HiN
Internationale Zeitschrift für Humboldt-Studien
International Review for Humboldt Studies
Revista internacional de estudios humboldtianos
Revue internationale d'études humboldtiennes

ISSN (online) 1617-5239
ISSN (print) 2568-3543

HiN XXVII, 51 (2026)
Beiträge

Stefanie Buchenau

Humboldt on *Kosmos*: Ornament and Order

ABSTRACT

Humboldt's *Kosmos* asserts the intelligibility of a single, unified world against chaos and multiple disconnected worlds. By invoking the Pythagorean notion of *kosmos* as order and ornament, Humboldt maintains this unity under modern conditions of openness and partial accessibility. Crucially, this entails a reconfiguration of the faculties: sensibility assumes functions once entrusted to reason, apprehending the infinite and giving it form as a representation of the world, while reason ceases to be primarily contemplative and instead operates on this basis to discern laws, to order and systematize observations. Beauty no longer expresses a preexisting order but makes its rational apprehension possible, allowing diversity to be grasped as unity. *Kosmos* thus presents a modern one-world epistemology where aesthetic perception and scientific explanation are inseparable.

ZUSAMMENFASSUNG

Humboldts *Kosmos* verteidigt die Erklärbarkeit einer einzigen, einheitlichen Welt gegen Chaos und die Vorstellung mehrerer getrennter Welten. Indem Humboldt den pythagoreischen Begriff *kosmos* als Ordnung und Schmuck aufgreift, denkt er diese Einheit unter modernen Bedingungen von Offenheit und partieller Zugänglichkeit neu. Entscheidend ist dabei eine Umkehrung der Prioritäten und eine Neubestimmung der Vermögen: Die Sinnlichkeit übernimmt Funktionen, die zuvor der Vernunft vorbehalten waren, indem sie das Unendliche aufnimmt und zu einer anschaulichen Darstellung der Welt formt; die Vernunft hingegen ist nicht mehr primär kontemplativ, sondern erschließt auf dieser Grundlage Gesetze, ordnet Beobachtungen und systematisiert sie. Schönheit ist daher nicht mehr Ausdruck einer vorgegebenen Ordnung, sondern die Bedingung ihrer rationalen und analytischen Erfassbarkeit und ermöglicht es, Vielfalt als Einheit zu begreifen. *Kosmos* formuliert so eine moderne Einweltlehre, in der ästhetische Wahrnehmung und wissenschaftliche Erklärung untrennbar verbunden sind.

RÉSUMÉ

Le *Kosmos* de Humboldt affirme l'intelligibilité d'un monde unique et unifié contre le chaos et l'existence de mondes séparés. En reprenant la notion pythagoricienne de *kosmos* comme ordre et ornement, Humboldt préserve cette unité dans des conditions modernes d'ouverture et d'accès partiel. L'enjeu décisif est une reconfiguration des facultés : la sensibilité assume des fonctions autrefois dévolues à la raison, en appréhendant l'infini et en lui donnant forme dans une représentation du monde, tandis que la raison n'est plus d'abord contemplative, mais opère sur cette base pour discerner des lois, ordonner les observations et les systématiser. La beauté n'exprime donc plus un ordre préexistant ; elle en rend possible l'appréhension rationnelle et analytique, en permettant de saisir la diversité comme unité. *Kosmos* propose ainsi une épistémologie moderne d'un monde unique où perception esthétique et explication scientifique sont indissociables.

URL http://www.hin-online.de
URL http://dx.doi.org/10.18443/401
DOI 10.18443/401

Titles can sometimes condense an entire scientific program.[1] This is certainly true of Alexander von Humboldt's major work, *Kosmos. Entwurf einer physischen Weltbeschreibung.* Borrowed from ancient Greek, *kosmos* carries a striking dual meaning: 'ornament' and 'order', beauty and systematic arrangement. Humboldt's choice signals an intention to bring these dimensions together. Yet what it means to unite them in a project devoted to describing the physical world is far from self-evident.

The difficulty becomes sharper when we consider that beauty and order often prompt different responses to nature. Beauty belongs to feeling, sensibility, and aesthetic experience; order to explanation, measurement, and systematic knowledge. Humboldt's reception has largely reinforced this divide. He is often portrayed as a Romantic traveler or a *Naturphilosoph,* placing *Naturgefühl* – the distinctly modern aesthetic feeling of nature – at the heart of his vision. From his American journeys to the monumental synthesis of *Kosmos,* his work is frequently read as privileging harmony and emotional resonance over mechanistic explanation, immersion over analytical distance.

Humboldt's deliberate choice of an ancient term further complicates this picture. Why anchor a modern scientific project in a word inherited from classical cosmology? Why, in particular, draw on a Pythagorean heritage in which *kosmos* already unites beauty and order, or aesthetic perception and intelligibility?

The hypothesis I would like to advance in this article is that, in the modern context, this connection takes on a profoundly new shape. In ancient cosmology, beauty and order were grounded in a fixed, harmonious structure. Humboldt, by contrast, posits a world that is not given as a closed, perfectly proportioned whole. Unity and coherence emerge through observation, comparison, and the tracing of relations among phenomena. This modern understanding reshapes both the meaning of *kosmos* and the articulation of beauty and order. In his vision, the experience or feeling of beauty – understood through the 18th century notion of *Naturgefühl* – becomes a condition for intelligibility rather than an expression of ontological order. Beauty, in other words, forms the horizon within which scientific ordering becomes possible and meaningful.

To trace this fundamental reinterpretation, this article first examines Humboldt's affinities with earlier Pythagorean and cosmological traditions; second, it considers the transformations introduced by the modern scientific context; and finally, it investigates the specifically modern aesthetic dimension of this conception.

1 Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Research Council Executive Agency. Neither the European Union nor the granting authority can be held responsible for them. This work is supported by ERC grant AdG 2024 Oecologie (No. 101200507).

I. Why Pythagoras? *Kosmos* as a Methodological Postulate

As already noted, Humboldt attached decisive significance to the title of his opus magnum, *Kosmos.*[2] He appears to have made this choice relatively late in the project's long gestation, which was first envisioned in 1796[3], developed through sixty-two university lecture courses, and ultimately realized in five volumes published between 1845 and 1862. Arising out of a long and rich tradition of natural history, the project might have borne other titles. Initially, Humboldt referred to it as a "physical description" of the world; only later did he settle on what he himself regarded as a more ambitious – almost "pretentious" – title, as attested in a letter to his friend Varnhagen von Ense from 1834.[4] In the preface of the first volume, he evokes this ancient concept in a deliberately 'solemn' and 'archaic' manner, writing:

To indicate the same idea in a more definite, one might say solemn *(feierlich)* and archaic *(altertümlich)* manner, I have prefixed to the title of my work the word *Kosmos,* which originally, in Homeric times, meant 'ornament' and 'order,' but was later transformed into a philosophical term of art – a scientific designation for the well-ordered arrangement of the world *(Wohlgeordnetheit der Welt),* indeed, for the entire mass that fills space, that is to say, for the universe itself. (Humboldt, 2014, 33).

In the extensive footnote 27 accompanying this passage, Humboldt explicitly justifies this choice of term by reconstructing the ancient semantic field and by insisting on its original double meaning: ornament *(Schmuck)* and order *(Ordnung).* In its most ancient usage, Humboldt recalls, *kosmos* designated ornament or adornment – whether of bodies (men, women, horses) or of discourse *(Schmuck der Rede)* – before being transferred, according to ancient testimony, to the ordering of the universe as a whole. It was Pythagoras, he emphasizes, who first applied the term to the world and world order, thereby uniting aesthetic and cosmological meaning in a single concept: Pythagoras was the first to use the word *Kosmos* for the ordering of the world, encompassing both the terrestrial and the heavenly realms *(Weltordnung, Welt und Himmelsraum).*[5]

2 For a comprehensive overview of the meanings Humboldt attributed to the title *Kosmos* and the broader ambitions he pursued in the work, see Ottmar Ette, *Alexander von Humboldt und die Globalisierung: Das Mobile des Wissens* (Frankfurt: Suhrkamp, 2009), Figur 8, pp. 201–222. On the gestation of the project, see Petra Werner, *Kosmos.* In Ottmar Ette, ed., *Alexander von Humboldt-Handbuch. Leben – Werk – Wirkung* (Stuttgart: Metzler, 2021), pp. 73–79.

3 Humboldt expresses the idea of a "physics as the world" as early as 1796, in a letter to Marc-Aurel Pictet from January 24, 1796.

4 Humboldt to Varnhagen von Ense, October 1834: "Mon titre est maintenant Cosmos. Esquisse d'une description physique du Monde … Je sais que Cosmos a quelque chose de prétentieux qui n'est pas sans une certaine afféterie; mais ce titre dit en un mot frappant ciel et terre".

5 Humboldt, 2014, 33. For further discussions of Pythagoras' mathematical symbolics, see vol. 1 History of physical description of the world, and book 3, in particular p. 390.

From this Pythagorean origin, attested by Philoloaus[6], Plutarch,[7] and Galen, Humboldt follows the subsequent philosophical, poetic, and semantic transformations of the term. Through the philosophical schools of Italy, he notes, the term passed into the language of the poets of nature – Parmenides and Empedocles among them (Humboldt, 2014, 33). In Plato, especially in the *Timaeus,*[8] *kosmos* designates both the visible world and its rational articulation, ordered according to numerical and harmonic principles. Humboldt further recalls its use in Pseudo-Aristotle's *De Mundo*[9]; its appearance in the plural, where *kosmoi* designate multiple worlds or stellar systems; and its eventual restriction, through a long semantic shift, to the earth alone – a usage attested, for example, in imperial inscriptions praising Trajan and Hadrian. He also evokes the Pythagorean division of space into *Olympus, Kosmos,* and *Ouranos,* with *kosmos* designating the middle, planetary region characterized by harmony and order.

Humboldt's philological inquiry extends even further, into the domain of comparative linguistics. Drawing on the work of his contemporary Franz Bopp, he considers possible Sanskrit roots *(sud, gagat),* connections to the Latin *mundus* – which likewise originally signified ornament before coming to denote the world – and parallels in other Indo-European languages *(loka, swjet, Welt).* Across these linguistic traditions, Humboldt notes a recurring association between the notion of "world" and ideas of adornment, shining, and order. Far from being accidental, these convergences testify, in his view, to the deep semantic and conceptual richness of the notion of *kosmos,* understood as a structured and meaningful whole.

Yet this historical and philological reconstruction is not pursued for antiquarian reasons. It serves, rather, to bring into relief a central and remarkably durable intuition that runs through these variations: the world is intelligible insofar as it is ordered. To name the world *kosmos* is already to interpret it, and this act of naming implies several interconnected claims. First, it affirms that the world forms a comprehensive whole rather than an infinite regress *(apeiron).* Second, it asserts that there is one world, rather than many, unrelated or merely juxtaposed worlds. Third, it presupposes that this world is structured by order. Finally, it implies that this order is not external to being, but expressed through harmony, proportion, and beauty. Ornament, in this sense, is not an addition to order, but its sensible expression and mode of appearance.

One may furthermore note that such claims were far from self-evident even in antiquity. Many ancient cosmological traditions conceived the world as emerging from chaos, governed by chance, or proliferating into a plurality of worlds. From Hesiod's primordial Chaos[10] and

6 *Philolaus, DK 44 A–B fragments,* in Hermann Diels & Walther Kranz, *Die Fragmente der Vorsokratiker* (Berlin: Weidmann, 1951): "Nature (φύσις) in the world-order (κόσμος) was fitted together both out of things which are unlimited and out of things which are limiting, both the world-order as a whole and everything in it."

7 Pseudo-Plutarch's *De placitis philosophorum* and Pseudo-Galen, *Historia philosophica,* are preserved in Hermann Diels, *Doxographi Graeci* (Berlin: Reimer, 1879).

8 Plato, *Timaeus* 30b.

9 Pseudo-Aristotle, *De Mundo* c. 2 (391a, Bekker) Greek (391a 8–13).

10 Hesiod's *Theogony* (lines 116–124) spoke of Chaos as the primal state, with order emerging only later and contingently, suggesting that the cosmos was secondary and derivative rather than fundamental.

Anaximander's *apeiron*[11] to the atomists' doctrine of infinitely many worlds[12], ancient cosmology often pointed toward contingency, disorder, or multiplicity rather than unity. In these traditions, order appears as secondary, provisional, or imposed, never as a fundamental presupposition of the world as such. Against this background, the Pythagorean affirmation of a single, harmonious *kosmos* appears as a bold and contested stance – one that excludes chance as a fundamental principle, rejects infinite regression, and denies the necessity of multiple worlds.

By invoking this Pythagorean origin in the title of *Kosmos,* Humboldt implicitly aligns himself with this tradition. However, the significance of this gesture lies less in adopting a fixed metaphysical doctrine than in its methodological and explanatory ambition. Unlike the Pythagoreans, Humboldt affirms the unity and order of the world *in the name of intelligibility.* The assumption that there is a single, ordered *kosmos* is not derived from experience; it precedes it. It functions as a methodological postulate, without which scientific inquiry – aimed at uncovering lawful relations beneath apparent disorder – would be impossible. To investigate nature scientifically is already to presuppose that its phenomena form a coherent system, a causal chain, governed by relations that can, at least in principle, be discovered.

II. Pythagoras Transformed: Humboldt and the Modern Copernican Cosmos

At the same time, Humboldt does not simply revive an ancient cosmology. While he draws on the Pythagorean idea of a single, harmonious *kosmos* and retrieves the Pythagorean gesture of affirming order against chaos and fragmentation, he profoundly transforms it. This transformation, imposed by the modern scientific context, distinguishes Humboldt's conception of *kosmos* from its ancient antecedents and prepares the ground for his distinctive articulation of order and ornament.

For the Pythagoreans, the *kosmos* is a closed, hierarchically ordered, and harmonious universe. Cosmic order is self-evident, perceivable through number, measure, harmony, and opposition: the ratios of musical intervals, or the "music of the spheres", mirror the essence of the things themselves. Knowledge of the cosmos thus seems to be direct, and mathematical or harmonic order imitates the order of things. This is how Humboldt himself describes the Pythagoriean doctrine in book 3 of *Kosmos*:

In stark contrast to the two branches of the Ionian school stands the mathematical symbolism of the Pythagoreans, which likewise encompasses the universe. Their gaze remains one-sidedly fixed *(einseitig geheftet),* within the world of sensibly perceptible natural phenomena, on what is lawful in form (the five fundamental forms), on the concepts of number, measure, harmony, and opposites. Things are mirrored in numbers *(Die Dinge spiegeln sich in den Zahlen),* which are, as it were, an "imitative representation" (*nachahmende Darstellung,* mimesis) of them. The boundless repeatability *(grenzenlose Wiederholbarkeit)* and increase of numbers is the

11 Anaximander, a Presocratic thinker of the sixth century BCE, described successive *kosmoi* arising from the *apeiron* (ἄπειρον), meaning "the boundless" or "the infinite" (DK12 B1).

12 For an overview of ancient cosmologies, see Andrew Gregory, *Ancient Greek Cosmology.* (London: Bloomsbury, 2008).

character of the eternal, of the infinity of nature. The essence of things can be recognized as numerical ratios *(Zahlenverhältnisse);* their changes and transformations can be understood as numerical combinations (Humboldt, 2014, 390).[13]

By contrast, Humboldt espouses none of these metaphysical or ontological postulates. He inhabits an open, decentered, and only partially accessible world – one in which what he calls the explanation of the world *(Welterklärung),* articulated in the later volumes of *Kosmos,* cannot be presupposed but must be actively produced through scientific comparison, synthetic integration *(Zusammenhang),* and representational practices. As Humboldt himself puts it:

In considering the study of physical phenomena, not merely in its bearings on the material wants of life, but in its general influence on the intellectual advancement of mankind, we find its noblest and most important result to be a knowledge of the chain of connection *(Zusammenhang)* by which all natural forces are linked together and made mutually dependent upon each other; and it is the perception of these relations that exalts our views and ennobles our enjoyments.

The order of the world, in other words, is a methodical and regulative rather than a metaphysical or mystical principle; it is heuristic, guiding empirical investigation.

This transformation builds on early modern science. In vol. 2 (Humboldt, 2014, 354–382), Humboldt situates his cosmology within the lineage of Copernicus, Tycho Brahe, Kepler, Descartes, and Newton.[14] He inherits from Copernicus and Kepler the insight that the Earth occupies no privileged position, yet is governed by the same natural laws as the rest of the universe. While Kepler and Copernicus still appealed to Pythagorean numerical harmony in defending heliocentric simplicity,[15] Humboldt goes further: the universe is no longer fully visible or immediately intelligible. Its order is inferred, contingent upon method and synthetic reasoning.

Thus, Humboldt preserves the Pythagorean methodological core – the assumption of a unified world – but recasts it epistemologically. Unity is no longer self-evident or directly observable

13 For a similar quote, see *Kosmos,* book 2, pp. 389, "The knowledge of nature, as the earliest physics of the Greeks, was drawn more from inner intuition, from the depths of the soul, than from the observation of phenomena. The natural philosophy of the Ionian physiologists was directed toward the primal ground of becoming, toward the transformations of a single fundamental substance; by contrast, in the mathematical symbolism of the Pythagoreans, in their reflections on number and form *(Zahl und Gestalt),* there emerges a philosophy of measure and harmony."

14 On Humboldt's immense contributions to the various branches of modern science, see Ottmar Ette, *Alexander von Humboldt-Handbuch. Leben – Werk – Wirkung* (Stuttgart: Metzler, 2021); Ette, *Alexander von Humboldt und die Globalisierung: das Mobile des Wissens* (Frankfurt: Suhrkamp, 2009); Eberhard Knobloch, "Naturwissenschaften," and "Wissenschaftsgeschichte," in *Alexander von Humboldt-Handbuch. Leben – Werk – Wirkung,* ed. Ottmar Ette (Stuttgart: Metzler, 2021), pp. 113–126, 127–132; Sara Bloch, Oliver Lubrich and Hubert Steinke *Alexander von Humboldt – Wissenschaften zusammendenken* (Bern: Haupt Verlag, 2021); Ulrich Päßler, *Im "freyen Spiel dynamischer Kräfte": Pflanzengeographische Schriften, Manuskripte und Korrespondenzen Alexander von Humboldts,* in *edition humboldt print,* Reihe III: Forschungen im Umfeld der Reisen, Band 1, 3–24 (Berlin/Stuttgart: J. B. Metzler/Springer Nature, 2020); Andrea Wulf, *The Invention of Nature: Alexander von Humboldt's New World* (London: John Murray, 2015).

15 Copernicus *De revolutionibus orbium coelestium,* 1543, Preface, book 1. *On the Revolutions,* trans. Edward Rosen (Baltimore: John Hopkins University Press, rev. ed. 1992)Humboldt repeatedly emphasizes Kepler's and Copernicus' familiarity with the Pythagoreans.

through numerical relations; it is a guiding hypothesis, indispensable for systematically investigating stellar motions, geological processes, or the distribution of life. Only by assuming a coherent cosmos can one organize empirical data and seek general laws. This implies recognizing the limits of human perception. Phenomena such as light, heat, electricity, and magnetism reveal interactions too complex for complete mathematical description. Only certain aspects of the "immeasurable" cosmos are directly observable; others must be inferred.

This epistemological stance aligns Humboldt with the Enlightenment transformation of the *systema mundi.*[16] Thinkers such as Kant (*Allgemeine Naturgeschichte und Theorie des Himmels,* 1755) and Lambert (*Kosmologische Briefe,* 1761), both of whom Humboldt directly quotes, emphasized that the cosmos cannot be fully grasped by immediate sensory experience; the order of the *systema mundi* even systematically *overturns* immediate sense perception. It is conceptual, inferred from natural laws and synthetic reasoning. Humboldt inherits this insight: the world is not identical with the Earth, nor is empirical order equivalent to cosmic order. Accordingly, Humboldt's *beschreibendes Weltgemälde* in *Kosmos* proceeds from the most distant celestial phenomena to the Earth itself, tracing a deliberate descent from the cosmic to the terrestrial. Moving through the stellar domain of our solar system, it culminates in an integrated account of the Earth as a physical body – its form, climate, and magnetic forces – and of the life that emerges on its surface under the stimulus of light.

As *Naturgeschichte,* it also incorporates a temporal and genealogical dimension: Humboldt's perspective is driven by a quest to uncover the forces shaping the Earth – a domain largely neglected by the Pythagoreans, who, in his view, remained too focused on the universe. He treats the planet not as a static object but as a system in which internal and external forces interact, producing mountains, volcanic eruptions, and seismic activity. By comparing actively forming materials (eruptive rocks) with long-solidified strata (sedimentary rocks), Humboldt establishes a temporal and causal framework – what he calls geognostic epochs – where understanding the sequence of forces and their manifestations enables a systematic comprehension of the Earth. The focus on forces – thermal, electromagnetic, mechanical, and volcanic – structures the perspective: nature is intelligible not through mere observation of forms, but through the dynamic interplay of underlying causes over time. This ordered progression exemplifies Humboldt's conviction that knowledge of nature is not given immediately but arises from methodical comparison, conceptual synthesis, and representational construction (Humboldt, vol. 1, 1845–62, 38).

Humboldt thus combines the Enlightenment quest for a sensitive apprehension of *systema mundi* with rigorous empirical methodology, producing a modern epistemology in which the cosmos is both law-governed and only partially knowable. He repeatedly acknowledges the provisional nature of this knowledge:

> We are still far from the point at which it might be possible to concentrate all our sensory perceptions into a unified concept of nature. It must be considered doubtful whether this

16 Schelling's *Naturphilosophie* provides a later resonance. Humboldt remains empirically grounded and critical of speculative excesses, particularly the arbitrary classification schemes of Enlightenment natural history. Yet, like Schelling, he recognizes that nature must be understood as an interconnected whole and that human representation requires a conceptual horizon extending beyond immediate perception.

> point will ever be reached. The complexity of the problem and the immeasurability of the cosmos almost thwart all hope of achieving it. Yet even if the whole remains unattainable, the partial solution of the problem – the striving to understand the phenomena of the world – remains the highest and eternal purpose of all natural research (Humboldt, vol. 1, 2014, 16–17).

While the cosmos remains only partially knowable, its presumed unity enables systematic empirical investigation. Humboldt retains a methodological intuition traceable to Pythagorean thought – namely the need for an explanation of the world *(Welterklärung),* understood not as a metaphysical doctrine but as the effort to render the world intelligible as a coherent whole. In this way, Humboldt integrates ancient insights into the epistemic demands of modern science, maintaining conceptual continuity while articulating a method adequate to an infinite, dynamic, and only partially accessible cosmos.

III. Order and Ornament: Humboldt's commitment to modern aesthetics

It is striking how Humboldt's strategy – at least at the beginning of *Kosmos* – rests on an appeal to continuity of views. The Pythagoreans, Humboldt suggests, are presented as having already captured the decisive articulation of *kosmos* in its dual meaning of order and beauty. With regard to order, they maintained that we already apprehend the world as an ordered unity and that reference to this unity – to a single world – is a necessary condition for science and explanation. Humboldt implies that we are still in the same position today. This gesture functions as an appeal to the unity of humankind, to the identity of our deepest intuitions and desires across time.

Yet this backward reference is in a crucial sense misleading. It overlooks the immense differences in cosmology, the transformations in epistemology brought about by the Copernican revolution, and the opening or expansion of the cosmos itself. Humboldt is fully aware of these changes. Later in *Kosmos,* he explicitly notes that the world was not the same at all times: its dimensions and horizons progressively expanded from Greek antiquity to the nineteenth century. In doing so, he situates Pythagoras within a history of world apprehension, rather than presenting him as a timeless origin.

A similar strategy of atemporalization governs Humboldt's treatment of the second component of *Cosmos*: beauty. He emphasizes the beauty of nature and the presence of a feeling for nature *(Naturgefühl)* from the Greeks to the present. Yet this continuity is misleading to the extent that the sense of nature is by no means ahistorical; in crucial aspects, it is a distinctly modern invention, and Humboldt extensively draws on a vocabulary *(Naturgefühl, Naturgenuss, Einbildungskraft)* which reflects his debt to his own modern aesthetic tradition. What remains constant is the articulation of beauty and order itself. For Humboldt, the presupposition of an ordered *Kosmos* is inseparable from its aesthetic dimension. But the hierarchy of priorities differs fundamentally from the Pythagoreans. Whereas for them the order of being is primary, with beauty merely an expression and both being the object of mathematical reason, Humboldt insists that beauty is epistemologically prior: it functions as the condition for knowing the order of the world. A sensible, aesthetic apprehension and contemplation of nature – in what he calls the linking of sensory intuitions *(Verkettung sinnlicher Anschauungen)* – precedes and guides rational analysis. To behold the stars, mountains, or diversity of life is first to be affected by the infinite grandeur and richness of the world; it requires receptivity and imagi-

nation as faculties distinct from reason.[17] Sensibility thus assumes functions that, in earlier traditions such as Pythagorean thought, were entrusted to reason. It is no longer reason alone, as a contemplative or theoretical faculty, that renders the world intelligible; rather, reason ceases to be contemplative in any strong sense and is reduced to connecting elements within an abstract *systema mundi.* Sensibility, by contrast, must be reconfigured as the faculty that first apprehends the infinite and gives it form, shaping it into a representation – a "painting" of the world. Only on this basis can reason then discern laws, order observations, analyze, and systematize them. Beauty is thus not a secondary ornament of an intelligible universe; it is the very condition of intelligibility.

The tradition most relevant to this definition of beauty, and one that profoundly shaped Humboldt, is German aesthetics, yet it appears only obliquely – through peripheral remarks or at the conclusion of the crucial book 2. To bring this intellectual inheritance to light – which Humboldt himself largely conceals – we must turn to its opening sections on poetic descriptions of nature and landscape painting, designed to animate the study of nature. These sections hint at Humboldt's engagement with the German aesthetic tradition, after an extensive survey of the sense of nature in other cultures and epochs: classical antiquity, medieval Christianity, and early modern Europe and beyond, including authors such as Homer, Virgil, Lucretius, Dante, Shakespeare, Milton, and others. Only after this wide-ranging panorama does Humboldt briefly address German poetry of his own time, almost as if it were of no importance: "In our German fatherland, the sense of nature has, as in Italian and Spanish literature, remained for far too long confined to the artistic forms of the idyll, the pastoral romance, and the didactic poem" (Humboldt 2014, 221). He then cites a few contemporary German authors, explicitly noting Barthold Heinrich Brockes, Ewald von Kleist, Hagedorn, Salomon Gessner, and, most importantly, Albrecht von Haller, whom he calls "one of the greatest natural scientists of all time," observing that Haller's local descriptions "offer at least more determinate outlines and a more objective truth of color" (Humboldt 2014, 221).

This account quickly shifts to travel literature, particularly Georg Forster, his "celebrated teacher and friend," who, as Humboldt notes, "began a new era of scientific travel," expanding the study of nature through observation, experience, and a living sense of the world's diversity.[18] The discussion continues in the section on landscape painting (Humboldt 2014, 225–234), which traces classical precedents, eighteenth-century French painters such as Claude Lorrain, Ruysdael, and Poussin, and extra-European traditions including Chinese painting. Explicit attention to German aesthetics remains minimal, yet the debt is legible in the very structure of *Kosmos* and in his vocabulary.

The concept of *Naturgemälde,* directly borrowed from Haller, had early on inspired Humboldt, who employs it in the title of *Ideen zu einer Geographie der Pflanzen nebst einem Naturge-*

17 On this shift, see already Joachim Ritter. *Landschaft: Zur Funktion des Ästhetischen in der modernen Gesellschaft* (Münster: Aschendorff, 1963), pp. 20 f. on Humboldt and p. 25: "Wo der Himmel und die Erde des menschlichen Daseins nicht mehr in der Wissenschaft wie auf dem Boden der alten Welt gewußt und gesagt werden, übernehmen es Dichtung und Kunst, sie ästhetisch als Landschaft zu vermitteln". See also Ernst Cassirer about reason and sensibility in the aesthetics oft he Enlightenment, *Die Philosophie der Aufklärung,* (Hamburg: Meiner, 2003), Kapitel Sieben: Die Grundprobleme der Ästhetik, pp. 288–377.

18 See in particular Georg Forster, *Ansichten vom Niederrhein, von Brabant, Flandern, Holland, England und Frankreich im April, Mai und Juni 1790* (3 Bände. Berlin: Vossische Buchhandlung, 1791–1794).

mälde der Tropenländer from 1805. It still serves as a structural principle in his *Kosmos*: for Humboldt, *Naturgemälde* refers to both nature description *(Naturbeschreibung)* and nature painting *(Naturmalerei),* uniting empirical observation and aesthetic representation. One may recall that Haller had already introduced this notion in his poem *Die Alpen* (1729), enriching verse with botanical notes and demonstrating the interweaving of scientific observation and literary expression. The concept was then central to a whole German aesthetic tradition prior to Humboldt, from Johann Jacob Bodmer, Johann Jacob Breitinger[19], and Baumgarten to Lessing. In his *Laokoon* (1756), the latter famously included a strategic reference to Haller's *Naturgemälde*[20], to reflect on the relation between poetry and painting – and establish the framework for the *schöne Künste* ("fine arts") and Art with a capital A: a novel classification of art in the 18th century.[21] Humboldt inherits this framework, defining *Naturgemälde* as the pictorial representation of the "abundance of natural phenomena that simultaneously present themselves to the soul" *(Fülle von Naturerscheinungen, die gleichzeitig vor die Seele treten).*[22] In *Kosmos,* it becomes both a methodological and epistemic principle: poetic and pictorial arts complement each other to present nature's phenomena in their fullness and beauty.

This lineage underscores that Humboldt's aesthetic is not decorative but epistemic: the capacity to perceive and organize the richness of appearances enables insight into nature's unity, making beauty a condition of understanding rather than a mere adornment.

Three interrelated stakes emerge from this development of German aesthetics.[23]

First, Humboldt elevates the role of the observer. As for German philosophers of aesthetics, the naturalist is no longer a passive spectator of a preordained order; rather, he or she becomes a poet, endowed with receptiveness, wonder, and poetic faculties – *Dichtung* understood as composition, fiction, and synthesis. Such a poet practices an art of attention – a logic grounded not in abstract coherence but in abundance and descriptive, phenomenal richness, what Baumgarten famously called extensive clarity. In this tradition, the study of nature unfolds through observation, description, composition, and a lived sense of the world's diversity in unity.

Second, Humboldt's aesthetic stance entails a new anthropology, where reason and feeling are distinct yet complementary faculties. Again, this shows his debt to the German aesthetic

19 See in particular Johann Jakob Bodmer and Johann Jakob Breitinger. *Die Discourse der Mahlern.* 4 Teile, Zürich: Joseph Lindinner, 1721–1723.

20 It is noteworthy that Lessing includes a direct reference to Haller's *Naturgemälde,* and that Haller in turn responds to his interpretation of such pictorial art in his *Laocoon,* in an anonymous review. See Detering, *Menschen im Weltgarten,* chapter 1.

21 Paul Oskar Kristeller. "The Modern System of the Arts: A Study in the History of Aesthetics Part I." *Journal of the History of Ideas* 12, no. 4 (1951), pp. 496–527.

22 Humboldt, *Kosmos,* Introduction, p. 11.

23 For an overview, see Frederick Beiser, *Diotima's Children: German Aesthetic Rationalism from Leibniz to Lessing.* Oxford: Oxford University Press, 2009. See also my monograph *The Founding of Aesthetics in the German Enlightenment: The Art of Invention and the Invention of Art.* (Cambridge: Cambridge University Press, 2013), as well as my recent chapter: "Aesthetics: The Emergence of a Discipline." In *The Oxford Handbook of German Philosophy in the Eighteenth Century,* edited by Corey W. Dyck, Frederick C. Beiser and Brandon C. Look. (Oxford: Oxford University Press, forthcoming).

tradition, to Wolff[24] and Baumgarten[25]: the poet serves as a model for human perception, endowed with faculties (*aisthesis* in Greek, from which Baumgarten derives the name of his discipline) that actively attend to nature's details, discerning patterns, relations, and singularities, and guiding the reader's attention. For Humboldt, beauty is no longer a mere reflection of an order apprehensible by reason alone, as in the ancient doctrines of *kosmos;* it requires sensibility, a cognitive faculty different from analytical reason. This sensibility carries an affective dimension – a self-feeling – but is not merely emotional. As just explained, it constitutes a fundamental human, linguistic faculty, analogous to reason, presupposing both receptivity and composition – poetry, *Dichtung* – and enabling cognitive insight into the world in its phenomenal plenitude. As Humboldt writes, "with growing insight, the feeling for the immeasurable fullness of natural life increases" *(mit wachsender Einsicht vermehrt sich das Gefühl von der Unermesslichkeit des Naturlebens).*

Third, this participatory epistemology carries an important ethical and cosmopolitan dimension. To perceive and feel the order and sublime beauty of nature is simultaneously to cultivate responsibility toward it. The aesthetic experience fosters a sense of worldly belonging – *Erdbürgerschaft* – and underpins a moral orientation inseparable from the scientific enterprise. This aligns with Humboldt's perspectivism: *Kosmos* aims to broaden the world view by bringing multiple perspectives and cultural *oecumena* into a complementary whole, each enriching our understanding of the one world. As the philological note at the outset shows, whether referring to the visible world and its rational order (Plato), multiple worlds or stellar systems, the harmonious planetary region, the Earth, or related concepts (such as *loka, swjet, Welt*), these terms point both to a particular world and to a shared, structured world. Each perspective deserves careful examination, and the cultures that produced them must be explored, because they expand the horizons of our own understanding.

In this way, Humboldt unites order and ornament in a uniquely modern synthesis. The ordered *kosmos,* methodologically presupposed like in the Pythagorean model, becomes accessible and meaningful through aesthetic perception. Ornament – here understood as beauty, harmony, and the pleasurable apprehension of complexity – is no longer a reflection of an already given cosmic order; it is its precondition, guiding reason to apprehend the unity of natural phenomena.

Conclusion: Defending One World and Anticipating Ecology

Even in the modern age, Humboldt confronts the same fundamental stakes that Pythagoras faced: the need to defend the unity and order of the world. This defense arises against at least three threats. First, the *apeiron,* the boundless and immeasurable, which threatens to overwhelm understanding both spatially and temporally. Second, the persistent threat of chaos and dissolution, exemplified in fossils of a long-vanished *Vorwelt,* reminds observers of nature's immense temporal depth and the transience of forms. Third, the multiplicity of fragmented worlds, where scientific disciplines specialize in isolation – astronomy, geology, biology – producing only aggregates rather than a coherent vision.

24 For imagination and the art of fiction, see Christian Wolff, *Vernünftige Gedanken von Gott, der Welt und der Seele des Menschen* (Halle, 1720), § 245.

25 Alexander Gottlieb Baumgarten, *Metaphysica,* 1739, sections on empirical and rational psychology.

Humboldt addresses these challenges in a uniquely modern fashion. Unlike the Pythagoreans, for whom beauty was a direct expression of the inherent order of Being, Humboldt defends the unity of the world through a methodological, empirical, and aesthetic framework. His innovation stems from a rigorous engagement with the empirical science of his era. He is no Romantic – at least not in the sense of opposing sentiment to science; rather, he employs sentiment to theorize the very possibility of science, bridging abstract cosmology and human experience through familiar representations. His breakthrough lies in reconfiguring the link between beauty and order: aesthetic perception is not merely a reflection of a pre-existing intelligible cosmos, but is epistemologically prior – a fundamental condition for knowing. It is through this aesthetic lens that the observer apprehends patterns, interdependencies, and regularities across time and space. Order becomes intelligible precisely because it is felt. Consequently, ornament and abundance are not merely decorative; they are epistemic catalysts that guide reason toward perceiving the underlying unity of natural phenomena.

This insight shows Humboldt's debt to the modern and German aesthetic tradition, conferring on the feeling of beauty a novel significance. It also makes Humboldt a co-founder of what is emerging as 19th-century ecology. Like Ernst Haeckel, a deep reader of Humboldt who was to coin the term 'ecology' in his 1866 *Generelle Morphologie,* he conceives observation as an engaged, attentive, and integrative practice, where the scientist's sensibility and perception are essential to understanding interdependence in nature. This legacy also points forward to later ecological thought, but it is firmly rooted in the 19th century.

Bibliography

Primary Sources

Baumgarten, Alexander Gottlieb. *Metaphysica.* Hallae Magdeburgicae: Hemmerde, 1739.

Bodmer, Johann Jakob/Breitinger, Johann Jakob. *Die Discourse der Mahlern.* 4 Teile, Zürich: Joseph Lindinner, 1721–1723.

Copernicus, Nicolaus. *De revolutionibus orbium coelestium.* Nuremberg: Johannes Petreius, 1543. *On the Revolutions,* trans. Edward Rosen (Baltimore: John Hopkins University Press, rev. ed. 1992).

Diels, Hermann/Kranz, Walther, eds. *Die Fragmente der Vorsokratiker.* 6th ed. Berlin: Weidmann, 1951.

Forster, Georg. *Ansichten vom Niederrhein, von Brabant, Flandern, Holland, England und Frankreich im April, Mai und Juni 1790.* 3 Bände. Berlin: Vossische Buchhandlung, 1791–1794.

Haeckel, Ernst. *Generelle Morphologie der Organismen: Allgemeine Grundzüge der organischen Formen-Wissenschaft, mechanisch begründet durch die von Charles Darwin reformirte Descendenz-Theorie.* 2 Bände. Berlin: Georg Reimer, 1866.

Haller, Albrecht von. *Versuch schweizerischer Gedichte,* Bern, gedruckt bey Niclaus Emanuel Haller, 1732. Hesiod. *Theogony.* Greek text and English translation in *Hesiod,* ed and trans. Most, Glenn W. Cambridge, MA: Harvard University Press, https://www.loebclassics.com/view/LCL057/2007/pb_LCL057.iii.xml2006.

Humboldt, Alexander von. *Kosmos. Entwurf einer physischen Weltbeschreibung.* 5 vols. Stuttgart and Tübingen: Cotta, 1845–1862. Reprint: Die Andere Bibliothek, 2014.

Humboldt, Alexander von. *Briefwechsel,* ed. Leitner, Ulrike, unter Mitarbeit von Knobloch, Eberhard. Berlin: Akademie Verlag, 2009.

Kant, Immanuel. *Allgemeine Naturgeschichte und Theorie des Himmels.* Königsberg: Petersen, 1755.

Lambert, Johann Heinrich. *Kosmologische Briefe über die Einrichtung des Weltbaues.* Augsburg: Klett, 1761.

Lessing, Gotthold Ephraim. *Laokoon oder Über die Grenzen der Malerei und Poesie.* Berlin: Bey Christian Friedrich Voss, 1766.

Plato. *Timaeus.* Greek text and English translation in: Plato, vol. 9. Cambridge, MA: Harvard University Press.

Pseudo-Aristotle. *De Mundo.* Greek text in *Aristotelis Opera,* ed. Bekker, Immanuel, vol. 2. Berlin: Reimer, 1831.

Wolff, Christian. *Vernünftige Gedanken von Gott, der Welt und der Seele des Menschen (Deutsche Metaphysik).* Halle: Renger, 1720.

Secondary Literature

Beiser, Frederick C. *Diotima's Children: German Aesthetic Rationalism from Leibniz to Lessing.* Oxford: Oxford University Press, 2009.

Bloch, Sara Kviat/Lubrich, Oliver/Steinke, Hubert (eds.), *Alexander von Humboldt – Wissenschaften zusammendenken,* Bern: Haupt Verlag, 2021.

Buchenau, Stefanie. *The Founding of Aesthetics in the German Enlightenment: The Art of Invention and the Invention of Art.* Cambridge: Cambridge University Press, 2013.

Buchenau, Stefanie. "Aesthetics: The Emergence of a Discipline." In *The Oxford Handbook of German Philosophy in the Eighteenth Century,* edited by Corey W. Dyck, Frederick C. Beiser and Brandon C. Look. Oxford: Oxford University Press, 2026.

Cassirer, Ernst. *Die Philosophie der Aufklärung.* Hamburg: Meiner, 2003.

Detering, Heinrich. *Menschen im Weltgarten: Naturlyrik von Brockes bis Goethe.* Göttingen: Wallstein, 2020.

Ette, Ottmar, ed. *Alexander von Humboldt-Handbuch. Leben – Werk – Wirkung.* Stuttgart: Metzler, 2021.

Ette, Ottmar. *Alexander von Humboldt und die Globalisierung: das Mobile des Wissens.* Frankfurt: Suhrkamp, 2009.

Gregory, Andrew. *Ancient Greek Cosmology.* London: Bloomsbury, 2008.

Knobloch, Eberhard. "Naturwissenschaften," and "Wissenschaftsgeschichte," in *Alexander von Humboldt-Handbuch. Leben – Werk – Wirkung,* ed. Ottmar Ette. Stuttgart: Metzler (2021), 113–126, 127–132.

Kristeller, Paul Oskar. "The Modern System of the Arts: A Study in the History of Aesthetics Part I." *Journal of the History of Ideas* 12, no. 4 (1951), 496–527.

Päßler, Ulrich. *"Im freyen Spiel dynamischer Kräfte": Pflanzengeographische Schriften, Manuskripte und Korrespondenzen Alexander von Humboldts,* In *edition humboldt print,* Reihe III: Forschungen im Umfeld der Reisen, Band 1, 3–24. Berlin/Stuttgart: J. B. Metzler/Springer Nature, 2020, DOI: https://doi.org/10.1007/978-3-476-04965-0_1.

Ritter, Joachim. *Landschaft: Zur Funktion des Ästhetischen in der modernen Gesellschaft.* Münster: Aschendorff, 1963.

Werner, Petra. "Kosmos." In Ottmar Ette, ed., *Alexander von Humboldt-Handbuch. Leben – Werk – Wirkung,* Stuttgart: Metzler (2021), 71–79.

Walls, Laura Dassow. *The Passage to Cosmos: Alexander von Humboldt and the Shaping of America.* Chicago/London: The University of Chicago Press, 2009, https://api.pageplace.de/preview/DT0400.9780226871844_A23611270/preview-9780226871844_A23611270.pdf.

Wulf, Andrea. *The Invention of Nature: Alexander von Humboldt's New World.* New York: Alfred A. Knopf, 2015.