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**Beauty in the Natural Sciences**

Sinje Dillenkofer’s Photographic Works on Alexander von Humboldt

“Beautiful, O Mother Nature, is the Majesty of all Thy Works” (Klopstock)

1. The Images of Nature

Alexander von Humboldt stood at a historical turning point in many aspects; a turning point that affected the understanding of nature, and the relationship between natural science and art. The conception of the world, which had begun to develop in the Renaissance period and continues to guide our understanding of nature today, is of a scientific-technical nature: It assumes that nature obeys laws and acts following a set pattern; that it is homogeneous, continuous, and quantifiable – and can therefore be ascertained and measured; that it displays no qualitative leaps, but follows the same laws everywhere, and without any break. This regularity was first realised in the perspectival construction of the picture space that presupposes that the space is always identical and of the same type everywhere, homogeneous, and continuous; it revealed itself in the recognition of the physical laws of nature (first, in mechanics and optics). In these sciences, the objects of the disciplines – energy and matter – were universal and regular from the beginning, and their regular behaviour transpired simultaneously in space and time, which were put in relationship to each other through causality.

In the field of physics – and later, chemistry – the recognition of the laws that nature was subjected to provided the decisive step for all knowledge of it, for the natural sciences. However, those sciences whose subject is the living world (biology), or the world as a “living” individuum (geography and geology), only came across laws at a later stage in their development, sometime around the middle of the nineteenth century. Over an extended period of time, they were primarily concerned with searching for, registering, copying, and ordering the complex and multifarious phenomena of living nature and the world in its gigantic proliferation. Plants, animals, rocks, and landscapes were discovered and found as quasi-individuals, and came to the attention and under the observation of the scientist, who was only able to search for their regularity with the help of problematic, hypothetical processes without achieving any mathematical-scientific knowledge, in a completely different – and much more fundamental – way. Initially, this searching and registering approach relied principally on the identification of similarities, guided by magical conceptions of resemblance, or through hypotheses on the principle of operation and function; they later investigated relationships with the aid of morphology. In this way, botany and zoology developed into taxonomies that – similar to the tree diagram of the familial lineage of humans – could only register and show a time-based dimension, but not prove or substantiate it in keeping with the laws. It was only later that time and space became integrated in these disciplines, that homogeneity and continuity, and therefore the quantifiability and measurability – also of time – became the foundation for knowledge. However, it was not a matter of recognising the regularity of causality (this is taken for granted), but the complex and only limitedly quantifiable laws of development (evolution), or the history of natural phenomena (geography).

As a result, the “world-recording” sciences, such as geography, biology, and meteorology, as well as medicine, achieved an exceptionally singular, ambiguous status: They recognised no rules and only recorded the multiplicity of objects that existed, ordered them, and placed them in relationship to each other. While the laws of nature stand at the centre of physics and chemistry, those natural laws such as genetics (the regularity of which was recognised by Charles Darwin; whose book “On the Origin of Species” was published in 1859, seven years before Gregor Mendel discovered genetics), or the continental drift, whose causality and regularity were determined by Alfred Wegener in the early twentieth century (today, formulated in the theory of plate tectonics), were not discovered until much later. And they are specific laws of nature in less of a mathematical sense than in the sense of the determination of regular events whose complexity, however, is often so great that they are sometimes only partially quantifiable mathematically; they therefore do not permit any prognoses and are only experimentally verifiable to a limited degree. The recognition that what is visible on the level of animals, plants, landscapes, stones, etc. in nature obeys a unique history with an extremely complex, compound causality (for example, evolution: genetic drift, genetic shift, and selection) only emerged at a later date: Formerly, there was solely the recording of the existing and the attempt to order it in keeping with criteria of similarity.

The taxonomic, hierarchical system in biology was influenced by a central idea: Taxonomy and nomenclature should produce a one-to-one relationship between language and nature or the name and the living organism – whereby the hierarchy of the tree diagram attested to a dimension of time or depth. “In the tenth edition of Systema Naturae, which was published in 1758, Carl von Linné definitively adopted the binary nomenclature for the animal species that was described in the first volume. He dealt with the plants in the second volume of Systema naturae. An originally planned third volume, which was intended to investigate the minerals, was not published. …the first chemically substantiated classification of the minerals was provided by Axel Frederic von Cronstedt in the year 1758.” A chemically substantiated classification no longer referred to the appearance or morphological similarity – to what was visible – but to the table of chemical elements with their atomic structure that had been verified through experiments: the periodic system.

In biology, knowledge was only achieved through the differentiation of the species that made them examinable: The attribution of morphological similarities to a specific species is not only a prerequisite for the definition of the species, but – conversely – also applies to the morphological investigation, the determination of the specific, the characteristic, name-giving difference to other species. This makes the uniqueness of the relationship between the visible individuum and the name problematic: The taxonomic name designates a species, not an individuum. The species is both a name and a concept: It defines the individuals in their comparability and shared identity in a species (a deixis) and, at the same time, orders them in a hierarchical tree diagram in keeping with the relationship links of the species. A tree diagram of this kind has its model in the logical system of concepts, traditional conceptual logic, which finds and specifies the commonalities at a higher level (class, genus) and specific differences, differentiae specificae, at an individual level (species). Similarity and identity of the species are therefore contradictory. The individuals of a species are subsumed to a species identity; similar individuals can belong to the same species, have the same conceptual identity, or belong to two different – but similar – species. However, only really existing individuals are seen, recorded, and illustrated.

The fact that, in the Renaissance period, painting (with drawing and graphic arts) was elevated from the status of a craft to that of a science not only has to do with the standardisation and constructability of the space in the regular perspectival construction, Alberti’s costruzione legittima, but also with the completely new recognition and registration of nature, of the material world. The multiplicity and complexity of nature became the object of an increasingly systematised perception, registration, and study. Here, painting primarily performed the deictic (indicative) work of providing the most precise illustration and recording for nature; in this sphere, it did not follow the imagination or powers of fantasy, but performed a largely speechless deixis, such as photography made possible at a later time. In contrast to the mathematical sciences, which only need and use formulas and diagrams in the form of images (in the widest sense), the world-recording natural sciences rely on the most specific illustrations possible. Therefore, it is completely understandable that Humboldt so warmly welcomed the advent of photography. In 1839, after he had seen early photographs taken by Louis Jacques Mandé Daguerre in Paris, he wrote to an acquaintance that they show “objects that paint themselves in inimitable fidelity; light, forced by chemical art to leave permanent traces in just a few minutes, the contours sharply outlined down to the most delicate detail.” Already 70 years of age, Humboldt sat on a commission of the French Academy of Sciences that had to decide on the Daguerreotype process. He stated: “It is one of the most delightful and admirable discoveries of our time… The images have a completely matchless natural character that only nature itself could have imposed.”

The illustrative images of the world-recording natural sciences were chiefly understood and used as indices, as references to natural objects, to referents in nature; the natural objects, the living organisms, however, refer to nothing and only exist in reality, only take part in reality, but not in meaning. In this way, nature is just as speechless as photography and the depicting image. An iconic picture is already charged with meaning and knowledge; an indexical picture only achieves its meaning through contexts and labelling, its written environment, or its framework. This makes it an illustration, a depiction within the framework of a text or body of knowledge. The natural object itself – like its photograph or image – remains indexical; this fundamental indexical character of nature, as well as of images, is essentially linked to attracting attention, to a presentation, a looking into, a giving-to-be-seen – in precisely the same ways that scientific collections, such as those of a zoological or botanical nature, do.

1. Art and Beauty in Nature

However, Humboldt simultaneously harboured a fundamental distrust of photography: “Although Humboldt compared the Daguerreotype with the most beautiful steel engravings, he did not trust it in terms of content seeing that it captured the appearance at a specific moment in time. On the other hand, he wanted to ensure that the essential filtered through the eye of the artist was brought out.” Specifically, this essential lies in the identity of the species, more decisively and more generally, however, in the harmonious unity of nature as a whole. Being satisfied with the possibilities of technical reproduction would mean not being able to reach the ultimate goal: knowledge of the entirety of nature. Only the unity of nature as creation assures, a priori, its vital, harmonious individuality and its beauty: and the recording natural sciences had to presuppose the unity and beauty of nature seeing that only this would make it possible to perceive a contemplative knowledge, and not just a conglomeration of insignificant details. Humboldt shared this – in a broad sense – basic religious assumption with both the nature philosophy of Hegel (even though he later attacked its speculative arbitrariness) and Schelling’s romantic nature philosophy in which nature itself was understood as natura naturans, as the creative force and producer of all existing, and manifest nature, natura naturata. Schelling understood and hypostatised this unity of the spirit and nature, conceived in this way, as an individual kind of recognition: as intellectual intuition.

Regardless of how greatly Humboldt later criticised the purely conceptual perception of romantic natural philosophy, the unity and beauty of nature – especially as the landscape – remained central for him: “The concept of nature as a whole, the feeling of unity and harmonious accord in the cosmos, becomes even more alive among people as the means to form the totality of natural phenomena into vivid images multiply (K 233 f.).” This pictorial perception, which simultaneously makes the experience of nature and beauty possible, finds its object above all in the landscape, and – interestingly – even more so in landscape painting that, going beyond the occasional turmoil we find in nature, is intended to portray this unity and beauty, to bring it to visible reality: “Landscape painting, which is just as little merely imitative […] requires a great amount and variety of direct sensory perception, which the mind should assimilate and, fertilised by its own power, reproduce to the senses like a free work of art […] in landscape painting, and all other fields of art, it is necessary to differentiate between what is produced in a more limited manner by sensory perception and direct observation, and that which arises in an unlimited way from the depths of feeling and the strengths of idealising intellectual power. The grandiose, which landscape painting – as a more or less enthusiastic nature poem – owes to this creative intellectual power […] is, like the human being, gifted with imagination, something that is not tethered to the ground (K 232).” In the cognitive contemplation of nature, it is not only seen but also perceived as being active, as a creative force that also includes and changes the recipient, who is himself a part of nature (this is tantamount to a short definition of the natura naturans principle). Therefore, according to Humboldt, it is the duty of the naturalist “to grasp the spirit of nature that lies hidden under the cloak of appearances. In this way, our endeavours transcend the narrow world of the senses, and we can succeed in grasping nature, in mastering the raw material of empirical observation through ideas, as it were.”

In Humboldt’s mind, there was a tension between this metalevel (nature as a harmonious, creative unity and wholeness) and his scientific-documentary work that he tolerated but was never able to completely harmonise. For example, this becomes quite obvious in his travel journals: A conglomeration of papers of a documentary and world-recording character containing measurements, altitude charts, cross sections of mountains, plans, drawings, travel reports, and other kinds of notes that are glued haphazardly into a major text, which is more of a nature-philosophical nature, often take up much more space, and contain more , than the main content itself.

“Even during Humboldt’s lifetime, natural science experienced a dramatic change. The dimension of space was joined by the discovery of time, first of all in geology, and then in biology. This “temporalisation” taught us to see the earth and the life on it not as a creation, but as what is actually the accidental result of historical processes.” Humboldt died on 6 May 1859 – and, with him, an entire era. Darwin’s work “On the Origin of Species”, which triggered a scientific revolution, was published in November of the same year. Since then, we have understood that natural phenomena have a history, that species have an origin, and undergo a development. With Humboldt at the latest, the epoch of the static and equilibrium came to an end; it was replaced by the theory of dynamic geological changes of the earth and the constant biological adaptations of life. Since Darwin’s theory of evolution through natural selection, natural harmony has been succeeded by a permanently changing – and, above all, a relentlessly selecting – nature with all its brutality.

1. Sinje Dillenkofer and the Materiality of the Institution of “Science”

Alexander von Humboldt considered it essential that each field of natural science observe nature; this simultaneously sensory and sentient contemplation provided proof of both its unity and beauty. What is so impressive in the painting of the early Renaissance is that nature is seen as if it was for the first time (and, it was actually seen as the explicit object of a scientific and aesthetic perception for the first time). Since the expulsion of art and visibility from the natural sciences, this kind of “seeing view” – in the sense of Max Imdahl’s “sehendes sehen” – that not only identifies the object, and which Humboldt developed both recognising and aesthetically enjoying the sight of diverse, previously unknown landscapes he explored, has only been known and possible in art. With their temporalisation and methodical-scientific definition of the object, the world-recording sciences have also changed fundamentally: The irreducible bond between knowledge and the visible, to the view of the world and its harmony and beauty, was fractured and the connection with art severed.

Sinje Dillenkofer takes a position that is both opposed to and reflective of this separation of the image or art and the natural sciences; she records the natural sciences photographically, as a material institution and material practice, as an archive (books, diaries, notes, diagrams, drawings) or a collection (classificatory collections of birds, insects, mammals, all kinds of plants, with their showcases, their containers and storage boxes, some of which have the negative form of the encased object, some of which show classificatory trees). She applies the principle of making natural objects visible, which is central to the world-recording natural sciences, to these sciences themselves: She photographs and collages Humboldt’s scientific work: the books, the notebooks with all their pasted notes and papers (which, because they protrude irregularly and to a different extent from the bound volumes, create irregular contours themselves), and the various types of visualisation of natural objects, above all of the landscape, on paper: in written notes, illustrations and edited drawings, in altitude lines, cross sections, diagrams, temperature tables, site maps, and geographical plans. She makes the recording media (papers, notebooks, books), which were the primary means for generating knowledge, visible as material, formed, existent reality, as objects that enable a visual and simultaneously media-technical and institutional classification of knowledge possible with the help of, and based on, their material bearers. After the complete separation of visibility and the natural sciences, the status of these photographs and digital photo collages can no longer be scientific itself: their status is at once artistic and reflexive, it questions the procedures, classifications, and taxonomies of the natural sciences in their institutional realities. But isn’t it the case that this kind of artistic procedure, which brings a fundamentally aesthetic dimension of the visible back into play, also indirectly (partially as the result of the effect of an institution-critical impulse) does the same to the beauty of what is materially encountered? Or, put more radically, doesn’t it allow a newly understood, reflected natural beauty to appear?