their allegiance to Aristotle. On the *Meteorology IV* tradition, see (Martin 2023, pp. 89–90). An influential text in this regard is the *Summa perfectionis*, an alchemical treatise that was ascribed to the semi-mythical Arab author Geber, but which was probably composed by the late thirteenth-century Franciscan Paul of Taranto (Newman 2006, p. 26). By the late sixteenth century, there were an increasing number of authors inside and outside the university who used small particles to explain the natural world and who relied on some combination of genuine Aristotelian sources, the traditions of pseudo-Geber and Paracelsus, and appeals to other schools of antiquity that had become increasingly accessible during the fifteenth and sixteenth centuries. Even when they appealed to the authority of Democritus and other ancient atomists, these early modern neo-atomists tended not to postulate atoms in the literal sense of absolutely indivisible smallest bodies. Rather, their particles or corpuscles were simply not actually divided in the normal course of nature, though they were divisible in principle.

Although a corpuscularian current existed within Aristotelian philosophy, (neo-)atomism was still perceived as a dangerous doctrine in many places. It was controversial enough to be officially condemned in 1624 in Paris, after a group around Étienne de Clave planned a public disputation of some atomist theses—for a summary of these events, see (Meinel 1988, p. 69). Conversely, many of the writers who called themselves atomists also were in conscious opposition to Aristotelianism. In 1621, for example, Sébastien Basson published a work in Geneva that was entitled *Twelve Books of Natural Philosophy, in which Aristotle's philosophy is refuted with solid reasons and the hidden wisdom of the ancients is restored* (Basson 1621). Basson tried his very best to burn all the bridges with Aristotle, and the core of the ancient doctrine that he strove to resurrect was a type of atomism: the belief that all physical changes come about through the separation and re-combination of indivisible particles.

Sennert's first public defense of atoms is in *De chymicorum* (Sennert 1619), and in later works he revised his account multiple times to make it as coherent as possible with Aristotle. More precisely, he distinguished two types of atoms, a primary tier corresponding to the four elements and a secondary one corresponding to the *tria prima* of the Paracelsians: "The use, therefore, of the chymical principles is that out of them, as if from proximate and proper principles, those properties of the mixed bodies can be deduced and demonstrated that cannot be directly demonstrated from the elements, as is particularly clear in the search for the properties of medicines"—"Usus igitur principiorum Chymicorum est, ut ex iis tanquam proximis & propriis principiis proprietates, quae corporibus mistis insunt, & ex elementis proxime demonstrari non possunt, deducantur, & demonstrantur, ut praecipue in proprietatibus medicamentorum inquirendis patet." (Sennert 1619, p. 298).

In contrast to Paracelsus and his followers, therefore, Sennert denied that Sulphur, Salt, and Mercury are the basic sorts of bodies in the physical world, even though he used them as a tool for describing chymical processes. In short, he integrated Paracelsian natural philosophy into the Aristotelian framework in a more coherent way than had been achieved before. Despite the existence of scholastic corpuscular theories in the traditions based on *Meteorology IV*, this was an ambitious project, which necessitated changes to the fundamentals of Aristotelian matter theory. As I shall argue in the concluding sections of this paper, one of the reasons why Sennert fulfills this ambition so successfully is that he not merely found a place for chymical evidence and arguments within Aristotelian natural philosophy, but that his matter theory solved a problem that had been present in scholastic matter theory, but which had always seemed unsolvable. The problem is the origin of the secondary qualities in so-called mixed bodies, which I shall use the next section to introduce.

4. The Problem of *Mixtio*

Aristotle's philosophical explanation of nature is very much a philosophy of common sense, and that extends to Aristotelian scholastic philosophy. The main goal is to give explanations of the properties and behaviors of the things we see around us in the everyday world: Animals, plants, people, materials like sand or gold or wood, water, ships, beds. Most of the things I have just listed would be regarded as *substances* by Aristotle, the basic ontological unit of his system. The most important tool for explaining these substances is the so-called substantial form, an inner principle that gives substances their properties and powers. The substantial forms of living things are their souls. For example, the walnut tree has a vegetative soul that makes it grow into a specific shape, with leaves and bark that are different from the leaves and bark of an oak tree. Among the powers that an individual receives from its substantial form is the power to procreate: a walnut tree produces nuts from which a new tree can grow, just as complex as the previous one.

Substances that are not alive, like a piece of silver or gold, do not have a soul, but they still have a substantial form. In the case of gold, its color, its weight, its resistance to rust, and all the other qualities that distinguish it from silver and from other metals result from the substantial form of gold. The simplest and most fundamental bodies, however, are the four elements fire, air, water, and earth. Each piece of one of the four elements is a substance, resulting from the union of the appropriate substantial form with matter. All other bodies, even such complex ones as the gold piece and the walnut tree, are composite in the sense that they contain these four elements in a certain proportion, and no material parts besides them. But the four elements are not atoms or particles, and gold is not an arrangement of minute particles. One might think that if one only had a microscope strong enough, or as Aristotle puts it, if one had the eyes of the mythical hero Lynceus, one would see that there is no distinct type of stuff "gold", but that what seems to us to be simply gold is really just particles of fire air water and earth (*On Generation and Corruption I*, 10, 328a15). The ancient atomists had suggested just such a solution, but Aristotle had insisted that if a true mixture had occurred, the resulting body must be homogeneous: no matter how good one's eyes might be, one will never find anything but gold in a piece of gold. The four elements are contained in it somehow in a fixed proportion, but they do not exist as separate entities anymore; they have been transformed into something new entirely, namely gold. Strange as this theory might seem today, it reflects a type of process that we encounter often in everyday life: wheat flour and water are quite different substances, one being a whiteish powder, the other a clear liquid. When both are mixed together, however, the resulting dough has entirely different properties from those of the two ingredients: it is neither a liquid nor a powder, but an elastic mass. What is more, it is quite impossible to regain either water or flour from the dough. The scholastic Latin term for this phenomenon is *mixtio*, though its meaning corresponds more closely to a chemical bond than to the meaning of the word "mixture" in modern English.

Scholastic Aristotelians differed in how exactly they explained this process. The main theoretical problem is this: do the substantial forms of the elements remain in the mixt? On the one hand, the homogeneity of the *mixtum* would seem to require that there is only one single substantial form present, which produces (for example) the color, weight, and relative softness of a piece of gold. On the other hand, for the dictum that the four elements are the fundamental ingredients of all bodies to have any foundation, the properties of the *mixtum* must also have some relation to the proportion of the four elements contained in it. The general shape of the scholastic solution is that though the elements themselves (that is to say, their substantial forms) are either destroyed or assimilated when the *mixtum* comes into being, their qualities are still the foundation of the qualities of the *mixtum*. In this way, the scholastic theories of mixture and of qualities are directly linked, which is why Sennert's postulation of atoms with substantial forms has such an immediate impact on the conception of qualities.

The basic distinction in this context is that between primary and secondary qualities. The primary qualities are the following: hot, cold, wet, and dry. Each of the four elements

was taken to have two of these four primary qualities in extreme form. The substantial form of fire, for example, produces the accidental forms of heat and dryness. The reason why a mixed body is hot, cold, dry, or wet, naturally, is that it contains one of the corresponding elements. But many or most of the remaining qualities encountered in mixts were also taken to depend on the primary ones. Which qualities exactly should be counted as secondary was a question of debate among scholastics. A minimal list includes the other “tactile” qualities given by Aristotle at *De Generatione et Corruptione* II, 22, 329b20: hard, soft, viscous, brittle, rough, coarse, fine, as well as the sensible qualities of color, smell, and taste (Pasnau 2011, p. 463). The yellowish color of gold, for example, is due to a certain proportion of the four elements. The secondary qualities are not identified with the corresponding proportion of primary ones, however: both are regarded as separate entities, even if there is a relation of dependency between them. Specifically, two relations were generally accepted by scholastics to hold between primary and secondary qualities. The first is *supervenience*—whenever a body changes one of its secondary qualities, for example when it is brittle at first and then becomes soft, there must also be a corresponding change in the primary qualities. Secondly, any causal power that a body possesses, it has in virtue of its specific mix of primary qualities. The supervenience thesis is, for example, endorsed by Caesare Cremonini, professor in Padua: “It is to be understood that nothing can change without a mutation in the qualities [of the elements]”—“intelligendum est nihil posse alterari nisi harum qualitatum [elementarum] mutatione. Naturaliter enim quicquid alteratur per aliquam mutationem in his qualitibus alteratur” (Cremonini 1605, sect. III, chp. 9, p. 150). The causal primacy of the primary qualities is stated among others by Albert the Great: it “is in virtue of [the primary qualities] that whatever acts acts and whatever is acted on is acted on.”—“[.] virtute earum agit quod agit, & patitur quod patitur.” *De Praed.* 5.6, in (Albertus Magnus 1651, vol. I, p. 162a). For a lucid summary of these issues, see (Pasnau 2011, pp. 461–66).

This doctrine ascribes enormous explanatory weight to a simple quantitative relationship between the four hypothetical primary qualities and the open-ended list of secondary ones. Despite this, such quantitative theories were never spelled out, simply because any concrete articulation of this very general theory would have immediately been open to any number of objections and counter-examples. To account for the quality of brittleness, for instance, one would need to decide on a fixed proportion of cold, wet, dry, and moist that constitutes brittleness. This then implies that if the nature of a given body includes the four primary qualities in that specific proportion, it must be brittle. The problem is that the changing variety of physical reality is too complex to be expressed by a fixed relation of four numbers. To stay with the example, various brittle things may have little else in common: heavy stones and metals, relatively light wood, ice. If one assumes a common proportion of the four primary qualities in all of these materials in order to account for all of them being brittle, one thereby restricts the range of possible explanations for their differences in weight, color, and temperature. Any explanation of these further properties places additional restrictions on the proportions of the four elements that characterize each material (that stones sink in water, e.g., implies that they contain a large amount of the element earth and relatively little air and fire). One is bound to run into a property that contradicts the hypothesized proportions eventually, at the latest when one attempts to derive complex properties such as colors, tastes, and odors. Despite such difficulties, as described above, the great majority of scholastics up until Sennert’s time held on to the principle that the secondary qualities depend on the primary ones. What was generally agreed on, however, were only the general principles of supervenience and causal priority, and not any concrete derivations of specific secondary qualities.

5. The Development of Sennert’s Matter Theory

Sennert, for his part, was not only aware of the problems surrounding the relation of primary and secondary qualities, but he was also actively working to solve them. This is apparent, among other places, in the *De Chymicorum* of 1619, the book in which he

publicly endorsed the existence of atoms for the first time. In that work, he explicitly denied the derivation of the secondary qualities from the primary ones: “And although many have tried to prove that colors, odors and tastes come from the elements, they have done so in vain, as has already been demonstrated by the most learned philosophers and physicians.”—“Et licet nonnulli monstrare conati sunt, colores, odores, sapes, ab elementis provenire: irritum tamen conatu id fecerunt, ut a doctissimis Philosophis & Medicis jam demonstratum est.” (Sennert 1619, p. 283). This passage is one of the proofs adduced by Sennert for the existence of material principles distinct from the elements, i.e., what he was later to call secondary atoms. He first argued that whenever a multitude of things have a common property, that property must come about “through some common principle”—“per commune quoddam principium.” (ibid.) The conclusion, i.e., the need for corpuscles as the source of secondary qualities, then follows from the passage quoted. Sennert’s atoms are therefore closely associated with the qualities of bodies. However, as I shall argue, Sennert’s account of 1619, despite its advantages for the explanation of qualitative processes, did not contain a clear or satisfactory account of qualities themselves, precisely because he had not yet completely integrated the atoms into the Aristotelian framework of form and matter.

What are the “chymical principles” or atoms postulated by Sennert in 1619? Each of these particle types corresponds to one of the Paracelsian *tria prima* Salt, Sulphur, and Mercury, but whereas the Paracelsian principles are immaterial, Sennert’s atoms are material. They are also indivisible in the sense that no natural process or human intervention is able to divide them. As Newman in particular has shown, when Sennert came to his atomist position gradually over the course of the 1610s, it was in large part under the influence of writers interested in empirical questions of chymistry (Newman 2006, p. 124; see also Lüthy 2005).

As Newman and others have also argued, Sennert’s best arguments for his quasi-Paracelsian corpuscles made use of empirical knowledge, specifically of a chemical experiment using simple acids. As had been known for some time, it is possible to dissolve silver in *aqua regis* (nitric acid), so that it is completely invisible in the resulting liquid. It is then possible to regain the pure silver from the solution by adding a catalyst. If the dissolution of the silver in the acid were a matter of one substantial form being replaced by the other, the second part of the experiment ought to be impossible since the substantial form of silver would be destroyed by the dissolution. It would be like regaining the flour from the baked bread. Sennert used this to argue that the form of silver is not destroyed and rather remains hidden in the solution, which is only possible if there are persistent material parts to carry it (Sennert 1619, p. 362). The Paracelsian movement as a possible influence on Sennert is already alluded to in (Lasswitz [1890] 1984, vol. I, p. 441). The acid experiments are discussed in (Meinel 1988, p. 94), and the arguments are reconstructed in detail in (Newman 2006, pp. 99, 112).

There is another contrast between Sennert’s atoms and the Paracelsian principles, however: while the purpose of the original *tria prima* was to replace the four elements as the fundamental principles of material bodies, Sennert postulates his chymical principles in addition to the four elements: “Furthermore, the Aristotelian elements and principles are in no way to be rejected [. . .] both the elements and these chymical principles are to be admitted in the constitution of mixts.”—“Deinde per ea elementa ac principia Aristotelica nullo modo rejicienda sunt [. . .] tam elementa, quam haec principia Chymica in mistorum constitutione admittenda.” (Sennert 1619, p. 281). But if this is the case, how do the elements relate to the chymical atoms? Sennert remains rather vague on this point in the 1619 edition of *De Chymicorum*. In order to understand why, we have to examine the evolution of his stance on mixture theory. The central question from the scholastic point of view, as mentioned above, is whether the substantial forms of the elements remain in the mixt or whether they are replaced by a single new form. Ever since the proto-*Epitome* of 1600, Sennert had subscribed to the theory of mixture associated with the name of Averroes. According to this theory, the substantial forms of the elements do remain in the mixt,

though only in a “refracted” state, which allows the qualities of the elements to be taken over by the form of the mixt. Since the forms of the elements have merged into a single form of the mixt, this position implies that in any given mixt, the form of the mixt must be the origin of all qualities. Sennert is quite clear about his position in a passage from the *Epitome*: “We, having rejected the others, follow Averroes, who believed that not only the qualities, but also the forms of the elements themselves remained in the mixt, but refracted, so that a single form comes about from them all.”—“Nos, caeteris rejectis, Averrois sequemur, qui putavit, non solum Qualitates, sed ipsas etiam formas Elementorum manere in misto; refractas tamen, ita ut ex omnibus una forma fiat” (Sennert 1600, disp. 14, thesis 19; 1618, p. 222; 1624, p. 242). This passage was reprinted without change until 1624. It is discussed in (Michael 2001, p. 337; Newman 2006, pp. 100, 110), among others.

There is no equally unambiguous statement on mixture theory in the first edition of the *De chymicorum*, and at one point Sennert seems to leave the question open deliberately (Sennert 1619, pp. 265–66). In the second edition published in 1629, however, he had changed his mind: from that point onwards, he consistently claimed that the substantial forms of the elements remain intact when they become part of a mixt. In other words, he rejected the view of Averroes and Zabarella, which he had earlier held himself, and subscribed to the position traditionally associated with Avicenna: “But that refraction of forms is a mere figment, as has been shown sufficiently by the Latins arguing against the view of Averroes.”—“Verum refractione illa formarum merum figmentum est, ut a Latinis contra Averrois sententiam disputantibus satis monstratum est” (Sennert 1629, p. 153a). The second edition of the *De chymicorum* indeed seems to be the point at which Sennert changed his mind on the question of mixture: a similar passage calling the position of Averroes and Zabarella a “mere figment” appears in the final edition of the *Epitome* (Sennert 1633, p. 265).

This change in Sennert’s mixture theory has often been emphasized by commentators as a sign of a more explicit version of a corpuscular theory. The first to note this was (Lasswitz [1890] 1984, vol. I, p. 439), while (Michael 2001, p. 337) is particularly well documented. The reason for this emphasis is that, according to the theory that Sennert held until at least 1618, the substantial forms of the particles, and therefore the individual particles themselves, cease to exist when they become part of a mixt. According to the Avicennan theory that he endorsed from 1629 onwards, on the other hand, each particle continues to exist within the mixt in the same way as outside it. Earlier scholastics had discussed this view of mixture since the thirteenth century, but had always rejected it, because the elemental forms remaining intact seemed in conflict with the very idea of mixture and therefore with one of the fundamental tenets of Aristotelianism. The conflict is this: since every part of a mixt contains all four elements, if the forms of the elements were to remain actually present even while they are part of the mixt, then the same piece of matter would be informed by four different forms. In other words, it would be multiple elements at the same time. In Sennert’s works after 1629, this conflict is solved by abolishing the idea of perfect mixture entirely, at least in the inanimate cases. Without perfect mixture, there is no contradiction in assuming multiple levels of substantial forms in the same body. To take up the previous example, the properties of a piece of gold, according to this late theory, stem from three different types of substantial forms: some are produced by the form of gold directly, others must be attributed to the presence of atoms of Sulphury, Salt, and Mercury, and the primary qualities are produced by the forms of the four elements. Despite the presence of a structuring form of gold, the piece of gold is not homogeneous, since its smallest parts do not always contain all four elements or all three secondary atoms; rather, multiple different types of corpuscles continue to exist next to one another. The same is true of each individual atom of Mercury, Salt, or Sulphur: though they are not divisible by natural means, they are nevertheless mixts containing the four elements, created by God in the first instant (Sennert 1676, p. 118; 1619, p. 274).

There has been some debate over the importance that Sennert’s change of opinion on mixture theory. The fact that the atomist passages in the *Epitome* occur only in the last

edition of that work, as well as the fact that Sennert's corpuscularian worldview is in large part complete in the first edition of *De chymicorum*, was already documented in (Lasswitz [1890] 1984, vol. I, pp. 439, 441). For this reason, Newman has criticized Michael for seeking the origin of Sennert's corpuscularian views in mixture theory, instead of the experimental tradition of Geber. In addition, Newman has implied that the corpuscularian position already includes the change in stance on mixture theory (Newman 2006, p. 111, n. 68; Michael 1997, pp. 280–84). However, while it is certainly correct that mixture theory was not the driving factor behind the corpuscularianism of the first edition of *De chymicorum*, it seems to me that there is further development in Sennert's matter theory after that point. The most important piece of evidence for this is the fact that in the 1624 edition of the *Epitome*, five years after the publication of the *De chymicorum*, the endorsement of the mixture theory of Averroes is reprinted without change. I would therefore suggest that between 1619 and sometime before 1629, Sennert held a "mixed" theory. According to this theory, bodies are composed of the four elements and the three types of secondary atoms, but when corpuscles come together to form a true mixt with its own substantial form, their forms become diminished, and their existence is now merely potential instead of actual.

This version of the theory is perfectly capable of explaining the chymical processes that are Sennert's main interest in the *De chymicorum*. In the aforementioned experiment, for example, in which silver is first dissolved by means of a strong acid and then reprecipitated, Sennert might simply deny that the silver dissolved in acid constitutes a true mixt. However, in my view, the theory held by Sennert after 1619 has a different problem, namely that it leads to a certain inconsistency in the ontology of qualities. One consequence of mixture theory on the model of Averroes is that in a true mixt, the same substantial form produces all qualities, whether primary or secondary or otherwise. For scholastics following Averroes, like Zabarella, the fact that the forms of the four elements are contained in the mixt in a "refracted" state does therefore not mean that these elemental forms produce the primary qualities. Rather, the primary qualities are produced by the form of the mixt, which is the result of the forms of all the parts melting together into one. But although the elemental forms do not actually exist anymore and their qualities are produced by the form of the mixt, the part-forms need to remain in the mixt somehow—otherwise the concept of the elements as the fundamental material parts would have no explanatory power left at all. The commonly accepted answer to the question of how the mixt contains the elements was that, though the elemental forms do not survive the generation of the mixt, their qualities do. It is for this reason that, as discussed above, almost all scholastics agreed that the secondary qualities supervene on, and are causally posterior to, the primary ones.

We have seen, however, that Sennert abolishes precisely this connection between primary and secondary qualities in 1619, denying that "colors, odors and tastes come from the elements" (Sennert 1619, p. 283). The idea in this passage is of course that the secondary qualities ought to be attributed to the secondary atoms instead of the elements. However, the secondary atoms themselves are also mixts. What Sennert therefore seems to be claiming is that even though (on his Averroesian theory of mixture) the forms of the secondary atoms are constituted by the forms of the elements, they exhibit a totally different and causally unrelated set of qualities. The same problem also occurs with higher-order inanimate mixts, like the previously discussed piece of gold: as a perfect mixt, it has a substantial form, which is the result of the melting together of many part-forms of secondary atoms. The form of the whole produces all the qualities of gold. Many of them, like the golden color, will belong to the list of secondary qualities and can therefore be attributed to the flowing together of the part-forms. However, the purpose of postulating a form of the mixt is to explain why there seem to be qualities of the whole that are not explained by the qualities of the parts. The origin of these additional qualities is equally as mysterious as that of the secondary qualities on the theory as Sennert presents it in 1619. In my view, it is plausible that it was because of problems like these that he changed his stance on mixture theory, thereby adapting his view on the hylomorphic structure of matter to the demands of his theory of qualities.

6. Conclusions

The matter theory presented by Sennert from 1629 onwards preserves all the advantages of the corpuscular theory he introduced in 1619 while avoiding the problems in the derivation of higher qualities from lower ones. The change in mixture is decisive because it completes the development that had begun with the introduction of secondary atoms: the ontological and causal decoupling of primary, secondary, and higher-order qualities. According to this last version of the theory, the substantial forms of the elements that together constitute a Sulphur atom are neither destroyed nor refracted but continue to exist as independent entities. If the Sulphur is warm, cold, dry or wet, therefore, it is so because it in a very literal sense contains atoms of the four elements. The substantial form of Sulphur has its own characteristic qualities, which it produces independently of the elements. In contrast to the earlier theory, the form of Sulphur does not also produce the primary qualities, which are instead delegated to the primary fire, water, air, and earth atoms contained in it.

On the level of sensible bodies, there is not only a substantial form belonging to the body as a whole, but also a separate form for each of its parts *and* for each part of a part. Since the main function of a substantial form is to act as the carrier of qualities, a quality expressed in a given body can now be located on any one of three ontological levels. Primary and secondary qualities observed in a body can be attributed to the primary and secondary atoms contained in it. The dryness and coolness of an aged plank of walnut wood, for example, might be explained by a relative lack of the elements water and fire in it, while its flammability might be attributed to the fact that it contains some amount of Sulphur.

In some cases, qualities can also be attributed to the substantial form of the whole body directly. This class of qualities is by no means Sennert's invention but had long been debated by scholastic philosophers. The most commonly discussed examples of such qualities were the phenomena of magnetism and the healing power of medicines. The scholastic term for them is "occult qualities." (Note that while among critics of Aristotelianism from the middle of the seventeenth century onwards, "occult qualities" became synonymous with "incomprehensible or unexplained properties", this is not how the Sennert and other scholastics use the term.) While the concept of occult qualities is not new, however, Sennert's unusual views on mixture means that the relation of the occult qualities to the primary and secondary ones, collectively called "manifest qualities", is a different one for him than for most Aristotelians. The occult qualities are traditionally understood to be the rare exceptions from the rule that all qualities are determined by a certain proportion of the four primary qualities. Sennert had agreed that occult qualities existed since the early stages of his career. In his *Disputation on pestilence* (1607), for example, he had already argued that the actions of the four elements are not enough to explain the deadly power of contagious diseases, which must therefore come from an occult quality (Newman 2006, p. 142). In his late writings, however, he extends the same model to the primary and secondary qualities as well: now, *all* qualities are produced directly by the substantial form of the corresponding body or particle, independently of the proportion of lower-tier atoms. This extension is only possible on the mature theory of matter and mixture Sennert endorsed from 1629 onwards, since it is only the Avicennian theory of mixture that enables him to give a coherent account of forms within forms. On Sennert's uses of occult qualities, see (Stolberg 2003, pp. 185–88; Newman 2006, pp. 140–42).

This second stage in the development of Sennert's matter theory after the initial adoption of a corpuscularian view illustrates that the merging of hylomorphist natural philosophy with corpuscularian ideas required adaptations in both sets of ideas. Sennert's atomism with substantial forms goes directly against doctrines that are either founded directly in Aristotle or almost universally accepted by scholastic Aristotelians. The most striking change is that, as discussed, he argues that mixed bodies are not homogeneous all the way down. Whereas the genuine Aristotelian doctrine about a homogeneous body like a piece of gold is that it has only a single substantial form and that the four elements are at

most virtually contained in it, for the mature Sennert only a subset of the properties of gold can be attributed to its own form, while most others are properly speaking the properties of its atomic parts.

I hope to have shown that Sennert had good reason for proposing his new matter theory. There are two ways in which his synthesis manages to combine the advantages of substantial forms with those of atoms. The first virtue of his system, which it shares with other corpuscularian approaches, is that it allows Sennert to point to the persisting particles contained in all bodies whenever that seems plausible. This is a useful mode of explanation for many of the chymical and physical phenomena commonly treated in natural philosophy. In addition to that, corpuscular explanations are also a central part of Sennert's biological theories, in which he used that type of explanation to intervene in the long-standing debate of the origin of the soul in conception. He argued that when a living being is born, its soul must have been already latent in the surrounding matter, rather than being created by supernatural forces (as was the dominant theory in the case of the human rational soul) or spontaneously (as was held to be the case for some "inferior" forms of life, like worms and flies). The latent souls, Sennert argued, must be present in the form of ensouled atoms, lying dormant everywhere in matter and suppressed but not destroyed by the fact that they are part of a larger object dominated by another form (Hirai 2012).

If these creative uses of invisible corpuscles are made possible by Sennert's atomist heritage, their careful integration into the Aristotelian framework helps him avoid some of the problems that had plagued other corpuscularian systems. One of the main weaknesses of ancient atomism had been that it was unable to explain how such complex bodies like the walnut tree, the gold, or the dog come about through the simple interactions of atoms. In these cases, Sennert is able to lean on his Aristotelian heritage by giving explanations that involve substantial forms as the origins of qualities and powers. It is not surprising, then, that he was far from leaving the framework of scholastic natural philosophy entirely, despite the creative changes he made to some doctrines within it. His philosophical project is rooted in an Aristotelian vision of the investigation of nature, and many of the scholarly debates in which he intervened had been ongoing at European universities for centuries. In the interconnected cases of mixture theory and the ontology of secondary qualities, his position has clear medieval antecedents: the idea that there are certain cases where more than one substantial form can be contained in a single body, for instance, was affirmed by such prominent medieval scholars as John Duns Scotus and William of Ockham (Michael 2001, p. 346). However, even the most extreme scholastic pluralists were only prepared to admit multiple forms in a very small number of cases, notably in living bodies. By adopting the Avicennan theory of mixture, Sennert extends this idea to non-living bodies—even Zabarella, who was prepared to admit "four or a hundred [forms] together in the same subject", sided with Averroes rather than Avicenna on this issue (Zabarella 2016, p. 502; cited by Sennert 1676, p. 155a). As I have argued, Sennert did not take this additional step in 1619, when he introduced corpuscular explanations into his natural philosophy for the first time, but only a number of years later. As I have further argued, a possible motivation for this change in stance on mixture theory is that association of specific secondary qualities with specific corpuscles was ultimately in conflict with the Averroesian account. As a result, the late Sennert contradicted claims on which scholastic Aristotelians had almost unanimously agreed for centuries. The fact that he was able to do so while still being recognizable as a scholastic natural philosopher is a testament to his ingenuity, but also to the breadth and flexibility of early modern scholasticism as such.

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Article

Nature as a Huge Organism: Gottfried Reinhold Treviranus (1776–1837) and Early Ecology in German Romantic Science

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Abstract: The following article explores ideas of early ecological thinking within the natural sciences of early-19th-century Germany and discusses its possible roots. It tries to shed some light on the work of Gottfried Reinhold Treviranus who developed a holistic understanding of nature. The historical background and 18th-century ideas Treviranus relies on will be described—namely, the ‘great chain of being’, the idea of nature as a vast network of interconnected living beings and the question about the existence of vital forces that cause movement, growth or reproduction. Reference will especially be made to Gottfried Reinhold Treviranus’ main work, the six-volume *Biologie oder Philosophie der lebenden Natur für Naturforscher und Aerzte* (Biology or Philosophy of Living Nature for Natural Scientists and Physicians) published in Göttingen between 1802 and 1822 and the somewhat later synopsis *Erscheinungen und Gesetze des organischen Lebens* (Phenomena and Laws of Organic Life) printed in Bremen in 1831 and 1832.

Keywords: ecology; physico-theology; nature as a huge organism

1. Introduction: Today’s Reception of Gottfried Reinhold Treviranus

“When we see how the living nature is arranged, or when we are regarding the relations in which we find the living nature [. . .] we find one single huge organism.”¹ As early as 1802, Reinhold Gottfried Treviranus, in his work *Biologie oder Philosophie der lebenden Natur für Naturforscher und Aerzte* (Treviranus 1802, 1803, 1805, 1814, 1818, 1822)—which was supplemented later on by *Erscheinungen und Gesetze des organischen Lebens* (Treviranus 1831, 1832) expresses an image of nature that recalls modern ecology and today’s ways of looking at nature. No doubt, the COVID-19 pandemic, climate change and endangered ecological balances have increasingly forced us to realise humanity’s dependence on and embeddedness in nature. Nevertheless, over a long time, ideas about nature as a giant organism, as cited above, seemed to be of Romantic origin—being rather speculative than representing a reality.

Introductions to the history of biology today list Gottfried Reinhold Treviranus parallel to Michael Christoph Hanow (1695–1773), Jean Baptiste Lamarck (1744–1829) or Karl Friedrich Burdach (1776–1847) and he is mainly remembered as one of those who coined the term ‘biology’. Treviranus was involved in the innovations that took place in botany and zoology at the time—especially developing comparative anatomy, physiology and embryology (Junker 2004; Höxtermann and Hilger 2007).² But apart from that, he is usually named among those that were close to Romantic natural philosophy. His work appeared to be rather unscientific and highly speculative, being part of a Romantic ‘interlude’ in the emerging modern natural sciences. It was interpreted as a Romantic view of nature, part of a countermovement to the Enlightenment, turning to dreamlike fantasies, resulting from a disappointment after the French Revolution (Jahn et al. 1982, p. 311).³ The failed faith in reason seemed to have opened the door to irrationality. As late as 2007, Torsten Kanz confirmed this kind of reception: “Such an understanding of ‘biology’ or ‘life theory’ meant turning away from mechanistic approaches [. . .]. Treviranus was accused of encouraging

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vitalist thinking, for example of replacing rational explanations with metaphysical constructs of vital forces inherent in all organisms and thus at the same time negating the applicability of the laws of chemistry and physics to living bodies" (Kanz 2007, pp. 100–21).

Nevertheless, Treviranus seems to have been well informed about what was going on during his time; his connections to the chemically researching natural scientists are striking, as Brigitte Hoppe has shown (Hoppe 1983). Andrea Gambarotto, on the other hand, has analysed how Treviranus was in fact influenced by intellectuals of the time, for example that he took over some of Immanuel Kant's and also Friedrich Wilhelm Schelling's assumptions concerning interactions between organism and environment—and at the same time transforming them (Gambarotto 2018, p. 91ff). Gambarotto even describes him as a pioneer of evolution theory (Gambarotto 2014).⁴ Elke Witt, in turn, stated in 2007 that Treviranus' work shows many changes in conceptions: "that he moved from a materialistic-mechanistic approach of explaining living nature, to a vitalist interpretation and to an almost spiritualistic view of the living in the last books" (Witt 2007, pp. 178–79). She even argues that his work could be read in terms of a pluralism of theories, as an attempt to establish a natural science that no longer insists on one uniform system but approaches the complex phenomenon of 'life' from different perspectives.

No doubt, the aspects in Treviranus' work are complex, and it is impossible to take all of them into account here. The following will rather focus on the broader historical context of his work—on questions of continuity and change. To what extent did this 'modern' biology of Treviranus take up 'pre-modern' ideas of nature? To what extent did it establish innovative ideas at the time? Can it really be considered as 'speculative' or even 'unscientific'? Did naturalists, when turning away from mechanistic ideas in the late 18th and early 19th century, really abandon rational patterns of explanation, as has been argued? Is empirical natural research replaced by 'metaphysical constructs' or even a 'theory pluralism' in Treviranus' work? Was Romantic natural science really an anti-Enlightenment movement that left the new, empirical, scientific knowledge aside? Was it a speculative natural philosophical theory that was ultimately unscientific by today's standards?

2. Gottfried Reinhold Treviranus and the Historical Background

"Indeed, what naturalist could deserve it more to be called a philosopher of nature, a seer and a mystagogue of natures' secrets, than Treviranus? [...] The scientific researchers of all Europe will feel devastated by the message of his death. For Gottfried Reinhold Treviranus was a man whose extensive, profound knowledge outweighed that of an entire faculty, whose achievements alone outweighed those of an entire academy." (Weber 1837, p. 4)⁵ These words, probably spoken at Treviranus' funeral and written down by Wilhelm Ernst Weber in 1837, show clearly that Treviranus was widely known during his lifetime. But from a modern point of view, this statement is rather irritating: the priesthood of the 'mystagogue' and the status as a scientific luminary are probably rather mutually exclusive. Was he a grandiose scientist or a 'mystagogue'—a priest, a mystic?

Reinhold Gottfried Treviranus' ancestors supposedly came from Trier—hence presumably the name 'Treviranus'.⁶ Among his own contemporaries, his younger brother, Ludolph Christian Treviranus, a botanist, was in fact much better known than Reinhold Gottfried. As late as 1894, the *ADB* (*Allgemeine Deutsche Biographie*) devoted an article four times as long to Ludolph Christian Treviranus. Nevertheless, today Gottfried Reinhold Treviranus, as mentioned above, is regarded as one of the co-founders of modern 'biology' and the younger brother is no longer remembered.

Born in 1776 as the eldest son of eleven children, Reinhold Gottfried Treviranus grew up in Bremen, where he was educated at a grammar school. According to Maria Hermes, he studied mathematics and medicine in Göttingen in 1793 (Hermes 2011).⁷ There, he attended lectures by Johann Friedrich Blumenbach and received his doctorate in 1796. Returning to Bremen, he worked as a teacher of mathematics and medicine at the local grammar school and at the same time practised as a doctor at the Bremen city hospital. In 1797, he married his former patient, Elisabeth Focke. Because of his frequent illness (he caught tuberculosis

in 1794), he rarely left the Hanseatic city and his family. But in addition to his teaching and medical activities, he was scientifically engaged in what he called ‘biology’. He died in Bremen in 1837 during an influenza epidemic.

What was Treviranus’ concern? And how did this lead to the emergence of ‘biology’? In the preface to his *Biologie* (Treviranus 1802), he explains his ‘research project’; he writes “There have always been men, and Linné himself was one of them, who realised that all those artificial systems, without relation to higher purposes, were only mere rubbish. They did not reach to the highest goal, and therefore everything they produced remained mere piecemeal. The ultimate goal of any natural research, however, is the investigation of the driving forces by which that large organism which we call nature is kept in eternal activity [. . .]. We have only a mere register, not yet a science of nature, as long as we cling eternally to these systems, and do not proceed to the attainment of that goal”.⁸ Treviranus thus explicitly turns away from what had been early modern science, from collecting and classifying. He is interested in the study of what he called ‘life processes’, what he and his contemporaries subsumed under the term ‘physiology’—the inner ‘driving forces’ of an ‘organised’ nature, the vital processes of living beings. Thus, the central concept for Treviranus is ‘life’: “Our intention is a new attempt [. . .]. The objects of our research will be the various forms and phenomena of life [. . .]. This science that deals with these objects will be called biology or life science.”⁹ For him, ‘life’ is everywhere where you find growth, movement or reproduction—phenomena that cannot be explained by external forces. He states “We call an animal or a plant alive as long as we still find signs of growth and movement i.e., activity, in them. But at the same time, we think of this activity as something in the body to which we ascribe life, produced from within, not from without”.¹⁰ The vital force interacts with what is outside, but it is an independent force (Cheung 2014, p. 73ff). Inner forces and external forces are clearly distinguished: “The sea, which is moved by the storm, is also in activity. Yet we do not ascribe life to it: Why? Because that motion is initiated by external forces. Every movement, then, which is caused by external forces, which are transmitted, we call a mechanical one, and those movements by which life expresses itself differ from the mechanical ones. They are not brought about by external but by internal causes.”¹¹ Mechanistic patterns of explanation—of movement for example—are in fact not rejected here (also in the realm of the so-called ‘organised nature’, the living beings), but they are clearly determined as being brought in from outside. Thus, external forces have an effect on living beings, but the expressions of life as such arise from an inner force that cannot be explained mechanistically. Treviranus admits that, at a first glance, the inner forces are often difficult to distinguish from external forces. But for him, this is nothing other than the result of the integration of living beings into their environment: “If the living body was a completely isolated being, and every reason for its movements only in itself, then the boundary between this and the mechanical movements would be easy to draw. But all expressions of its activity are products of an interaction between itself and the external world [. . .].”¹²

Treviranus now sees himself as somebody who is exclusively concerned with these ‘inner life forces’ of animate nature—a ‘physiologist’ and not a ‘physicist’. He is dealing with life processes, with the *inner* functions of living beings. One has to bear in mind though that around 1800, the three-kingdom doctrine (dividing nature into animals, plants and minerals) had already given way to a two-kingdom doctrine. Many naturalists now distinguished ‘organised bodies’ from ‘unorganised bodies’: humans, animals and plants now differed from minerals because of their vital properties. This distinction also determines Treviranus’ thinking: “We find visible nature divided into two great kingdoms, the lifeless and the living”,¹³ he states in the introduction to his *Biologie*. Treviranus explicitly turns to the latter, the group of ‘living’, ‘organised’ bodies—to the realms of ‘biology’.

Once we look at the figures Treviranus himself drew on the internal structure of spiders, this becomes illustrated (see Figure 1: Arachnids). Of course, even at the beginning of the 19th century, there were still zoologists who aimed to collect, record and classify arachnids (such as Carl Wilhelm Hahn for example, Hahn 1820–1836), and the recording

of the European spider species was far from complete. But this is not what Treviranus is interested in. He focuses on the internal and external organs of the arachnids, from the digestive tract to the spiders' eyes. Consequently, he also entitled his work on spiders *Ueber den innern Bau der Arachniden* (On the Internal Structure of Arachnids, Treviranus 1812). He describes the anatomy of the animal and the internal operations of the organs that maintain the spider's life processes, and he finds similar characteristics in all living organisms: instincts, passions, arbitrary actions, reproduction, sexual difference, waking and sleeping, youth and old age, health and disease. Even if they differ in one way or another, all of these organisms share these phenomena. Moreover, they all interact with each other.

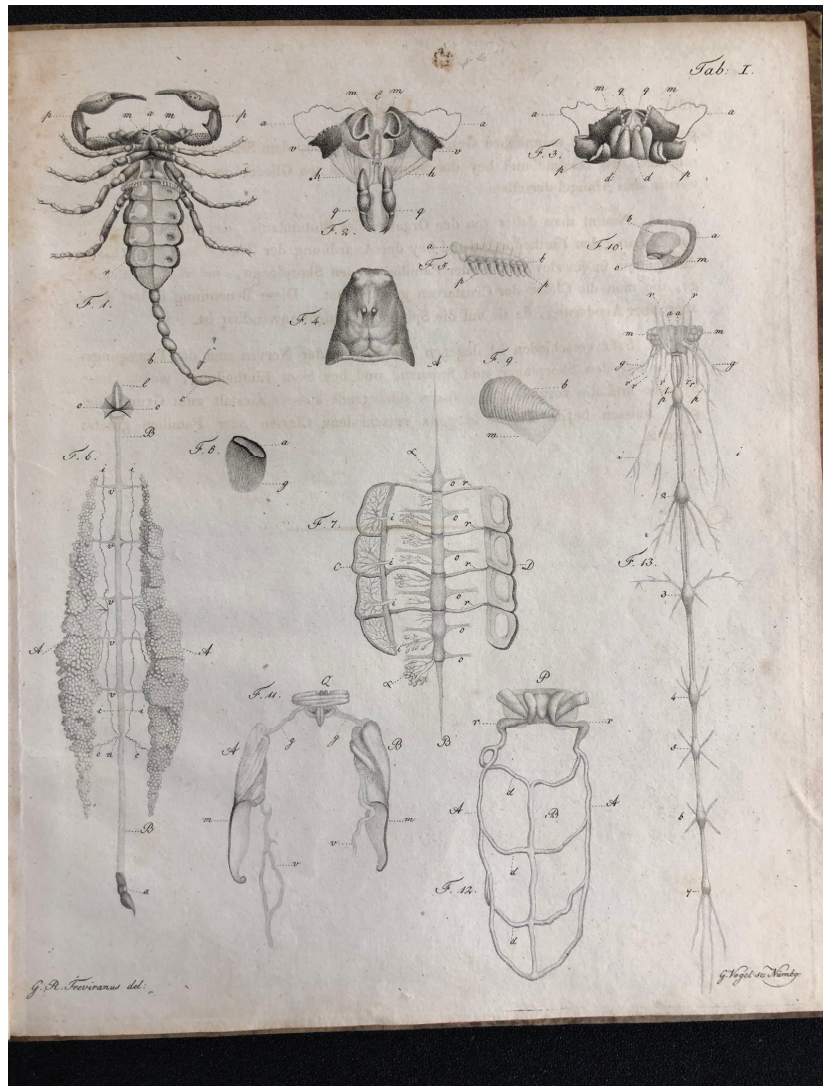


Figure 1. Cont.

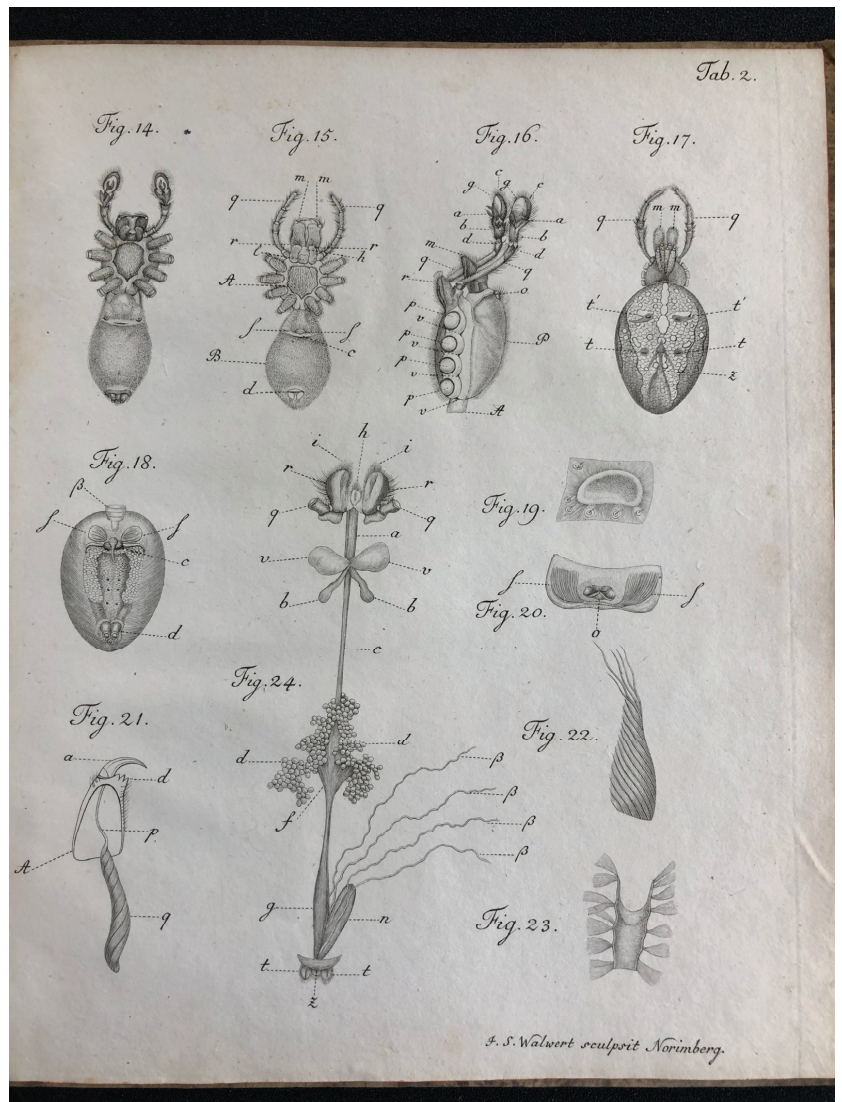


Figure 1. Treviranus, Gottfried Reinhold, *Ueber den innern Bau der Arachniden*, Nürnberg, verlegt bei Johann Leonhard Schrag, 1812, Tafeln 1 und 2; Universitätsbibliothek Basel, Signatur: Zool Cv 2:1:1.

Treviranus in no way discredits the findings of the preceding period, but he wants to go further than his predecessors. In his work, he refers to a myriad of natural scientists—botanists, zoologists and anatomists. He mentions Marcello Malpighi, Georges Cuvier and Georges-Louis Lerclerc de Buffon, and he recalls names that we today usually assign to the so-called ‘physico-theologians’, to those who connected their description of nature with the praise of an ingenious creator who was believed to direct nature’s harmony and perfection, such as Nehemiah Grew, Robert Boyle, Pierre Lyonnet, Jan Swammerdam or Charles Bonnet. Treviranus did of course not distinguish between those who wrote explicitly physico-theological works and those whose works only showed a physico-theological framing or completely omitted it. In other words, Treviranus was working at a time when physics (the knowledge of nature) and metaphysics (theological-philosophical concepts)

were not yet completely separated. He of course knew that naturalists of the 18th century had linked natural science and their belief in God, their belief in a divinely caused nature. But for him, this did not discredit their observations, their concepts or their work. If so, what traces of these 'pre-modern' ideas can be found in Treviranus, who is said to have founded something 'new', a new science called 'biology'?

To anticipate one finding: The 'argument from design' (which is so central to physical theology), the explanation of the complex order of nature from a divine providence and through an all-embracing divine intention,¹⁴ is not present in his work. And describing natural phenomena and natural objects is no longer intended to prove the wisdom of God and God's rationality, Gods' intelligent arrangement of nature. The term 'God' does not appear at all in Treviranus' text. Nevertheless, he recurs to physico-theological ideas that had been discussed at length in the 18th century.

3. Preceding Concepts? The Aristotelian *Scala Naturae* and the Great Chain of Being

How did Treviranus explain the order of nature? In his *Biologie*, Treviranus refers to an eighteenth-century concept of the natural order that was very popular: the idea of the so-called 'great chain of being'. The 'great chain of being', based on ancient Greek philosophy, can in fact be found in many works of those who dealt with zoological or botanical subjects in late 18th and early 19th century. Arthur Lovejoy, in his work *The Great Chain of Being*, described this concept as early as 1936 (Lovejoy [1936] 1965). Lovejoy even considered it to be the most powerful idea about nature in the 18th century.

Of course, the originally Aristotelian idea of a *scala naturae* had long since merged with Christian ideas. It had been linked to the belief in a divine and ingenious creator who had created the abundance of species at the beginning of all time. But one central feature of this concept remained important even at the turn of the 19th century: nature was arranged in *gradual gradation*; species had been located on a continuum, on a finely graded scale, to allow perfect abundance and plenitude (Feuerstein-Herz 2007). Lovejoy described this natural order as a "chain [. . .] of an infinite number of links, reaching from the lowest things, just escaping non-being, in hierarchical succession through all stages to the *ens perfectissimum*. [. . .] Each of these members differed from the one immediately above and below it by the smallest possible degree of difference" (Lovejoy [1936] 1965, p. 59).

In the medieval (Christian) form, this chain had ranged from the angels down to the smallest living beings of the invisible world or even down to the minerals and elements. But in the second half of the 18th century, with the expanding natural sciences, the idea of the 'chain' became even more concrete. It is well known how Charles Bonnet (to whom Treviranus refers in some places) in his *Traité d'Insectologie* of 1745 filled the idea of the chain of being with concrete elements and designed complex gradations of species (Bonnet 1745). For Bonnet too, species differed only minimally from each other. In his *Betrachtungen über die Natur* (Contemplations of Nature), published in German in 1774, he states "Nature descends by imperceptible steps from man to the polyp, from the latter to the sensitive plant, from the latter to the truffle. Higher species are at all times related by some character to the lower, and these to the still lower".¹⁵ Bonnet himself wanted to find these species and their minimal differences, clinging to the principle of continuity. In doing so, he also insisted on a preformist view of the world, on the pre-existence of germs since the days of the creation.

But the idea of a 'chain of being' was not restricted to Bonnet's conception of nature. In the physico-theological treatises, it is omnipresent. The innumerability, the interdependencies of humans, animals and vegetation seemed to prove the infinite wisdom of God. The natural scientist and theologian Heinrich Sander (1754–1782) is a key example of this physico-theological spelling out of the connections and chains in nature. His book *Von Gottes Güte und Weisheit in der Natur* (Of God's Goodness and Wisdom in Nature)¹⁶ was published in Basel in 1778 and was reprinted in at least seven more editions until 1827. In late 18th century, it was a 'bestseller' that dealt almost exclusively with the links and the mutual dependencies of man, animal and plant. It was especially the ingenious

interplay, the arrangement of creatures and the interdependence of all creatures that was seen as irrefutable evidence for the wisdom and benevolence of God: interdependencies that formed one huge harmony where every item and every living being had its place, well suited to serve the preservation of the greater whole (or the ecological system, as we would put it today). In Enlightenment natural theology, God thus became the reasonable, benevolent and wise creator, the *ultima ratio*, the supreme rational being. Sander states “Creation is a single whole. Everything is laid out according to a plan, everything has symmetry, proportion, measure, number and weight, there is nothing that should not fit into the general design of God. [. . .] God rules the world by means of these thousandfold concatenations and connections”(Sander 1784).¹⁷ The ultimate purpose is the *harmony* of the whole: “The greatest gift of beauty is unity, and this is in nature. Millions of creatures interweave their activities. A single great purpose, the bliss of the whole, is produced. In nature there is no contradiction anywhere, there cannot be. [. . .] The whole earth proves that a supreme, omnipotent, wise and benevolent being holds life in its hands. The more one comes to know nature, the more one realises the interrelation of all creatures, the more the idea that God is Father and Benefactor of the world gains ground.”¹⁸

Sander’s ideas remained present well into the 19th century. As late as 1804, one of his students claims “Nature walks along with majestically slow steps, rises from level to level, and, inexhaustible in variety, sets up myriads of beings, which, like the rungs of a ladder, always stand one above the other in a higher order. The stone borders on the plant, the plant on the animal, the animal on man, man on the spiritual world. But what a distance from the pebble to the fir, from the fir to the oyster, from the oyster to the Hottentot, from the Hottentot to the wisest man! Nevertheless, nature is the most perfect whole. There is nowhere a gap; it links being to being, and connects them unnoticed, connects them so finely, blurs their boundary lines so gently, that the explorer believes he is still walking in the same realm of nature, when he has already moved far away in the next. Nature, it is true, knows no division into classes. Each individual being is a ring of natures’ immeasurable chain, just as there are not two things in the world that are perfectly alike: only the limited human mind, tired of the immense series of created beings, has marked out certain points of rest.”¹⁹

Similar works can be found easily. In Julius Bernhard von Rohr’s *Phyto-Theologia*, for example, these chains within nature are described in detail—here in particular in relation to vegetation, to the ‘plant world’ (Von Rohr 1745). It is the same idea that is predominant: the wonderful order, the overall harmony, is maintained as one cog meshes with the other. This ‘ingenious arrangement’ was described in all variations, up to detailed descriptions of entire ecosystems (if one wants to use this modern terminology here).

Even natural scientists who did not argue in an exhaustive physico-theological way, such as Johann Friedrich Blumenbach, Treviranus’ teacher, Polycarp Erxleben or Nikolaus Joseph von Jacquin (See for example: Blumenbach 1779; Erxleben 1777; Jacquin 1800, p. 14), all referred to the idea of a continuous transition from one species to another. They contrasted what they called a ‘natural system’ to the ‘artificial system’ that would draw sharp boundaries. The latter was seen as a simplifying model—useful in daily life or for teaching but not depicting reality. The idea of living organisms located on a quasi-continuum, of organisms that were hardly distinguishable from one another, could of course not be easily represented in manuals or textbooks; in practice, the Linnaean classification was still used for classification purposes.

This ‘chain of being’ and the principle of continuity remained plausible for zoological and botanical researchers for another reason as well: within the chain of being and the continuity thesis, the diversity of species was to be explained. Species that were seemingly located between animals and plants, such as the so-called animal plants (‘Thierpflanzen’, such as polyps) or plant animals (‘Pflanzenthiere’, such as the mimosa that showed movement), seemed to present the links between the various kingdoms of nature. The border between plant and animal seemed to blur exactly at that point.

Towards the end of the 18th century, the image of the chain of being became more and more differentiated and, to a certain extent, also horizontalised. It was turned into an image of multiple chains and links. A veritable network of interwoven living beings emerged. Naturalists such as Johann Hermann from Strasbourg, for example, now designed complex net-like schemes of the so-called ‘natural systems’ of kinship among animals. These schemes became increasingly confusing (Diekmann 1992).²⁰ (Sander, a few decades earlier, used the image of ‘wallpaper’ in which everything was interwoven.) (Sander 1784, p. 184).

Back to Treviranus: for Treviranus too, ‘gradation’ is no longer a simple sequence of steps; it consists of multiple chains in all directions. He even links it to the mixing of ‘substances’. In the first volume of *Biologie*, he explains these gradations in a whole chapter and argues that there is still a lot to be discovered.²¹ According to him, *living nature* can be divided into two areas that merge into one another: “The whole of living nature can be divided into two large divisions: in the one, nitrogen predominates, in the other, carbon. The former comprehends the animals and animal plants, the latter the plant animals and plants. The former approach the animal, the latter the vegetable organisation.”²²

These ‘two divisions’ then, again, are finely graded: “For each of these two divisions there is a maximum and a minimum [. . .]. The maximum of the animal organisation we find in mammals, and especially in man, the minimum in infusion animals. The maximum of plant-like formation is peculiar to the dictyledons with a many-leaved corolla (flowering plants, note by the author), the minimum to several sexes of the families of sponges, conferves, seaweeds and lichens. There is an uninterrupted gradation from each maximum of living nature to each of its simplest forms.”²³ Continuity is thus present in Treviranus’ model; although, here, complex sequences of stages or steps also exist side by side. The ‘chain’ is also arranged according to mutual effects, purposes and interdependencies, like a net.

At the end of this chapter, Treviranus—like many others—refers to Leibniz and states “Nature, Leibnitz said, forms a whole. Its parts are so closely connected with each other, that it is impossible for the senses and even the imagination to indicate the point where one ends and the other begins. This statement remains true and certain! But if this wise man called the whole a single chain, this comparison must not be repeated. Not one, but thousands and thousands of chains, interwoven with infinite art into the tightest knot, make up the whole of nature.”²⁴ Even the boundary between the ‘living’ and the ‘lifeless’ might be dispersed one day: “But on whose side lies the truth, on ours, who have been accustomed to the distinction between a lifeless and a living nature since our youth [. . .] or on the side of those who [. . .] still find a faint reflection of life in those phenomena? Anyone who considers this question will hardly set himself up as an arbiter; he will admit that we are not yet able to establish a boundary between the living and the lifeless nature.”²⁵

According to Treviranus too, humans represent the highest level of existence, which he believes to be able to prove anatomically on the basis of the complexity of the human brain: “Furthermore, this gradation is confirmed in the brain. Even in mammals, one misses many peculiarities of the human brain. [. . .] In birds the convolutions of the brain disappear completely. [. . .] The brain of amphibians and fish is even simpler.”²⁶ (And this, he thinks, also applies for the complexity of other organs, especially the reproductive organs.)

Concerning gradation, even man can be located on different ‘levels’ and become similar to the animal. Treviranus reports on a case found on the Shetland Islands (referring to the *Edinburgh Philosophical Journal* of 1819) about “David Tate, born deaf and blind, a young man of five and twenty living at Fetlar, one of the Shetland Islands, who was on such a low level of human existence that he could not accept an upright position other than by force, and whose entire communication with the external world was mediated only by the sense of touch.”²⁷

4. The Huge Organism and the Disappearance of God

The reader of the Treviran text, of his description of nature as one universal organism, is unquestionably reminded of other natural philosophers of the time, especially of

Friedrich Wilhelm Joseph Schelling (1775–1824). No doubt, Treviranus knew Schelling, who published the *Von der Weltseele, eine Hypothese der höhern Physik zur Erklärung des allgemeinen Organismus* (the idea of a ‘world soul’) a few years earlier (Schelling 1798). Treviranus’ brother Ludolph had listened to lectures of Schelling. And there are definitely concordances, as well as differences, between the Treviran understanding of nature and Schelling’s idea of a ‘world soul’ (Gambarotto 2018, p. 96).²⁸

For Treviranus, the whole world is to be understood as a single context, as one huge organism: “The whole universe is one single system without any boundaries [. . .]. Each individual organism is dependent on the universe.”²⁹ And all organisms interact with each other: “If the entire sensually comprehensible world is only one single organism, if the smallest thing in it is what it is only by the fact that it interacts with the largest thing, and if the largest thing has its existence only through the smallest thing, then it is pointless to want to determine something about even one atom without taking the universe into consideration.”³⁰ Each individual organism must fulfil its purpose in the whole organism, because “the whole realm of living organisms constitutes a member of the great organism, and each living individual must contribute its share to the preservation of this”³¹.

Nevertheless, Treviranus rarely refers explicitly to Schelling in his six volumes of *Biologie oder Philosophie der lebenden Natur* and rather illustrates his ideas by depicting interdependencies in nature. One could maybe even argue the other way round: that many natural philosophers at the turn of the century (including Schelling) drew their ideas from preceding ideas about the order of nature. We have already seen that in physico-theological literature of the 18th century, conceptions of nature as one big ‘system’ were in fact en vogue. Although there, of course, the emphasis had been on God as the one who had created this ‘system’, this huge organism. God is not mentioned in Treviranus. But nevertheless, his ideas are reminiscent of the physico-theological explanations, because each individual organism has its place and has to fulfil its purpose for the bliss of the whole. In the physico-theologists work, in Sander’s book, in the edition of 1784, we read “No fold of the world may be different, no being may be missing, no force may transgress its order. [. . .] The grass, every cornflower is precisely linked to the whole atmosphere, indeed to the whole solar system”.³² Here, already in the eighteenth century, in this total organism of nature, man becomes one organism among others; Sander writes “From the milky way in the sky down to the mosquitoes dancing around the pond, nothing is small, nothing is insignificant. For God nothing is small, nothing contemptible. [. . .] We are so proud that we almost always think of ourselves as the centre of creation, as the sun around which everything should revolve. But what are we more than a unity in the directory of all God’s creatures? Is it not a ridiculous delusion to believe that God has made everything in heaven, in the ocean, and on earth merely for our sake? [. . .] Poor man, who then are you in the state of God? A thousand and another thousand kinds of creatures populate this earth with thee. You fill no more than a single place; nature takes care of the preservation of the water beetle just as well as it takes care of you.”³³ Thus, Sander turns away from an anthropocentric view of the world³⁴ and confesses “The privileges of God, which the Creator has given you, are not so great that you alone may rule, and declare everything you cannot devour dead and barren.” (Sander 1784, p. 51). He even shows concrete examples that describe the disaster arising if man interferes with the natural systems. He tells, for example, a story from America, where forests had been destroyed and plants that had been important for the natural balance were lost: diseases appeared because the air had no longer been sufficiently purified by the plants (Ibid., p. 66ff). Sander connects this with the idea of the ‘bliss of the whole’: “The greatest law of beauty is unity, and this is in nature. Millions of creatures interweave their effects so that a single great purpose, the bliss of the whole, is maintained. There is nowhere in nature a contradiction, there cannot be. Everything that is and everything that happens relates to the whole, to the present and to the future. A magnificent spectacle for an archangel who understands more about it than we do!”³⁵

Treviranus does not speak of a God-given harmony anymore, yet he observes—as Sander did before—the mutual linkages and the interdependencies in nature. And even Treviranus, in some places, speculates about a kind of final reason behind it. The great organism seems to be ‘rationally ordered’ when he writes in 1805, in the third volume of the *Biologie*: “Every living body exists through the universe, but the universe also exists mutually through it. A higher mind would be able to deduce from the given organisation of a single living individual the organisation of the rest of the world”.³⁶

Whereas in late 18th century, physico-theological literature the whole of nature (including man) is seen as a total work of art, a ‘Gesamtkunstwerk’, originating from God’s genius, here, the reason behind the huge organism cannot be explained. In physico-theology, the investigation of the laws of nature, the scientific observation of nature had led to religious awe. In Treviranus’ work, on the other hand, the ecological interdependencies remain within nature; an external power directing the system does not appear. Creation is replaced by nature. But the relational structures and the mutual dependencies of living beings, the purposeful arrangements of nature within the framework of the laws of nature, remain. The question ‘What for?’, which the 18th century still provides with the answer ‘to the praise of God’, is omitted. The analysis remains within what can be described empirically. The archangel has vanished.

5. Souls, Life and the Vital Principle

In late 18th and early 19th century, many naturalists had already turned away from the Cartesian concepts—defining the animal as a soulless automaton body in contrast to the ensouled human being. The Cartesian dualism had obviously not answered the central question how body and soul interacted, what the ‘soul’ was and how it could be described, how it caused movement, etc. Thus, they searched for new models. (Whether the Cartesian concept of the animal had ever convinced those who researched botany or zoology is still subject to debate.)³⁷

And Treviranus’ concern is no longer the explanation of the interaction of body and soul. The living being (man, animal and plant) is simply seen as one entity, driven by a ‘vital force’. The vital force behind every sign of liveliness is what he now calls ‘life’ itself. And ‘life’, he says, is a mystery, something we are not able to explain. The vital principle, the ‘life force’ (‘Lebenskraft’), maintains the organism of living beings, but there is no longer an opposition of body and soul. For the physico-theologians—and one could even say for naturalists of the 18th century—this primordial reason for ‘life’ had been unquestionably the divine. But Treviranus does not comment on this at all. He rather argues that all answers at this point are highly speculative. The divine act of creating life is thus replaced by an abstract ‘life force’, a vital principle that permeates all living things. It is causing growth, reproduction, movement, etc., but it cannot be explained any further. God is, as we have seen before, not mentioned. Consequently, Treviranus rarely uses the terminology of ‘the soul’; he speaks of the ‘life force’ of every living organism. In the sixth volume of *Biology or Philosophy of Living Nature*, he even devotes an entire chapter to this subject, under the title “Connection of Physical Life with the Intellectual World”, where he puts this up for discussion: “There is a double view of the connection of the physical with the intellectual. Either spiritual and material forces are quite unlike each other; to the body of the animate the spirit is bound as an alien being. Or the spiritual and the physical are not only with but also through each other.”³⁸ Treviranus tends to stick to what he sees: the inseparable existence of mind and body. And his solution to this problem lies somehow in the middle, avoiding a final decision. While defining a ‘living matter’ or ‘self-activity’ within all living beings, he ultimately does not specify where these vital forces come from. Life remains a mystery. Already in the first volume, he admits: “But that basic force is to us what colour is to the blind-born, a philosophy which undertakes to solve this task a priori is therefore no longer philosophy, but fantasy.”³⁹ He now uses the terminology of ‘self-activity’: “The origin of all life lies in a principle whose essence is self-activity.”⁴⁰ And he devotes his detailed empirical investigations to these activities, to the life processes. And

in researching this 'life force', he is concerned with modern scientific methods: observation, experiment and verifiability.

Like Bonnet and other predecessors, Treviranus resolutely connects these vital forces with the theory of gradation and he asks himself how far mental forces extend within the gradual sequences and steps of nature. His answer is unambiguous: due to the principle of continuity, mental powers also extend into the animal kingdom. He even distinguishes between different mental powers in animals, such as the capability to invent things or the ability to remember: "Memory and the ability to recollect are the most widespread mental powers in animal nature. Even the insects give clear and sometimes striking evidence of their possession of these powers, such as the bees, for example, when they return in spring to the places where they were fed in autumn."⁴¹ On the basis of the gradation theory, these forces even extend into the plant kingdom, since here, too, not only reactions to external stimuli can take place but also movements, growth processes, etc. These life processes are a result of the inner strength, the inner vital force. The connecting 'link' between man and animal—on the continuous ladder of gradation—is the monkey. About the apes, he writes "Compare the ape with man: read the news of reliable observers of the mental abilities of the orang-outang: the distance between the ape and man will, however, be big. But the ape cannot be denied the possession of similar, though far more limited, mental powers than are given to man. The animal seems to seek and avoid, to desire and detest, to love and hate, like man. [...] The animal also remembers the past, which would not be possible without the consciousness of existence, and acts, where instinct alone cannot guide it, with deliberation and choice of means, thus with freedom."⁴²

6. Conclusions

The example of Gottfried Reinhold Treviranus shows that scientists like him were no longer concerned with classifying, collecting and perfecting the stores of knowledge, something that had been the central scientific concern and scientific technique of the early modern period. Scientists of the early 19th century were now dealing with the questions of "modern" natural science—in Treviranus' case, the functioning of organs in animals, such as in spiders. In doing so, he started from a premise that assumed active forces in nature, 'life forces'. These are, he says, not further explicable. According to Treviranus, life forces are inherent in all living organisms—man, animal and plant. And all of these are organisms. Nature itself represents a giant organism, in which complex interdependencies and interconnections prevail. It is in fact still an open question how holistic ideas such as the Treviran image of nature might have paved the way for 20th-century theories (e.g., the Gaia hypothesis developed by James Lovelock and Lynn Margulis).

Treviranus himself, in any case, recalls eighteenth-century thought: the multiplied and extended 'chain of being'. Relying on these concepts of the 'great chain of being', gradation still determines the order among living beings for Treviranus. But the idea of nature as an overall system which is structured by finest gradation now raises questions about the distribution of mental forces within nature. Thus, animals and plants are maybe not seen as 'ensouled', but they have vital powers, mental powers. A Cartesian separation into an automaton world of animals and plants on the one side, facing a human soul given by God on the other side, is no longer a convincing explanation.

Moreover, God is no longer mentioned. The life force as a formative, creative and ultimately inexplicable principle replaces him. Only in very few places in Treviranus' work can one conceive a transcendental power, characteristically rather recalling ancient terminology when he states "That we look for the reason of life, which was already honoured in the childhood of biology with the name of a spirit of life, or Archeus. It is true that our present age rejects this perception, calls it a hyperphysical hypothesis, and puts in its place the mere form and mixture of matter. But that fundamental force is a hyperphysical being."⁴³ In *Erscheinungen und Gesetze des organischen Lebens*, which he published a little later, it becomes even clearer: "If we now proceed to the consideration of our object itself, we must first

answer the question: What actually is life? Whoever utters this word names something mysterious. The region of life borders on the supernatural world" (Treviranus 1831).⁴⁴

In that respect, Treviranus is well aware of his predecessors. He explicitly states "All observation [. . .] and all reflection on it leads finally to an original cause which can only be guessed at. Therefore, all those who investigated the phenomena of life with a pure heart were people of deep religious feeling. I recall only Swammerdam, Bonnet and Linné. Their piety, of course, wore the dress of their education and their era. But even if Swammerdam appears to have been a bit of a raving theologian when he spoke of his great zootomic discoveries [. . .] even if Bonnet and many other naturalists of the last century praised their own wisdom for that of the Creator, they still sought, though on the wrong track, the higher light whose reflection they had glimpsed."⁴⁵ Treviranus finds another solution: nature is permeated with a vital force; nature is a giant organism, a living system. He distances himself from a mechanistic or purely dissecting view of nature and, at the same time, distances himself from speculation: "Whoever fails to recognise this light in nature only sees an eternal cycle of coming into being and passing away. Whoever, dreaming or writing poetry, seeking words that are supposed to correspond to the light, and thus tries to explain the phenomena of life, does not find the truth, but only his fantasies everywhere".⁴⁶

Can the Treviran 'Romantic natural science', which was bound to organicist thinking and yet, at the same time, insisted on empiricism, be understood as being part of a 'counter-Enlightenment', an unscientific 'interlude' in the development of modern natural sciences? Treviranus rather appears as a renewed case for Late Enlightenment vitalism, as Peter Hanns Reill has described it. Reill defined Late Enlightenment vitalism as a movement that remained in fact linked to the ideals of Enlightenment. According to him, these ideas can neither be equated with Schelling's philosophy of nature nor with a Romantic counter-Enlightenment or even a mystification of nature and rapturous view of nature—it is an image of nature that has its own contours (Reill 2005). Treviranus' concept of the natural order is in fact based on central concepts of the Enlightenment. On one of the most powerful terms of the Enlightenment, 'reason', he writes "No purposeful activity is conceivable without an analogue of reason. Purposefulness is the actual character of the activity of reason [. . .] every expression of life must therefore be the effect of a principle similar to reason" (Treviranus 1831).⁴⁷ For him, nature is 'rationally' arranged and decipherable with the help of the mind, with reason.

It is undoubted that this kind of 'Romantic natural science' attempted to counter the fragmenting sciences at the beginning of modernity. Scientists such as Treviranus definitely searched for a great synthesis, an overall view of the world (See: Barkhoff 2009, pp. 209–26, esp. p. 210). He aims at this when he retrospectively writes in 1831: "The subject of which I shall communicate the results of my research in this work is the history of the origin, activity and decay of living beings and the relationships in which they stand to each other and to the rest of nature, their individual parts to each other and to the whole."⁴⁸ In doing so, he devotes himself to a (for the time being, final) linking of natural science and philosophy, focusing on the concept of life and the origin of life: "One can acquire profound mineralogical, chemical and physical knowledge without reflecting on the great questions: What, from where and for what purpose are we ourselves? But one cannot even gain any certainty about the origin of the infusion animals without coming up against questions that are linked to those questions".⁴⁹ Thus, in Treviranus, both the scientist *and* the philosopher speak; one merges into the other. Because only in researching nature, in the mirror of the natural environment, does man find his place. He says "To know oneself is the first law for the wise. But no one knows himself, as little in spirit as in body, who does not compare himself with the beings related to him."⁵⁰ Reading Treviranus, we might get an idea about the complexity of how theology and natural science developed together and maybe also how they finally became alienated from each other.

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Notes

- 1 (Treviranus 1802, vol. 1, p. 107). „Wir betrachten hierauf die Organisation der lebenden Natur, oder die Verhältnisse, worin die lebende Natur, als ein einziger grosser Organismus.“ (All translations in the following: S.R.).
- 2 For example: (Junker 2004, p. 8). On the discussions about the term ‘biology’, in combination with ‘life force’: (Höxtermann and Hilger 2007, p. 100ff).
- 3 For example, in a basic introduction to biology: (Jahn et al. 1982, p. 311).
- 4 “The first naturalist in the German-speaking world to sketch the outline of a theory concerned with the historical transformation of living forms”. (Gambarotto 2014, p. 137).
- 5 (Weber 1837, p. 4). “In der That welcher Physiologe mögte in höherem und würdigerem Sinne, als Treviranus, ein Philosoph der Natur, ja ein Seher und Mystagog ihrer Geheimnisse, genannt zu werden verdienen? Daß über diese Todesbotschaft die wissenschaftlichen Forscher von ganz Europa sich bestürzt fühlen werden. Denn Gottfried Reinhold Treviranus war ein Mann, dessen umfangreiches, tiefes Wissen das einer ganzen Facultät, dessen Leistungen die einer ganzen Academie allein aufwogen.”
- 6 For biographical details see: (Pagel 1894, p. 588).
- 7 For detailed information on both brothers and their work, see: (Hermes 2011).
- 8 (Treviranus 1802, vol. 1, p. v). “Zwar gab es immer schon Männer, und Linné selbst gehörte zu diesen, welche einsahen, dass alle jene künstlichen Systeme, ohne Beziehung auf höhere Zwecke, nur schwerer Tand seyen. Allein sie erhoben sich nicht zu dem höchsten dieser Zwecke, und darum blieb alles, was sie in Beziehung auf diesen lieferten, blosses Stückwerk. Das letzte Ziel aller Naturforschung aber ist die Erforschung der Triebfedern, wodurch jener grosse Organismus, den wir Natur nennen, in ewiger Thätigkeit erhalten wird [. . .]. Wir haben erst ein blosses Register, noch keine Wissenschaft der Natur, so lange wir ewig an diesen Systemen kleben, und nicht auf die Erreichung jenes Ziels ausgehen.”
- 9 (Treviranus 1802, vol. 1, p. 4). “Unsere Absicht ist, einen neuen Versuch zu wagen [. . .]. Die Gegenstände unserer Nachforschungen werden die verschiedenen Formen und Erscheinungen des Lebens seyn [. . .]. Die Wissenschaft, die sich mit diesen Gegenständen beschäftigt, werden wir mit dem Namen der Biologie oder Lebenslehre bezeichnen.”
- 10 Ibid., p 16. “Wir nennen ein Thier, eine Pflanze lebend, so lange wir noch Spuren von Wachsthum und Bewegung, also von Thätigkeit, bey ihnen antreffen. Allein zugleich denken wir uns diese Thätigkeit als etwas in dem Körper, dem wir Leben zuschreiben, von Innen, nicht von Aussen hervorgebrachtes.”
- 11 (Treviranus 1802, vol. 1, pp. 16, 17). “Das Meer, das vom Sturme bewegt wird, ist auch in Thätigkeit. Dennoch schreiben wir ihm kein Leben zu: Warum? Weil ihm jene Bewegung durch äussere Kräfte mitgetheilt ist. Jede Bewegung nun, welche von äussern Kräften herrührt, welche mitgetheilt ist, nennen wir eine mechanische, und diejenigen Bewegungen, wodurch sich das Leben äussert, unterscheiden sich von den mechanischen, folglich dadurch, dass sie nicht durch äussere, sondern durch innere Ursachen hervorgebracht werden.”
- 12 (Treviranus 1802, vol. 1, p. 17). “Wäre der lebende Körper ein ganz isolirtes Wesen, das jeden Grund seiner Bewegungen nur in sich selbst enthielte, so wäre die Gränze zwischen diesem und den mechanischen Bewegungen freylich leicht zu ziehen. Aber alle Aeusserungen seiner Thätigkeit sind Produkte einer Wechselwirkung zwischen ihm und der Aussenwelt.”
- 13 (Treviranus 1802, vol. 1, p. 3). “Wir finden die sichtbare Natur in zwey grosse Reiche geschieden, in die leblose und in die lebende.”
- 14 On Europe-wide physico-theology as a combination of natural science and theology, see: (Blair and Von Greyerz 2020).
- 15 (Bonnet 1774, p. 371). “Die Natur geht durch unmerkliche Abfälle vom Menschen zum Polypen, von diesem zur empfindlichen Pflanze, von dieser zum Trüffel herab. Die höhern Arten hängen jederzeit durch irgendeinen Charakter mit den niedrigeren, und diese mit den noch niedrigeren, zusammen.”
- 16 This is based on the edition of 1784: (Sander 1784).
- 17 (Sander 1784, pp. 25, 26). “Die Schöpfung ist ein einziges Ganzes. Alles ist nach einem Riß angelegt, alles hat Symmetrie, Proportion, Maas, Zahl, und Gewicht, es ist nichts da, das nicht in den allgemeinen Plan der Gottheit passen sollte. [. . .] Vermittelst dieser tausendfachen Verkettungen und Verknüpfungen regiert Gott die Welt.”
- 18 (Sander 1784, pp. 69, 71). “Das grösste Gesez der Schönheit ist die Einheit, und diese ist in der Natur. Millionen Geschöpfe verflechten ihre Würckungen so untereinander, daß ein einziger grosser Zweck, die Glückseligkeit des Ganzen, erhalten wird. In der Natur ist nirgends ein Widerspruch, kann nicht sein. [. . .] Die ganze Erde beweist es, daß ein höchstes, allmächtiges, weises, und gütiges Wesen die lange Kette des menschlichen Lebens in Händen hat. Je mehr man die Natur kennen lernt, je

mehr man den Zusammenhang aller Geschöpfe untereinander einsieht, desto mehr gewinnt der Gedanke, daß Gott Vater und Wohltäter der Welt sei.“

- 19 (Anonymous 1804, p. 39f). “Die Natur geht mit majestätisch langsamen Schritten einher, hebt sich von Stufe zu Stufe, und stellt, unerschöpflich an Abwechslungen, Myriaden von Wesen auf, die, wie die Sprossen einer Leiter, immer in höherer Ordnung übereinander stehen. Der Stein gränzt an die Pflanze, die Pflanze an das Thier, das Thier an den Menschen, der Mensch an die Geisterwelt. Aber welcher Abstand vom Kiesel zur Tanne, von der Tanne zur Auster, von der Auster zum Hottentotten, vom Hottentotten zum weisesten Menschen! Gleichwohl ist die Natur das vollkommenste Ganze; sie arbeitet in einem fort; thut nichts durch einen Sprung; lässt nirgends eine Lücke; knüpft Wesen an Wesen, und verbindet sie unvermerkt, schattiert sie so fein, verwischt ihre Gränzlinien so sanft, dass der Forscher noch in dem nemlichen Naturreiche zu wandeln glaubt, wenn er in dem darauffolgenden schon weit fortgerückt ist. Die Natur zwar kennt keine Klasseneintheilung; jedes einzelne Wesen ist ein Ring ihrer unermessliche Kette, so wie es in der Welt nicht zwey Dinge giebt, die einander vollkommen gleich wären: nur der eingeschränkte Menschenverstand hat sich, aus Ermüdung über die unübersehbare Reihe erschaffener Wesen, gewisse Ruhepunkte ausgesteckt.“
- 20 These schemes became more and more confusing, Annette Diekmann has written on this: (Diekmann 1992).
- 21 (Treviranus 1802, vol. 1, pp. 446–75). Section Six: “Gradationen der lebenden Natur“.
- 22 (Treviranus 1802, vol. 1, p. 447). “Die ganze lebende Natur lässt sich in Ansehung der Mischung ihrer Organisation unter zwey grosse Abtheilungen bringen: in der einen hat der Stickstoff, in der anderen der Kohlenstoff das Übergewicht. Jene begreift die Thiere und Thierpflanzen, diese die Pflanzenthiere und Pflanzen. Die erstern nähern sich insgesammt der animalischen, die letztern der vegetabilischen Organisation.“
- 23 (Treviranus 1802, vol. 1, p. 447). “Es giebt für jede dieser beyden Abtheilungen ein Maximum und ein Minimum in der gesammten Organisation [. . .] Das Maximum der thierischen Organisation finden wir bey den Säugethieren, und vorzüglich bey dem Menschen, das Minimum bey den Infusionsthieren. Das Maximum der pflanzenartigen Bildung ist den Dictyledonen mit einer vielblättrigen Blumenkrone (Blütenpflanzen A.d.V.), das Minimum mehrern Geschlechtern aus den Familien der Schwämme, Conferven, Tange und Flechten eigen. Es giebt eine ununterbrochene Gradation von jedem Maximum der lebenden Natur zu jeder ihrer einfachsten Gestalten.“
- 24 (Treviranus 1802, vol. 1, pp. 474, 475). “Die Natur, sagte Leibnitz, bildet ein Ganzes, dessen Theile in so enger Verbindung stehen, dass es den Sinnen und selbst der Einbildungskraft unmöglich ist, den Punkt anzugeben, wo der eine aufhört und der andere anfängt. Dieser Ausspruch bleibt wahr und gewiss! Aber wenn eben dieser Weltweise jenes Ganze eine *e i n f a c h e* Kette nannte, so darf diese Vergleichung nicht wiederholt werden. Nicht eine einzige, sondern Tausende und noch viele Tausende von Ketten, die mit unendlicher Kunst zu dem engsten Knoten verschlungen sind, machen das Ganze der Natur aus.“
- 25 (Treviranus 1802, vol. 1, pp. 156, 157). “Auf wessen Seite liegt aber nun die Wahrheit, auf der unserigen, die wir, an die Unterscheidung einer leblosen und lebenden Natur von Jugend auf gewöhnt [. . .] oder auf Seiten dessen, der [. . .] in jenen Phänomenen noch einen schwachen Widerschein des Lebens findet? Wer unbefangen diese Frage erwägt, wird sich schwerlich zum Schiedsrichter aufwerfen, er wird eingestehen, dass wir noch nicht im Stande sind, eine Gränze zwischen der lebenden und leblosen Natur festzusetzen.“
- 26 (Treviranus 1802, vol. 1, p. 453f). “Ferner bestätigt sich diese Gradation bey dem Gehirne. Schon bey den Säugethieren vermisst man viele Eigenthümlichkeiten des menschlichen Gehirns. [. . .] Bey den Vögeln verschwinden die Windungen des Gehirns gänzlich. [. . .] Noch einfacher ist das Gehirn der Amphibien und Fische.“
- 27 (Treviranus 1822, vol. 1, p. 16). “über den taub und blind gebornen David Tate, einen fünf und zwanzigjährigen, zu Fetlar, einer der Shetländischen Inseln, lebenden jungen Menschen, der auf einer so niedrigen Stufe des menschlichen Daseyns stand, dass er selbst die aufrechte Stellung nicht anders als gezwungen annahm, und dessen ganze Gemeinschaft mit der äussern Welt nur durch den Tastsinn vermittelt wurde.“
- 28 Andrea Gambarotto refers both to Treviranus’ critique of a Schellingian ‘world soul’ and to the adoption of an organizistic conception of nature. (Gambarotto 2018, p. 96).
- 29 (Treviranus 1802, vol. 1, pp. 36, 37). “Dass das ganze Weltall nur ein einziges gränzenloses System ausmacht [. . .] Jeder einzelne Organismus ist abhängig vom Universum“.
- 30 (Treviranus 1803, vol. 2, p. 3). “Ist die ganze Sinnenwelt nur ein einziger Organismus, ist das Kleinste in ihr das, was es ist, nur dadurch, dass es mit dem grössten in Wechselwirkung steht, und hat das Grösste sein Daseyn nur durch das Kleinste, so ist es ein eitles Beginnen, auch nur über ein Atom etwas bestimmen zu wollen, ohne auf das Universum Rücksicht zu nehmen.“
- 31 (Treviranus 1802, vol. 1, p. 68). “ . . . dass das ganze Reich der lebenden Organismen ein Glied des allgemeinen Organismus ausmacht, und dass jedes lebende Individuum zur Erhaltung dieses Gliedes das Seinige beitragen muss.“
- 32 (Sander 1784, p. 71). “Keine Falte der Welt darf anders sein, kein Wesen darf fehlen, keine Kraft darf ihre Ordnung überschreiten. [. . .] Das Gras, jede Kornblume steht mit der ganzen Atmosphäre, ja mit dem ganzen Sonnensysteme in genauer Verknüpfung.“
- 33 (Ibid., p. 50f). “Von der Milchstrasse am Himmel herab bis zu den Mücken; die um den Teich tanzen, ist nichts klein, nichts geringfügig. Für die Gottheit ist nichts gering, nichts verächtlich. [. . .] Wir sind so stolz, daß wir uns beinahe immer, als den Mittelpunkt der Schöpfung, als die Sonne, um die sich alles herumdrehen soll, ansehen. Aber was sind wir mehr, als eine Einheit im Verzeichnis aller Geschöpfe Gottes? Ist es nicht ein lächerlicher Wahn zu glauben, daß Gott alles im Himmel, im Ocean, und

auf der Erde bloß um unsertwillen gemacht habe? [. . .] Armer Mensch, wer bist Du dann im Staat Gottes? Tausend und wieder tausend Arten von Geschöpfen bevölkern diesen Wohnplatz mit Dir. Du füllst nicht mehr, als eine einzige Stelle aus, die Natur sorgt für die Erhaltung des Wasserkäfers eben so gut, als für dich.“

34 Keith Thomas calls it “the dethronement of man”: (Thomas 1984, p. 165ff).

35 (Ibid., p. 69). “Das grösste Gesetz der Schönheit ist die Einheit, und diese ist in der Natur. Millionen Geschöpfe verflechten ihre Wirkungen untereinander, daß ein einziger grosser Zweck, die Glückseligkeit des Ganzen, erhalten wird. In der Natur ist nirgends ein Widerspruch, kan nicht sein. Alles, was ist, und alles, was geschieht, bezieht sich aufs Ganze, aufs Gegenwärtige, und aufs Zukünftige. Prächtiges Schauspiel für einen Erzengel, der davon mehr versteht als wir!“

36 (Treviranus 1805, vol. 3, p. 552f). „Jeder lebende Körper besteht durch das Universum, aber das Universum besteht auch gegenseitig durch ihn. Ein höherer Verstand würde aus der gegebenen Organisation eines einzigen lebenden Individuums die Organisation der ganzen übrigen Welt abzuleiten im Stande sein.“

37 Already as early as the 17th century, the English botanist John Ray contradicted the idea of the automaton body of animals. (Ray 1744, p. 55). Interestingly, even before the middle of the 18th century, Ray adds here that one could assume a kind of ‘plastick principle’, a kind of forming force (“*but if it be material and consequently the whole Animal but a mere Machine, or Automaton, as I can hardly admit, then we must have recourse to a Plastick Nature*”).

38 (Treviranus 1822, vol. 6, book 9, p. 3f). “Es gibt eine doppelte Ansicht der Verbindung des Physischen mit dem Intellektuellen. Entweder geistige und materielle Kräfte sind einander ganz ungleichartig; am Körper des Beseelten ist der Geist als ein fremdartiges Wesen gefesselt. Oder das Geistige und das Körperliche sind nicht nur mit, sondern auch durch einander.“

39 (Treviranus 1802, vol. 1, p. 81). “Aber jene Grundkraft ist für uns, was die Farbe für den Blindgebohrnen, und eine Philosophie, welche diese Aufgabe a priori zu lösen sich unterfängt, ist also nicht mehr Philosophie, sondern Schwärmerei.“

40 (Treviranus 1822, vol. 6, 1822, p. 5). “Der Ursprung allen Lebens liegt in einem Princip, dessen Wesen Selbstthätigkeit ist.“

41 (Treviranus 1822, vol. 6, p. 13f). “Gedächtnis und Erinnerungsvermögen sind überhaupt die am weitesten in der thierischen Natur verbreiteten Seelenkräfte. Selbst die Insekten geben deutliche und zum Theil auffallende Beweise von dem Besitz derselben, wie unter andern die Bienen bey ihrer schon erwähnten Rückkehr im Frühjahr zu den Stellen, wo sie im Herbste gefüttert wurden.“

42 (Treviranus 1822, vol. 6, p. 7f). “Man vergleiche den Affen mit dem Menschen: man lese die Nachrichten zuverlässiger Beobachter von den Geistesfähigkeiten des Orang-Outang: den Abstand zwischen diesem und dem Menschen wird man allerdings gross finden. Aber den Besitz ähnlicher, wenn auch weit mehr beschränkter, geistiger Kräfte, als dem Menschen verliehen sind, wird man dem Affen nicht absprechen können. Das Thier scheint zu suchen und zu meiden, zu begehren und zu verabscheuen, zu lieben und zu hassen, wie der Mensch. [. . .] das Thier erinnert sich auch an Vergangenes, welches ohne Bewusstseyn der Existenz nicht möglich wäre, und handelt da, wo der Instinkt allein dasselbe nicht leiten kann, mit Ueberlegung und Wahl der Mittel, also mit Freyheit.“

43 (Treviranus 1802, vol. 1, p. 52). “dass wir den Grund des Lebens in einer Ursache suchen, die man schon in der Kindheit der Biologie mit dem Namen eines Lebensgeistes, oder Archeus ahndete. Zwar verwirft unser jetziges Zeitalter diese Ahndung, nennt sie eine hyperphysische Hypothese, und setzt an die Stelle derselben die blosser Form und Mischung der Materie. Allein jene Grundkraft ist ein hyperphysisches Wesen.“

44 (Treviranus 1831, vol. 1, p. 7). “Gehen wir jetzt zur Betrachtung unsers Gegenstandes selber über, so liegt uns zuerst die Beantwortung der Frage ob: Was eigentlich Leben ist? Wer dieses Wort ausspricht, nennet etwas Geheimnisvolles. Die Region des Lebens gränzt an die Übersinnliche Welt.“

45 (Treviranus 1831, vol. 1, p. 4f). “Alles Beobachten jener Zweckmässigkeit [. . .] und alles Nachdenken darüber führt endlich zu einem Urgrund, der sich nur ahnen lässt. Daher waren alle, die den Erscheinungen des Lebens mit reinem Herzen nachforschten, Menschen von tiefem religiösem Gefühl. Ich erinnere nur an Swammerdam, Bonnet und Linné. Ihre Frömmigkeit trug freilich das Kleid der Erziehung und ihres Zeitalters. Aber wenn auch Swammerdam faselnd erscheint bei den theologischen Ausführungen, die er von seinen grossen zootomischen Entdeckungen machte [. . .] wenn auch Bonnet und viele andere Naturforscher des vorigen Jahrhunderts ihre eigene Weisheit für die des Schöpfers priesen, so suchten sie doch, obwohl auf Abwegen, das höhere Licht, dessen Abglanz sie erblickt hatten.“

46 Ibid. “Wer dieses Licht in der Natur verkennet, sieht trostlos in ihr nur einen ewigen Kreislauf von Entstehen und Vergehen. Wer träumend oder dichtend Worte sucht, die dem Licht entsprechen sollen, und damit an die Erklärung der Erscheinungen des Lebens geht, findet nicht die Wahrheit, sondern allenthalben nur seine Hirngespinnste.“

47 (Treviranus 1831, vol. 1, p. 10). “Kein zweckmässiges Wirken ist ohne ein Analogon der Vernunft denkbar. Zweckmässigkeit ist der eigentliche Charakter des Wirkens der Vernunft [. . .] jede Lebensäusserung muss also Wirkung eines, der Vernunft ähnlichen Principis sein.“

48 (Treviranus 1831, vol. 1, p. 1). “Der Gegenstand, worüber ich die Resultate meiner Forschungen in diesem Werke mittheilen werde, ist die Geschichte des Entstehens, Wirkens und Vergehens der lebenden Wesen und der Verhältnisse, worin sie zu einander und zur übrigen Natur, ihre einzelnen Theilen zu einander und zum Ganzen stehen.“

- ⁴⁹ (Treviranus 1831, vol. 1, p. 3). “Man kann sich tiefe mineralogische, chemische und physische Kenntnisse erwerben, ohne über die grossen Fragen zu reflectiren; Was, woher und wozu wir selber sind? Aber man kann nicht einmal über die Entstehung der Aufgussstherchen zur Gewissheit gelangen, ohne auf Fragen zu stossen, die sich an jene knüpfen.”
- ⁵⁰ (Treviranus 1831, vol. 1, p. 1). “Sich selber erkennen ist das erste Gesetz für den Weisen. Aber Niemand erkennt sich selber, so wenig dem Geiste als dem Körper nach, der sich nicht mit den ihm verwandten Wesen vergleicht.”

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Article

Naturmenschen? Alexander von Humboldt and Indigenous People

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Abstract: In the numerous texts he wrote about his grand voyage to the Americas (1799–1804), the Berlin-born, highly influential, independent scholar Alexander von Humboldt (1769–1859) considers the people in Spanish America time and time again. While Humboldt was trained as a botanist, geologist, and mining engineer, he was nevertheless fascinated by indigenous actors who employed specific competencies as they operated in their natural environments and their own socio-cultural contexts, which were distinctly different from those in Europe. His perspectives on indigenous people are complex and refer back to various current discourses of his day. Although these texts address very different topics across a range of disciplines, they nevertheless clearly testify to his intense interest in Latin American society and culture. Humboldt repeatedly reconsiders his approaches to these topics; in a characteristically Humboldtian manner, he attempts to understand quite diverse phenomena by means of precise, on-site observation, comparison, and contextualization. In so doing, his argumentation oscillated between the poles established and defined by contemporary discourse, namely ‘savage’ and ‘barbarism’ on one side of the spectrum, and ‘civilization’ on the other.

Keywords: Humboldtian science; barbarism; savage; civilization; indigenous knowledge

1. Introduction

In the numerous texts he wrote about his grand voyage to the Americas (1799–1804), the Berlin-born, highly influential, independent scholar Alexander von Humboldt (1769–1859) considers the people in Spanish America time and time again. While Humboldt was trained as a botanist, geologist, and mining engineer, he was nevertheless fascinated by indigenous actors who employed specific competencies as they operated in their natural environments and their own socio-cultural contexts, which were distinctly different from those in Europe. His perspectives on indigenous people are complex and refer back to various current discourses of his day. Although these texts address very different topics across a range of disciplines, they nevertheless clearly testify to his intense interest in Latin American society and culture. Humboldt repeatedly reconsiders his approaches to these topics; in a characteristically Humboldtian manner, he attempts to understand quite diverse phenomena by means of precise, on-site observation, comparison, and contextualization. In so doing, his argumentation oscillated between the poles established and defined by contemporary discourse, namely ‘savage’ and ‘barbarism’ on one side of the spectrum, and ‘civilization’ on the other.

Both the sources themselves and the current state of research on Alexander von Humboldt resemble either a mushrooming plant or a branching labyrinth—not least in the sense that it is difficult to get an overview of either. Humboldt wrote an immense number of texts, which were available in various editions and different languages even during his lifetime, not to mention today. It would be difficult to find another historical actor about whom a comparable amount of research has been published in recent decades. This is all the more true when one looks beyond the biographies published around the time of the 250th anniversary of his birth in 2019. Beyond questions of science in the narrower sense, Humboldt’s work and personality clearly lend themselves to his stature as

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a pioneer and a role model. This applies, for instance, to Humboldt's status as the 'second discoverer' of America and an advocate for the continent in the famous "Dispute of the New World", someone to whom the freedom fighters who rallied around Simón Bolívar also paid tribute; it applies to Humboldt as arguably the first ecologist and the founder of a new, future-oriented understanding of nature; as an intellectual who thought in global terms; as the new 'national icon' who, especially in the German culture of remembrance, personifies the 'good' Prussian German, filling the gap left by all those Friedrichs and Wilhelms who have fallen from grace and are no longer worthy of veneration (Gerbi 1973), (Clark and Lubrich 2012), (Sachs 2006), (Wulf 2015), (Ette 2009).¹ With a sly wink, people today nickname Humboldt 'Super Alex' or dub him 'Everybody's Darling' (Osterhammel 2022).² In the midst of so much praise, it is worthwhile to consider the critical voices as well. From a decidedly postcolonial perspective, in a 1992 article that is still well worth reading, Mary Louise Pratt criticizes Humboldt's quasi-reinvention of America as first and foremost—in his own words—"the stupendous display of wild and gigantic nature", a view that served both the romantic and the imperialist-expansionist interests of the elite in Europe as well as the up-and-coming creole elites in South America. According to Pratt, indigenous societies are more or less absent from Humboldt's books, and when indigenous actors do appear, they do so only "as instrumental subjects". In this respect, she attributes to Humboldt the idea that "the more savage the nature, the more savage the culture". (Pratt 1992, pp. 111, 130, and 133)³ In German-language research, Oliver Lubrich in particular has emphasized that Humboldt's approach more closely resembles that of a cultural-anthropological 'participant observer' who—with a humanist ethos, already thinking beyond colonial contexts—posed "the question of the 'unity of the human race' (*Einheit des Menschengeschlechtes*) in all its diversity". (Lubrich 2009, p. 167)⁴

As far as Humboldt's understanding of both nature and culture is concerned, his starting point in empirical field research, his transdisciplinarity, and his focus on 'interdependencies' (*Wechselwirkungen*) of various kinds are all worth emphasizing.⁵ Andrea Wulf's bestselling book about Humboldt and his successors, *The Invention of Nature* (2015), has received much attention in the publishing world. She sketches Humboldt as a modern subject who sought to combine scientific analysis with holistic, romantic experiences of nature in an innovative way. (Wulf 2015). However, the debate over Wulf's thesis has raised doubts, especially in German-language research. On the one hand, in the context of 'Humboldtian Science', there is the question of the extent to which the American traveler's findings are innovative in terms of the history of science. (Glaubrecht 2019b, vol. 10, pp. 376–79; Glaubrecht 2019a). On the other hand, scholars have pointed out that Humboldt's texts go beyond Romantic experience and scientific measurements to show a nuanced understanding of complex human–nature relationships, whereby—in an ultimately postcolonial fashion—local political power relationships were reflected as well. (Eibach and Haller 2021)⁶ My article takes up this point.

Humboldt has left behind an exceptionally extensive and heterogeneous textual corpus. To start with, we should remember that the scholarly discourse of his day developed and propagated new ideas, some of which are still influential today. As an example, we have the following keywords: firstly, the idea of humanity's 'natural state' (*Naturzustand*) in Enlightenment discourse (especially in the work of Jean-Jacques Rousseau); secondly, the Romantic concept of the sublime, 'primordial' (*ursprüngliche*), all-powerful nature; and thirdly, concerning indigenous peoples, especially those who lived in 'primeval forests' (*Urwäldern*), labels oscillated between opposing poles—on one end the uncivilized, 'barbarous man-eaters' (*rohe Menschenfresser*), and on the other the 'noble savages' (*edle Wilde*)! In addition to Romanticism's historical imagination, the racial discourse of the Enlightenment—which focused on systematization and typologies—also played a role here: popular and widely read eighteenth-century travelogues describing journeys through non-European countries fed this discourse with new information, views, and opinions. (Nutz 2009), (Peter-Röcher 1998), (Röcklein 1996)⁷

Of course, Humboldt himself was familiar with these opinions, and he refers to them over and over again. Yet had he merely reproduced the dominant discourse of the European ‘République des Lettres’, then ‘Humboldtian Science’ would hardly be worth talking about today. In fact, his characteristic style of differentiation is based on empirical methods, personal observation, and direct interaction in the field. Moreover, he takes delight in falsifying widespread stereotypes, and he formulates his ideas accordingly—sometimes emphatically and sometimes with a pinch of irony. From his own perspective, this traveler to the Americas sketches the appearance, knowledge, practices, and means of communication of the people on the Llanos, along the Orinoco River and the Rio Apure, and in the Andes. In the process, he also calls attention to the violence and repression that affected indigenous groups. This is the basis for Humboldt’s prestige among intellectuals in Latin America to this day. On top of all this, Humboldt is also interested in the ‘theories of the natives’, and he tries to explain the thinking and practices of these actors in comparison to other cultures.⁸ Whether directly or indirectly, he has no other option but to classify indigenous people’s practices in this way. Thus he inherits a basic epistemological problem of the Enlightenment, which raises the question: Does Humboldt construct an insurmountable opposition between ‘primitive people’ (*Naturmenschen*) and ‘advanced civilizations’ (*Hochkulturen*), or between ‘nature peoples’ (*Naturvölkern*) and ‘culture peoples’ (*Kulturvölkern*)? Such assessments, which draw on alterity, are to be expected from the liberal Alexander von Humboldt, who upon his return from America became a key player in the shift from the European ‘République de Lettres’ to the global ‘scientific community’, and who remained convinced throughout his life that progress could be achieved through ‘discoveries’ and through science. This is precisely the point at which Humboldt becomes interesting. In what follows, I will focus on two aspects of Humboldt’s writings:

1. Conceptual labels and contemporary discourse;
2. Observations of indigenous people in their natural environment.

2. Conceptual Labels and Contemporary Discourse

Humboldt understands the power of concepts and, thus, the fact that they are open to question. Nevertheless, he depends on them and has been trained in their use. He sometimes uses them spontaneously and provisionally, sometimes reflectively and critically. A longer quotation from one of Humboldt’s published travelogues clarifies this problem from his own perspective:

I use the word ‘savage’ (*Wilder*) with regret, in that it implies that there exists between the subjugated Indian (*Indianer*) living in the missions and the free, independent Indian a difference in culture which is often disproved by observation. In the forests of Southern America, native tribes live quietly together in villages, obeying their chiefs, planting banana, manioc, and cotton on fairly extensive lands, and weaving their hammocks from it [the cotton]. They are hardly more barbarous than the naked Indians of the missions, who have been taught to make the sign of the cross.

Additionally, according to Humboldt: “It is a fairly common mistake in Europe to think that all non-subjugated Indians are non-sedentary people and hunters. [Yet] agriculture existed in Tierra Firme long before Europeans arrived; indeed, it still exists between the Orinoco and the Amazon rivers, in forest clearings where missionaries have never been.”⁹

In this passage from his *Reise in die Äquinoktial-Gegenden*, first published in French, Humboldt not only reflects on the problematic nature of labels such as ‘savage’ and ‘barbarian’, as well as the questionable, even pointless practices of the missions in South America; he also challenges the model of progressive historical stages, which was much discussed during the Enlightenment. According to this model, hunter-gatherers represented the lowest level of human development, while farmers represented a higher level. According to Humboldt, however, agriculture already existed in South America before Columbus arrived. Yet even a cursory reading of his texts shows that Humboldt quite often speaks

of ‘savages’ (*l’homme sauvage*), ‘wild Indians’ (*Indiens sauvages*), or similar terms without necessarily intending these to be pejorative terms.

In order to systematically and comprehensively trace Humboldt’s discourse—or more precisely, his use of key terms—below I present the results of a digital full-text search of Humboldt’s *Sämtliche Schriften* (*Collected Writings*, Bern edition), edited in 2019 by a team led by Oliver Lubrich and Thomas Nehrlich at the University of Bern. Hence the foundation for this analysis is all the articles, essays, and contributions Humboldt published during his lifetime—that is, all of his published texts, with the exception of his monographs. Thus, the focus of this article is not on one specific field of knowledge, inextricably connected with colonial science and the exploitation of resources, as in Allison Bigelow’s seminal study on early modern *Mining Language* (Bigelow 2020). Instead, my focus here is on Humboldt’s use of concepts and his perspectives on Amerindian people, which have to be seen in the context of the manifold discourses of his day. Humboldt did not argue as a mining engineer (which he was by profession), but from various disciplinary perspectives in the age of the Enlightenment, Romanticism, liberalism, and colonialism.

Altogether, this corpus spans seven volumes and three supplementary volumes, comprising approximately 750 texts on a wide variety of subjects, all of which flowed from Humboldt’s pen between 1789 and 1859. If we add the different versions and the translations into other languages, which are also included in this edition, then this corpus comprises no less than 3600 published texts or documents.¹⁰ The content of these texts encompasses all the topics Humboldt ever addressed as an author, without regard to disciplinary boundaries. Here one could object to the fact that his well-known, longer book publications—such as *Views of Nature* or the above-mentioned *Reise in die Äquinoktial-Gegenden* (in French: *Relation historique*; in English: *Personal Narrative*)—are missing from this corpus of sources. However, a closer inspection of the *Sämtliche Schriften* shows that Humboldt repeatedly published excerpts of his major works as spin-offs (something like single songs from CDs or LPs) in academic journals, newspapers, magazines, and other print media—sometimes more than once, and sometimes with variations in content. Humboldt used these as opportunities to respond to requests from and interest among the contemporary academic community as well as the general public. In quite a few cases, no one explicitly asked him for permission to print, and the texts were published without authorization—bootleg copies, in a manner of speaking. Thus, the *Sämtliche Schriften* corpus encompasses a broader Humboldtian discourse in the ‘Age of Humboldt’, extending beyond his better-known works. One of the great advantages of the Bern edition of the *Sämtliche Schriften*, which is published both in print and in digital format, is that it enables full-text online searches.¹¹ Using individual search terms, researchers can call up thematically relevant passages as well as entire texts, including all the variants published during Humboldt’s lifetime. In what follows, I have supplemented these digitally determined quantitative results with readings from Humboldt’s diaries and monographs.

This quantitative evaluation of selected terms in the *Sämtliche Schriften* both underscores and nuances the impression I have sketched in the introduction with regard to the term ‘savage’—the use of which clearly caused Humboldt some concern. Thus, it becomes apparent that, in his characterizations of indigenous people in South America during the late phase of the Spanish colonial empire, Humboldt reverted to the accepted contemporary terminological arsenal, which is problematic from our perspective today, while at the same time, he wrestled with these very terms—in some cases explicitly rejecting them, searching for alternatives, paraphrasing, or relativizing them by means of argumentation.

Returning to the guiding question of this article, the first finding is that this Prussian-born global intellectual speaks of *Naturmenschen*—or more precisely, “simple, natural people”—in only one of his texts. Entering the terms *Naturvolk*, *homme de la nature*, or *homme naturel* in the database search function yields no results at all. The single exception is found in a text written in 1841, in a preface in which Humboldt, searching for an explanation for the sharp decrease in the water level of a lake in what is now Guyana, not only considers scientific hypotheses but is also interested in the “myths” and “opinions”

that “also present themselves to the simple natural man [*Naturmenschen*] at the sight of the earth’s surface, the colored stripes of the previous water levels, [and] the scattered shells on the nearby hills”.¹² It is important to bear in mind the fact that Humboldt’s research predates the formation of the discipline of ‘ethnology’ (*Völkerkunde*), later ‘anthropology’ (*Ethnologie*), when scholars attempted to overcome previous pejorative terms such as ‘savage’ or ‘primitive peoples’ by means of the dichotomy ‘nature peoples’ (*Naturvölker*) vs. ‘culture peoples’ (*Kulturvölker*). The German conceptual construct *Naturvolk* is attributed to Johann Gottfried Herder. According to Johann Christoph Adelung’s *Grammatisch-kritisches Wörterbuch der Hochdeutschen Mundart* (first published between 1774 and 1786), *Naturvolk* is defined as: “a people living in the state of nature [*Stände der Natur*], without a discernible civil constitution; such peoples are commonly referred to as savages [*Wilde*]”. Adelung’s *Naturmensch* entry read similarly: “a person living in the state of nature, without a civil constitution or external constraints”.¹³ In the meantime, this distinction has long been discarded. Instead, recent ethnological and social-anthropological research is generally interested in forms of socio-cultural organization and ways of life across all human groups, without making hierarchical value judgments, and particularly in the specific ways in which such groups interact with natural resources. (Müller 2005, pp. 380–81).¹⁴ Against the background of the successive formation and differentiation of the modern academic disciplines in the humanities and the social sciences, which only took place over the course of the nineteenth century, this finding is in no way surprising. But what about Humboldt’s adaptation of the term ‘state of nature’—which, as we well know, had played a central role in eighteenth-century philosophical discourse since the Enlightenment?¹⁵ Here too, we must clarify: Humboldt explicitly uses the terms *Naturzustand*, *état naturel*, or ‘state of nature’ remarkably rarely with reference to humankind. He uses the German term *Naturzustand* in only two texts, and only once with reference to human society—in passing, in a report on a ‘Mexican giant’, which appeared in 1806 in the *Magazin für den neuesten Zustand der Naturkunde mit Rücksicht auf die dazu gehörigen Hilfswissenschaften*.¹⁶ He uses the term in other languages somewhat more conspicuously but nevertheless judiciously overall. The nine documents in the corpus in which Humboldt comments on an *état naturel* in French do not refer to human society either, but rather to chemistry, to trees, and to fish breathing in their *état naturel*, namely in rivers.¹⁷ More important for our analysis in this article are the three texts—including the textual variants, a total of ten documents—written in English between the years 1816 and 1826, which explicitly though still rather incidentally contain the term ‘state of nature’ with reference to indigenous groups in South America. In quantitative terms, this finding is no more striking than the others. Overall, Humboldt seems to try to avoid the term, or else he uses it with additional linguistic distancing. In this sense, an excerpt from his travelogue *Travels in the Equinoctial Regions of the New Continent*, which was published in London in 1826, addresses the practice of tightly swaddling infants, a custom among the Carib ethnic group in Spanish America that educators in Europe also discussed. Humboldt describes Caribbean mothers engaging in this practice in their huts, which he portrays as characterized by “extreme neatness and order”, stating: “Our infants when swaddled suffer much less than these Caribbee children, in a nation which is said to be so much closer to a state of nature”.¹⁸ The phrase ‘which is said to be’ is a fairly clear marker of Humboldt’s skepticism when it comes to the ‘state of nature’ theory. It is fitting to note here that Jean-Jacques Rousseau’s name is mentioned only five times in the entire *Sämtliche Schriften* corpus: three of these mentions occur incidentally in texts about the ages of trees, and another occurs in an article on Romantic poetry. Thus, there remains the above-mentioned excerpt from the famous 1826 *Travels in the Equinoctial Regions of the New Continent*. The passage quoted above, about the swaddling of infants in Carib huts, continues seamlessly: “In vain, the monks of the missions, without knowing the works or the name of Rousseau, attempt to oppose this ancient system of physical education” (*Ibid.*). Clearly, Rousseau’s work does not constitute an explicit point of reference for Humboldt. For comparison, Voltaire is mentioned in 15 documents in this corpus; William Robertson, author of *The History of America*, is mentioned 19 times; and the botanist José Mutis, who

worked in Bogotá, is mentioned 87 times; the name Forster (Georg and/or Reinhold) is mentioned in 98 documents; and Charles-Marie de la Condamine, who also traveled to America, is mentioned a total of 147 times.

However, this does not mean that Humboldt did not take specific progressive stages of human history as his starting point or that he did not have the ‘stadial theory’ model, as circulated by Rousseau and other Enlightenment philosophers, in the back of his mind. In this respect, several times and in various formulations, he refers to the “first” or “prolonged childhood of the human race”, the “earliest childhood of its culture”, “the human race since its earliest childhood”, and “the primordial state of humankind”.¹⁹ Yet he does not presume linear, quasi-natural, or ontologically predetermined developments. A recurring theme in Humboldt’s argumentation is that once human populations have reached a certain level of culture and civilization, they may fall back again— ‘degenerate’ or ‘become savage’ (*verwildern*)—or be forced to return ‘to the forests’. Humboldt published an interesting short article, which has not yet been widely studied, under the title “What are Barbarians?” (*Was sind Barbaren?*) in the *Morgenblatt für gebildete Stände* in Stuttgart and Tübingen in December 1817, and again a short time thereafter in journals in Graz and Vienna. In it, Humboldt compares ethnic groups along the Orinoco and in other regions of Spanish America with the Tartars and other peoples in the Caucasus and Asia. Thereby he arrives at the following consideration: “The barbarism [*Barbarey*] that prevails in these various regions is perhaps due not so much to the primordial lack of all civilization as to protracted savagery [*Verwilderung*]. Most of the hordes, which we call savages [*Wilde*], probably originate from people who at one time had advanced in culture; and how can one distinguish the prolonged childhood of the human race [...] from that state of moral degeneration in which segregation, misery, forced migrations, or severe climatic causes destroy all traces of civilization”. In the jargon of his time, Humboldt here distinguishes between ‘savages’ or ‘hordes’ and ‘civilization’, although he also critically questions the actual current state of the ethnic groups in the regions he mentions. The so-called ‘forced migrations’ he mentions would probably be called ‘expulsions’ or ‘land grabs’ today.²⁰ In any case, Humboldt emphasizes the coercive aspect when he goes on to state, with reference to sources from India as well as the meaning of the word ‘barbarian’ in its original Greek-Roman context: “the savages of all tribes of peoples [*die Wilden aller Völkerstämme*] [...] were cast out of civil society, relegated to the forests” (von Humboldt 2019m).

The explanatory model of regression due to adverse circumstances or coercion occupied Humboldt, both directly and ad hoc, even during his journey to America, as his travel diary testifies: the conquistadors in South America had not promoted “the progress of human culture” in the form of agriculture and cloth weaving; in fact, they had made such progress “even more difficult”. For this reason, one must ask oneself who is actually responsible for this cultureless “desolation” (*Oedigkeit*) and “dead silence” on the banks of the Orinoco. Primarily to get a sense of the reality on the ground for himself, Humboldt provides an answer that is nothing if not explicit: “You Europeans, who every night rob the children of the poor, peaceful inhabitants (terrifying them with guns or assaulting them in their sleep like cowards), you who drive the savage from the banks”. (von Humboldt 2003c, p. 201).

Despite all of his critical reflection and cultural-theoretical efforts, *wild* or *Wilde(r)* remains a conspicuous term in Humboldt’s discourse, and he uses it—quasi-provisionally, apparently for lack of alternatives—quite often. If we include textual variants and repeat publications, then the textual corpus contains no less than 195 documents in which the German term ‘Wilde(r)’ appears, although this term is used with reference not only to humans but also to plants and animals. The phrases *wilder Indianer* (‘savage Indian’, which occurs 5 times), *wilde Menschen* (‘savage people’; 9 times), *wilde Völker* or *Volksstämme* (‘savage peoples’ or ‘tribes’; 11 times), *wilde Nationen* (‘savage nations’; 3 times), and *wilde Horden* (‘savage hordes’; 8 times) are revealing. Once again, Humboldt refrains from engaging in rapturous idealization. Entering ‘edle(r) Wilde(r)’ into the digital search function of the *Sämtliche Schriften* produces no results; the same is true for the English equivalent

‘noble savage’, and there is just one single result for the French term ‘homme sauvage’ (von Humboldt 2019f). Moreover, in a comparable way to the contemporary geological debate between Plutonists and Neptunists over the origin of the world, Humboldt, the botanist, makes comparisons here and there between human society and the history and propagation of plants.²¹ Thus his article “Zur geographischen Botanik” (1847, first published in Spanish in 1809) refers to parallels between ethnic groups and plants in terms of the dichotomy between containment and savagery: as with the “human race”, the “primordial habitat” (*ursprüngliche Heimath*) of many of the “plants” that serve as food for humans is unclear; once domesticated, plants could also “run wild [*verwildernd*], regaining their old freedom in the forests” (von Humboldt 2019n).

In the mirror of his conceptual practice, Alexander von Humboldt is reflected as a transdisciplinary, interconnected thinker, one who distances himself from the discourse of his time and also criticizes it. One final, brief example from his famous text *Das nächtliche Leben im Urwald*, an excerpt from *Views of Nature* (1849), which concerns the Yaruros and Achaguas along the tributaries of the Orinoco river, illustrates this point: “They are called savages in the monks’ mission villages because they want to live independently” (von Humboldt 2019e). At the same time, however, we should not overlook the fact that Humboldt himself also uses and perpetuates the prevailing discourse. To be sure, he largely refrains from classifying the ethnic groups in Spanish colonial America as ‘people primitif’ (3 times) or ‘primitive people’ (not once), but from today’s perspective, his frequent recourse to the two terms ‘horde’ (which occurs in 82 documents in the corpus) and ‘barbarism’ (*Rohheit*; 41 occurrences) is jarring. Humboldt uses ‘horde’ to describe a form of social organization that he contrasts with developed ‘civilization’. ‘Barbarism’ or the phrase ‘moral barbarism’ (15 occurrences) proves to be a particularly relevant term. Like ‘horde’, ‘barbarism’ refers to the assumptions inherent in the evolutionist, progressive-stage theory characteristic of the Enlightenment, which constitutes a reference point for Humboldt’s thought in both his early and later works. Thus, in the first edition of *Ansichten der Natur* (1808), he explicitly mentions the “lowest stage” of human development as “animal barbarism” (*thierischer Rohheit*). In a less well-known text published in 1857, he refers to “the manifold stages of undeveloped intelligence in the primordial state [*Urzustände*] of the hordes” (von Humboldt 2019b, 2019i).²²

While the writings of this traveler to Spanish America contain no ‘noble savages’, they certainly feature ‘man-eaters’ (9 times) and ‘cannibal(s)’ (39 times). But Humboldt would not be Humboldt if he did not contextualize these labels and put them into perspective. He is not fundamentally concerned with constructing alterity but rather with pointing out the potential for development. Thus his stated goal is to “trace the slow and at the same time very mysterious course of the moral formation [*sittlichen Bildung*] of the American indigenous peoples [*Stammvölker*]” (von Humboldt 2019j). As we have already seen, the theory of evolution is thereby upended several times since Humboldt identifies (forced) regression rather than (steady or successive) progress as an effect of (European) colonialism. From this perspective, the “most primordial state of the human race” was not necessarily characterized by “barbarism and ignorance;” rather, “the wild hordes [could] have descended from people whose powers of understanding, as well as the language in which these were reflected, were both equally developed earlier” (von Humboldt 2019c). Above all, the complexity of the languages spoken among the American ethnic groups as well as the actors’ competence in terms of multilingualism constituted indicators of “the awakening of self-actualized intellectual power” as far as William von Humboldt’s brother was concerned (von Humboldt 2019b).

Humboldt does not presume a natural, *sui generis*, or racially conditioned ‘barbarism’ among humans; instead, he sees the potential for cultural development toward ‘civilization’ in broad terms across all ethnic groups—even on the level of the ‘horde’. Ultimately and with relish, he draws his European readers’ attention to the fact that in the past, precisely that portion of humankind that “now enjoys a high flowering of culture, in science, and the fine arts, lived in just such a barbarous manner” (Ibid.). Moreover, Humboldt considers

the ‘morality’ achieved as a result of educational processes and progress both dubious and debatable. In his popular *Views of Nature*, he admonishes the educated reading public in Europe that not only “on the lowest level of animal barbarism”, but also “in the pseudo-glamor of their higher education”, humankind would only and “always [live] a hard life” (von Humboldt 2019d).

3. Observations of Indigenous People in Their Natural Environment

While Humboldt’s published articles, supplemented by his diary entries, stood in the foreground of the foregoing analysis of terms, my focus in what follows is the opposite—it is directed primarily toward the entries in his travel diary, as well as a passage from his famous travelogue *Reise in die Äquinoktial-Gegenden* (in English: *Personal Narrative*). Characteristically, in his travel diaries, Humboldt wrote down his observations in a timely manner and without a purgative round of editing. On the one hand, he draws on his direct experiences, not least his personal interactions with indigenous actors; on the other hand, he draws on reports from local informants, such as monks in the missions along the Orinoco River. The statements in Humboldt’s travel diary meander in different directions without demonstrating any compulsion to be consistent in terms of content. Once again, his epistemological interests refer back to contemporary scholarly discourse, but he also repeatedly counters and vigorously contradicts prevailing European opinions and modes of thought regarding ‘the savages’.

Humboldt grew up in the enlightened milieu of Berlin and studied in Göttingen under the anatomist and anthropologist Johann Friedrich Blumenbach; as such, he was certainly an inheritor of the—from our perspective today, extremely problematic—racial discourses of the late Enlightenment. Therefore it is not surprising that Blumenbach is mentioned in 59 documents in the *Sämtliche Schriften* corpus. We do know that Humboldt opposed the racist idea that humankind originated from several different roots. In the first volume of his *Kosmos* (1845), he clearly states: “By asserting the unity of the human race, we also resist any unpleasant assumption of [the existence of] higher and lower human races” (von Humboldt 2014a, p. 187). But his travel diary certainly contains allusions to the anthropological discourse of the day, as the following sketch of the Chaimas ethnic group in present-day Venezuela demonstrates: “Flat Greek forehead. The corners of the eyes are drawn outward, slightly upward (Chinese), with long slits, and long eyelashes. Eyelids are mostly half-closed. Nose long, straight, broader, and wrinkled toward the bottom. Mouth straight; large, thick, not upturned lips [. . .] Face flat, Georgian, but very broad maxillae. Race small, almost 4 feet 10 inches, broad-shouldered, and fleshy” (von Humboldt 2000b, p. 160). In contrast, Humboldt’s description of the Caribe is quite different: “slender, with beautiful symmetry in the limbs, small-headed like the ancient statues, and such beautiful curvature of the muscles that one would think one is looking at the back of a bronze Olympic Jupiter. In all of Europe, there is no tribe of men of equal size or [such] wonderful physical beauty”. (von Humboldt 2000a, p. 342)

A basic theme in Humboldt’s work is the rejection of the stereotypical simplifications that were common in European scholarly discourse. This is also true with regard to anthropological racial typology. In his diary, for example, he explicitly criticizes the “one-sidedness of the judgment of [the] outer form. Is it not true that all American writers say that all Ameri[can] Indians have one and the same facial features?” In contrast, he and his French companion, Aimé Bonpland, stated: “One cannot but be astonished at the diversity of facial features among [the] forest Indians. How different are [the] facial features of the Otomaco and Guahibo from the Caribe, how different the Chaimas from the Maravitanos and the inhabitants of the Guainia” (Ibid.). Over and over again, Humboldt emphasizes the difference—yet not at all between the ‘civilized’, cultured people in Europe and the ‘savage’, natural people in America, but rather in terms of the physical stature and facial features of various indigenous ethnic groups in Spanish America.

In stark contrast to Mary Louise Pratt’s findings, accounts of the knowledge, skills, and practices of indigenous groups struggling to hold their own in a natural environment

defined by scarce resources abound in Humboldt's travel diary—and in other places as well. Humboldt typically analyzes 'Indian' practices in the context of their natural living conditions, even when—like many travel writers of the time and many functionaries of the colonial system on the ground—one might at first glance see only 'savagery' or 'barbarity'. From Humboldt's perspective, such seemingly unavoidable terms proved inadequate and misguided when in close contact with indigenous peoples in the field. Nevertheless, contemporary debates in the 'République des Lettres' were also part of his mental baggage when he wrote his diary on the banks of the Orinoco—he did not manage to leave them behind in Europe when he left.²³ And so, based on his direct observations of the "Sauvages Xíbaros" (Jivaros), he quickly arrives at general conclusions, which also constitute a distant echo of the scorned Rousseau's assumptions about "the man who has not yet degenerated through luxury" (von Humboldt 2003b, p. 198). In order to analyze Humboldt's perspective on the knowledge and practices of indigenous groups, the following discussion is based on three texts: in addition to the section on the 'Sauvages Xíbaros' and a reflection on 'Indiens, Sagacité', both taken from his diary, there is also a detailed account of the indigenous ethnic groups' practice of painting their skin red, which extends over several pages in the published travelogue (*Reise in die Äquinoktial-Gegenden; Personal Narrative*). When it comes to the social behavior of the 'hordes' as well as their 'pensée sauvage' (Claude Lévi-Strauss), the following observation applies: by investing so much attention, sketching his observations precisely and in detail—and not simply describing allegedly deserted landscapes and plant habitats—Humboldt has already conveyed a certain level of appreciation. Several relevant aspects were essential for him: first, the question of which knowledge, skills, and practices the indigenous actors he and Bonpland encountered on the Llanos, along the Orinoco, and in the Andes used to ensure their subsistence and survival; second, which insights in terms of human anthropology resulted from his on-site observations. Thus his detailed sketches always end with comparisons to other cultures—not least pointed comparisons between the so-called 'savages' along the Orinoco and the 'civilized' people in Europe.

Let us briefly discuss the content of these three sources. The text on the Xíbaros (Jivaros) describes encounters with indigenous people in the remote village of Tomependa (Peru), situated on a tributary of the Amazon river, in August 1802. In this text, which he wrote in French, Humboldt speaks of "Sauvages", "Indiens", and "the wild man of the woods" (*le Sauvage des bois*). Impressed, he outlines a number of characteristics and behaviors among the Xíbaros, not least in an effort to point out once again the discrepancy between the bright, inquisitive "l'homme sauvage et libre", who is very "different from the man of the missions, [who is a] slave to priestly opinion and oppression" (Ibid., p. 197). Specifically, he makes notes in an ethnological style on skillful swimming with the aid of logs in the river as the customary indigenous mode of travel in this fluvial landscape, on dietary and clothing habits, on the balance between work and leisure, on conflicts with other indigenous groups in the area, on their amazing ability to learn languages by repeating phrases from European languages, and on their reactions when he lets them use his instruments—his telescope, chronometer, and compass. This last aspect also sheds light on the direct contact Humboldt sought in communicating with indigenous actors rather than relying on the information provided by missionaries and other informants.

The second text, which is shorter, was written in Guayaquil (Ecuador) at the beginning of 1803; in it, Humboldt reflects on the "acumen" of the indigenous people, the "very small hordes (Orénoque)" who lived scattered throughout the landscape. This text primarily addresses some of the skills of the people who would later be referred to as *Naturmenschen*, which are surprising for Humboldt and therefore worth emphasizing. Here he is explicitly concerned with "man in his natural state" (von Humboldt 2003a, p. 181). He begins by emphasizing the complete attention the people in the forests along the Orinoco pay to the flora and fauna in their immediate environment: "The savage man is the most faithful, the most exact observer of nature" (Ibid.). This leads Humboldt to mention some of the people's skills, which are difficult to explain but which he notes as "very definite facts". As

it turns out, he is describing concrete events and experiences over the course of his journey. For example, in the sandy wasteland along the Peruvian coast, their guide lost his way and led them around in circles for two hours. At last, by repeatedly bending down and inhaling the sand, the guide had managed to scent the road (*en flairant*) (Ibid.), and thus they found their way again. Some of Humboldt's other experiences point in the same direction: special skills in the use of one's senses. For example, the forest-dwelling indigenous people could determine what kind of tree they had encountered by chewing its bark. In an old Inca palace, an attendant could taste the bricks and thus determine whether or not the stones originated from the time of the Incas. Along the Rio Apure (Venezuela), the inhabitants could distinguish crocodiles that posed a danger to humans from those that did not by observing which ones stretched out their tails while they were sleeping and which curled their tails to the left. Humboldt made a skeptical addition to this report: "The Indians say fabulous things" (Ibid., p. 182).

While Humboldt's diary offered him the opportunity to note various details and draw provisional conclusions on this basis without claiming consistent adherence to a narrative, the publication of his travelogue upon his return to Europe called for a more consistent structure and required him to formulate his notes and ideas. One passage in the *Reise in die Äquinoktial-Gegenden* is particularly remarkable in this respect—in it, Humboldt goes into detail on the indigenous peoples' practice of painting their skin red. For context, I must explain here that many European observers considered the indigenous peoples' nakedness, combined with the pigment they painted on their skin and their resulting designation as 'redskins', to be emblematic of their essential otherness and their frightening savagery. Humboldt himself points this out (von Humboldt 1997, p. 219). Yet instead of dwelling on such labels, he provides a long, precise description of how the paint was made as well as the peoples' reasons and motives for painting their skin. Thus the text reports on the elaborate process of producing the dye ('Onoto' or 'Chica'), which indigenous women made from plant seeds mixed and kneaded with turtle oil or crocodile fat; the different skin-painting practices of different ethnic groups, which were based on historical events; and their various motives for painting their skin. Just as they had experimented with chewing tree bark, Humboldt and Bonpland proceeded to experiment on themselves to find out whether rubbing the dye on their skin helped to deter the plague of mosquitoes. At the end of this passage, as so often in Humboldt's work, he makes brief cross-cultural comparisons and raises the question of "barbarism" vs. "civilization" (Ibid.). Overall, this report is written in an ethnological style, which certainly indicates that Humboldt took the practices he encountered among the ethnic groups along the Orinoco and in other places very seriously and that he wanted to explore their meaning without making snap judgments.

In some passages, Humboldt seems *prima facie* to emphasize a certain essentialized alterity in his notes on the special skills of 'savages' or 'natural men'. Yet a closer reading repeatedly reveals that he also records ethical and other behaviors, which his readership—and he himself—has no choice but to evaluate as 'culture' or as 'civilized' behavior. Thus, he addresses his contemporaries' key moral precepts and values with regard to gender relations, property, intellectual ability, and work ethic. In the text on the 'Sauvages Xíbaros', he describes how they sing and dance in pairs. They refuse to drink wine or brandy. The gender-specific division of labor among the Chaimas, according to which the women take care of the cooking while the men spin the cotton they have grown themselves and weave it into beautiful ponchos, corresponds rather strikingly to the idea of 'separate spheres' in the formation of the bourgeois family in Europe around 1800 (von Humboldt 2003b, p. 198)²⁴. It is true that "these savages" would rather steal bananas than grow the fruit themselves and that they would also steal from each other ("very inclined to steal from other Indians in the village"). But they would never touch anything in the governor's house, so as not to offend his hospitality (*pas blesser l'hospitalité*). (von Humboldt 2003b, pp. 197–98) Elsewhere in his diary, Humboldt is more explicit and speaks more generally, directly criticizing the judgments other travel writers make, as follows:

How one-sided and miserable, for example, is what Ulloa, La Condamine, Frezier, D[o]n George Juan, and all the missionaries say of [the] Indians. No man is farther from stealing than Chaima und Atures [...]. Additionally, they even wanted to transfer this idiosyncrasy to all savages; in contrast, I can assure [them] that property is nowhere more respected and sanctified than it is among the forest-dwelling Indians from the Orinoco to Marañón. (von Humboldt 2000a, p. 342)

As I have already mentioned, Humboldt is fascinated by the Xibaros' ability to learn Spanish and other European languages quickly. While he laments the fact, as he sees it, that people with "such a great nobility of spirit" and "so many intellectual faculties" are also prone to laziness and indolence ("the most indolent, the laziest when it comes to work"), he immediately qualifies this argument by referring to the "indolence of our grand seigneurs and our scholars" in Europe. These people in Europe would also refuse to cultivate the earth, would not travel on foot, and would prefer to be served (von Humboldt 2003b, p. 197).

The ability to distinguish between placid and ravenous crocodiles did not matter to people in Europe at a time when predators were becoming increasingly scarce. For people who lived along the Rio Apure, this skill was essential to survival. Therefore, Humboldt finds it worth mentioning. However, another aspect was even more important for his report. When the village chief's son was attacked by a crocodile and dragged to the bottom of the river, the "Teniente de Pueblo" gave orders that the villagers dive down and find the crocodile, kill it, and retrieve his son's body. As Humboldt explains, the bereaved father, seeking comfort, wanted to give his child a decent burial. (von Humboldt 2003a, p. 182).

According to a widespread conception in Europe, the 'primitive savages' in America are naked and painted red. Humboldt cannot directly contradict this, at least as far as the indigenous ethnic groups along the Orinoco or in Guiana are concerned. But his characteristic response to this stereotype employs the discursive methods of relativization, contextualization, and historicization, as well as—once again—global-intercultural comparison. Missionaries in Spanish America would bemoan the lack of shame among the women. Yet according to Humboldt, "Must we not attribute this indifference, this lack of a female sense of shame among peoples that are not characterized by great moral corruption, to the stupor and slavery with which the female sex in South America has been degraded by injustice and by abuse of power on the part of men?" (von Humboldt 1997, p. 218). Moreover, the "mental powers" of "most of the people of Guiana" are "quite developed". Like sedentary, agricultural peoples, they cultivate food crops and weave cotton cloth, but they are "just as naked" and "just as poor" as indigenous peoples in Australia, for example. The cause of this nakedness, according to Humboldt—no doubt arguing on the basis of his own experience—is quite simply the sweaty, "intense heat" that makes "clothing unbearable". As far as tattoos and other types of skin decoration are concerned, one finds instances of this practice even in Roman times, "also among the white race in the north of Europe". And finally, with regard to present-day customs involving make-up, both in Europe and in colonial American society, he cannot help observing: "After living for some time among people painted with *onoto* and *chica*, one is more than a little surprised to observe the remains of an ancient barbarism still present in the midst of all the customs of civilization" (Ibid., pp. 218–19).

4. Concluding Remarks

Alexander von Humboldt employed the terms and—along with them—the intellectual paradigms of his day. At the same time, he struggles with these terms, rejecting some of them outright, paraphrasing others, and repeatedly expressing his skepticism with regard to their explanatory power. My first conclusion is therefore methodological. It is not enough to look at the terms themselves in isolation and analyze them exclusively quantitatively. Rather, one must include the linguistic and argumentative contexts in which they occur. The results of such efforts paint a picture that is quite different in many respects. We should also bear in mind that some of the terms that we consider extremely problematic

today were intended and used differently in Humboldt's time. For instance, from the point of view of the educated person in his day, 'barbarous people' existed beyond the boundaries of the jungle and could be found along more rivers than the Orinoco. In his well-known text "What is Enlightenment?" (1784), Immanuel Kant famously appealed to people to emancipate themselves from "self-inflicted nonage" by employing their "own understanding". (Kant 1784) Kant's text is addressed to the educated general public in Europe, and so his concluding reflection on the question of whether his audience is "now living in an enlightened age" also refers to the situation in European societies. His optimistic verdict is: "When one does not deliberately attempt to keep men in barbarism [*Rohigkeit*], they will gradually work out of that condition by themselves" (Ibid.)²⁵. Humboldt would certainly have supported Kant's optimistic prognosis; he mentions Kant relatively often in his textual corpus, namely in 23 documents in the *Sämtliche Schriften*. He would also have immediately endorsed the demand that the free development of the powers of reason, particularly among the 'savage hordes' in Latin America, should not be hindered. Even though he presumes the existence of defined, progressive stages of human development, in the characteristic style of Enlightenment discourse, one of Humboldt's central concerns is to critically reflect on, reduce, and level the gap between 'savagery' and 'civilization'. As a rule, he is not concerned with alterity or the construction of difference, but rather with the potential for development, which he finds in principle among all ethnic groups around the world. European colonialism, as he experienced it on the ground, did not foster but in fact, impeded or even destroyed the potential progress of indigenous societies. Conversely, for instance, Humboldt considered the industriousness of the locals and the quality of cloth production in Amerindian villages in the vicinity of Quito to be on par with advanced European countries. In this comparison, he mentions the Netherlands and Switzerland (von Humboldt 2006, p. 80).

To explain Humboldt's overall approach, we need not necessarily point to the 'humanistic ethos' of someone like Humboldt, who adhered to the ideas behind the French Revolution, nor assert that Humboldt was the 'last liberal' at the Prussian court. Indeed, Humboldt's repeated encounters with 'indigenous knowledge' in different iterations throughout his journey may have been more important to the development of his thought. This applies to his experiences of the ability to orient oneself in impassable landscapes, skill in interpreting natural phenomena, the capacity for survival in an environment inhabited by predators and characterized by limited resources, and not least the daily procurement of food, protection from mosquitoes, and safe places to sleep, among many other things (Daum 2019, p. 51). Beyond these skills, however, indigenous knowledge was also evident in the moral behavior and intellectual capacities of indigenous actors. In Humboldt's work, it sometimes seems that the initial Eurocentric interest in *Naturmenschen* has been reversed: What can 'we' learn from the knowledge of these 'others' in the 'primordial forest'? In this vein, when it comes to explaining the degradation of local ecosystems, such as falling water levels in lakes, Humboldt includes local people's opinions. More generally, he is fascinated not only by indigenous people's skills but, above all, by their storytelling and their wisdom. Today, indigenous knowledge is once again playing an important role in current debates vis-à-vis new challenges associated with the pandemic or the Anthropocene (Lubrich 2004).²⁶

In the debate about 'Humboldtian Science', scholars on several sides have pointed out that Humboldt's thought was open and hypothetical, oriented toward constant verification and improvement. It meandered as the Orinoco River did. (Ette 2009, p. 27) (Eibach 2018, pp. 157–61). He often revised his preliminary findings or followed a train of thought, sometimes in one direction and sometimes in another. In addition, the fact that this prolific writer continued to produce an enormous amount of text up to a ripe old age meant that he was not always able to remember his earlier pronouncements, which is probably one of several reasons why contradictions arose.²⁷ At the end of the day, a certain ambivalence remains with regard to Humboldt's view of *Naturmenschen*, or 'savages' in Latin America. In a somewhat obscure article published in a journal on the occasion of the appearance of

the Prussian Balduin Möllhausen's travelogue from the western United States in 1857, the 88-year-old Humboldt once again criticizes the use of the term "savages (Indios bravos)" as "so imprecise and often so inappropriate;" he expresses himself in a nuanced manner with regard to the "contrast between culture and its opposite" (*Cultur und Uncultur*) in various ethnic groups and refers to the cultural achievements of the Aztecs, the Incas, and other peoples in the western part of the American continent prior to the Europeans' arrival (von Humboldt 2019b). Four years earlier, in 1853, taking up a passage from the first volume of his *Kosmos* (1845), the aging scholar wrote an article on the history of knowledge and the state of research on magnetism. The phenomena of magnetism and electricity had fascinated him since his youth. Here, however, Humboldt not only addresses the recent progress of (Western) science but also references the pioneering knowledge on the subject in ancient China and refers back to his long-ago experiences in South America. He states:

It was not without surprise that I also noted on the wooded banks of the Orinoco, during the games the savages' children played, among tribes that represent the lowest level of barbarism, that they are aware that electricity can be excited by friction. Boys rubbed the dry, flat, shiny seeds of a climbing pod plant [...] until they attracted cotton and bamboo cane fibers. That which enthralls the naked, copper-brown natives is apt to leave a deep and serious impression. What a gulf separates the electric game of those savages from the invention of a metallic lightning conductor in a thunderstorm, [...] a light-generating magnetic apparatus! In just such a gap, millennia of the history of humankind's intellectual development lie buried! (von Humboldt 2019h, p. 98)

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Notes

¹ Relevant publications since the 250th anniversary of Humboldt's birth in 2019 include Daum (2019); Nehrlich (2021); Lubrich (2022).

² In defense of Humboldt in the face of postcolonial criticism, see Osterhammel (1999).

³ As an early critical response to Pratt, see Sachs (2003).

⁴ See also Lubrich (2019), vol. 10, pp. 437–62.

⁵ On the term 'Humboldtian Science', see Cannon (1978); Dettelbach (1996), pp. 286–304; with a different emphasis, see also Ette (2018), pp. 106–12; Daum (2019), pp. 40–44; and the contributions in Kviat Bloch et al. (2021).

⁶ See also Eibach (2018).

⁷ See also Rousseau's (1755) original, epoch-defining text, published in 1755.

⁸ For further details, see Eibach (2021).

⁹ This and all subsequent citations are taken from the edition of Humboldt's travelogue, *Reise in die Äquinoktial-Gegenden des neuen Kontinents* (first published in French as: *Relation historique du voyage aux régions équinoxiales du nouveau continent*, 1805–34; and in English in various editions under the title: *Personal Narrative of Travels to the Equinoctial Regions of the New Continent*), published in von Humboldt (1997); the citation here is taken from vol. 2/1, p. 308. Alissa Jones Nelson has translated these quotations into English.

¹⁰ Lubrich and Nehrlich (2019a), vol. 8, pp. 7–76; for a quick overview, see <https://humboldt.unibe.ch/editionen.html> (accessed on 9 September 2023).

¹¹ Accessed at <https://humboldt.unibe.ch/text> (accessed on 30 September 2023); subsequent citations are taken from the digital edition of the *Sämtliche Schriften*, cited as Lubrich and Nehrlich (2019c).

- 12 Lubrich and Nehrlich (2019c), “Vorwort”, <https://humboldt.unibe.ch/text/1841-Vorwort-1> (accessed on 31 August 2023). See (von Humboldt 2019k).
- 13 Adelong (1811a, 1811b), https://lexika.digitale-sammlungen.de/adelung/lemma/bsb00009133_2_0_618 (accessed on 30 September 2023); https://lexika.digitale-sammlungen.de/adelung/lemma/bsb00009133_2_0_624 (accessed on 31 August 2023).
- 14 On the history of the discipline, see Petermann (2004).
- 15 See, e.g., Bollenbeck (2007).
- 16 von Humboldt (2019a), “1. Ueber die alten Aturer am Orinoco/2. Ein Mexicanischer Riese”, https://humboldt.unibe.ch/text/1806-xxx_1_Ueber_die-1-neu (accessed on 30 September 2023).
- 17 von Humboldt and Provençal (2019), “Recherches Sur la respiration des poissons”, https://humboldt.unibe.ch/text/1809-Recherches_sur_la-2 (accessed on 31 August 2023).
- 18 von Humboldt (2019l), “Voyage aux Régions Equinoxiales du Nouveau Continent, fait en 1799–1804, Paris, 1825. Travels in the Equinoctial Regions of the New Continent in 1799 to 1804, &c.”, https://humboldt.unibe.ch/text/1826-Voyage_aux_Regions-1-neu (accessed on 31 August 2023).
- 19 In order of mention: von Humboldt (2019j), “Ueber die Urvölker von Amerika, und die Denkmähler welche von ihnen übrig geblieben sind”, https://humboldt.unibe.ch/text/1806-Ueber_die_Urvoelker-1 (accessed on 31 August 2023); von Humboldt (2019m) “Was sind Barbaren?”, https://humboldt.unibe.ch/text/1817-Was_sind_Barbaren-2-neu (accessed on 31 August 2023); von Humboldt (2019g) “Ideen zu einer Physiognomik der Gewächse”, https://humboldt.unibe.ch/text/1806-Fragment_aus_der-03 (accessed on 30 September 2023); von Humboldt (2019n) “Zur geographischen Botanik”, https://humboldt.unibe.ch/text/1809-Geografia_de_las-5-neu (accessed on 30 September 2023).
- 20 On this concept, see Bodley (2008); Haller (2019).
- 21 Cf. Nehrlich and Strobl (2019), pp. 241–72; Lubrich and Nehrlich (2019b), pp. 273–310.
- 22 see the new translation by Jackson and Dassow Walls (von Humboldt 2014b); see also Mathieu (2021).
- 23 Lubrich and Nehrlich (2019c), “Alexander v. Humboldt über Möllhausens Reise nach der Südsee”, https://humboldt.unibe.ch/text/1857-Alexander_von_Humboldt_ueber_Moellhausen-1 (accessed on 31 August 2023); see also Eibach (2018), pp. 153–59.
- 24 For a discussion of gender-specific ‘separate spheres’, see Vickery (1993).
- 25 On the question of non-European peoples’ ability to reason in Enlightenment discourse and in Kant’s work, see Carey and Trakulhun (2009).
- 26 For further details on Humboldt, see Eibach (2019), pp. 479–91; Eibach and Haller (2021), chap. 4; on the new interest in indigenous wisdom, see, e.g., Wall Kimmerer (2020); Betasamosake Simpson (2017). My thanks to Maeve Cooke and Martin Sauter for this information.
- 27 For an overview, see Ette (2009), pp. 16–30; idem. 2018, p. 106; Daum (2019), p. 44; Glaubrecht (2019a).

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Essay

A Political Ecology of the Body: Nature in French Anarchist Pedagogy around 1900

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Abstract: This essay historicizes the concept of nature in French anarchist pedagogy around 1900. I argue that anarchist cosmology was not dualist in the sense that it did not neatly separate the natural from the cultural or social. Nature was rather understood as an ever-evolving realm that encompassed nonhuman and human entities. This example should encourage historical scholarship to look more deeply into what anthropologists sometimes call “naturalist ontology”. Instead of conceiving it as a fixed worldview, we should investigate its genealogy, transformations, and contestations.

Keywords: anarchism; nature; naturalism; Fin de Siècle; pedagogy; historical anthropology

1. Introduction

“A school that is truly free from ancient bondage can only be seriously developed in nature” (Bulletin de l’École Ferrer 1916, p. 3). One finds this statement in a bulletin of the École Ferrer, an anarchist school in Lausanne that operated between 1910 and 1919 (Wintsch 1919). Above the sentence is a picture showing naked children playing in the open air. The image and sentence were taken from a book by the famous anarchist geographer Élisée Reclus (1830–1905) (Reclus 1908, vol. 6, p. 433), then already deceased, who had lived and written in Switzerland in the 1870s and 1880s and who is today described as a pioneer of ecological anarchism (Pelletier 2009; Lefort and Pelletier 2013; Ferretti 2014; Guest 2017; Clark 2019; Oyón 2017).

Such statements were not uncommon in anarchist pedagogical discourse at the turn of the century. For these anarchists, emancipatory schooling did not only take place in nature. The aim of anarchist pedagogy also consisted of educating nature itself, insofar as it focused on bodies and their “spontaneous” and sound development. In the picture from the bulletin, a teacher can only be seen far in the background, for the children were to grow into physically healthy and rationally thinking beings in a self-determined manner without any authoritarian discipline. The director of the school, Jean Wintsch (1880–1943), captured this in one of his most important principles: “Return to nature and life” (Wintsch 1913). And he was not alone: the great anarchist scholar and activist Pëtr Kropotkin also aspired to what he called a “return to nature” (Kropotkin [Krapotkin] 1893, p. 355).

The aim of this article is to historicize the anarchist understanding of nature around 1900 by focusing on the writings of French-language anarchism. This does not mean that transnational connections and transfers are considered irrelevant. As several works have shown, anarchist ideas and practices were always embedded in transnational networks (Bantman 2017; Kramm 2021). They have also to be understood in relation to colonial and imperial ideologies, of which they were only partially critical (Deprest 2012).

This essay asks what was the “nature” to which Jean Wintsch and his comrades wanted to return. Did it conceal a reactionary attempt to tie human actions and ethics back to something supposedly natural? Are we dealing with an ideology that denied the historicity of humans and their environments and that wanted to return to a primitive and harmonious original state? Is there then a fundamental contradiction between the emancipatory claims of anarchist pedagogy and its “ideology of nature”?

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I will argue that the contradiction only appears if we impute to the anarchists an understanding of nature that was not theirs. For them, nature was not stable, ahistorical, or preordained. Nor was it identical with what we would call “biology”. Returning to nature rather meant turning to a self-regulating life where humans and nonhumans, body and mind, and nature and culture formed a unity, a life in which freedom, equality, autonomy, and solidarity were already inherent. In the anarchists’ view, nature was not something that had to be transcended to acquire human freedom. Put differently, the anarchists were fighting not only for a different society; that is, different relations between people; their struggle was also directed toward saving human and nonhuman nature from its oppression by capitalism, religion, and the state.

Hence, the example of anarchist pedagogy discloses the heterogeneity and disputes within what the anthropologist Philippe Descola has called “naturalism” (Descola 2013). The “Great Divide” between the sphere of human culture and the realm of nature, typical of Western modernity, did not create unity, as Descola himself acknowledges (Descola 2014, pp. 285, 314). Thus, contemporary debates in social anthropology could benefit from historical research into the complexity and conflicts of naturalist ontologies. Instead of reproducing narratives of supposedly homogeneous Western modernity and its ontology, historical research should focus on parsing the different ways that moderns have related natural and cultural entities (Probst 2020a, 2020b).

In this respect, this paper is not primarily about the history of anarchist educational institutions. Several works have already engaged with the history of anarchist schools from a biographical and institutional perspective (Avrich 1980; Grunder 1986; Brémand 1992, 2008; Klemm 2002; Demeulenaere-Douyère 2009; Suissa 2019; Lenoir 2020). The objective of this paper is rather to historicize the concept of nature as it was elaborated in French anarchist pedagogical writings around 1900. After a brief presentation of the historical context, I first problematize common interpretations of the anarchist ideology of nature. I then show how anarchist emancipation can be understood as an attempt to bridge the gaps between humans and nature, body and mind, the naturally given and the artefact, and so on, in order to cultivate nature as an all-embracing and autopoietic entity. This is what I will call a “political ecology of the body”. I conclude this paper by showing that my interpretation does not negate the politically problematic aspects of anarchist pedagogy, such as its references to eugenic and racist discourses. My point is rather that these aspects have to be traced back to a specific—in this case homogenizing and teleological—concept of nature and not to the reference to nature itself. Therefore, not every reference to nature should be rejected because of its allegedly essentializing effect. The challenge is rather to consider the possibility of an emancipatory concept of nature that includes the openness, heterogeneity, incompleteness, and ambivalences of life. In this way, anarchism around 1900 could be brought into a fruitful dialogue with current (eco)feminist approaches.

2. Against Omnipotent Nature

The tradition of anarchist education dates back to the early socialist movement of the 19th century (Brémand 2008; Lenoir 2020; Dupeyron 2021). However, the heyday of anarchist educational projects began only toward the end of the century (Maitron 1975, vol. 1, p. 351). At that time, various anarchist thinkers and activists founded educational institutions that were more or less openly dedicated to anarchist principles. These included the orphanage Prévost run by the anarchist Paul Robin (1870–1945) between 1880 and 1894, the school La Ruche founded by the anarchist Sébastien Faure in 1904, and the educational institution *L’Avenir* social established and run by the feminist Madeleine Vernet. These projects were part of a transnational network in which the Spanish pedagogue Francisco Ferrer played a significant role. After his assassination in 1909 by Spanish authorities, several “Ferrer schools” were founded in the transatlantic space (Avrich 1980), the aforementioned *École Ferrer* in Lausanne being one of them. All these projects were supported by famous anarchist intellectuals, such as Élisée Reclus, Pëtr Kropotkin, Jean Grave, Louise Michel, and Charles Malato (Reclus et al. 1898).

This network extended far beyond the anarchist movement and encompassed the broader pedagogical-reform movements of the time (Oelkers 2010). They all shared some fundamental pedagogical principles: the individual child was to be the center of attention; corporal punishment, discipline, and school grades were to be avoided; and knowledge was to be conveyed not abstractly through books but through active and collective learning. Furthermore, the educational institution was not allowed to function in isolation from the rest of society. It was rather supposed to be in a permanent exchange with parents, workers, and the community. Finally, anarchist educators, together with the feminist movement, advocated the principle of coeducating children of both sexes (Heimberg 2006, 2000). This whole program was often called “integral education” by anarchist writers and activists.

Several anarchist educators took up the discourses of nature preservation and conservation that emerged around 1900 (Probst 2019). According to Joachim Radkau, various heterogeneous discourses were assembling around that time, ranging from the hygiene movement, nature conservation, animal protection, and the preservation of cultural heritage (Heimatschutz) to life reform, urban criticism, vegetarianism, and naturopathy (Radkau 2011, p. 58). A lot of these critiques were reflected in anarchist writings and directed against bourgeois-capitalist society as a whole. The aim of anarchist educators was to educate children to treat nonhuman beings with respect. According to the anarchist Aristide Pratelle, for example, the goal was to develop a “natural feeling of man for his environment” instead of dividing flora and fauna into “harmful and useful animals and plants for humans” (Pratelle 1923, p. 111; Pratelle 1908). Jean Wintsch criticized the destruction of natural spaces by capitalist corporations, and the bulletin of the École Ferrer recommended several books on natural history and nature conservation (Guides 1913).

But not only nonhuman nature needed to be protected and nurtured. The interest of the anarchist pedagogues was also focused on the human organism as a whole. Similar to the whole pedagogical-reform movement, anarchist pedagogues absorbed physiological and hygienic discourses, whose goal was to assist the child organism in growing into a healthy, strong, and resistant body (Oelkers 1998). This created a strong proximity to eugenic discourses (Cleminson 2019), even though most anarchists rejected eugenic measures by the state, such as forced sterilizations (Kropotkin [Kropotkine] 1913). Paul Robin played a significant role in the anarchist reception of eugenics as the founder and director of the League of Human Regeneration [Ligue de régénération humaine] (Robin 1896). He intended for his orphanage to prevent human degeneration and optimize the children’s bodies. He hoped that teachers could, with the help of “anthropometric observations”, prevent “permanent or temporary defects of their children” (Robin 1895). Sébastien Faure, for his part, advocated separating “normal” and “abnormal” children so as not to disturb the development of the former. Both Robin and Faure observed meticulously the physical development of their children. Robin even rejected the admission of some children into his orphanage because of their alleged physical handicaps (Valière 2016, pp. 354–55).

Thus, the anarchist project of achieving liberation through a “return” to nature immediately triggers suspicion. Are we dealing with what Jakob Tanner called an “ideology of nature” (Tanner 2016, p. 57)? Is liberation not, on the contrary, the overcoming of the naturally given? Can the reference to nature produce anything other than conservative, misogynistic, or racist effects?

I do not want to negate the problematic aspects of this pedagogical discourse. I would rather argue that, put this way, the critique prevents us from historicizing the anarchist concept of nature properly. By simply attributing eugenics, sexism, ableism, or racism to the “return to nature and life”, we lose sight of the fact that, for these anarchists, nature was not stable, unchangeable, and predefined. Let us listen to the French anarchist Jean Grave: “God did not exist, that was understood; but Nature, Forces, Matter, Natural Laws, all the attributes of the dead Divinity each inherited a part of its omnipotence and became so many entities, acting and willing, substituting for the dead authorities in the brain of man and perpetuating there a frenzied jumble that prevented him from seeing his own

conceptions clearly and left him just as much a slave as before, he who thought he had been freed!” (Grave 1897, pp. 261–62).

Here, Grave criticizes the hypostasizing of categories, such as nature or natural laws, and their transformation into metaphysical concepts. By capitalizing “Nature”, man replaced God with another omnipotent entity, thus creating a new authority that hinders human liberation. But what did a nonomnipotent concept of nature look like in Jean Grave’s view? And how did this understanding of nature relate to the “Great Divide” of nature and culture, which began to prevail at that very moment?

3. A Naturalist Pedagogy?

Answering this question requires a short excursion into the history of knowledge. It would be oversimplified to portray the “Great Divide” of nature and culture, as the anthropologist Philippe Descola calls it, as already fully established in the 19th century (Descola 2013, chp. 3). Indeed, if we follow Descola’s genealogy of the modern concept of nature, which spans several millennia, it becomes clear that the dualism of nature and culture was only beginning to be fully developed at the turn of the 20th century. Only then, Descola reminds us, did dualism become autonomous; that is, it became itself an object of scientific inquiry. It was only at the turn of the century that the cultural sciences aimed to relate the realm of human culture—a sphere of social interaction and symbolic representation—with the realm of nature. Anthropology was one of the disciplines that takes this dualism as its central analytical and theoretical object, asking how humans build societies by using and representing the natural entities they are surrounded by (Charbonnier 2015). Descola’s critical intervention into his own discipline and the Western sciences, in general, consists in showing that this dualism is not universal but rather a historically and geographically specific way of relating human and nonhuman entities.

It is important, then, to distinguish dualism—that is, the belief in two separate and incommensurable spheres—from naturalism, a “social and historical context” where the concept of nature is key in that it names the properties of things, their regularities, and their normativity (Charbonnier 2015, p. 23). In fact, scientific naturalism in the 19th century was by no means dualistic in the above sense, as the historian of science Claude Blanckaert points out. Rather, it was framed by a science that was “equally called ‘anthropology’ or ‘natural history of man’” (Blanckaert 2017, p. 41). The naturalistic gaze of the 19th century united heterogeneous fields of knowledge without assuming a radical incompatibility of disciplinary perspectives. Instead, it sought to gradually complement a divided epistemological space (Blanckaert 2017, p. 51). The “nature” of an entity consisted of an “ensemble of properties” that could encompass the most diverse domains, from ways of life to habitats (Bourdeau and Macé 2017, p. 13). The distinctions between the innate and the acquired, the dead and the living, bodies and their environment, and human societies and their natural surroundings were blurred, as Fabien Locher and Jean-Baptiste Fressoz emphasize (Locher and Fressoz 2012, p. 581). This is how “life” entered into history, as Foucault puts it, in the sense that “phenomena peculiar to the life of the human species” were integrated “into the sphere of political techniques” (Foucault 1978, p. 142).

Foucault also shows that, through this process, “life”—and we should add “nature” as well—entered the vocabulary of resistance (Foucault 1978, p. 145). It should be noted, then, that in the 19th century at least, nature and life were symbolically and politically contested concepts. They were not only instrumental in conservative discourses. Nature and life could just as well symbolize the resistant, the exuberant, or the untamed (Alaimo 2000). Nor did the term nature and related concepts always imply an essentializing biologism in today’s sense. In his *Philosophy of Progress* from 1853, the classical anarchist thinker Pierre-Joseph Proudhon, for example, defined nature as “movement” (Proudhon 1868, p. 31). From there, he took issue with Cartesian philosophy by postulating that the human subject cannot be thought of as a stable basis for knowledge. As everything moves, *cogito ergo sum* is a false premise, he contended. We should rather say *moveor, ergo fio*—I move, therefore, I become (Proudhon 1868, p. 21). Similar ideas were put forward by Mikhail Bakunin.

In the posthumously published manuscript *God and the State*, he contrasted the “vile matter” of the “idealists”—a “stupid, inanimate, immobile thing, incapable of giving birth to everything”—with the matter of the “materialists”, among whom he counted himself. This was a “spontaneous and eternally mobile, active, productive matter chemically and organically determined and manifested by the properties or forces, mechanical, physical, animal, and intelligent, which necessarily belong to it” (Bakunin 1970, pp. 12–13). Hence, returning to nature meant relating to an autopoietic life in humans and their surroundings. The maxim contained a critique of capital, the church, and the state, which were thought to dress, despise, and subjugate the physical and the natural as if they were made of lifeless “lower matter”.¹

Thus, when the anarchists defined the natural as movement and as living matter, they did not aspire to return to an ahistorical primordial state of nature. Apart from some primitivist anarchists (Baubérot 2004, 2014), the majority advocated technical interventions in nonhuman nature. In this respect, there is a striking continuity with early or “utopian” French socialism. As John Tresch points out in his fascinating study, early socialists developed a cosmology in which “science and technology appeared not as enemies of the human, but as integral components—both tools and actors—in the creation of a ‘second nature’” (Tresch 2012, p. 4). They defended a concept of freedom that brought together the human and the nonhuman, the organic and the technical. Tresch calls it a “freedom through connection—with other humans, with the rest of nature, and with machines” (Tresch 2012, p. 6).

It is analytically helpful to understand anarchist pedagogy as a technique in the above sense: as the careful regulation, channeling, promotion, and potentiation of forces inherent in human bodies and minds in order to bring them to fruition, thereby promoting nature to a higher form and not subduing it. Paul Robin, therefore, understood “integral education” as the establishment and cultivation of “continuous relationships” between physical, mental, and moral capacities: “Integral education is not, as one generally imagines, the forced accumulation of an infinite number of notions about all things; it is an education that tends to cultivate, to develop in parallel and harmoniously all the faculties of the human being, health—hence strength and beauty—skill, intelligence, and happiness—hence kindness. It embraces the usual divisions called physical education, intellectual education, and moral education and moreover indicates continuous relations between them” (Robin 1896, p. 1). According to Robin, instead of fragmenting and subjugating the “nature” of the young, it is necessary to recognize the child as a whole and to support children in their development. Integral education thus involved more than just a broad range of knowledge. It was directed toward human life in all its facets. While anarchist educators typically attended to three subject areas—the body, the mind, and morality—they did not do so in order to separate the given from the artificial and to let the realm of freedom begin where nature ends. It was rather a strategy to bring together what, in their view, had been separated by the dominant understanding of pedagogy.

Anarchist pedagogy was thus not naturalistic because it neatly separated nature from culture and derived human development from something given that limited human freedom. It was naturalistic in the sense that the category of nature and related concepts, such as matter, life, or the body, fulfilled a central function. With their understanding of nature, the anarchist pedagogues intervened in the political controversies of their time. From this standpoint, they developed what I would call a political ecology of the body that was directed toward a specific kind of natural body—a body that, like the concept of nature itself, united the physical and the mental, the person and its surroundings.

4. A Political Ecology of the Body

It is significant that the anarchist pedagogues used the metaphor of the gardener to describe pedagogical techniques. Educators had to relate to their children like gardeners to their plants, as Sébastien Faure put it: they had to dedicate themselves to “cleaning, weeding, digging up, sowing, thinning, replanting, replanting, pruning, grafting, support-

ing, protecting, watering, planting” so that “fragrant flowers” and “tasty fruits” would develop (Faure 1933, p. 7). Growing plants and bringing up children were understood as structurally similar in that both activities support and nurture the autopoietic capacities of beings.² The pedagogue was someone who literarily grew up children: with care and foresight, he had to assist the young in their autonomous development.

Behind this conception of pedagogy as specific techniques of growing human beings lay an understanding of liberation that I would like to call a political ecology of the body. All the terms are significant here. First, liberation was directed at the body and its organs, which, as I have already shown, were to be developed in their “harmonious” relationships. Instead of disciplining bodies, the aim was to develop them holistically. For anarchists, the body was a contested place of oppressive but also liberating experiences. Starting from the body, its organs, senses, and desires, the subject was able to relate to others and its environment. For, as the anarchists Janvion and Degalvès underscored, the body was “neither a pure spirit nor an automatic machine” (Degalvès and Janvion 1897, p. 2). Humans had to avoid just disciplining and controlling their bodies in order to liberate themselves. The body was a processual, open-ended “project”, as Cleminson writes with regard to anarchist nudism (Cleminson 2004, p. 714).

Second, for anarchists, the body did not consist of a homogeneous whole. It was rather a network, or ecology, of different entities, and its limits were porous and open to influences from the surroundings. The body was not insular, as Rosalind Petchesky puts it in another context (Petchesky 1995, p. 400). Free individuals stood in continuous and freely chosen relationships with their fellow human beings and their environments. The anarchist Alexandra David-Neel wrote in this regard: “Our body is a product of those of our parents, nourished by the daily assimilation of a host of elements borrowed from nature; our thoughts are born and nourished by the thoughts of others; our whole mental and physical organism, in constant communion with the Whole, has no point where it can rest and say I, because everywhere it finds the others in it” (Myrial 1898, p. 29).

Third, this ecology was political because it criticized the observed divisions, isolations, and fragmentations of bourgeois-capitalist society and sought to overcome them. These separations included the dissociation and isolation of mental and physical skills, the epistemological separation of subject and object, and the relations of domination between social groups. This political ecology of bodies was thus one that was supposed to bring the organs, senses, and bodies of acting individuals and of nonhuman entities into a system of “natural” relations. Precisely because it rested on autonomy and freedom, this system was supposed to be strikingly stable, regular, and uniform. Last, it is important to note, that when I call this view a political ecology of the body, I do not mean to emphasize its positive aspects. I understand it primarily as an analytical concept that should help us grasp the specific anarchist conception of emancipation and its relationship to nature and the natural human body.

This enables us to see that viewed from the broader history of political philosophy, anarchist pedagogy broke with the possessive individualism of classical liberalism. Anarchists did not define liberation in terms of an exclusive and absolute ownership of nonhuman nature on the one hand and the ownership of oneself and the body on the other (Macpherson 1962). Rather, they conceived of individual freedom as the result of cooperative relations to the body and its environment. The individual—as an active, feeling, sensing, and corporeal being—should always be interacting with social and natural environments. This was the individual the educators wanted to raise by turning and seeking inspiration from nature and its autopoietic potentialities.

5. Conclusions

In this essay, I have tried to historicize the anarchist concept of nature around 1900. I have shown that the desire to return to nature did not entail an ahistorical and biologicistic understanding. To truly understand anarchist cosmology, we must acknowledge that nature was something different for the actors of the time: an autopoietic entity in motion

that encompassed both the human and the nonhuman. Only in this way can we understand that, for the actors, there was no contradiction between achieving human freedom and turning to nature.

This example thus encourages us to think more deeply about the concept of nature in modernity. For there was no unanimous conception of Western naturalism, even at the time when the “Great Divide” between nature and culture was being established. It is important to make conflicts about the concept of nature historiographically visible in order to problematize narratives of supposedly homogeneous Western modernity. I fully agree with Pierre Charbonnier when he contends that we should not altogether reject the concept of nature because of its complexity and opacity but rather take the chance and dive into its “historical thickness” (Charbonnier 2015, p. 18). By looking at a political movement that drew a lot of inspiration from scientific disciplines but was not identical to them, we should also feel encouraged to study the ways in which naturalist ontology was reproduced, modified, or challenged in, for example, political movements or social institutions, such as schools. A comprehensive historical anthropology of naturalism and Western modernity cannot only focus on science and scholarly practices, as has most often been the case, but should also look into how people in other social fields have related to nonhuman entities (Mathieu 2022).

In addition, this historical example also offers insights into contemporary theoretical debates. It shows that there is no direct connection between naturalization and essentialization. Nor is there a compelling antagonism between naturalization and emancipation. If nature itself is understood as a mixture of the human and the nonhuman, of the historically evolved and the “naturally” given, then it might be possible to think differently about liberation. Ecofeminists have been drawing attention to this problem for some time (Carlassare 1994; Sturgeon 1997; Larrère 2015). Like some ecofeminists in the 1980s, the anarchists were concerned with discovering and developing a liberating nature behind the “lower matter” that was subdued by capitalism, the state, or the patriarchy. Both movements tried to develop a different “ontology” of nature and the body.

A critical reader might answer that all this does not change the fact that anarchists used the concept of nature to separate the normal from the pathological, thereby reproducing eugenic discourses. This is absolutely true, and this essay does not aim to negate or justify those aspects. I would simply argue that we must properly historicize different concepts of nature, because only then can we grasp that its use of the category of nature alone did not make anarchist pedagogy reactionary. It was reactionary when it posited a specific concept of nature, one that was homogeneous and teleological. In fact, most 19th-century theories of development in the natural and social sciences conceived of development as a progression toward maturity (Bowler 2009, p. 570). Anarchist pedagogues in Western Europe were no exception. If we let children grow autonomously, they will all become strong and healthy, they hoped. In their view, spontaneous growth produced astonishing uniformity. Therefore, references to nature should be always open to controversy and contestation from different points of view in order to be truly emancipatory.

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¹ There is a philosophical continuity between Bakunin and Spinoza. See (Mümken 2010).

² Interestingly, Tim Ingold makes similar comparisons between the activities of gardening and raising children. See (Ingold 2000, chp. 5).

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Essay

'Apart from the Experiences of Subjects There Is Nothing, Nothing, Nothing, Bare Nothingness'—Nature and Subjectivity in Alfred North Whitehead

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Abstract: While long ignored, the philosophy of Alfred North Whitehead has attracted considerable interest and wide academic reception since the 2000s. One reason for the renewed interest in Whitehead's work is most certainly that his philosophy and concepts offer a way out of dualistic schemes of thought that have dominated the conceptual framework of the West since modernity. In my paper, I focus on Whitehead's undoing of the opposition between nature and subjectivity, for it is a crucial aspect of Whitehead's concept of nature not to exclude subjectivity from the 'realm of nature'. For Whitehead, subjectivity is a fundamental feature of the whole of reality and by no means exclusively human, leading to a radically non-anthropocentric, pluralistic notion of the subject.

Keywords: Alfred North Whitehead; philosophy of nature; philosophy of subjectivity; metaphysics; Donna J. Haraway

1. Introduction

While long ignored, the philosophy of the mathematician and process philosopher Alfred North Whitehead has attracted considerable interest and wide academic reception since the 2000s. Nowadays, numerous publications are being issued in various scientific fields almost on a daily basis—from philosophy and theology to sociology and media theory. Isabelle Stengers is certainly one of the most important Whitehead scholars of recent times. With her interpretation of and approach to Whitehead, she has contributed decisively to his increased reception. In addition, Donna J. Haraway, Bruno Latour, and Karen Barad, for whom Whitehead implicitly or explicitly serves as an important source of inspiration, should not go unmentioned. It seems that the significance and relevance of Whitehead's concepts and ideas for the humanities have been fully realized only recently.¹ Another reason for the renewed interest in Whitehead's work is most certainly that his philosophy and concepts offer a way out of dualistic schemes of thought that have dominated the conceptual framework of the West since modernity. It is specifically the nature–culture dualism that is, one might say, the primordial dualism from which most other dualisms have derived, with one side always considered superior while the other is devalued (mind and matter, body and soul, subject and object, facts and values, male and female, human and animal, and so on). It is for this reason that the feminist scholar, biologist, and historian of science Donna J. Haraway states that 'queering' what is conceived of as nature in Western modernity is her "categorical imperative" (Haraway 1994, p. 60). One might say that this is also Whitehead's main concern when he tries to conceptualize nature in a radically non-modern way. However, it is important to add that for both Haraway and Whitehead, in a pragmatist vein, this 'queering' is "not for the easy frisson of transgression, but for the hope for livable worlds" (Haraway 1994, p. 60).

It is not possible to treat Whitehead's concept of nature exhaustively within the scope of this paper, for his whole philosophy, his whole metaphysics, is a philosophy of nature, even a cosmology, and thus provides a comprehensive analysis of the fundamental ontological

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structures of all that exists. Since it is an important aspect of Whitehead's concept of nature not to exclude subjectivity from the 'realm of nature', I will focus on his notion of subjectivity in the following and trace how Whitehead conceptualizes subjectivity as being part of nature, as being everywhere in nature, leading to a radically non-anthropocentric, pluralistic notion of the subject.

As a process philosopher, for him the world doesn't consist of individual substances but of processes, or, more precisely, of an interweaving of processes or events. Understanding processes as individual 'acts of experience', i.e., as subjects, he can claim that the whole world consists of subjects, and he can even claim "that apart from the experiences of subjects there is nothing, nothing, nothing, bare nothingness" (Whitehead [1929] 1978, p. 167). Whitehead hence radically generalizes and pluralizes the concept of the subject.

Since Whitehead's notion of the subject is closely linked to what he is determined to avoid in his metaphysics, namely what he calls "the bifurcation of nature", I first need to trace what he meant by this notion. In the second part of my paper, I will discuss Whitehead's notion of subjectivity.²

2. The Bifurcation of Nature or the Unconscious Metaphysics of Modernity

Whitehead describes modern thought as plagued by a "radical inconsistency" (Whitehead [1925] 1948, p. 77) which he calls "the bifurcation of nature". According to Whitehead, this fundamental "incoherence" (Whitehead [1929] 1978, p. 37) at the foundation of modern thought is reflected not only in the concept of nature itself, but in every field of experience—in modern theories of experience and subjectivity, of ethics and aesthetics, as well as many others. In "The Concept of Nature" (1920), Whitehead states that nature splits into two seemingly incompatible spheres of reality at the beginning of modern European thought in the 17th century: 'Nature' on the one hand refers to the (so-called) objective nature accessible to the natural sciences only, i.e., the materialistically conceptualized nature of atoms, molecules, cells, and so on; at the same time, however, 'nature' also refers to the (subjectively) perceptible and experienced, i.e., the appearing nature with its qualities, valuations, and sensations. Whitehead considers this modernist division of nature in thought—the differentiation of primary and secondary qualities, of 'first' and 'second' nature, of a material and mental sphere—a fundamental, serious, and illicit incoherence. His term for this incoherence is 'bifurcation of nature', for the question of how these two concepts of nature—'objective' and 'subjective'—relate to each other remains largely unresolved for Whitehead within the philosophical tradition of modernity. Avoiding this inconsistency and sketching a metaphysics beyond the bifurcation of nature, which necessarily implies a revision of the modern concept of both subject and experience, guides most of Whitehead's thought (Cf. Stengers [2002] 2011):

What I am essentially protesting against is the bifurcation of nature into two systems of reality, which, in so far as they are real, are real in different senses. One reality would be the entities such as electrons which are the study of speculative physics. This would be the reality which is there for knowledge; although on this theory it is never known. For what is known is the other sort of reality, which is the byplay of the mind. Thus there would be two natures, one is the conjecture and the other is the dream.

Another way of phrasing this theory which I am arguing against is to bifurcate nature into two divisions, namely into the nature apprehended in awareness and the nature which is the cause of awareness. The nature which is in fact apprehended in awareness holds within it the greenness of the trees, the song of the birds, the warmth of the sun, the hardness of the chairs, and the feel of the velvet. The nature which is the cause of awareness is the conjectured system of molecules and electrons which so affects the mind as to produce the awareness of apparent nature. The meeting point of these two natures is the mind, the causal nature being influent and the apparent nature being effluent. (Whitehead 1920, 30f.)

The bifurcation of nature always takes place when two separate, incompatible realms of reality are assumed: the never directly perceivable ‘reality’ or material sphere on the one hand, and the ‘appearance’ or mental sphere on the other. Whitehead’s thesis of the bifurcation of reality thus also provides an explanation not only for the historical–systematic origin of the categorical–binary distinctions that characterize the philosophical tradition of modernity, but also for the modern bifurcation of modes of knowing, that is, “the division of territory” (Whitehead [1925] 1948, p. 145) between the natural sciences, dealing with the ‘objective world’, and philosophy, dealing with the ‘subjective conditions’ of knowing this objective world.³

Against this background, the bifurcated nature can be interpreted as a “historical-discursive constellation” that, along with the basic conceptual presuppositions—which mostly remain implicit and hence theoretically unfounded—“forms the historical self-evidence of modernity” (Sehgal 2016, p. 15, my translation). As the “implicit metaphysics of modernity” (Sehgal 2016, p. 15, my translation) or, following Fredric Jameson’s theory of the political unconscious (Jameson [1981] 2002), as the unconscious metaphysics of modernity, it fundamentally determines the conditions and terms as well as the content and form of modern thought. Whitehead thus also refers to thinking in the mode of the bifurcation as the “general form of the forms of thought” (Whitehead [1933] 1967, p. 12) of modernity: in addition to the stipulation and fixation of the content—that is, what can and may be thought at all qua the first principles—, it also adheres strongly to the way, the form, or the mode of thinking (Cf. Halewood 2011, p. 6). With Whitehead, then, the bifurcation can be understood as the outstanding mode of modern thinking, as the modern convention, culture, or habit of thought par excellence.

In assessing Whitehead’s interpretation of the history of ideas, I would like to point out, with Melanie Sehgal, that his own conflation of historical and systematic analysis, as it is also brought to bear in his theory of bifurcation, must be taken into account. It is pivotal, then, to consider Whitehead’s understanding of philosophy as well as history: he addresses “the modern way of thinking initially as *one* system of thought, *as if* it were one philosophical system” (Sehgal 2016, p. 15) and, via this carving out of a conceptual system, links areas that are themselves treated separately in the tradition of modernity. In other words, Whitehead’s ‘modernity’ has to be understood as a historical and systematic construct, which is assigned a specific function within his thought.⁴ His generalizing approach and the corresponding generalized use of the notion of modernity may seem questionable from a philosophical as well as historical viewpoint, but can be justified along with Sehgal by means of the Whiteheadian conflation of historical and systematic considerations. For, according to Whitehead, it is precisely and primarily in this entanglement that the fundamental incoherence that characterizes modern thought becomes apparent: the modern basic principles are incompatible or, as in the case of the concept of nature, characterized by an internal contradiction. Thus, Whitehead also deploys a specific reading method: his starting point for assessing the history of ideas is always the problem of the bifurcation of nature and therefore that of (mostly) implicit presuppositions.⁵

2.1. Nature as ‘Meaningless Complex of Facts’

According to Whitehead, it is not so much the explicit as the implicit presuppositions that most fundamentally determine the conceptual framework of an epoch.⁶ For him, one of, not to say the most fundamental and momentous, though in some areas nonetheless very useful of all the implicit presuppositions of modern philosophy and science, characterized by the bifurcation, lies in the endeavour to describe reality on the basis of substance and quality, subject and predicate, particular and universal:

All modern philosophy [and science, I.S.] hinges round the difficulty of describing the world in terms of subject and predicate, substance and quality, particular and universal. [...] We find ourselves in a buzzing world, amid a democracy of fellow creatures; whereas, under some disguise or other, orthodox philosophy can only introduce us to solitary substances [...]. (Whitehead [1929] 1978, 49f.)

Whitehead locates the systematic roots of thinking in the mode of substance and attribute in the hypostatization and illegitimate universalization of the particular and contingent subject–predicate form of the propositional sentence of Western languages. The resulting equation of grammatical–logical and ontological structure leads to conceiving the logical difference between subject and predicate as a fundamental ontological difference between subject and object, thing and property, particular and universal.

In general, Whitehead’s critique of substance metaphysics is directed less against Aristotle himself, “the apostle of ‘substance and attribute’” (Whitehead [1929] 1978, p. 209), than against the reception and careless adoption of the idea of substances in modern philosophy and science, precisely the notion of substances as self-identical material.⁷ Historically, Whitehead sees the bifurcation sealed with the triumph of Newtonian physics, within which the mechanistic-materialist understanding of matter was universalized and seen as an adequate description of nature in its entirety. In this way, scientific materialism became the guiding principle and implicit assumption of the modern conception of nature at large:

One such assumption underlies the whole philosophy of nature during the modern period. It is embodied in the conception which is supposed to express the most concrete aspect of nature. [...] The answer is couched in terms of stuff, or matter, or material [...] which has the property of simple location in space and time [...]. [M]aterial can be said to be *here* in space and *here* in time [...] in a perfectly definite sense which does not require for its explanation any reference to other regions of space-time. (Whitehead [1925] 1948, p. 50)

The misconception of matter as “simply-located” (Whitehead [1925] 1948, p. 49) stems once again from the premise of the substance–quality model criticized by Whitehead as an ill-considered and false abstraction. Following the doctrine of the simple location and the associated idea of an absolute space and an absolute time, matter is merely characterized by being at a certain time (now) at a certain position in space (here), thus existing independently. For these accounts, therefore, only the *external* relations between the matter–particles are relevant, which are to be understood as purely external insofar as the matter–particles mean nothing to each other, are irrelevant for each other. The assumption of the simple location thus implies a primal disconnectedness of the pieces of matter—which, by the way, has been ruled out within physics itself since the general theory of relativity—and thereby, according to Whitehead, abstracts from the complex and manifold interconnectedness of all entities. As a result, in scientific materialism, nature in general appears as a “meaningless complex of facts” (Whitehead [1938] 1968, p. 132).

Whitehead’s rejection of mechanistic materialism is not only due to the immanent development of the physics of his time, which, from thermodynamics to the theory of relativity and quantum physics, limited the validity of the materialistic view even within physics itself. Rather problematic for him was the interpretation of Newton’s understanding of matter, meaning the universalization of the materialistic conception of nature or the mathematical approach, which was carried out within physics as part of its triumphal procession and its transmission to (de facto) all other regions of experience. From a philosophical point of view, however, this universalization is indefensible, since its experiential basis in Newtonian physics is so limited that it cannot claim validity outside its limited scope. As a result, Newton’s matter particles are not taken as what they are, namely the result of an abstraction, but as the most concrete components of nature as such, as concrete reality. Whitehead therefore tirelessly emphasizes that the materialistic understanding of nature is an abstraction that can only be applied to a certain segment, that is, to the solid bodies or inanimate nature in the Newtonian sense of the term. This error of mistaking an abstraction for concrete experience, of confusing (the result) of an abstraction with reality itself is what Whitehead calls the “Fallacy of Misplaced Concreteness” (Whitehead [1925] 1948, p. 52). This logical fallacy poses a far-reaching and highly consequential problem because it excludes essential realms of experience from the metaphysical context by “explaining [them] away” (Whitehead [1929] 1978, pp. 17, 145). For everything that does

not fall within the scope of mathematical explanation and cannot be grasped in mechanistic terms is seen as located in the (human) subject alone, and thus denied ‘reality’ and, consequently, value. This way, the differentiation between primary and secondary qualities, mind and matter, nature and culture, subject and object, human and non-human is constantly re-established. Whitehead’s ‘protest’ against the bifurcation of nature is thus motivated by the fact that experience is conceptualized inadequately by the theories of bifurcation, excluding essential fields of experience; and, on the other hand, ethically and politically, since scientific materialism with its idea of ‘mere’, worthless matter guides the mentality and culture of modernity in general reaching far beyond the realm of science. Thus, because Newtonian physics abstracted from sensations and qualities qua its field of research, since these eluded mathematization and could not be described in mechanistic terms, the illicit generalization of materialism resulted in a fundamental exclusion of qualities from the realm of a ‘first nature’ in general. For if an abstractum like matter is mistaken for concrete reality as such, differentiating everything that is perceptible in nature as secondary from its primary qualities and locating these secondary qualities exclusively in the (human) subject cannot be avoided. This ultimately cements the dualism between mind and matter, body and mind, nature and culture. In the course of the universalization of modern physics, qualities were suddenly excluded from the realm of nature by definition, instead of simply not belonging to the current field of research with respect to their application. With the separation of the secondary from the primary qualities, nature is reduced to dead, passive matter, to raw material; it appears as “dull affair, soundless, scentless, colourless; merely the hurrying of material, endlessly, meaninglessly” (Whitehead [1925] 1948, p. 56). Within such a conception, nature is not only conceived as the ‘completely other’, but additionally deprived of its qualities and values *for its own sake*—in Whitehead’s words. This legitimizes any form of exploitation. Whitehead therefore called for a more responsible engagement with nature as early as 1925, condemning “the habit of ignoring the intrinsic worth of the environment” (Whitehead [1925] 1948, p. 196). His theory of bifurcation thus additionally provides a reasonable explanation for today’s ecological crisis. However, his advocacy for a different understanding of and relationship to nature cannot be tied to classical conservation arguments, insofar as within the latter, in order to preserve nature, the distinction between nature and culture must be presupposed, and the division between the two must be maintained. A “political ecology” (Bruno Latour), also in a Whiteheadian sense, has to be something other than a mere protection of nature, a discourse that usually only results in a reification of nature. Whitehead’s theoretical efforts can therefore be traced to an interest or concern that is foremost a practical one. They can be read as a “theoretical basis for a different kind of practice” (Holzhey 1990, p. 18, my translation). According to Whitehead, the bifurcation of nature poses a catastrophe in the modern age in terms of its practical effects on life, its ‘worldly consequences’.

2.2. Subjectivity versus Nature

One of the most decisive systematic–historical reasons for the inconsistency within the concept of nature and the concomitant exclusion of subjectivity, experience, and history from nature is, according to Whitehead, the abstract, binary distinction between primary and secondary qualities of the 17th century physical notion of matter based on the substance–quality scheme. Quantitative, measurable properties, such as extension, number, size, shape, weight, and movement, are for Galileo via Descartes through to Locke real, i.e., primary qualities of the thing itself. They are conceived as inherent to things as well as independent of perception. In contrast, secondary qualities, such as colors, scents, sound, taste, as well as inner states, feelings, and sensations, are understood to be located in subjective perception, in the mind, and are considered to be dependent on the primary qualities. They only *appear* to the subject to be real qualities of the objects themselves. In modernity, then, the subject—which, by the way, theoretically as well as practically, cannot be justifiably defined as naturally human—has to endow the ‘dull nature’ with qualities and values, with meaning. These “psychic additions” (Whitehead 1920, p. 29, 42f.), as

Whitehead also calls them, are, in contrast to the primary qualities, not describable in the language of mathematical physics, i.e., not quantifiable and therefore do not possess any ('objective') 'reality'. Consequently, they are of no use for science, and the sensuously perceived nature becomes a ('subjective') 'dream'. Meanwhile, the nature of the sciences becomes a 'hypothesis' since it can never become an object of perception as such, given that the primary qualities can only be experienced in a mediated way, for example in experiments. In the course of separating the secondary from the primary qualities, the 'realm of the objective', the 'realm of the hard facts' is only complemented by the 'realm of the subjective'; for itself, according to a frequently used formulation in Whitehead, nature is conceived as completely devoid of subjectivity, i.e., values, feelings, and intentions. Against this background, Whitehead can then also suggest, in an ironically exaggerated way, that the Romantic poets are completely wrong in praising the rose for its scent or the nightingale for its song.⁸

According to Whitehead, modern philosophies of nature, as well as theories of experience and the subject, rest on these implicit premises of a bifurcated nature. As described, the distinction of two kinds of qualities leads to the assumption that there are two regions of experience and thus two kinds of objects of experience, so that it always has to be decided whether a quality is inherent to the things themselves or is to be located in the subject only—the bifurcation of nature occurs. Consequently, Whitehead's radical reformulation of the concept of nature (and thereby also subjectivity) takes place within the scope of this observation: for in the same way that nature, with the differentiation of the 'two natures', is conceived as being located outside the subject, vice versa, subjectivity is no longer a part of nature, but is, so to speak, in opposition to it, for it is considered external to nature and entirely 'other'. Thus, the separation of primary and secondary qualities is accompanied by the exclusion of subjectivity and therefore of experience and history from the realm of the 'material nature' altogether. From this perspective, then, the body-mind dualism that characterizes modern philosophy is revealed as an expression of the bifurcation of nature, of the division of primary and secondary qualities, which also means of the exclusion of subjectivity from nature. Whitehead's maxim against this exclusion, on the other hand, is: "All we know of nature is in the same boat, to sink or swim together." (Whitehead 1920, p. 148). It is therefore inadmissible to be interested in the red glow of the sunset alone, like phenomenology, or to focus exclusively on the mechanical movements of molecules, like physics: "[...] everything perceived is in nature. We may not pick and choose. For us the red glow of the sunset should be as much part of nature as are the molecules and electric waves by which men of science would explain the phenomenon." (Whitehead 1920, p. 29). It is therefore for philosophy, if it doesn't want to be useless, not to exclude or 'explain away' anything, but to place the different realms of experience in relation to one another, without reducing them to one another: "It is for natural philosophy to analyse how these various elements of nature are connected." (Whitehead 1920, p. 29).

3. Subjectivity as a Fundamental Feature of the Whole of Reality

Whitehead, on the basis of his interpretation of the modern conceptual framework, derives the task of sketching a metaphysics in which nature does not bifurcate and in which there is no division of nature and mind and their respective knowledge fields of the material and the mental. Such a metaphysics requires not only a radical reconstruction of the concept of nature, but necessarily includes an equally radical reframing of subjectivity. For Whitehead assumes that it is precisely the modernist conception of subjectivity (and thereby objectivity) that has contributed decisively to the bifurcation of nature. His interpretation of modernity as a historical-discursive formation characterized by the bifurcation is therefore crucial to his radical reconstruction of the concept of nature.

Such a reformulation of the concept of nature includes for Whitehead not least the dissolution of the opposition nature/subjectivity or else nature/experience⁹: instead of excluding the subject and experience from nature and thus opening the door to bifurcation, for Whitehead *subjectivity is a fundamental feature of the whole of reality*. According to the

Philosophy of Organism, everything that exists feels; every atom and every flower feels. A statement, as Melanie Sehgal notes, “that sounds strange only against the background of a concept of experience implicitly oriented towards conscious, human perception, as it characterizes modern philosophy” (Sehgal 2016, 209f., my translation). Reality must be described as a hierarchy of consistently given, though varying, degrees of subjectivity. This is also the reason why Whitehead can state “that apart from the experiences of subjects there is nothing, nothing, nothing, bare nothingness” (Whitehead [1929] 1978, p. 167). If such a relocation of subjectivity into nature is linked to the goal of correcting the materialist–mechanistic conception of the ‘natural’ world as it derived from the bifurcation, subjectivity can also no longer be a “privilege of higher developed entities, let alone an ontological distinction of man” (Wiehl 2007, p. 30, my translation). On that note, Whitehead vehemently rejects modern anthropocentrism, which locates subjectivity outside of nature: “Pansubjectivism,” Reiner Wiehl elaborates, “thus means in Whitehead not only the implementation of the subject in nature and the natural sciences, but equally also a naturalization of subjectivity” (Wiehl 1990, p. 212, my translation). In this regard, what Bruno Latour phrased much later in the context of his Actor–Network Theory also applies to Whitehead’s theory of an immanent, all-encompassing subjectivity: “Subjectivity, corporeality, is no more a property of humans, of individuals, of intentional subjects, than being an outside reality is a property of nature” (Latour 1999, p. 23). Mental structures are a basic feature of reality and the difference between mentality and materiality is, from this perspective, merely one of degree, by no means a differentiation that is ontologically prior.¹⁰ Whitehead’s “panexperimentalism” (Griffin 2007) or “pansubjectivism” (Wiehl 1990) does not mean that everything senses in the same way and intensity, that the sensations of a stone are the same as those of a human being—“[i]t is obvious that a structured society may have more or less ‘life’”—, but that there are no absolute but only gradual differences within life: “[T]here is no absolute gap between ‘living’ and ‘non-living’ societies”¹¹ (Whitehead [1929] 1978, p. 102). Therewith, Whitehead insists against the bifurcation of nature that “[e]ach actuality is essentially bipolar, physical and mental” (Whitehead [1929] 1978, p. 108) and thus contradicts another extremely persistent dualism within Western philosophy: the dualism between the organic and the inorganic.¹²

3.1. *Subjects as Process-Relational ‘Acts of Experience’*

If the bifurcation of nature is to be overcome, there must be no “bifurcation of actualities” (Whitehead [1929] 1978, p. 289) and thus no distinction between sentient-thinking entities on the one hand and ‘merely material’ entities on the other. The assumption of entities “void of subjective experience” (Whitehead [1929] 1978, p. 167) is therefore strictly rejected by Whitehead. Thus, “all final individual actualities have the metaphysical character of occasions of experience” (Whitehead [1933] 1967, p. 221); they must be understood as sensing, i.e., “experiencing subject[s]” (Whitehead [1929] 1978, p. 16) in a non-anthropological (and thereby also non-anthropocentric) sense. With this, subjectivity has been metaphysically generalized as well as pluralized: subjectivity is everywhere present in nature, no longer bound to consciousness and no longer the sole predicate of man.

Whitehead calls the smallest “individual unity of experience” (Whitehead [1929] 1978, p. 129) an ‘actual entity’, ‘actual occasion’, or ‘organism’. They are “drops of experience, complex and interdependent” (Whitehead [1929] 1978, p. 18), detached from their anthropological and consciousness–philosophical context. Whitehead describes them as dynamic–creative processes of ‘growing together’ (“conrescence of prehensions”), as processes of synthesis and integration through which the drops of experience ‘feel’ or ‘grasp’ the others (‘prehension’¹³) and include the others relevant to them (‘positive prehension’). They thereby constitute each other as well as themselves. That is precisely what Haraway says, even using Whitehead’s term ‘prehension’: “Through their reaching into each other, through their ‘prehensions’ or graspings, beings constitute each other and themselves.” (Haraway 2003, p. 6) The world thus becomes a world of manifold, perspectival, mutually

grasping events; it brims with touching, intersecting, and interlinking subjects. Ontologically, it is then no longer the independently existing that is the primarily existing, but the relational processes of becoming of the drops of experience. Actual entities thus continuously emerge from and merge into each other through their “entanglements” and “intra-actions,” as Karen Barad would say: “Existence is not an individual affair. Individuals do not preexist their interactions; rather, individuals emerge through and as part of their entangled intra-relating” (Barad 2007, p. ix). Or, again with Haraway: “To be one is always to become with many” (Haraway 2008, p. 4).

Once constituted as a new entity through the process of interweaving relations—in Haraway’s words, “becoming-with,” “co-becoming,” or “co-constitution”—the occasions of experience become the object, the “stubborn fact” for the actual entities that follow them, i.e., they become “objectively immortal” (Whitehead [1929] 1978, p. xiv). Every subject, therefore, as the object that it has become, enters into the subjects that follow it and emerges from them, with which they coincide in the new thing they have become. Actual entities, then, stand constantly in tension between subjectivity and objectivity, and subject and object become relative as well as functional categories in the process of the relations they enter into and from which they emerge: “There are no pre-constituted subjects and objects” (Haraway 2003, p. 6). The categories of subject and object are therefore applicable and valid in their conceptual abstraction only and exclusively after the process of the many entering into a new entity and in relation to other actual entities. Accordingly, Whitehead does not present an overall critique of the differentiation of subject and object, or even of body and mind: rather than dissolving the difference, he reinterprets it, by dropping it as a metaphysical premise.

That which an actual entity in the nexus of relations that constitute it is *for itself* as an “individual unity of experience” (Whitehead [1929] 1978, p. 129, my emphasis)—i.e., as a ‘subject’—is what Whitehead calls its “private side” or its “psychic pole”; but since it is at the same time and always also for others, it also has an objective “public side” or a “physical pole.” In terms of its privacy, an actual entity is a ‘subject’, a psychic structure that creates itself from the data given to it by integrating others. One and the same actual entity, however, in terms of its physical, public aspect, is also an ‘object’, for “it arises from the publicity which it finds, and it adds itself to the publicity which it transmits” (Whitehead [1929] 1978, p. 289). Each actual entity, thus, also poses the question of order anew. By adding itself, it can change the entire order: “Reality is an active verb” or else “the world is a knot in motion” (Haraway 2003, p. 6). An actual entity is hence, on the one hand, dependent on its actual world, but at the same time it always goes beyond it, transcending solidified structures and constituting itself in its process of becoming. Therefore, there is no total dependence of becoming on structure. Accordingly, drops of experience oscillate between finality and causality, between self-causation and effect-causation; both determined and free, they enjoy a certain level of self-determination and agency. How an actual entity evaluates the previous actual events, the ‘data’ available to it, whether something is of interest for it, concerns it, whether it integrates or rejects what it feels and how it unifies it, is up to its—conscious or unconscious—‘decision’. “It [the subjective form, I.S.] may, or may not, involve consciousness [...]” but, in any case, “[it] will involve aversion, or adversion, that is to say, decision” (Whitehead [1929] 1978, p. 261). Thus, another concept, predominantly limited to the realm of the human, has been speculatively extended: agency is no longer linked to consciousness and therefore no longer an ontological distinction of man. Whitehead consequently speaks of “[t]he ultimate freedom of things, lying beyond all determinations” (Whitehead [1929] 1978, p. 47). Every event is thus not only an acting, active process, but equally a creative one,¹⁴ and every event therefore also has a unique “subjective form” and a “subjective aim” in which its individuality is expressed. In its process of synthesis or integration, every act of experience always strives for “satisfaction,” “self-fulfillment,” or “self-enjoyment” and thus fundamentally contains the moment of valuation in its decision. Actual entities therefore also have a value for themselves, whereby

intrinsic value is extended into nature. Consequently, nature can no longer be conceived as ‘meaningless complex of facts’.¹⁵

As feeling-grasping, as relational ‘act of experience’, every actual entity, every subject is to be understood as a creative act or event. They are therefore necessarily processual. According to Whitehead’s notion of processuality, they must be conceived as temporary, ephemeral events that essentially imply emergence and perishing—“no subject experiences twice” (Whitehead [1929] 1978, p. 29). A basic feature of actual entities is therefore their ‘atomistic’ structure. To consider time ‘atomistic’ or ‘epochal’ means to conceive of time as consisting of distinct wholes, which are extended in time, but which themselves can no longer be divided into temporal sections (Cf. Sölch 2014, p. 287). Each actual entity must be thought of as an undivided duration, as an indivisible process of becoming, which only becomes and perishes, but does not change: “Actual entities perish, but do not change; they are what they are” (Whitehead [1929] 1978, p. 35). In this context—the relation between continuity and discontinuity—, Whitehead mentions Zeno’s arrow paradox: since Zeno assumes that every becoming is based on something *that* becomes, and that becoming is divisible into discrete periods of time, he presumes the substance–attribute model. In Whitehead’s conceptual universe, therefore, a distinction is also made between ‘change’ and ‘becoming’. For him, there can only be “a becoming of continuity, but no continuity of becoming,” “[i]n other words, extensiveness becomes, but ‘becoming’ is not itself extensive” (Whitehead [1929] 1978, p. 35). Whitehead’s conception thus implies that the existence of an actual entity is constituted by its indivisible, atomistic becoming, so that when an actual entity has fully become, it ceases to exist—“[i]n the organic philosophy an actual entity has ‘perished’ when it is complete” (Whitehead [1929] 1978, 81f.). The way an actual entity becomes therefore also determines what it is:

[...] *how* an actual entity becomes constitutes *what* that actual entity is; so that the two descriptions of an actual entity are not independent. Its ‘being’ is constituted by its ‘becoming’. This is the ‘principle of process’. (Whitehead [1929] 1978, p. 23)

A subject, therefore, cannot persist as a self-identical entity that merely experiences qualitative changes without itself becoming something else—“[i]t is fundamental to the metaphysical doctrine of the philosophy of organism, that the notion of an actual entity as the unchanging subject of change is completely abandoned” (Whitehead [1929] 1978, p. 29). An actual occasion neither reoccurs nor does it change; it emerges and passes away, ceases to exist, and is replaced by other actual occasions.¹⁶ Actual entities are thus temporary events, ephemeral truths, and essentially historical. Once the bifurcation of nature has been overcome theoretically, historicity can also no longer be considered nature’s other.

Properly considered, therefore, actual occasions cannot be understood as the smallest elements composing the world. I therefore agree with Melanie Sehgal’s assessment that the quasi-physical view of actual entities as the smallest pieces constituting everything else overlooks the speculative dimension of the term. For Sehgal, in pragmatist terms, “the crucial question is not *what* actual entities are, but what the concept enables to think, *where it might lead*” (Sehgal 2016, p. 375, my translation). And, ‘for the hope for livable worlds’, it might lead to a dissolution of the dualism between nature and culture and its related dualisms.

3.2. ‘Societies’ or of People, Stones and Electrons

As processes of becoming, actual entities are not directly observable and therefore cannot be considered objects of experience. That which is actually perceived, on the other hand, is what Whitehead calls ‘societies’. Societies are a more or less complex assemblage of events, a nexus of actual entities that, in a complex process of transformation, take up (‘prehend’) patterns and properties of past entities and repeat them in such a way that enduring structures, solid, material things like people, plants, stones, electrons, etc., emerge. Societies are therefore characterized by a relatively high level of stability, which is achieved through repetition. The concept of repetition therefore is fundamental to the Philosophy

of Organism. More importantly, however, is that continuity cannot simply be taken as a given but must be understood as the result of a process of unification and realization. The repetition of previous structures therefore implies the possibility of failure as well as the possibility of completely different behaviors, i.e., also the emergence of the new. Thus, in addition to its critical dimension of avoiding the incoherent aspects associated with the bifurcation of nature, the concept of the actual entity allows to theorize change, the emergence of the new, but also the possibility of failure of continuities. It is therefore only consistent that for Whitehead the laws of nature merely present the “widespread habits of nature” (Whitehead [1938] 1968, p. 154) and are by no means necessary: “They exist as average, regulative conditions because the majority of actualities are swaying each other to modes of interconnection exemplifying those laws” (Whitehead [1938] 1968, p. 155).

Spatiotemporally extended, meaning observable, are only the more or less complex societies of momentary, simultaneous events. The identity of consciousness shows a similar pattern: it can emerge as a “personal society” (Whitehead [1933] 1967, p. 206) in the continuity of the moments of experience, but it is by no means the ontologically prior. Therefore, it is not the processes themselves that are experienced, but rather it is from them that one experiences: what is observable is not the becoming of the actual entities themselves, but only the realized structures, the relational assemblages, which have been established by such processes. The more complex the societies of the psycho-physical events are, the higher is also the level of mentality of the prevailing actual entities, which also means their ability to have richer and more intense experiences, as well as their capacity for self-determination. Thus, the feelings of the actual entities that constitute the mental structures of a mouse are much more complex and sophisticated than those that constitute any cell of its body.

3.3. Atomistic Subjectivity

If the world is to be conceived of as consisting of processes or events rather than substances, or, according to Haraway, as a “knot in motion” or “active verb” (Haraway 2003, p. 6), the subject cannot be presupposed as a fixed and self-identical entity, as if it were isolated, independent, and self-sufficient, and that in the course of time (understood as being serial) obtains further accidental qualifications. Instead, subjects must be constituted atomistically, therefore disappearing after their process of realization, and thus can ontologically neither precede nor succeed their feelings. Therefore, they must be “*both* process and outcome” (Whitehead [1929] 1978, p. 84, my emphasis), or in Whitehead’s terms, both “subject” and “superject” of their experiences:¹⁷

An actual entity is at once the subject experiencing and the superject of its experiences. It is subject-superject, and neither half of this description can for a moment be lost sight of. The term ‘subject’ will be mostly employed when the actual entity is considered in respect to its own real internal constitution. However, ‘subject’ is always to be construed as an abbreviation of ‘subject-superject’. (Whitehead [1929] 1978, p. 29)

Conceptually, then, a distinction can be made between the becoming, initial subjectivity, the ‘subject’, and the having become, final subjectivity, the ‘superject’. But in fact, they are never separate. The subject, then, according to Whitehead, is nothing but the process and outcome of its own relatings, its relational ‘process of becoming’—“beings do not preexist their relatings” (Haraway 2003, p. 6). For Whitehead, the world conceived as stable is not reality; the only real things are the interlocking and diverging processual subjects, which in their realization presuppose structures, but always transcend them as well. Nature as a whole can be conceived of as a process-relational structure of continuous and permanently changing, creative, manifold subjectivity. This is, again, why Whitehead can state “that apart from the experiences of subjects there is nothing, nothing, nothing, bare nothingness” (Whitehead [1929] 1978, p. 167).

In a systematic respect, Whitehead’s reconceptualization of subjectivity is necessary and fundamental to his project of outlining a metaphysics beyond the bifurcation of nature.

If the world is not to be described in dualistic terms, subjectivity must be a feature of all of reality and cannot be attributed to humans only. Demonstrating this is the project of Whitehead's metaphysics, which he also calls, in opposition to Kant, a "critique of pure feeling" (Whitehead [1929] 1978, p. 113). Beyond that, however, Whitehead's pluralistic notion of the subject provides arguments against anthropocentrism, the reduction of nature to passive, dead matter, and the ruthless exploitation that comes with it.

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Notes

- ¹ As a mathematician, he is known to this day for the very influential three-volume *Principia Mathematica*, co-authored with Bertrand Russell.
- ² This paper is largely based on a chapter of my book *Tausend Subjekte. Der radikal pluralistische Subjektbegriff im kritischen Posthumanismus und bei A. N. Whitehead*, published in German (Schlehaider 2021).
- ³ For Whitehead, "this antagonism between philosophy and natural science has produced unfortunate limitations of thought on both sides," namely in that "[p]hilosophy has ceased to claim its proper generality, and natural science is content with the narrow round of its methods" (Whitehead [1929] 1971, p. 49). Within the scope of Whitehead's maxim "against bifurcation of nature", overcoming the separation between the natural sciences and the humanities is therefore fundamental for him. Moreover, this division is also responsible for the inadequate conceptualization of nature in modernity.
- ⁴ Therefore, I adopt this general usage hereafter.
- ⁵ As Sehgal shows, Whitehead thereby contextualizes himself and thus rejects the myth of the possibility of an unsituated reading as well as an unsituated philosophizing: "The besetting sin of philosophers is that, being merely men, they endeavor to survey the universe from the standpoint of gods" (Whitehead [1947] 1974, p. 132). The proximity to Donna Haraway's "god trick" pretending to be able to "see [...] everything from nowhere" is evident (Haraway 1988, p. 581).
- ⁶ In the context of criticism, therefore, Whitehead's priority is to work out the implicit, unquestioned (metaphysical) presuppositions: "When you are criticising the philosophy of an epoch, do not chiefly direct your attention to those intellectual positions which its exponents feel it necessary explicitly to defend. There will be some fundamental assumptions which adherents of all the variant systems within the epoch unconsciously presuppose. Such assumptions appear so obvious that people do not know what they are assuming because no other way of putting things has ever occurred to them. With these assumptions a certain limited number of types of philosophic systems are possible, and this group of systems constitutes the philosophy of the epoch" (Whitehead [1925] 1948, 49f.). Along these lines, Whitehead's thinking repeatedly revolves around the question of the implicit presuppositions of the modern frame of thought.
- ⁷ Whitehead rejects this view utterly in his *Philosophy of Organism*, as he calls his philosophy (cf. Whitehead [1929] 1978, p. 29). According to Whitehead, reality must be conceived on the basis of our concrete experience, i.e., as a living one, and that means one that is continually changing, indeed having agency. This is not without consequences for the concept of nature as such.
- ⁸ "Thus the bodies are perceived as with qualities which in reality do not belong to them, qualities which in fact are purely the offspring of the mind. Thus nature gets credit which should in truth be reserved for ourselves: the rose for its scent: the nightingale for his song: and the sun for his radiance. The poets are entirely mistaken. They should address their lyrics to themselves, and should turn them into odes of self-congratulation on the excellency of the human mind." (Whitehead [1925] 1948, p. 56).
- ⁹ The reconceptualization of subjectivity equally requires a reconceptualization of experience. Drawing on the findings of physiology, Whitehead identifies two modes of experience, namely "causal efficacy" and "presentational immediacy". In contrast to the clear and distinct 'presentational immediacy', perceiving in the form of 'causal efficacy' is primitive, fuzzy, and vague. According to Whitehead, the subliminal, immediate feeling or grasping of one's own and other's e/affect, of being e/affective and being e/affected, forms the much larger, and that means above all the more important and primary part of experience. While sense perception is a trait of higher evolved beings, 'causal efficacy' occurs at any level of organization: "A flower turns to the light with much greater certainty than does a human being, and a stone conforms to the conditions set by its external environment with much greater certainty than does a flower" (Whitehead [1927] 1958, p. 42). This is the reason why "the philosophy of organism attributes 'feeling' throughout the actual world" (Whitehead [1929] 1978, p. 177). Moreover, this is the reason why "the philosophy of organism aspires to construct a critique of pure feeling" (Whitehead [1929] 1978, p. 113).

- ¹⁰ In fact, recent scientific research proves that even bacteria display a rudimentary form of mentality and are therefore capable of making decisions: “[B]acteria are sensitive, communicative and decisive organisms [...] bacterial behaviour is highly flexible and involves complicated decision-making” (Devitt 2007; quoted from Shaviro 2009, p. 92). The same applies to cells, slime molds, plants, and fruit flies (cf. Shaviro 2009, 92f.). Similarly, quantum physics seems to imply that the smallest components of matter, the elementary particles, must have certain mental capacities if one wants to adequately explain their behavior (cf. Griffin 2007, p. 60; Shaviro 2009). Nevertheless, I want to emphasize, with Isabelle Stengers, the importance of the speculative aspect of Whitehead’s thinking. Stengers is indeed concerned with “distan[cing] Whitehead’s speculative philosophy from the role of being the forerunner of a new, ‘enlightened’, scientifically grounded conception of the world” (Stengers [2008] 2014, p. 44).
- ¹¹ Accordingly, as Helmut Holzhey notes, Whitehead develops “a theory of order instead of a theory of levels of consciousness” (Holzhey 1990, p. 36, my translation).
- ¹² Karan Barad also remarks: “The inanimate-animate distinction is perhaps one of the most persistent dualisms in Western philosophy and its critiques; even some of the most hard-hitting critiques of the nature-culture dichotomy leave the animate-inanimate distinction in place. It takes a radical rethinking of agency [and therefore also subjectivity, I.S.] to appreciate how lively even ‘dead matter’ can be.” (Barad 2007, p. 419).
- ¹³ Whitehead uses the neologism ‘prehensions’ to describe the processes of mutual feeling and mutual references of actual entities. He thus deliberately avoids the terms ‘apprehension’ or ‘comprehension’, which are implicitly anchored in the realm of human perception and thought: “The word perceive is, in our common usage, shot through and through with the notion of cognitive apprehension. So is the word apprehension, even with the adjective cognitive omitted. I will use the word prehension for uncognitive apprehension: by this I mean apprehension which may or may not be cognitive.” (Whitehead [1925] 1948, p. 70).
- ¹⁴ Historical development, which now, similar to subjectivity, extends to nature, means that it doesn’t follow the maxim of necessity, but that of creativity, according to Whitehead.
- ¹⁵ Thus, Whitehead’s re-evaluation of the notion of value leads to a further dismantling of a classical dualism mediated by the bifurcation of nature, namely that between (valueless) facts and (human) values.
- ¹⁶ With this conception of process, Whitehead avoids the substance–attribute scheme based on the habit of thought of a bifurcated nature and thus based on inconsistencies and contradictions. As processes, actual entities “are not describable in terms of the morphology of a ‘stuff’” (Whitehead [1929] 1978, p. 41).
- ¹⁷ For this reason, they must also be ‘self-realizing’ or ‘self-creating’. Furthermore, that is why an ‘act of experience’, as just stated, also has a ‘subjective form’ and a ‘subjective aim’.

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Essay

How Great Was the “Great Divide of Nature and Culture” in Europe? Philippe Descola’s Argument under Scrutiny

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Abstract: In his much-discussed work *Beyond Nature and Culture*, anthropologist Philippe Descola gives central importance to the “great divide” between nature and culture in European history. According to him, the “naturalism” created by this gap is at the heart of Western modernity and distinguishes it from the “others” on the planet. One can certainly agree with Descola that the nature-culture dualism cannot claim universal validity. However, the extent of the “great divide” created in Europe by early modern “rationalist” scholarship remains unclear. Methodologically, one should not limit oneself to the narrow history of science and philosophy, but also examine the linguistic, religious, and social history.

Keywords: nature; culture; science; religion; European history

In recent decades, a series of philosophical and anthropological publications have problematized the divide of nature and culture in the Western world and attempted to reverse the tendency. Given the serious environmental problems we are facing, this is quite understandable. Polluted and plundered oceans, urban concrete deserts, global warming caused by carbon dioxide, and much more: should we not today emphatically demand a culture that does justice to nature, so that the two reconcile or even merge into one? Historically, the Western world must have been disrupted at some point. Otherwise, it could not have come to such a divide.

Without denying that much was disrupted, I would like to show in this essay that the divide of nature and culture in European history is more difficult to identify than one might think. Oceans can be sampled, concrete deserts mapped, temperatures measured and predicted. But “nature” and “culture” are very general, abstract terms. They have no direct counterpart. We cannot expect to locate them like two building blocks, say, that were close together in the 16th century and miles apart today.

It has long been widely agreed that the two terms are semantically sprawling and almost impossible to delimit. In the fourth volume of *Geschichtliche Grundbegriffe* (Basic Concepts in History), edited in 1978 by Reinhart Koselleck and colleagues, it is said that “nature” is one of the most ambiguous terms in intellectual history. It cannot be determined empirically, but only by opposites: nature and spirit, nature and history, nature and art, nature and custom, nature and God—or, as in our case, nature and culture (Schipperges 1978). Before that, the anthropologists Alfred Kroeber and Clyde Kluckhohn had already found that it was not much different with “culture”. Their 1952 *Critical Review of Concepts and Definitions* lists a good one hundred and sixty different versions of “culture” (Kroeber and Kluckhohn 1952). Recently, Albrecht Koschorke, in his theory of narrative, also pointed out the numerous possible combinations of the two terms, as opposites or overlaps, diverging or converging (Koschorke 2012, pp. 352–68).

This paper focuses on Philippe Descola’s approach, which is much discussed in current scholarship. The French anthropologist also considers “nature” and “culture” to be very general, fuzzy terms. Nevertheless, in his work *Beyond Nature and Culture* (French original 2005), he uses them as the cornerstones of a complex theoretical edifice. He situates the small societies he studies in the Amazon and elsewhere beyond the conceptual pair, but not the Western world with its long-term history. Here he diagnoses a “great divide” (grand

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partage) of nature and culture. Already recognizable in Greek antiquity, the separation came to maturity around 1900, after more than two thousand years (Descola 2013, pp. 63–66, 78).¹ According to Descola, the most important phase for the process was the period between the 16th and the early 20th century, which he traces in the third chapter of the work. It was then, he says, that the basic modern orientation of “naturalism” characteristic of Europe emerged. Representative of other writings of this kind, the following essay examines his history of separation sketched out in a good forty pages.

The next section looks at Descola’s background and outlines the methodology of this essay. We then follow the “great divide”-chapter and discuss several points: the detailed introductory example from art history, the word frequencies of “nature” and “culture”, and selected points from social and religious history. The focus is on points that allow meaningful comparisons of different societies and to which European history can offer important clarifications.

1. European History in Anthropological View

Philippe Descola, born in 1949, first studied philosophy in Paris and then switched to anthropology. Under the supervision of Claude Lévi-Strauss, the founder of structural anthropology, he wrote a doctoral dissertation on the Achuar indigenous group in the Amazon on the border between Ecuador and Peru. In the late 1970s, when he undertook the arduous and sometimes dangerous fieldwork, the warlike Achuar lived by horticulture supplemented with hunting and fishing in very remote, scattered clearings of the rainforest that were re-opened from time to time. Descolas wanted to explore the image that this group had of their natural environment and of themselves. He emphasizes right at the beginning that they did not have a coherent, canonical view of the world, so that the investigation had to “assemble” (bricoler) the structures of their representation from a wide variety of circumstantial evidence. This is especially true for the realm of the unexpressed and implicit, while the linguistically explicit can be better investigated empirically with the method of ethnoscience. Ethnoscience and ethnobiology are the designations used to refer to the terminological recording of the environment, which Descola compared with Western taxonomies partly compiled by himself. As one can easily imagine, the investigation was very laborious due also to the limited linguistic understanding (Descola 1994, pp. 2, 7–8, 62–63, 332–33).²

Descola’s later work *Beyond Culture and Nature*, which interests us here, begins with his experiences among the Achuar and returns there again and again. Together with many other small societies that the anthropologist knows from literature, it forms a background for his view of European history. In the two decades between the two publications, the concept of ontology had emerged in part of anthropology, which is also intended to give political dignity to the worldview of the Amazonian small societies in their confrontation with the encroaching white immigrant society. Accordingly, the Achuar ideas, reconstructed under difficult circumstances, have solidified into an “ontology” in the new book. They now stand for the “animism” that had been rejected as a concept in the dissertation (Descola 1994, pp. 98–99). The “naturalism” diagnosed by Descola in Europe has now also become an ontology, for the author intends to run through the whole spectrum of conceivable human-environment relations and to bring them to a unified denominator. For this purpose he uses two more ontologies, totemism and analogism (Descola 2013, p. 122).

In Europe, the term “ontology” has long been common, but it usually refers to particular approaches and traditions of philosophy. One of the difficulties in Descola’s historical account concerns his unclear general level of reference. Is naturalism a particular social construction of reality, or is it so closely related to a mode of existence that one can speak of an ontology in this new anthropological sense?³ In our chapter on the “great divide”, however, the author holds back, preferring to use the term “cosmology” and other less marked words. The chapter begins with a look at historical representations of landscape and then deals in loose chronological order with six domains that he addresses as autonomous: the

autonomy of *phusis*, the autonomy of creation, the autonomy of nature, the autonomy of culture, the autonomy of dualism, and the autonomy of worlds.

Before we begin reading, I would like to introduce a second interlocutor. Keith Thomas, born in 1933, is a very distinctive, highly decorated British historian with a flair for anthropological topics. Among his many works, two of note here are *Man and the Natural World. Changing Attitudes in England 1500–1800* (Thomas 1983), published in the U.S. with the subtitle *A History of the Modern Sensibility*, and *In Pursuit of Civility. Manners and Civilization in Early Modern England* (2018). Keith Thomas has also been interested in anthropology since his student days. Inspired by Edward E. Evans-Pritchard, he published general reflections on the relationship between the two disciplines as early as 1960 (Thomas 1960). Of particular importance to Thomas was practice-related British anthropology. He used it as inspiration to examine his own history from a large number of sources. In fact, he cites so many historical witnesses that one feels transported back to a well-populated marketplace in the early modern period. At the same time, he gives clues as to how the intellectual views he elaborates fit into the broader cultural and social history. For us, Thomas represents an indigenous European voice that we can bring into conversation with the more outside voice of Descola.⁴ For reasons difficult to understand, the latter does not seem to have consulted the British text.

In this essay, I want to make up for this omission after the fact and explore what a conversation between the two protagonists might lead to. First, I discuss the art-historical example with which Descola introduces his “great divide”-chapter.

2. Prelude in the Mountains

To make the emergence of the modern conception of nature immediately comprehensible by means of an example, Descola begins his separation narrative with a drawing from about 1606. It is a little piece by the Flemish artist Roelant Savery, then working at the imperial court in Prague. The drawing shows a bare mountain landscape, almost devoid of people, with only a small artist in the foreground sketching the landscape. According to Descola, the appearance of the rocks, the stepped relief of the ground, and the location of the fields and houses indicate that the drawing reproduces a real view, seen in perspective, “although possibly a little foreshortened so as to accentuate the vertiginous character of the mountain” (Descola 2013, p. 57).

The drawing, Descola continues, expresses a new distance between man and the world, using linear perspective developed one hundred and fifty years earlier. At the same time, under the influence of Pieter Bruegel, the artist shows a mountain range devoid of people and, with the existence of the draftsman, suggests another perspective in addition to the perspective visible to viewers. This is a “double objectivization of reality” and thus an illustration of manifold movements of the 16th and 17th centuries: withdrawal of the subject from nature, mathematization of space, subjugation of reality with newly invented instruments. In short: “Nature, now dumb, odor-free, and intangible, had been left devoid of life” (Descola 2013, pp. 58–61).

Historical sources tell us that Roelant Savery also traveled to Tyrol between 1606 and 1608 to study the alpine “wonders”. He was known as a painter of the living environment. In his largest painting he captured 44 different animal species and 63 plant species. That he consciously applied linear perspective may be readily assumed with Descola. He also mastered the new oil technique that had emerged since the 15th century, with its refined overpaintings and the use of canvas instead of wooden panels. In addition, he was versed in various genres of painting that had developed at that time. Nevertheless, it is doubtful that Savery is a convincing example of a separation of nature and culture. Rather, we see an artist who was intensely concerned with both the animate and inanimate worlds. If we want to express his preoccupation in binary simplified terms, we must say that historically it was about approaching nature, not separating from it.⁵

There are dozens or even hundreds of books on the representation of the landscape and the mountain in the history of art. They have titles like *The Discovery of Landscape, The*

Invention of Landscape, or (in the technical 19th century) *The Conquest of Landscape*. So far, I have not seen a title in this genre that alludes to the separation from nature through new modes and techniques of representation.⁶ The connection with new interests of elites and afterwards a broad population is too obvious. Bruegel, Savery and many others, later for example William Turner and Giovanni Segantini, made sketches and sometimes whole paintings in the wild and in the mountains. Their written legacy is full of references to their passion. In the Alps, the rush to the mountains can even be quantified in a makeshift way. While we know of 21 documented first ascents for the 16th century, there were 1220 in the 19th century (Furter 2005, p. 96). Keith Thomas put it in a nutshell when he wrote: “By the later eighteenth century the appreciation of nature, and particularly wild nature, had been converted into a sort of religious act” (Thomas 1983, p. 260).

According to Thomas, this appreciation of nature was also expressed in painting and in the art trade. Since the late 17th century, there was an established market in England for landscape engravings, which the middle classes hung on their walls. The more the 18th century progressed, the more the engravings also showed wild nature (Thomas 1983, pp. 265–66). Our interlocutors thus classify things differently, and this difference runs through other questions to be considered here: While the anthropologist, according to his theoretical ideas, almost automatically focuses on autonomy and separation, the historian uses countless documents to show how the motherland of industrial modernity grew beyond a limited anthropocentric perspective in the early modern period and began to take an interest in nature for its own sake. In what follows, we first address the linguistic dimension and then turn to aspects of the history of religion and science. Since the basic question refers to the classification of worldviews, an overview of the linguistic development is a prerequisite for the analysis of other aspects.

3. Nature and Culture—An Unequal Pair of Words

When terms are as abstract and vague as “nature” and “culture”, it is advisable to take the historical use of language very seriously. Words are good indicators. We can puzzle over what they mean. But we cannot argue about whether they occur in the text at all, as with preconceived concepts that the history of philosophy likes to use. When Descola made his elaborate ethnoscience recordings in the Amazon, he started from the use of language, and only in a second step (re)constructed the more or less implicit worldview of the Achuar. “Nature” and “culture” were learned words in Europe, adopted from Latin, and generally used only by the elites until around 1900. Among the lower classes, “nature” had not least sexual meanings, as a taboo word for sex drive, procreative power, menstruation, sperm, and genitals. We can assume that this expression came to the people via doctors and advice literature.⁷ In general, the chronology of usage was quite different. While “culture” did not really emerge until 1770 and then especially in the 20th century, “nature” was already present in the 16th century. With the rise of natural history, it was used more and more often. According to Ngram Viewer, the peak of word frequency in the digitized printed materials of Google Books was around 1800 (see Figure 1).⁸ Here it is advisable to start from German, because in this language “culture” was not rivaled by “civilization” to the same extent as in English and French, and because the German word pair “Naturvölker”/“Kulturvölker” (nature/culture peoples) expresses the imperialist phase most clearly.

As is known, authors of the Late Enlightenment, before and around 1800, produced a series of writings that claimed to be a “system of nature”, in individual cases even a “catechism of nature”. The French Revolution brought about a sharp politicization of the concept of nature. This intense debate can be clearly seen in the frequency of words. Contrary to what one might think, in these writings people were not regularly conceived as an external component. There were also authors who identified them as an inseparable part of nature, like the Baron d’Holbach in a work from 1770 (Schippberger 1978, p. 233). Those who do not look for just one word, but for the word pair, have more problems. The late emergence of “culture” means that substitute words must be employed if one is to

interrogate the early modern period. Descola (like others) uses mainly “man” or “society” as surrogates (Descola 2013, p. 70). This is justifiable. However, one should be aware that “culture” is thereby further diluted, because the substitute words, despite overlaps, also cover other fields of association.

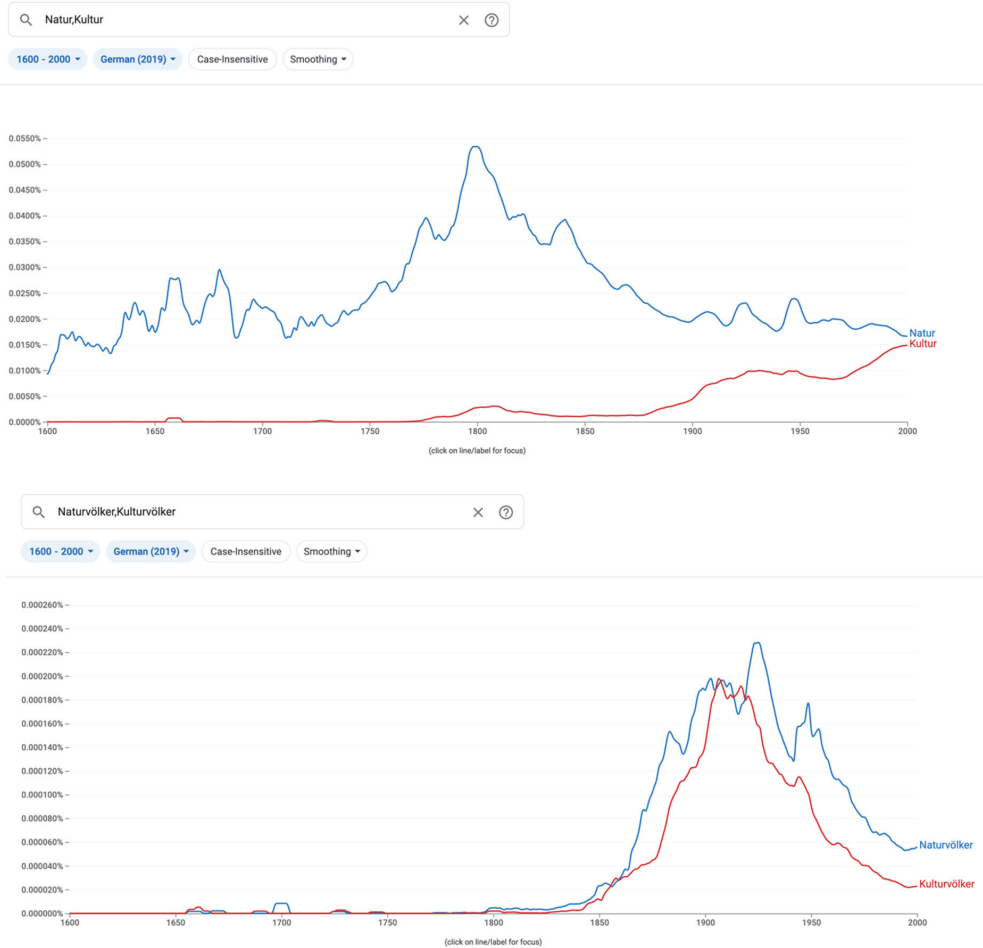


Figure 1. Word frequency of Natur/Kultur and Naturvölker/Kulturvölker in German printed matter. 1600–2000 (Google Books Ngram Viewer n.d.).

Descola does not come across a text that literally juxtaposes nature and culture until the end of the 19th century. The German philosopher Heinrich Rickert gave a lecture on cultural and natural sciences (Kulturwissenschaft und Naturwissenschaft) at the Kulturwissenschaftliche Gesellschaft of Freiburg in 1898, which he published, later reworked, and greatly expanded. The book was quickly successful and appeared in many editions. This was the moment when the pair of words became historically operative and actually contributed to the classification in Western “cosmology”, but in the narrow field of philosophy of science. Here, linguistically, it can be argued with good reason that nature and culture took separate paths. This was also often interpreted in this way. Rickert himself disagreed. It is quite unjustified to say that this approach tears apart the unity of science, the philosopher held in the 1926 edition: “On the contrary, I have precisely shown how, despite the logically different tendencies of scientific conceptualization, the many special

disciplines can be methodologically combined into a unified whole” (Rickert 1926, p. VIII; my translation).

As shown on the graph of word frequency, the talk of (high) “Kulturvölker” versus (low) “Naturvölker” emerged around 1800, intensified massively in the imperialist phase of the late 19th century, and declined after the First World War. The hierarchized pair of words became a means in a global struggle fought also with other expressions. Keith Thomas devotes several chapters to it in his study of “civility”, a parallel term to “culture”. In the 19th century, he argues, the dominance of British economic and military power produced a huge self-confidence and an absolute trust in the superiority of Western civilization. “It confirmed the widespread disdain for the ‘backward’ peoples of Asia and Africa and strengthened the assumption that it was entirely acceptable to suspend conventional standards of civil conduct when dealing with them”. Despite many cautionary and critical voices, the opinion that the world was divided into civilized and barbarian peoples was almost as widespread as at the beginning of the early modern period (Thomas 2018, p. 295).

One learns surprisingly little from Descola about this aspect, which particularly concerns the small societies he treats. Only at the end of the book does he mention the “revolting disparity” between the conditions of existence in the global South and North. They are not, he says, the subject of his anthropological theory (Descola 2013, p. 405). But it can be assumed that they were part of its historical background. The talk of ontology that Descola half-heartedly takes up undoubtedly places itself in the struggle of indigenous groups and nations for self-determination that has emerged since the mid-20th century and has been fought out in many places. As anti-colonial and indigenous movements gained strength and Western views went on the defensive, the conceptual pair of nature/culture took on new meaning. It now became a handicap because it was seen as expressing a dualistic rather than a holistic worldview. The “divide from nature” developed into an important theme and sometimes, as with Descola, into a main characteristic of European history.⁹

4. Who Has Which Soul?

A possibility of insightful comparisons is offered by the concept of soul. When Descola worked on the field study of the Achuar in the Amazon, he translated the indigenous word “wakan” with French “âme” (from Latin “anima”), i.e., “soul”. Not only did the people of this group possess such a soul, but also the majority of plants, animals and celestial bodies. However, not all of them were endowed with it in the same way. Depending on the possibilities of the communicative exchange between them, there were fine gradations. The dialogues were not only dependent on the production of sounds and the sense of hearing. According to Descola, intersubjectivity was also expressed in a “discourse de l’âme” (speech from the soul) that overcame language barriers and transformed plants and animals into meaning-producing subjects, except when communication could not function due to a defect of the soul or for reasons of distance (Descola 1994, pp. 93, 98–99, 324–25).

In *Beyond Nature and Culture* Descola returns to this more-than-human concept of soul of the Achuar and underpins with it his ontology of animism. At a theoretical point, however, he now relativizes the close relationship and assumes a universal separation between a level of “interiority” and a level of “physicality”. These concepts are introduced by him in order to schematize his four ontologies in a matrix of difference and similarity. A gradual difference between European naturalism and the other ontologies remains, however, because the universal and universally variable dualisms of interiority and physicality are, according to Descola, most pronounced in Western modernity (Descola 2013, pp. 115–22).

But who had a soul in this “most dualistic” Western modernity? Keith Thomas reports that the conception of the soul of ancient philosophers was taken over by medieval scholasticism and fused with the Judeo-Christian doctrine according to which human beings were created in the image of God (Genesis 1:27). “Instead of representing man as merely a superior animal, it elevated him to a wholly different status, halfway between the beasts and the angels. In the early modern period it was accompanied by a great deal of self-congratulation” (Thomas 1983, p. 31). Nevertheless, there was a striking disagreement

in the period as to what exactly constituted this unique superiority of humans over animals. The intellectuals brought into play the most diverse characteristics. One of the most remarkable attempts to magnify the difference came in the 1630s from René Descartes. The bodies of humans and animals were machines or automata; only humans possessed additionally an immaterial soul. Among the reasons for the resonance of this theory, according to Thomas, were its religious harmlessness (animals were therefore not immortal) and its justificatory character for a brutal treatment of animals in everyday life. However, Cartesianism remained controversial and temporary. In England, many later intellectuals followed John Locke and John Ray, who rejected the notion of animal-machines as “against all evidence of sense and reason” (Thomas 1983, pp. 33–35).

As Thomas goes on to explain, this tendency toward a more animal-friendly worldview was fostered from the 17th century onward by the increasing keeping of pets and domestic animals. First in the aristocracy, then in wider circles, these personal animals, dogs in particular, took up more and more space. Thus, the last bastion of an unbridgeable barrier between humans and animals also began to falter: the uniqueness of the human soul. On the level of popular religiosity, this was not a problem, because the intellectual distinction between creatures with and without souls had never really penetrated the peasant population. Even on the theological level there were possible approaches. Had not Paul spoken in Romans (8:21) of the entire creature being redeemed on the last day? Could animals therefore be immortal? In the 17th century, such an interpretation was considered an affront; in the course of the Enlightenment, it became more acceptable. In the 1770s, an Anglican clergyman declared that animals possessed real souls, stating “that he had never heard an argument against the immortality of animals which could not be equally urged against the immortality of man” (Thomas 1983, p. 140).¹⁰

5. Anthropocentrism Eroding

Thus, in Keith Thomas there are definitely certain “divides from nature”, yet not one big general one as in Philippe Descola, but several sectorial and temporary ones. They do not determine the overall direction of development. For Thomas, this runs from a “breathhtakingly anthropocentric spirit” to a more open view of nature also “for its own sake”. He describes as breathhtakingly anthropocentric sermons of the 16th and 17th centuries that presented the whole natural world as a direct response to the Fall. It was only because of the Fall that wild animals were wild, that there were hideous reptiles, and that farm animals had to endure a miserable life of beatings. The domination of man was the central point in God’s plan. Man formed the goal and purpose of the divine creation, everything was arranged for him (Thomas 1983, p. 18).

While Descola wants to derive a general cosmology from the history of philosophy and science, Thomas—interested in social history—puts much emphasis on religion. This was the cosmology of which the general population actually learned and had to learn something in church services and other religious occasions. It was also the horizon of thought for intellectuals and naturalists. From them came the most important impulses for change. In a social-historical view, one should ask at each step how many people the innovations could affect. At first, the learned treatises undoubtedly went over the heads of the vast majority (Thomas 1983, p. 36).

According to Thomas, the gradual erosion of comprehensive anthropocentrism during the early modern period can be traced to a combination of different developments. Some were already underway at the beginning of the period, others came later. First he cites the emergence of natural history with a new zoological and botanical curiosity (Thomas 1983, p. 51). Instead of using fauna and flora primarily as symbols for the human sphere, as had been the case in the past, there was now an increasing search for other, more objective classification criteria. “Each of these classificatory schemes represented an ambitious attempt to impose a new form of intellectual order upon the natural world, to reduce ‘all kinds of animals and vegetables into method’, as a contemporary put it”. For plants, John Ray’s classification became established in the late 17th century and was superseded from

about 1760 by the system of Carl Linnaeus, before “more natural” taxonomies emerged again around 1810. However, the rival classifications continued to operate with analogies between humans and the environment. They were organized hierarchically and followed familiar concepts of order. Thus, in the anglicized Linnaean system, there was a “Vegetable Kingdom” subdivided into various “Tribes” and “Nations” (Thomas 1983, pp. 65–66).

One might think that classification would be the ideal setting for Descola to profile his “great divide” in naturalism. However, many scientific classifications also included humans. Therefore, he helps himself with the explanation that the general diversification of the criteria serves to conceal the “crude ontological origins” of the fundamental divide and to “restore humans to the field of natural history” (Descola 2013, p. 244). Thomas does not have to rely on such a circumstantial explanation. For him, the new approaches are an attempt at less interest-driven views of nature. The researchers, he says, were far from separating the natural world entirely from the human world. In the end, however, they challenged the self-assured anthropocentrism of the previous period. “By 1800 the confident anthropocentrism of Tudor England had given way to an altogether more confused state of mind. The world could no longer be regarded as having been made for man alone, and the rigid barrier between humanity and other forms of life had been much weakened” (Thomas 1983, pp. 89, 301).

6. Conclusions

How great was the “great divide” of nature and culture in Europe highlighted by Philippe Descola? With his narrow approach rooted in the history of philosophy and science, this question cannot really be answered. If “naturalism” was to represent a cosmology, or even an ontology, in European history and the present, one would have to ask more broadly about the social anchoring of these concepts. For this purpose, linguistic clues are of importance, for they reflect most clearly the basic categories of historical actors. Until the 19th century, they hardly ever seem to have explicitly contrasted “nature” and “culture”. Descola has anthropological experience and is interested in theoretical construction. He lacks equally intense historical contact with indigenous Europe. And paradoxically, he should not be fully reliant on this great divide of nature and culture anyway, for in the course of the study he introduces a universal distinction between physicality and interiority.

The historian Keith Thomas also sees a great divide, but this was at the beginning of the study period and was religiously based. It formed a legacy of the Christian tradition and made of mankind (especially its male part) not only higher creatures, but a caste quite distinct from the rest of creation. Due to scientific development and other factors, the anthropocentrism of the 16th and 17th centuries weakened; historical actors began to take an interest in the environment in a variety of less self-centered ways. Since the late Enlightenment and Romanticism, this led to nature-oriented popular movements on which later environmental protection built. When Thomas speaks of nature and culture, he does so in concrete contexts that give support to the expressions.¹¹ He would not be carried away by a rhetorical philosophy of a general “rapprochement of nature and culture”.

Whether divide or rapprochement—it has become clear that the complex developments of environmental perception cannot be reduced to a simple spatial relationship between two abstracta. Incidentally, it would not be a foregone conclusion whether an all too violent rapprochement with nature would not have contributed to the manifold problems with which we are confronted today and which lead to a justified desire and a widespread longing for something different.

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Notes

- ¹ I am using the English version, but have checked the passages central to this essay in the original French version (Descola 2005).
- ² I am using the English version, but have checked the passages central to this essay in the original French version (Descola 1986); one also learns about the circumstances of the field research from a book designed as a narrative of experiences for a larger audience, see (Descola 1996); the basic idea of *Beyond Nature and Culture* is announced there as the first and most important lesson of the field stay (pp. 405–6).
- ³ According to Ingold (2016), Descola remains mostly attached to the representational paradigm and does not use “ontology” in the sense of the new ontologists; however, for him ontologies are not world views or cultural constructions in the conventional sense, but rather the fundamental generative principles that produce them; a general overview of the discussion is provided by Heywood (2017).
- ⁴ Whereas Thomas drew inspiration from anthropology, anthropologists in turn have drawn on his historical studies, see (Goody 1995).
- ⁵ The specialized literature emphasizes Savery’s “closeness to nature” and “turn to nature”, see (Wallraf-Richartz-Museum 1985, pp. 32–35, 46, 51; also Spicer-Durham 1979; Müllenmeister 1988).
- ⁶ I quote here only the scientific anthology published in parallel with the exhibition catalog used by Descola: Legrand (1994); no divide of nature and culture is alluded to in this book.
- ⁷ Schweizerische Idiotikon n.d. vol. 4, columns 849–50; for the broad population, the linguistic use of “nature” has hardly been explored so far.
- ⁸ Ngram Viewer: <https://books.google.com/ngrams> (accessed on 20 November 2021). It is well-known that Ngram graphs have their problems, yet in this case the results seem realistic, not in detail, but in broad outline. The Digital Vocabulary of the German Language (Digitales Wörterbuch der Deutschen Sprache n.d., <https://www.dwds.de>; accessed on 22 November 2021) also allows long-term word inquiries using the DTA core corpus (1598–1913), but only in absolute numbers and not relative to a given corpus size; I checked the terms “Natur”, “Kultur”, “Naturvölker” and “Kulturvölker” in quarter-century increments; the results agree well with the Ngram graphs.
- ⁹ Prototypically, the change in the United States can be traced through the Red Power movement, the counterculture and the ecological awakening; the world power status also gave these movements a global aura, (see, e.g., Josephy et al. 1999; on the question of ontology, see note 3 above).
- ¹⁰ Parallel to this, intellectuals in the Enlightenment were increasingly ready to abandon the objections against the possession of souls by women, children and indigenous people; some references in (Thomas 1983, pp. 42–43).
- ¹¹ Symmetry in sites of cultivation, for example, indicates a “separation between culture and nature”, (Thomas 1983, p. 256).

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Essay

Harm and Harmony—Concepts of Nature and Environmental Practice in Japan

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Abstract: Japan is often surrounded by the myth of featuring a unique “love for nature”, and its traditional culture and lifestyle as having been “in harmony with nature” before it was corrupted by modernization and Westernization. In this paper, I employ three examples to delineate images of nature in different times of Japanese history and point out the discrepancy between discourse on nature and physical engagement with nature. I argue that the environmental destruction that peaked in the Meiji period (1868–1912) is not primarily derived from a new, dualistic Euro-American understanding of nature. Rather, I demonstrate that environmental harm was already inherent in premodern Japan and was reconcilable with the respective concepts of nature. Therefore, industrialization and the adoption of Western technology solely released the potential for large-scale environmental impact.

Keywords: Japan; nature; culture; history of ideas; environment; pollution

1. Introduction

“If people ask about the heart of [the people of] Yamato, it is the blossoms of mountain cherry reflecting the rising sun” (Norinaga 1790, cited in Marcon 2017, p. 96).

This poem from 1790 by scholar Motoori Norinaga (1730–1801) about Japan, former Yamato and the “land of the rising sun” employs the image of cherry blossoms as a natural phenomenon to express his notion of Japanese cultural identity in the late eighteenth century—and their allure has not faded until today. After a two-and-a-half-year ban on foreign tourism in response to the global COVID-19 pandemic, Japan is experiencing a surge in guests in March and April 2023 to witness the floral spectacle of *hanami* (“cherry blossom viewing”). Not only can they enjoy the magical scattering of the cherry-blossom petals in parks, gardens, and forests, but also a variety of sweets and snacks with the corresponding taste, and a wide offering of decorative objects and souvenirs adorned with Japan’s probably most famous symbol of nature. Whereas the aesthetic appreciation of blooming flowers is a common practice throughout the world, the centuries-old reverence for cherry blossoms in Japan is often taken as a proof of an alleged “love for nature” or “harmony with nature” in Japanese culture. Yet this notion is not limited to orientalist romanticism and enchanted tourists, but is also held by Japanese scholars and citizens themselves (cf. Brecher 2000, p. 209).

At the same time, Japan has been criticized by international mass media and global environmental groups for its role in environmental pollution and destruction worldwide (Kirby 2011, p. 10; Schreurs 2002, p. 251), with the Minamata mercury poisoning in the 1950s as one of the most infamous incidents. Even in the twenty-first century, Japanese environmental policy falls short of other industrialized nations’ efforts to preserve biodiversity, reduce their waste load, and combat climate change (cf. Sakaguchi et al. 2021, p. 121; OECD 2010, p. 19). But how does the ambiguity of nature’s celebration and its simultaneous mutilation arise?

Many scholars have discussed this question. On the one hand, some argue that the traditional—i.e., pre-industrial—Japanese lifestyle was in harmony with nature, and ex-

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or implicitly blame Euro-American influence and the import of the culture–nature dualism in the Meiji period (1868–1912) for environmental destruction in Japan (Hargrove 1989; Toyama 1971; Kagawa-Fox 2012; Suzuki and Jaffe 2019; Callicott 1997; Becker 2017). On the other hand, some scholars see the premodern Japanese concepts of nature and simultaneous environmental degradation as no contradiction *per se*, for human manipulation of nature has been prevailing and culturally approved throughout Japanese history (cf. Asquith and Kalland 2004; Brecher 2000; Bruun and Kalland 2014; Kirby 2011; Stolz 2014; J. A. Thomas 2002; Morris-Suzuki 1998; Totman 2014).

In this discussion about the relationship between humans and nature, it is often assumed that the Western, Euro-American image of nature is a dualistic one, with a conceptual divide between a superior human realm and an inferior realm of nature as the non-human (White 1967, p. 1205; Blackbourn 2004, p. 14; Wolschke-Bulmahn 2004, p. 75). This divide and devaluation of nature is said to stem both from ancient-Greek philosophy and the Judaeo-Christian cosmology (Brecher 2000, pp. 46–51; Arntzen 2004, p. 65), with God establishing the human as creation’s crowning glory, with all non-human nature designed as a convenient tool to satisfy human needs (cf. National Council of the Churches of Christ in the United States of America 2021, NSVUE Gen 1:26–30).¹

The traditional (e.g., prior to the influence or domination by Western culture) East Asian image of nature, in contrast, is described as holistic, comprising both humans and the non-human environment on an equal status—or even with a higher spiritual status for non-human phenomena (Brecher 2000, pp. 45, 48; Yamauchi 2017, p. 162; Kalmanson 2017, p. 29; Kalland 2014, pp. 246–47). Also, in this case, the concept mainly draws on religious ideas, stemming from the teachings of Buddhism, Shintoism, Confucianism, and Daoism (Kalland and Asquith 2004, p. 29; Kagawa-Fox 2017, p. 206).

This differentiation—which I can’t reject *per se*—is sometimes followed, however, by the deduction that the higher ideological status of nature in East Asia would result in “harmony” between human lifestyle and the environment, whereas the low opinion of nature would bring forth a lifestyle in the West that is much more prone to harming the environment (as discussed in Kagawa-Fox 2012, p. 36; Marcon 2017, p. 305; Moon 2004, p. 228; Morris-Suzuki 1991, p. 81). While this might seem plausible in theory, the situation is more complicated in practice, as many authors have shown (Shirane 2012, p. 219; J. A. Thomas 2002, p. 188; Kalland and Asquith 2004, p. 5; Brecher 2000, p. 81).

In the case of Japan as an East Asian country that secluded itself from most of the Western world between the 1630s and 1858,² it is often assumed that its ambition to catch up with the industrial, scientific, and military status of Europe and the United States was accompanied by the adoption of the Western concept of nature. In accordance with this deduction, the alleged Westernization of Japan’s nature concept is, therefore, blamed for the surging environmental degradation from the Meiji period (Moon 2004, p. 228; Morris-Suzuki 1998, p. 54; 1868–1912; cf. discussion in Brecher 2000, p. 93).

With this paper, however, I argue (1) that it is difficult to speak about a Japanese adoption of the Western image of nature in the Meiji period, as a range of diverse concepts and discourses about nature coexisted; and (2) that pollution and environmental damage were already emerging in pre-Meiji Japan but could only reach critical levels through the application of “modern”—i.e., Western—technology from the Meiji period.

I strive to point out the discrepancy in the discursive relation to nature in Japan and the physical interaction with the environment. I will start with an introduction to the linguistic understanding of the term “nature” in Japanese and give a brief account of the cultural role of nature in premodern Japan. Then I apply three examples from Japanese history by first presenting their contemporary discursive images of nature as well as its physical treatment to elaborate on how nature’s appraisal and destruction—or, as the title phrases it, “harm and harmony”—have been coexisting. I assert that it is not the adoption of a dualistic Western view on nature that caused environmental degradation in Japan from the end of the nineteenth century, but the prioritization of interests—often social, political,

and economic—other than the physical environment, accompanied by the adoption of the more disruptive Western technology.

2. “Nature” in the Japanese Language

Although “nature” might seem a trivial word of daily conversation, it comprises a multilayered set of meanings and cultural implications and has even been called “perhaps the most complex word in the language” (Williams 2011, p. 184). The material environment, the abstract concept of all organic and inorganic matter, natural phenomena and their laws, the character of people, the essence and quality of things, the creation, a god-like life force—these are just a few examples of possible understandings of “nature”. Like in many other European languages, the English “nature” is derived from the Latin noun *natura*, which already contains the divers above-mentioned meanings, and, in turn, stems from *natus*, the past participle of the verb *nasci*, meaning “to be born, to come into being” (Kalland and Asquith 2004, p. 10). Therefore, it is an almost futile endeavour to expect a semantically identical term in any foreign language, especially outside of the European cultural sphere that coined these understandings.

And, in fact, instead of one all-encompassing notion, the Japanese language offers a multitude of terms specifying and further elaborating on the diverse meanings entailed in “nature”. Literature scholar Sonja Arntzen (2004, p. 66) even states that “there is no ‘Nature’ in the traditional [Japanese] world view; there are only immanent natural phenomena in their fragmentary specificity that are woven into the fabric of human experience without losing that specificity [. . .]”. In accordance with this, expressions such as *sansui* (“mountains and waters”), *tenchi* (“heaven and earth”), *mono* (“things”), *tennen* (“something that is so given by heaven”), *shinrabanshō* (“vegetation growing in ten thousand forms”), *banbutsu* (“ten thousand things”), *tenchibanbutsu* (“ten thousand things under heaven and earth”) or *fūdo* (“wind and soil”; climate, geographical and biological environment of a region) represent primarily the material aspects of nature (cf. Brecher 2000, p. 70; Kalland and Asquith 2004, p. 9; Marcon 2017, p. 17, 20–21; Mori 2002, p. 117; J. A. Thomas 2002, p. 7). In contrast, *sei* (“character, quality”) describes the inner constitution of things and people (Kalland and Asquith 2004, p. 9), and *zōka* (“creating change”) embodies the force of creation and Daoist concept of nature’s power to generate life (Brecher 2000, p. 70; Marcon 2017, p. 21).

While most of the listed terms were mainly deployed in premodern Japan, the word commonly used today to express the English term “nature” is *shizen* 自然. (Brecher 2000, pp. 69–70). It is written with the characters for “self” *ji/shi* 自 and “so, in that way” *zen* 然, literally “something that is so by itself”, and refers to the abstract concept of nature (Kalland and Asquith 2004, p. 9). Although *shizen* was derived from the Chinese *ziran* about 1500 years ago in the reading of *onozukara* (“what is so of itself”; Tellenbach and Kimura 1989, pp. 153–54) and in a Buddhist context as *jinen*, this term appeared first as a translation of the Dutch *natuur* in a Dutch–Japanese dictionary in 1796 (Mori 2002, pp. 117, 123; J. A. Thomas 2002, p. 7). *Ziran* and the premodern *shizen* comprised an understanding of nature as the phenomenal universe, with both humanity and its physical environment as equal and inseparable parts of it, resulting in their conceptual unity (cf. Jackson 2013, p. 41). The new use of *shizen* as a translation from European languages, in contrast, refers to a conceptual divide between nature and culture, with humanity as the subject and nature as the object of contemplation (Kalmanson 2017, p. 29). It came into popular usage only from the Meiji period (1868–1912), when increased contact with Western science, philosophy and economics lead to new conceptualizations based on the notion of an objectified, material nature (Brecher 2000, p. 58; J. A. Thomas 2002, p. 171). A tangible example is author and intellectual Mori Ōgai’s usage of *shizen* for the phenomena that are object of the natural sciences, which had previously been translated as *tennen*, *tenchi*, or *banbutsu* (Yanabu 1989, p. 138). Due to the difficulty of their semantic distinction, the nuances in the meaning of *shizen* first coexisted, and eventually the “Western” meaning gained the upper hand (cf. Yanabu 1989, pp. 127–48). In a similar way, *kankyō*, as translation of the

English “environment” and the German *Umgebung*, was established in the early twentieth century (Soda 2003, p. 66).

With the linguistic transition to *shizen* and the semantic implications occurring in the Meiji period, one could assume that the environmental degradation emerging in this era in Japan resulted from an altered relationship with nature, elicited by a new Western-style, objectified concept of it (Moon 2004, p. 228; Morris-Suzuki 1998, p. 54; as discussed in Brecher 2000, p. 16). I will demonstrate based on three examples—two pre-Meiji, one during Meiji period—of discourse and environmental history, however, that this is a fallacy, and that even before the socio-political transformations of the Meiji period, environmental degradation and a notion of nature as an exploitable resource were emerging in Japan.

3. Examples from Different Periods of Japanese History

3.1. Example I: Nature Reverence and Manipulation in Premodern Agriculture

In the agricultural realm of ancient Japan (i.e., until the end of the twelfth century), the discourse on nature was mainly shaped by religion and folklore. Shintoism, an animistic belief which developed from Japan’s early indigenous religions in the Yayoi period (300 BCE–300 CE; Kagawa-Fox 2017, pp. 206, 208), inscribes the presence of *kami* (godlike spirits) into unique rocks, large trees, and other natural objects or phenomena that, hence, demand reverence (Parkes 2017, p. 67). Flowers and plants were attributed talismanic functions against disease and evil, or for good fortune, and trees or branches served to invite the presence of *kami* (Matsuoka 2020, p. 30; Shirane 2012, p. 21). But nature was not only sacred and benign: the wilderness of mountains and forests outside of the rural *satoyama* villages was considered the realm of wild animals, spirits, and mythical creatures such as *kappa* (water goblins), *tengu* (bird-human-monkey chimeras), *kitsune* (fox spirits), and *tanuki* (evil raccoon dogs; Marcon 2017, pp. 3–4). *Torii* (Shinto gates) defined the border between the human world and supernatural wilderness (see Figure 1), and worship at Shinto shrines meant to pacify the malevolent creatures of the forest and win the favour of benevolent *kami* (Marcon 2017, pp. 3–4). With the progressive taming of nature, its image shifted to a more positive view from the middle of the Heian period (794–1185), and many previously violent spirits turned into guardian gods of agriculture in Shintoism (Shirane 2012, p. 14).



Figure 1. A *torii* equipped with a fence to separate the human realm from mountains and forests in Kamikatsu, Tokushima Prefecture. Photo by Regina M. Bichler.

After the mid sixth century, Buddhism, which had been introduced from China, added new elements to the relationship with nature and the environment (Matsuoka 2020, p. 218; Kagawa-Fox 2012, p. 28). The Buddhist view on life as suffering makes the request for universal compassion extend also to animals and plants, which were regarded capable of attaining Buddhahood by the Japanese Tendai and Shingon Buddhist schools (Brecher 2000, p. 63; Sørensen 2013, p. 98). Similar to Shintoism, even inanimate nature such as mountains was considered sacred and turned into destinations of Buddhist pilgrimage (Shirane 2012, p. 144). Furthermore, the killing of animals as sentient beings was deemed a sin, which led to the taboo and prohibition of meat eating—at least for some species—in 675 (Shirane 2012, pp. 182–83; Sørensen 2013, p. 87). Nevertheless, Buddhism did not propagate a “love for nature” in the form of non-intervention or nature conservation (Kalland 2014, p. 247). As it teaches the escape from the transitory existence in an illusionary material world through enlightenment, Buddhism’s concern for the physical environment was mainly utilitarian. Sparing the life of sentient beings prevented its believers from accumulating negative karma, and sustainable use of resources helped to properly manage monastic assets (Sørensen 2013, pp. 85–87, 103–4).

Yet the religious ideals about nature were not necessarily followed in agriculture and forestry—or could not practically be followed, respectively. The reclamation of farmland through logging and its cultivation provided a livelihood for rural communities, but the spatial closeness with and dependency on nature made agrarian communities vulnerable to its forces, such as floods and vermin (cf. Sørensen 2013, p. 89). Therefore, despite the Buddhist ban on killing animals, birds and insects that damaged the harvest were considered as pests and culled by farmers (Shirane 2012, p. 120). Yet farmers found a practical resolution to the animal-killing dilemma in posthumously venerating the resentful spirits of the beings that had to give way to the extension of the human-dominated domain at shrines, or by appeasing their souls through Buddhistic *kuyō* rituals (i.e., offerings to the spirits of the deceased; cf. (Shirane 2012, p. 120; Kagawa-Fox 2012, p. 31). Similarly, although large trees were regarded as the seat of the *kami* in Shintoism and were theoretically able to attain Buddhahood, logging for timber and firewood demanded in the construction of Buddhist temples and Shinto shrines consumed enormous areas of woodlands, leading to environmental deterioration such as soil erosion and flooding in the remaining fallow landscapes (Totman 2014, pp. 86–87).

The acceptance of collateral damage to the environment in the wake of agriculture and forestry is certainly not specific to Japan, but a common issue in farming throughout the world. The point of interest here is, however, that reverence of a divine nature would make one expect a policy of active environmental protection, or at least non-interference with the environment. Instead, it did not impose, or hardly imposed, specific limits to the kind and extent of harm done to nature but asked for atonement in the form of religious rituals instead. In contrast, in the Christian religious sphere, for example, where the physical environment is explicitly created for human prospering and, therefore, has a lower status than humans (cf. White 1967, p. 1205), no religious practices of “compensation” for nature are demanded. Consequently, the discursive concept of a “sacred” nature did shape religious practices towards nature but did not exert significant influence on ecological behaviour.

Several possible reasons can be attributed to this observation. First, while we might understand “nature” by default in terms of “environment” from a contemporary and Western-language perspective, this is not the case for both other periods in history and the Japanese language, as Section 2 has discussed. The linguistic divide of nature into an abstract concept and its phenomenal elements suggests that there was not necessarily a practical connection between these two ideas.

Second, even if there was a direct connection, such as in the case of the Buddhist ban on meat eating, this does not mean that such prescriptions were being followed. The load of bad karma from the killing of an animal was probably a neglectable burden in comparison to starving, especially as karmic imbalances could be compensated for by religious

rituals and good deeds, and the wrath of angry spirits could be appeased post-mortem. Furthermore, it has been demonstrated in many a study that humans do not necessarily act according to their values and social norms (reviewed, e.g., in Turaga et al. 2010)—a behavioural pattern that probably was not much different in ancient times.

Another factor is that discourse on nature and practices engaging with the environment occurred on different societal levels—clergy and farmers, respectively. Although both Shinto shrines and Buddhist monasteries often possessed their own land for farming to provide for their staff (Sørensen 2013, pp. 86–87), the high priest or abbot who composed treatises about the human–nature relation was most certainly not the one to till the land and perform the “dirty work” that gave rise to conflicts of interest between religious ideals about nature and food security.

In summary, the relationship with nature in ancient agricultural Japan emphasized the human dependence on nature in both good and bad terms. Religious practices sought to reconcile the ambiguity of revering natural phenomena and simultaneously harming them to meet human needs. This harm, however, should not be understood as awareness for—or knowledge about—ecological ramifications when, e.g., decimating the local population of a pest; it was rather an awareness of the transgression of rules prescribed by Shintoism and Buddhism. Yet this transgression was made up for by religious rituals, and, therefore, the “harmony” with nature was restored.

3.2. Example II: Neo-Confucian Resource Exploitation in the Edo Period

The Edo period (1604–1858), which is also classified as “early modern”, secured a long-term peace after centuries of constant war and, thus, allowed the flourishing of art, literature, and trade. Nature and its representations had been playing a vital role in aristocratic art and literature since the Heian period (794–1185), and this tradition continued throughout the Edo period, proliferating into the social stratum of samurai and wealthy merchants (Matsuoka 2020, p. 297; R. K. Thomas 2008, pp. xvi–xvii; Shirane 2012, pp. 209–10). Although poetry was centred around topics of nature, nature’s literary role was mainly the indirect expression of human emotions in a highly stylized symbolic code of associations which were usually interconnected with a specific season (Arntzen 2004, pp. 54–55). Konishi (1991, pp. 13–14) even postulates that there was no conceptual barrier between humans and nature in ancient Japanese literature that would allow its objective description—which resonates with the religious concepts of 3.1, Example I.

Yet this was not the only engagement with nature in the Edo period. A precursor of today’s natural sciences emerged in the form of medical botany (jap. *honzōgaku*), a study devoted to the pharmacological properties of minerals, plants, and animals for medical purposes (Shirane 2012, p. 110; Nakamura et al. 2014, p. 239). Due to its Chinese origins, the view on nature in medical botany and its species-classification system was deeply rooted in Neo-Confucian philosophy and the Confucian concept of nature as a metaphor for the social order that functions according to moral principles (Roetz 2013, p. 30). Medical botany became a popular fashion, not only in the form of professionals and amateurs collecting specimens, but also as a spectacle for the common public who craved to see or possess exotic plants and animals imported by Dutch and Chinese merchants (Morris-Suzuki 1991, pp. 90–91; Winkel 2012, p. 13; Marcon 2017, p. 163). In teahouses and public spaces, facilities similar to botanical and zoological gardens were established (Marcon 2017, p. 174). From a mystical, potentially dangerous realm inhabited by gods and spirits, nature turned into an intellectual and economical commodity with monetized value, and its experience into a consumer good (J. A. Thomas 2002, p. 55; cf. Marcon 2017, p. 178). Even for the ruling elite, the physical environment was merely an exploitable resource, the reason why *honzōgaku* studies had been financed and promoted in the first place (Marcon 2017, pp. 252, 277; Morris-Suzuki 1991, p. 91). This coincided with the emergence of the idea of *kaibutsu* (“opening of things”), a term coined by botanist and philosopher Kaibara Ekiken (1630–1714) that—like *honzōgaku*—was based on Neo-Confucian values, propagating the study of and active engagement with the physical environment for the efficient utilization

of natural resources (Morris-Suzuki 1998, pp. 41, 45). *Kaibutsu* evolved into an important concept due to the increasing outflow of money from the countryside into the newly established capital Edo (present-day Tokyo) and flourishing trade hub Osaka, which had developed into cultural and economic centres (Morris-Suzuki 1998, pp. 45–46). This and the lack of revenue from war conquests during the peace of the Edo period caused financial shortages in the feudal domains and led to the search for ways to expand agricultural production, e.g., by the manipulation and reconstruction of the natural landscape (Brown 2013, p. 97).

Although the praise of idealized nature in the arts found some practical expressions in gardening and landscape architecture according to literary descriptions (Shirane 2012, p. 214), the main environmental developments of the Edo period rather mirrored *honzōgaku* and *kaibutsu* practices. With the population almost doubling in the seventeenth century (Totman 2014, p. 152), agricultural intensification and expansion was unavoidable. Yet logging was not only spurred by agricultural-land reclamation (Seta 2000, pp. 5–33), but also by a construction boom and increasing demand of firewood for metallurgy, resulting in unprecedented deforestation. The ramifications of deforestation, namely, soil erosion, flooding, and sedimentation, among others, destroyed agricultural systems and threatened the livelihoods as well as the existence of whole villages, and, consequently, also the food supply of the elites—not to mention the damage to the biotic community. Therefore, laws were adopted in the second half of the Edo period that limited logging and established areas of forest conservation as a way of long-term resource management (jap. *chisan chisui*, “management of mountains and waters”; Totman 2014, pp. 175–78).

Although this turn is sometimes praised as exemplary nature conservation (Morris-Suzuki 1991, p. 95; Yasuda 1990, pp. 2–4), Conrad Totman (2014, p. 143) argues, in his environmental history of Japan, that it was, rather, an unavoidable adaptation to ecological limits than a conservationist attitude. The purpose of these measures was not the preservation of the forest *per se*, but to give it sufficient time and possibility to recover for logging anew. Furthermore, reforestation was not undertaken in such a way as to restore the original ecological conditions of the forest, but the planted trees were adapted to the needs and interests of different social and economic groups (Totman 2014, p. 178).

Yet environmental damage was not restricted to trees. Mining for gold, silver, copper, sulphur, and coal—resources critical for trade and technological development—had commenced during the Edo period and had demonstrated the environmental as well as social consequences of the increasing exploitation of natural resources (Totman 2014, p. 172). Chemicals for ore extraction were discharged into rivers, where they poisoned fish and crops, resulting in environmental damage, threats to rural livelihoods, and human health issues. The first recorded chemical-pollution incident occurred as early as 1640 at the Akazawa copper mine in Hitachi, Ibaraki prefecture, where mining activity was terminated due to protests of local farmers (Colligan-Taylor 1990, pp. 69–70). Yet in many other cases to follow, the authorities took the side of the mine operators to ensure the supply of resources for trade and production, providing financial compensation to silence protests (Totman 2014, pp. 172–73).

As the discursive developments in the Edo period (1605–1868) demonstrate, even before the Meiji period and the opening to Western technology and ideas, objectified understandings of nature and the physical environment emerged in Japan. *Kaibutsu*, as the imperative to actively utilize the archipelago’s natural resources, is strongly reminiscent of the Christian notion of nature as existing purely for human exploitation, even though Christian faith was prohibited and persecuted—therefore, it is very unlikely that there is a direct connection. Rather, the dominance of Neo-Confucianist cosmology and ethics, prescribing the utilization of all available resources for the efficient fulfilment of duties, paired with the economic incentives resulting from the socio-political conditions of the Edo period can be taken as the motivation for this train of thought. A similar reasoning applies to *honzōgaku*: although no historical connections can be drawn, its gradual turn away from Neo-Confucian principles to proto-scientific practices appears comparable to

developments within the Scientific Revolution beginning in sixteenth-century Europe. Yet whereas the occidental concept of nature is already defined as dualistic and objectifying before the Scientific Revolution and the subsequent Age of Enlightenment, in Japan, the dissection, analysis, and commodification of natural elements and phenomena could be said to constitute a paradigm shift from the conceptual unity and equality of humanity and nature to the establishment of nature as a mere object of human interest, profit, and manipulation. In the view of Neo-Confucianism, although humans and nature were still proclaimed to be united and inseparable, the practical role attributed to nature lay in its benefit and profit for the human realm, such as the pharmaceutical properties of plants collected, the increased harvest derived from intensified agriculture, the newly built temples and houses made of high-quality wood, and the goods that could be produced from the ores extracted in mining. Thus, the human hand only helped nature and the physical environment fulfil its designated role.

On the contrary, Brecher (2000, p. 15) sees Neo-Confucianism's focus on duty, control, and management instead of profitmaking as beneficial to conservation efforts during the Edo period. However, considering that wood scarcity had already commenced in the early seventeenth century (Totman 2014, p. 174), I find Totman's argument more convincing that it was not ideological restrictions, but biological limits to the exploitation of natural resources, which elicited forest conservation programs. Yet even if there are correlations between the discourse about nature and practices of engagement with the physical environment, causal connections should not be drawn hastily. The socio-political and economic developments in the Edo period were strongly pushing for an intensified resource use, independent of how nature might be discussed in theory. Importantly, these tendencies commenced even before the emergence of the *kaibutsu* concept and the popularization of medical botany—presenting the change in the discourse about the relationship of human and nature in a rather apologetic light (cf. Morris-Suzuki 1991, p. 93).

Although the eventual backlash to the extractive engagement with nature and the environment and the consequential need for its active preservation could be regarded as an important lesson for society in the Edo period, the worst was yet to come.

3.3. Example III: Meiji-Period Industrialization and the Diversification of Images of Nature

After being forced by the United States to open up for trade relations in 1853, Japan's shift from an agrarian, feudal society to one of the world's leading industrial nations took place at the end of the nineteenth century within merely 50 years (cf. Saaler 2005, p. 74). In this era, Japanese and Western knowledge about nature converged into modern natural sciences (Marcon 2017, p. 302), and the aforementioned *shizen* was introduced as a translation of European language terms for "nature", with its scope of use gradually widening (see Section 2). In contrast to previous terms for nature, it implied the dichotomic separation of nature and culture (jap. *bunka* or *bunmei*). *Bunmei kaika* ("enlightenment and civilization"), a Meiji-period (1868–1912) catchphrase referring to the absorption of Euro-American thinking, technology, and culture, promised economic, industrial, and military advancement according to the Western model (Totman 2014, p. 151). It was advocated, among others, by the Meirokusha, an influential group of intellectuals around the political reformers Mori Arinori (1847–1889) and Fukuzawa Yukichi (1835–1901) (Swale 2009, pp. 98–122; Huish 1972, pp. 208–9).

At the same time, there were also voices opposing Japan's intellectual "Westernization" arguing that Japanese philosophical traditions should be retained while adopting only Western knowledge and technology. This notion was expressed through scholar and politician Sakuma Shōzan's (1811–1864) "*tōyō no dōtoku, seiyō no geijutsu*" ("Eastern morality, Western technology") and journalist and geographer Shiga Shigetaka's (1863–1927) *kokusui shugi* ("maintenance of Japan's cultural identity"), for example (J. A. Thomas 2002, p. 57; Gavin 2000, p. 220). Others even rejected industrialization including its socio-ecological ramifications as part of their critique on Japan's "Westernization" and called for a return to traditional values and philosophies (Brecher 2000, p. 5). The well-known folk-

lorist Yanagita Kunio (1875–1962), for example, argued that deforestation, the relocation of villages and other forceful alterations of the landscape would deprive the Japanese people of their communal identity and religious foundation: “[. . .] our worship of the gods originates not in some sacred body, or shrines, but in the land itself and the forest growing densely on the land” (cited in Marcon 2017, p. 299). Similarly, Shiga’s *Nihon Fūkeiron* (1894) suggested that the Japanese national character was shaped by Japan’s climate, landscape, and geography, and that the physical environment must not only be treated as an economic but also as a cultural resource demanding preservation (Gavin 2000, pp. 225–26). The popularity of their writings reflects the public resonance with their ideas. Yet aesthetic and cultural appreciation of nature is not equal to its environmental treatment: whereas the agreement on the beauty of the Japanese landscape was widespread, some saw nature’s riches waiting for their utilization (Marcon 2017, p. 289), and others argued that due to Japan’s scarcity in natural resources, not only intensive resource extraction but also geographical expansion were necessary to cater national needs—later justifying Japan’s imperialism in the dawn of World War II (Befu 2001, p. 17; J. A. Thomas 2002, p. 197).

In political decisions, the latter views prevailed, and to keep up with the Western nations, rapid industrialization and the utilization of all available resources was pursued. With a further surge in population, urbanization, and the high demand for natural resources, however, industrialization was soon followed by *bunmei byō* (“diseases of civilization”; Pyle 1975, p. 348). Cases of *kōgai* (“public harm”), referring to environmental pollution that affects human health, had already emerged from mining in the Edo period, but were becoming endemic during Japan’s industrial revolution, with the the Ashio copper mine disaster of 1873 the most famous incident (Colligan-Taylor 1990, pp. 69–70; Kagawa-Fox 2017, pp. 200–1). The new industrial technologies imported from the West had opened up unprecedented possibilities for resource extraction. While mining in previous centuries, for example, had literally only scratched the surface and, therefore, caused significantly smaller amounts of toxic waste and pollution, new deep-mining technology allowed the underground extraction of ores, accompanied by extensive chemical processes that discharged pollutants into air and water on a totally different scale (Totman 2014, pp. 171–72). Moreover, due to the introduction of dynamite and mining machines, the productivity of mining increased significantly, but so did its adverse effects for miners’ health (Totman 2014, pp. 222–23). Even the demand for wood, which had already been at critical levels for centuries, surpassed all previous thresholds as more and more fires had to be fed for industrial processes. This, unsurprisingly, exacerbated the social and environmental problems that had already arisen during the Edo period. Yet worsening environmental conditions such as air and water pollution and their victims were either ignored or viewed as inevitable side effects of successful economic development (Brecher 2000, p. 16). This situation continued more or less unchanged until the postwar years of economic recovery, as the government held on to the “belief that individuals would recognize the advantages of industrialization and tolerate its inconveniences for the sake of the greater good” (Brecher 2000, p. 195).

The focus on growth and progress was not limited to mining, but similar developments—an increase in output and efficiency through the import of Western technology—were also pursued in agriculture, fishery, manufacturing, and forestry, but all these sectors suffered, at the same time, from industrial pollution (Totman 2014, pp. 220–35). Forestry further experienced a catastrophic escalation when the forest management system was reformed to imitate Western standards, and even extended efforts for reforestation only proved effective when downstream pollution and damage was curtailed. Environmental ramifications emerging in the Edo period multiplied under the new techno-economical regime.

Tracing the images of nature from the end of the Edo period throughout the Meiji period, one cannot speak of a simple adoption of the dualistic, objectified Western nature concept—especially not one that appeared on the Japanese stage like a *deus ex machina*. Instead, the Edo period had already born two concepts—*honzōgaku* and *kaibutsu*—from Neo-Confucianism that were comparable with the Euro-American one in its view on na-

ture as a means to satisfy human interests and needs. On the one hand, this could either increase the openness to engagement with the foreign-but-similar view on nature, but also make its adoption unnecessary and lead to its rejection, like in the case of Sakuma, on the other hand. Furthermore, with the connection of nature and the Japanese nation such as in Shiga's and Yanagita's writing, and other theories sharing their appraisal of nature without their call to protect it, a diversity of competing ideas about nature existed in nineteenth- and early-twentieth-century Japan (J. A. Thomas 2002, pp. 29–30).

Yet the symbiotic harmony between the Japanese lifestyle and nature before the perceived intrusion of Western capitalist thinking and industrialization that many scholars suggested was an invented tradition (J. A. Thomas 2002, p. 181), ignoring and denying early deforestation, soil impoverishment through intensive agriculture, and pollution incidents that had emerged long before the Meiji period. As sketched above, Japan's pre-industrial relationship with nature was ambiguous rather than harmonious, and more oriented toward practical issues and priorities such as the securing of one's livelihood or the satisfaction of needs and desires than toward religious and philosophical concepts of nature.

Among the different views on nature in the intellectual discourse, the—both Western-style and Neo-Confucian—idea of utilizing nature to pursue Japan's self-prescribed development goals was especially beneficial to industry and government, two sectors that were closely connected in the Meiji period. With an already minimal concern for human damage, as the endemic mine pollution incidents demonstrated, their concern for the non-human environment was virtually non-existent.

Therefore, I argue that it was not the Euro-American concept of the human–nature dualism that caused the unprecedented environmental degradation in the Meiji period, but rather the prioritization of the goal of catching up with the Western industrialized nations under the slogan *fukoku kyōhei* (“enriching the nation, strengthening the army”; Morris-Suzuki 1991, p. 93). In this process, imported “advanced” knowledge and technology were employed for a more efficient resource extraction—but also engendered a more efficient environmental destruction. As the utilization of natural resources for human benefit were supported in Neo-Confucianist philosophy, invoking these values allowed the government to reconcile Western technology with Eastern philosophy.

Historian Tessa Morris-Suzuki (1998, pp. 53–54) even goes as far as to state that the indifference of the Meiji government to the environmental effects of industrialization resulted from adherence to the Neo-Confucian notion of the unity of humans and nature. Humanity as an inseparable part of nature made the idea of an environment free of human manipulation unimaginable—and undesirable. Yet whereas the correlation between environmental degradation and Neo-Confucian ideas is obvious, it is questionable whether it is really a causal connection—as nature exploitation, e.g., in the form of extensive logging, can already be observed centuries before the emergence of Neo-Confucianism (cf. Section 3.1).

4. Conclusions

In this paper, I aimed to debunk the myth that the Japanese lifestyle was imbued by “love for nature” and “in harmony” with nature, derived from a holistic human–nature concept, before the intrusion of the Western dualistic-nature concept led to the environmental degradation of the archipelago. I demonstrated that the severe environmental damage occurring in modern Japan, i.e., from the middle of the nineteenth century, cannot be attributed to the adoption of the Euro-American notion of nature, for it was only one of many competing notions during the Meiji period (1868–1912), with similar ideas reflected in established Neo-Confucian ideas such as *honzōgaku* and *kaibutsu*. Instead, the import of Western technology to propel industrialization through maximum resource extraction aggravated environmental tendencies that had already spawned during Japan's seclusion in the Edo period (1604–1868), if not earlier. I gave a short introduction to the semantics and linguistics of “nature” in Japanese, and employed three examples from Japanese history, both premodern and early modern, to corroborate these findings.

The Japanese language offers a wide variety of notions, expressing primarily physical phenomena, subsumed under “nature”, which were mainly in use before the prevalence of *shizen*—the translation of the European term that was introduced during the end of the eighteenth century. Although the term was originally imported from Chinese, meaning “something that is so by itself”, it eventually came to refer to an understanding corresponding to its English equivalent.

In ancient Japan (until the twelfth century), agricultural life was influenced by folklore and religion; yet agricultural interests such as defending one’s crops against pests conflicted with the Shintoist notion of sacred nature and the Buddhist condemnation of killing sentient beings such as animals. This conflict of discourse and practice was resolved by performing religious rituals to appease the spirits of the creatures that had experienced violence through humans.

In the Edo period (1604–1868), the traditional literary praise of nature stemming from the aristocratic realm made its way into the samurai, townspeople, and merchant class, and was supplemented by new concepts. Neo-Confucianist cosmology served as the basis of *honzōgaku*, a proto-scientific study of natural phenomena, which spawned interest in the interaction with the physical environment, but also enabled its commodification. *Kaibutsu*, on the other hand, also buttressed by Neo-Confucianist ideas, promoted the utilization of nature’s resources to secure the provision for the rapidly growing population and compensate for economic disadvantages of the provinces. Yet agricultural expansion and the construction boom took its toll, forcing the populace to adapt to ecological boundaries such as the regeneration time of forests. Furthermore, first incidents of mine pollution already foreshadowed the socio-ecological destruction that was still to come.

Political, social, and economic disruptions in the Meiji period (1868–1912) facilitated a re-evaluation and diversification of the relation between humans—or, more precisely, the Japanese nation—and nature. While industrialization was promoted by both industry and the state, factions supporting the occidental duality between human and nature, calling for the retention of “traditional” Neo-Confucian Japanese values or rejecting the modernization and “Westernization” of Japan altogether, competed in the intellectual discourse. Although the latter group saw environmental protection as part of preserving the Japanese identity, in governmental and industrial practice, the goal of developing into a potent international player on par with Western states was prioritized. Newly imported technology for resource extraction and industrial processing caused unprecedented environmental pollution, simultaneously threatening the biotic community, human health, and local livelihoods, but the collateral socio-ecological damage was declared a necessary evil for the future prospering of the nation.

Although the discursive and environmental developments described here are specific for the Japanese case, many of the observations made in Japanese history can easily be transferred to other times and places. The appreciation of an abstract concept of nature is an experience unrelated to the physical interaction with the environment (Totman 1989, p. 179), and, therefore, environmental behaviour cannot be deduced from the attitude towards nature. Therefore, “love for nature” does not necessarily mean care for the environment, as the three examples have demonstrated—and, e.g., the waste left behind in the mountains by “nature-loving” hikers regularly does. The lack of knowledge about ecological connections could be a reasonable explanation for many environmentally harmful practices, especially when looking at premodern times. When the first chemicals from mining were discharged into rivers, the damage inflicted to the human and non-human environment were most probably not known and unforeseeable. Yet even after the interrelations became evident in the Edo period, the harm to local ecology, health, and economy were still viewed as less important than the perceived benefit for the nation—a view that was propagated not only in the Meiji period, but also during the economic boom after World War II, with ecological ramifications similar to, if not worse than, those in the Meiji period. More than values and theoretical considerations on nature, practical aspects prevailed, as illustrated in Totman’s (2014) comprehensive description of the socio-political

and socio-economic developments that led to the presented environmental outcomes in the respective era.

However, this article does not suggest that there was or is no sincere concern for nature as environment in Japan. Already during the Meiji period, engaged politicians warned about the dramatic effects of environmental pollution on human health (Stolz 2014, p. 5). In the twentieth century, the renowned primatologist Imanishi Kinji (1902–1992) and the Oscar-winning director Miyazaki Hayao (*1941) critically address the modern human–nature relationship and suggest a new environmental ethic in their works (cf. Berque 2017, p. 23; Odin 2017, p. 138). Today, Buddhist schools are increasingly propagating active environmental protection, and Japanese branches of NGOs such as Greenpeace and environmental movements such as Fridays for Future fight against environmental degradation on both the domestic and international scales. Of course, pre-industrial deforestation, environmental degradation and appreciation of secondary nature can easily be found in other cultures as well, e.g., in Germany (Moranda 2006, p. 105; Stehr 1994, p. 218). However, the persistent claim of the innate “love for nature” in Japanese culture, character, and identity puts it under special scrutiny how this “love” and “harmony” could coexist with environmental harm. Discursively, one could even claim that the Japanese civilization and nature were “in harmony”, as their impact on the environment were backed or in some way reconciled with the prevalent images of nature in different times of history, as the three examples showed. Practically, however, interests other than the preservation of the actual landscape that was valued so much in the arts and literature—such as economic prosperity, which was promised by kaibutsu, honzōgaku, and the introduction of modern technology from the West—were prioritized and pursued. The resulting pollution and environmental degradation emerged as byproducts of these interests and were, therefore, considered as unavoidable—shō ga nai (“Nothing can be done about it”) in Japanese.

Thus, the often-cited Japanese “love for nature” is a very euphemistic and simplified expression for this relationship and the historical diversity of nature concepts. More pointedly, the gap in the veneration of abstract nature and the destruction of physical nature has been described by Kalland and Asquith (2004, p. 15) as a “love affair from a distance”. Yet even if this distance is bridged by strolling among the neatly planted rows of cherry blossoms in April, one will find that their most-valued quality is not their soft white and pink contrasting the bright-blue spring sky, but the scattering of their petals in the wind, reminding us of the transience of all things—even nature.

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Notes

- ¹ This view on nature is, of course, not the only one existing in the Euro-American culture until the early twentieth century, but as it is the concept addressed in the myth I want to debunk, I will not discuss other Western nature images in this essay.
- ² Apart from Asian trade partners, only the protestant Netherlands were permitted, under strict regulations, to maintain purely secular trade relations with Japan as Christianity, in particular Catholicism, was increasingly perceived as a threat to social stability (Sugimoto and Swain 1978, pp. 160–61).

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