The Cultural Enframing of Nature: Environmental Histories during the Early German Romantic Period

JOAN STEIGERWALD

Faculty of Environmental Studies
York University, Toronto, Canada
Email: steiger@yorku.ca

ABSTRACT

The introduction of histories of nature in the late eighteenth century posed the epistemological problem of how to bring the diversity of empirical laws into theoretical unity. Whilst Goethe and Humboldt argued for the possibility of objective histories of nature through modes of disciplined perception, Schelling emphasised the inevitable subjectivity of such histories and the impossibility of displaying visually or instrumentally the internal processes generating manifest forms. Each of these three figures used different technologies of representation to produce their environmental histories. But all three gave a central role to aesthetic judgment in representing their view of a unified history of nature.

KEYWORDS

Representation, aesthetics, Goethe, Humboldt, Schelling

An emblematic image of early German Romanticism is Caspar David Friedrich's 1809–10 painting *Monk by the Sea* (Figure 1). The title is suggestive of a religious theme, and at first glance one might read the image as that of a romantic longing for the divine as present in nature, the monk losing himself in contemplation of the vast expanse of nature and the infinite within it. A more philosophical reading, in the terms of the time, would be that of the problematic relation between the particular and the universal, the real and the ideal. The tiny human figure in the foreground of the painting, the monk, can be regarded as the representation of the particular, the real in the domain of nature; the vast sky in the background can be regarded as the representation of the universal, the ideal

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FIGURE 1. Caspar David Friedrich, *Monk by the Sea*, 1809–10. Staatliche Museen zu Berlin – Preußischer Kulturbesitz Nationalgalerie.

in the domain of freedom. What is striking about the image, and indeed a frequent motif in Friedrich's paintings, is how the foreground and the background are set against each other as two distinct planes, with no mid-ground between them. The effect, in viewing the image, is that the eye cannot easily slide from the foreground monk to the sky; these can only be related by a leap across an unmapped space. Moreover, when the viewer looks to the sky, the universal, there is no focal point on which the eye can rest, and so our eye falls back to the distinct, particular form of the monk. Not content to rest on this small object, the eye moves again toward the vast sky. Thus the eye is forced into a restless activity between the two domains, the particular and the universal, effecting an uneasy relation between them. This act, this leap, of the eye in traversing the problematic central space of the image is indicated by some birds in flight across it.[1]

Friedrich's image can be regarded as symbolising issues within environmental histories around 1800. In the painting, the human being, the monk, in the foreground of the painting is almost overwhelmed by, almost disappears into, the greater environment of which he is a part – the earth, sea and sky. At the turn of the nineteenth century it was assumed that the characteristics of each individual human being, indeed of each individual natural object, could only be understood in terms of its relationship to the rest of nature, to the natural history of the

environment. Human beings were regarded as a part of nature and as affected by their environment. At the same time, natural history was consciously transformed from a descriptive to a theoretical discipline. The human subject, looking at the environment and the various natural objects within it, attempted to discern their causal nexus, and not simply to describe their apparent characteristics. The painting also represents to the viewer the epistemological problems associated with discerning such a causal nexus. In the *Naturphilosophie* of the time, the problem of making judgments regarding the system of nature, of relating particular phenomena and laws under a universal concept of an ordered whole, was reflected upon critically. The human being was considered physically to be a part of the greater environment and as only understood in relation to it, and yet as an investigating subject to be separated from nature as the object of his or her inquiry. To conceive the relationship between the human being and nature, between the phenomena of nature and its conception, required an act of imagination, a creative leap across an uncharted domain.

In Friedrich's painting, the separation between the foreground and the background, the monk and the sky, is enhanced by a dark, dense, central strip of sea and clouds. Joseph Koerner, in his excellent recent study of Friedrich, reveals the density of this dark strip to be the result of Friedrich's ongoing, reflexive revisioning of the painting, a density that contrasts with Friedrich's normal application of colour in thin, transparent glazes, which show no evidence of brushwork and little of the physical presence of paint. The palpable, murky region resulting from Friedrich's repeated reworking of the image slows and baffles the eye as it moves between the monk and the sky.[2] Rather than acting as an intermediary, guiding the viewer's eye from foreground to background, it disrupts and disturbs its easy movement. The effect of this dark strip is even more striking when one stands before the actual painting rather than viewing a reproduction. It becomes the increasingly dominant aspect of the image, drawing the viewer in, into the dark, unclear space between the safe shore where the monk stands and the luminous, distant sky, a dark space that perturbs but cannot be resisted by the viewer's eye. If one stands before the original painting of this key image of early German Romanticism, one is disturbed by the presence of a rupture, a dark space of absence at the heart of the image, a rupture that is eventually seen to be its central theme.

The *Monk by the Sea* was completed at a time when the north German artist Friedrich had become fascinated by *Naturphilosophie* through his acquaintance with Gotthilf Heinrich Schubert, a disciple of Friedrich Wilhelm Joseph Schelling. Schelling was particularly aware of the rupture lurking at the centre of *Naturphilosophie*, the indeterminism of judgments of the relation between phenomena and their conceptualisation, making it the principal preoccupation of his philosophical reflections. Thus, one seems justified in reading Friedrich's image in these philosophical terms. But the critical reflexivity of early German Romanticism, seen in philosophical reflections on the problem of judgment and

in Friedrich's reworking of his image, penetrates to all acts of signification, and thus even to the significance of Friedrich's image. One finds this critical reflexivity in Heinrich von Kleist's 1810 essay review of the *Monk by the Sea*, which was then being exhibited at the Academy of Art in Dresden. The essay presented not only Kleist's own sentiments before the canvas, but also a series of fictive dialogues written by Clemens Brentano and Achim von Arnim. One of these dialogues presented an interpretation of the image similar to that given above. But an ironic distancing to this particular reading of the image was effected by its juxtaposition to a series of alternative readings, some of which are comical conversations and playful misunderstandings. If some interpretations are clearly inappropriate, these also serve to ironise the fundamental hermeneutical problem posed by the review, the silence of the work of art before a succession of overly confident expositions.[3]

Friedrich used several techniques to draw attention to the problem of the reflexivity of acts of signification, and to the problem of how human beings can comprehend nature when they are conscious of their separation from nature. In addition to the human subject being placed on a distinct plane from the object of his or her purview, the natural landscape or environment, in Friedrich's images the human subject characteristically has his or her back turned to the viewer of the painting, so that we, the viewers, are looking at someone looking at nature, and are thus invited to reflect on the epistemological problems posed by any view of nature. Friedrich also painted the same landscape with and without this *Rückenfigur*, so that the viewer of the two images could see, could experience, how the natural environment was changed by a human presence, by a human view. Friedrich also composed several images with views of landscapes through the window of his studio. In his 1805–6 *View from the Artist's Atelier, Right Window* (Figure 2), the window dominates the painting. To the left of the window Friedrich included a partial image of himself, particularly his eyes, in a looking glass. As Koerner represents the image: 'Friedrich encodes the relation between interior and exterior as a play between self and world, consciousness and nature.… The mirror's reflection and the window's view are both in their own way 'self' portraits: one picture the artist's gaze, the other the content thereof'.[4] Friedrich's images of natural environments, and the human presence within them, can be regarded as acting as mediators between the viewer and landscape, subject and object, consciousness and nature, drawing the beholder into the canvas and making the landscape seem more immediate. But his figures most often are alien to their environment, and so act to distant them, and us, from the landscape, so that nature is experienced only in separation from it, through a reflexive gaze.[5]

Friedrich's complex paintings influenced other artists in the early nineteenth century. The 1807 *View through an Open Window* (Figure 3) by the Dresden artist Carl Ludwig Kaaz is clearly based on Friedrich's *View from the Artist's Atelier*. Both images explicitly represent the cultural enframing of our views of

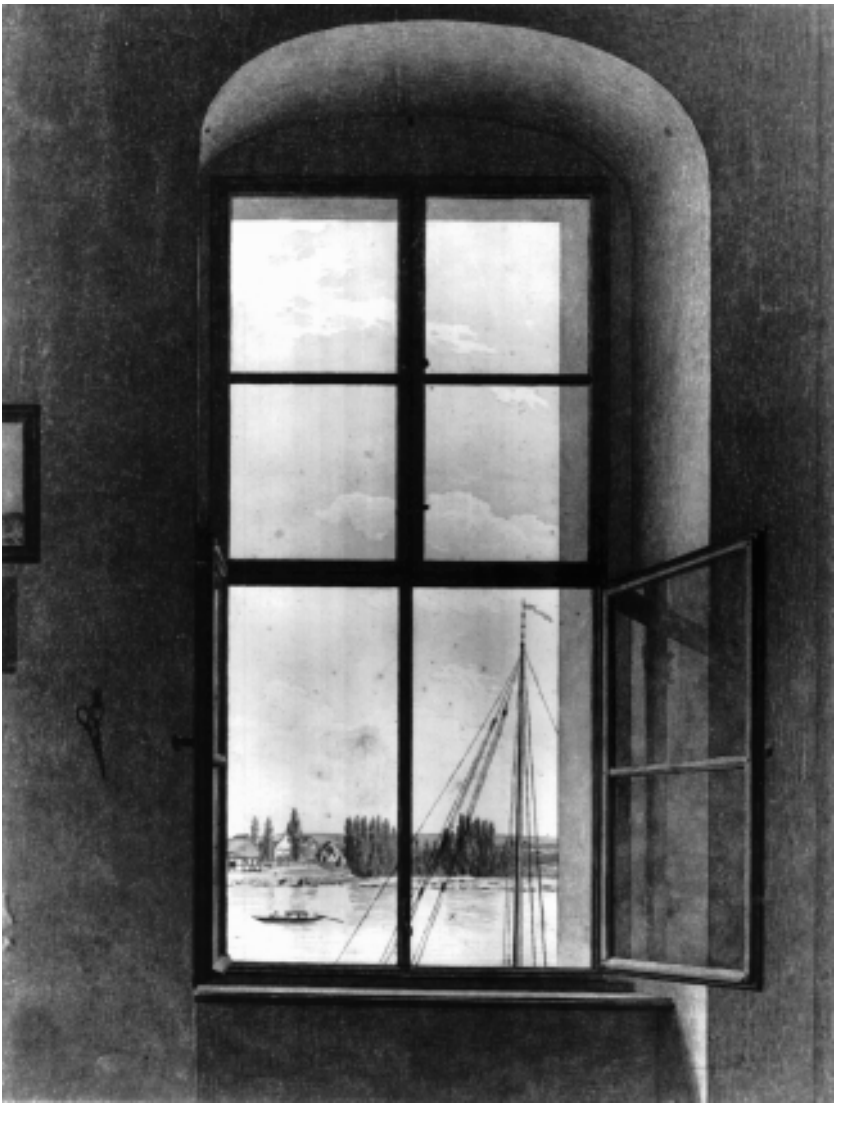


FIGURE 2. Caspar David Friedrich, *View through the Studio Window: Right Window*, 1805–6. Österreichische Galerie, Vienna.

FIGURE 3. Carl Ludwig Kaaz, *View through an Open Window*, 1807. Private Collection, Dortmund.

nature. Friedrich's image, with its partial perspective of the landscape, the dominance in the image of the structure, the building and window frame from which the landscape is viewed, and the gaze of the artist mirrored in the image, is the more critically reflexive of this enframing. But if Kaaz's image represents a more traditional image of a landscape and is indeed dominated by that image of a landscape, it nevertheless invites reflection on our views of nature, by presenting a perspective through a window of a dwelling, and by placing upon the framing window different technologies that mediate between the viewer or artist and nature, different means to shape his or her view of a landscape – an artist's palette, a small telescope and a book of poetry. Indeed, it is interesting that the landscapes depicted in these two images differ significantly. Friedrich's view is at once realistic and symbolic – offering an image of a random fragment of a landscape exactly as it would have been seen from his studio window, yet using the image to comment on the viewer's gaze. Kaaz, on the other hand, uncertain of his direction after a classical training, decided to try his hand at the current trend for landscape. But he seems to have been unable to relinquish the techniques of his training; the scene viewed through his window is an idealised, classical landscape.[6] The enframing of a natural environment, reflexively distanced from its viewer, refers not only to the cultural conceptions informing a perspective of nature, but also to the technologies available and utilised to realise that perspective in a concrete form.

It is important to stress that despite its preoccupation with culture and art, one could hardly regard early German Romanticism as devaluing nature. Another image of Friedrich's reveals the extraordinary place of nature in romantic vision. His 1808 *Cross in the Mountains* (Figure 4) was commissioned for the private chapel of Count Thun and Hohenstein's castle at Tetschen. What was remarkable, and controversial, about the painting was Friedrich's idea of using an image of a landscape for an altarpiece, rather than the traditional depiction of the human drama at the centre of the Christian story. But since nature was to take the central place of worship, Friedrich's portrayal of nature was laden with symbolic significance despite its careful attention to empirical detail. The sun, for example, corresponded to God, the Father, and is shown sinking because the time when God revealed himself directly to humankind was past. The evergreens and ivy surrounding the crucifix signify human faith in the redeemer. The frame, carved to Friedrich's design, was embedded with Christian symbols to direct the viewer to the purport of the image.[7]

The *Naturphilosophen* who will be discussed in this paper, Johann Wolfgang Goethe, Alexander von Humboldt and Schelling, were not interested in a pious worship of the divine immanent in nature, but in understanding the relations in nature that formed it into an organised whole. Where their views of nature were similar to Friedrich's was in their reflexive awareness of the separation of the human subject from nature and thus the difficulty of discerning relations in nature objectively. Although diverse natural phenomena could be imaginatively

FIGURE 4. Caspar David Friedrich, *The Cross in the Mountains*, 1807–8. Gemäldegalerie Neue Meister, Dresden.

related under a concept or idea, the problem was whether or not this synthetic act could be made determinate. It was reflection upon the problematic of achieving knowledge of nature that led them to appeal to all the tools human culture had to offer, from scientific instruments to artistic intuition. Indeed, at the turn of the nineteenth century there was considerable interchange between artists and *Naturphilosophen*, as evidenced by Friedrich's reading of Schubert and the poet Goethe's extensive scientific studies, as well as Humboldt and Schelling making aesthetic judgments essential components of their studies of nature. Thus the emphasis on the cultivation of aesthetic sensibility in early German Romanticism was not only for the purpose of the development of the individual, the development of the art and culture, the morality and freedom of the nation; it also served the understanding of the natural environment. The cultural enframing of nature was not only an ironic, artistic play, but also penetrated, critically and reflexively, into all views of nature. This paper discusses the particular expressions of the cultural enframing of nature by Goethe, Humboldt and Schelling, and the normative and practical significance they saw in these expressions. If Goethe and Humboldt sought an ideal and definitive history of nature, the most radical German Romantics regarded the representation of nature as an infinite task, in which no particular representation could be definitive. These latter figures, whose radical perspective would influence Schelling's *Naturphilosophie*, focused upon the process of understanding, of imagining, the relationship between humankind and nature, upon the continual reinvention of our relationship to nature. As the poet Novalis argued, we should 'treat the history of [nature] as the history of humankind'.[8] As Schelling would argue, the history of nature is invariably subjective, a history of the mind, not only changing with time, but dependent upon the creative participation of the human subject and the techniques he or she uses to investigate nature.

The emphasis placed upon the cultural enframing of nature during the German Romantic period in this paper is done with a view to debates within environmental history regarding the focus upon historically and culturally constructed understandings of nature in recent scholarship, such as witnessed in the discussions in and around 'A Round Table Discussion' in the *Journal of American History* and the collections of articles in *Uncommon Ground: Toward Reinventing Nature* and *Reinventing Nature? Responses to Postmodern Deconstruction*.[9] In his introduction to *Uncommon Ground*, William Cronon argues that 'the way we describe and understand [the] world is so entangled with our own values and assumptions that the two can never be fully separated'. He states that the primary concern of the book is to address:

> What happens to environmental politics, environmental ethics, and environmentalism in general once we acknowledge the deeply troubling truth that we can never know at first hand the world 'out there' – the 'nature' we seek to understand

> and protect – but instead must always encounter that world through the lens of our ideas and imaginings?[10]

Donald Worster, in contrast, wants to reverse this emphasis. Whilst acknowledging the importance of understanding the history of our conceptions of nature, he argues that this process has gone too far. In his view 'the foremost philosophical challenge of this age ... is to escape the state of nihilism, relativism, and confusion that modernist history, and modernist everything else, have left us in'.[11] Rather than putting 'nature into history', he maintains that 'we ought to be helping people find again the coherence, pattern, and integrity of nature, to help locate the realm of nature into which we can once more put our human history'. Worster sees the value of environmental history in that it redresses the lack of respect for nature in much of historical writing by giving nature a starring role. But can Worster thus elude the force of Cronon's argument? Are not the coherence, pattern and integrity that Worster seeks in nature human values and concepts? To acknowledge environmental or natural history as a hybrid of nature and history, of nature and culture, is not to descend into nihilism, but to acknowledge critically our participation in our ideas of nature and to take responsibility for it. The reflexive preoccupations of early German Romanticism were not nihilistic or idle play, for all their clever wit, but highly sophisticated critical examinations of the extent of cultural enframings of nature, and attempts to find meaningful and responsible histories of nature in the face of them.

THE HISTORY OF NATURE IN THE LATTER EIGHTEENTH CENTURY

The emphasis on understanding human beings in terms of their relationships to the natural environment in the latter eighteenth century arose in part from a transformation in the conception of natural history. Immanuel Kant signalled this transformation in 1775 by distinguishing a mere description of nature from a genuine history of nature.

> The history of nature, which we still almost entirely lack, would teach us the alteration of the form of the earth; and likewise the alteration which the earth's creatures (plants and animals) have undergone through natural migrations; and the deviations from the original form of the stem-kind that have thence arisen.[12]

The study of the history of nature was intended to bring the relationships of natural phenomena under the rule of law, to found the natural history of plants and animals in their necessary connections, to discern the idea underlying the unity of nature. Human beings were regarded as a part of this history of nature, affected both mentally and physically by the environment in which they lived. By his 1790 *Critique of Judgment*, however, Kant was stressing the epistemo-

logical problems associated with our judgments of the history of nature, how the heterogeneity of nature's laws made our estimation of nature's order indeterminate. The relationship of human beings to their environment thus also became significant in critical reflections upon the subjectivity of our judgments of the history of nature.

Natural history had entered the eighteenth century as a descriptive discipline, preoccupied with the comparison of visible structures, with taxonomic relationships and practical application. When Georges Louis Leclerc, Comte de Buffon, opened the first volume of his monumental *Natural History* in 1749 with a discussion of the nature of generation, it promoted a shift in natural history from artificially constructed logical systems of classifications to the natural or concrete relationships among actual plants and animals which he conceived in terms of genetic relationships or the 'succession of interbreeding individuals'. Central to Buffon's approach to natural history was a discussion of the alteration or degeneration of animals migrating to new environments over time as differences in climate and food affected the generative process.[13] Buffon's *Natural History* would grow to forty-five volumes and become one of the most widely read books of the eighteenth century. Its influence can be seen in the treatises on natural history of Johann Friedrich Blumenbach, the pre-eminent professor of medicine in Germany at the end of the eighteenth century. Blumenbach began his discussions of the different kinds of animals with analyses of physiological variations, examining differences not only in modes of generation, but also growth and nutrition and vital powers such as irritability and sensibility. This extensive discussion of physiological processes was introduced to detail the processes by which historical degeneration took place.[14] Gottfried Reinhold Treviranus conceived his *Biology, or the Philosophy of Living Nature* in these terms. This multi-volume work, which appeared over twenty years in the first decades of the nineteenth century, presented a natural history of physiology, an account of the variations in basic physiological functions of different plants and animals living in different specific conditions.[15] Whilst Treviranus's biology detailed the variations in the physiological function between different plants and animals, Alexander von Humboldt's geography of plants detailed the variations in the physical forces in the different environments in which such plants and animals lived. What was being developed in these studies was a theoretical understanding of the historical relationships between living organisms, a philosophical understanding of living nature in relationship to the history of the environment.

The history of humankind also came to be treated as a part of this history of the environment. On the one hand, one can see in the writings of Buffon or Humboldt discussions of the central place humankind has had in the transformations of the environment, in the migration of plants and animals and in the alterations of the landscape through agriculture and settlement. On the other hand, the physical characteristics and *moeurs* of human beings were regarded as

being under the influence of the environment. The eighteenth-century preoccupations with the science of humankind, with making sense of the exotic peoples encountered on new voyages of discovery to exotic lands, and with medical studies of airs, waters and places, resulted in extensive discussions of the influence of the environments on physical and cultural characters of human beings.[16] Works such as Charles-Louis Montesquieu's *Spirit of the Laws* (1748) and Johann Gottfried Herder's *Ideas for a Philosophy of History* (1784–91) represented particular historical periods, particular cultures, the behaviour and values of particular peoples, as developing organically in response to particular environments. Incorporating human beings into their histories of nature, Buffon and Blumenbach offered detailed discussions of the influence of the environment, of climate and food, upon the varieties of humankind. Physiology textbooks, which appeared at the turn of the nineteenth century, also represented human physiology as part of the global environment. Karl Friedrich Burdach's *Natural Theory of the Human Organism*, for example, opened with a detailed examination of the physical world and then moved on to examine the human organism in relation to that physical environment. By bringing into consideration the total environment, inorganic and organic, human and natural, a history of nature was developed by the turn of the nineteenth century that sought to discern the necessary relationships between all its constituents, unifying them into an organised whole.

In the Introduction to his 1790 *Critique of Judgment*, Kant examined the problem of grasping nature as a system of empirical laws. Given the possible endless diversity of empirical laws, the unity of nature appears contingent for our cognitive powers; yet for our knowledge of nature to cohere into a whole, this unity must be presupposed. Kant argued that we lack an *a priori* conception of nature as an organised whole that can be applied to its heterogeneous laws, so judgment must act reflectively to discern an order in these laws. Reflective judgment moves between the experience of the diversity of particular laws and the thought of a system of nature, giving itself a principle to mediate its movement. But the only principle at which judgment can arrive to make intelligible the idea of a unity of nature despite the diversity of its empirical laws is that nature with regard to these empirical laws is purposive for our cognitive powers.[17] The need for a principle of purposiveness to judge nature in its systematic unity led Kant to represent the problem of resolving the heterogeneity of laws of nature into a unity as a part of the larger task of the Introduction to the *Critique of Judgment*, that of presenting a complete system of our cognitive powers, of relating theoretical knowledge with reference to the sensible and practical reason with reference to the supersensible, the respective concerns of Kant's first two critiques. In the vast territory in which the cognition of objects is possible for beings with our particular cognitive powers, Kant distinguished two domains: that in which understanding legislates through the concept of nature to give rise to empirical knowledge, and that in which reason legislates

through the concept of freedom to give rise to morality. Kant argued that 'an immense gulf [*Kluft*] is fixed between the domain of the concept of nature, the sensible, and the domain of the concept of reason, the supersensible, … just as if they were two different worlds'.[18] Yet for Kant it must be possible for the second to have an influence on the first; it must be possible for the human being to act freely in nature; it must be possible to think of nature as being such that the lawfulness of its form will harmonise with the possibility of achieving purposes according to the laws of freedom. And it must be possible to think of nature as being such that the lawfulness of its form will harmonise with our cognitive powers. It was the task of reflective judgment to effect these relations, to traverse the gulf between understanding and reason, between the empirical and the ideal, between the concepts of nature and freedom. But whereas the concepts of understanding and the concepts of reason have their respective domains of legislative authority, judgment, in its reflection on the relation of understanding and reason, has none. The principle of purposiveness, the principle that nature in its diversity is purposive for our intellect, helps judgment to mediate between the domains of understanding and reason. But whilst this principle of purposiveness is necessary to effect a relation between the diversity of particular empirical laws and the idea of their unity, it is only a subjective principle that judgment gives to itself through reflection on its own activity and for its own use, and lacks objective reference or its own domain.[19]

It is these Kantian concepts, as transmuted through post-Kantians philosophers like Schelling, that informed Friedrich's image *Monk by the Sea*. The two planes of the painting can be seen as corresponding to Kant's two domains of empirical understanding and reason, between which yawns a gulf with no determinate ground. The movement of the viewer's eye between these two planes, and Friedrich's reflexive reworking of the painting to affect the action of the viewer's eye, can be seen as corresponding to the reflective action of judgment in its attempt to relate these two domains. Kant contended that given that it is contingent that the order of nature should be commensurate with our ability to grasp that order, a feeling of pleasure arises in response to this harmony.[20] In the C*ritique of Judgment* Kant associated the feeling of pleasure with aesthetic judgment. In an aesthetic judgment:

> The power of judgment, having no concept ready for the given intuition, holds [for the sake of comparison] the imagination (as it merely apprehends the object) up to the understanding ([so that] a concept as such [rather than any individual concept] is exhibited) and perceives a certain relation between the two cognitive powers, … which we can only sense, … (namely, the mutual harmony of imagination and understanding).[21]

The basis of aesthetic judgment is thus a sensation brought about in the subject by the harmonious play of imagination and understanding, the feeling of pleasure. Although Kant held that aesthetic judgments are universally valid for

all with our cognitive powers, such a judgment provides only the subjective conditions for cognition as such, rather than a determinate cognition of an object; no determinate concept provides the basis of aesthetic judgment, only the subjective conditions of the feeling of pleasure and judgment's reflection on the conditions of its judgments. The harmonious play between the imagination and understanding generating the feeling of pleasure in aesthetic judgment results in the judgment that the object is purposive for our cognitive faculties. But this purposiveness is purely subjective, and does not refer to a characteristic of the object. A feeling of pleasure also arises when we are able to find unity in the diverse laws of nature and supports the judgment that nature in its diversity is purposive for our cognitive powers. But this judgment of purposiveness is similarly purely subjective, and lacks an objective referent.[22]

But Friedrich's image *Monk by the Sea* also generates a feeling of dissonance. The viewer's eye is disturbed by the depth and darkness of the gulf or rupture between the foreground and background of the image, by its inability to effect a relation between the monk and sky, the human subject and the natural world, and it is disturbed by the vast expanse of the sky, which cannot be brought into singular focus and which only draws it again into that gulf. In his *Critique of Judgement* Kant ascribed such a feeling of dissonance to the experience of the sublime, a feeling he attributed to a discord between the powers of reason and imagination. Reason, not content to restrict its concepts to what is empirically applicable, endeavours to think things in terms of their possibility, and to ascend to the highest conceptual ideals. The imagination seeks to fill ideas with sensible content, but it soon loses sight of the flight of reason into the infinite and feels itself in a kind of chasm. Thus confronted, for example, by the enormity of the totality of nature and its incomprehensibility, disconcerted by what lies beyond his control, an individual at first feels fear. But fear is superseded by pleasure as new conceptual criteria are summoned to explain and contain what was previously beyond understanding, and the power of imagination is stretched to encompass these new conceptions. Kant emphasised that the sublime does not exist in the observed object but in the response of the observer. Nevertheless, certain phenomena are more likely to provoke such reactions than others. Heroic landscapes, such as depicted by Joseph Anton Koch in his 1811 painting, *Schmadribach Falls* (Figure 5), sought to depict such phenomena. In this image, as a tiny human figure takes a shot at some game on the lower slopes, towering above him are a raging falls and monumental alpine peaks. The evocation of the towering effect of the snow-capped mountains is intensified by bringing the upper regions of the painting as close to spectator as the lower, so that the overhanging rocks seem to threaten the minute human form. An air of menace is also engendered by the brooding masses of mountains receding into the infinite.[23] The ability of a human being to resist, to domesticate, such might seems an insignificant trifle. But Kant argued, if our position is secure, as is

FIGURE 5. Joseph Anton Koch, *The Schmadribach Falls*, 1811. Museum der bildenden Künste, Leipzig

Koch's figure on the gently sloping pasture, the aspect of such landscape is all the more attractive for its awesomeness. Kant called such objects sublime:

> Because they raise the soul's fortitude above its usual middle range and allow us to discover in ourselves an ability to resist which is of a quite different kind, which gives us courage [to believe] that we could be a match for nature's seeming omnipotence.[24]

Kant contended that the violence done to the imagination by the limitlessness of nature can be overcome by reason. As Eva Schaper argues, Kant's representation of the pleasure taken in the triumph of our rational over our sensible nature in experience of the sublime seems indistinguishable from his representation of the pleasure taken in the good; Kant's arguments here 'read like thinly disguised moral arguments'.[25]

Goethe, Humboldt and Schelling each reacted differently to the problem of judgment that Kant set out in the *Critique of Judgment*, and each proposed different means to achieve a history of nature that grasped the natural environment as an organised whole. Goethe and Humboldt sought to close the gulf Kant had exposed between particular phenomena and the order of nature and thus to achieve an objective history of nature, and they enlisted aesthetic judgments as means to cultivate the forms of perception they contended were necessary to do so. Escaping the confines of life in the civilised estates of Germany for more exotic and wilder climes – Goethe by travelling overland to Italy and across Sicily, Humboldt by his extraordinary travels through Spanish America – they nevertheless sought to domesticate unbounded nature, to regard it as a perceptible, a beautiful totality arranged according to proportion, measurement and harmony. For Goethe, the idea or ideal in nature, his 'symbolic plant', was something he could perceive.[26] Humboldt also stressed that his 'portrait of nature' was founded upon observation.[27] The appropriate disciplining of perception, in order to discern the system of nature, was the moral task of the investigator of nature. Schelling, on the other hand, a more radical and restless thinker, focused critically and reflexively upon the indeterminism in our judgment of the system of nature that Kant had exposed in his *Critique of Judgment*. In Schelling's view, nature as an organised whole could not be captured perceptually, no matter how cultivated the perception, no matter the instruments brought to the aid of its judgment. Indeed, despite a succession of philosophical systems, it continued to elude his precise formulation.[28] Artistic activity brought us closest to the generative activity forming the history of nature, but even it could not eliminate the gulf, the indeterminate rupture, at the heart of each system of nature, each attempt to relate the real and the ideal, the particular and the universal, the human subject and the natural environment, that rupture respresented so graphically in Friedrich's *Monk by the Sea*. Schelling agreed with Goethe and Humboldt, however, that the development of an aesthetic judgment of nature was of the utmost moral significance.

GOETHE'S SYMBOLIC PLANT

Although Goethe's foremost reputation is that of a poet, his scientific studies have attracted considerable attention. His interest in contemporary scientific ideas and practices may have begun simply as one of the many genteel pursuits of a well-educated gentleman of the latter eighteenth century,[29] but this interest developed into a more serious intent and ambition. The context for these studies was provided when the twenty-six year old Goethe, already famous amongst the reading public of Europe for his 1774 novel *The Sufferings of Young Werther*, was invited to the Duchy of Weimar in 1775 to become an assistant to the young duke. He soon took on various administrative duties, organising the ducal roads, mines and forests, duties that stimulated his interest in geology and natural history. In pursuing these scientific interests, Goethe drew upon the expertise of individuals at the nearby University of Jena, read numerous scientific treatises and corresponded with some of the leading scientists of his day. Court society, ministerial duties, scientific studies – Goethe found in Weimar the means for disciplining the passionate energies that had dominated his early literary career. This emphasis on order and discipline in his life at Weimar was reflected in the science of morphology that he developed during the 1790s.[30] Goethe's artistic theories and practices also influenced his science of morphology, but it was the artist's palette rather than poetry that became the instrument guiding his judgement of organic form. Goethe claimed to be able to intuit a series of anatomical structures as derivations of an ideal type through a method of disciplined perception, a method that he learned through his study of the visual arts which he began during his journey to Italy in the late 1780s and that he developed in his aesthetic and scientific studies during the 1790s. Goethe claimed disciplined perception to be the ideal scientific method, a method allowing a direct intuition of the necessary connections between the pure phenomena of nature. It was a method he held could resolve the epistemological problems of discerning an objective history of nature opened up Kant's *Critique of Judgment*. It was a method he sought to disseminate by drawing upon his increasingly authoritative position in German culture.

Goethe's introduction of morphology, 'the theory of the form, formation and transformation of organic bodies',[31] was to give a vantage point from which the whole could be visualised and known objectively. Rejecting Linnaean classification as too fragmentary and artificial,[32] Goethe's morphology was to order the cacophony of forms of plants and animals found in nature by representing each as modifications of an *Urkörper*, an ideal original form or archetype. Thus, in his 1790 essay *The Metamorphosis of Plants*, Goethe portrayed the plant as formed through the progressive modification of a single fundamental organ, the primordial leaf or *Urblatt*. In detailing these modifications of the leaf, Goethe gave an important role to the generative forces at work within the plant, drawing upon the work of Blumenbach and others on generation. But his primary interest was in

the perceptible formal constraints upon the transformation of manifest organs, not speculations on the formative activity underlying this metamorphosis. He was interested in how a limit is set to nature's structural range through the archetype, not in modifications of form through contingent environmental conditions. In Goethe's view, the archetype acts as a principle of order or necessity, framing the development of plants or animals, delimiting it to the transformation of a basic form.[33]

Goethe had begun to look for an organising principle, a 'guiding thread' through the diverse appearances of organic bodies, during his scientific studies whilst an administrator in Weimar. But his main conception of what this principle might be only came when he escaped from Weimar to journey through Italy in 1786. Freed from the social and emotional constraints of the Weimar court, which had all but stifled his creative abilities, Goethe found himself stimulated by the lush landscape, the antique artefacts, and the free lifestyle of artists' colonies that he found in Italy. Nevertheless, Goethe showed a remarkable degree of discipline during his eighteen months in Italy, completing numerous literary works, learning to draw, and studying art. Goethe's view of the many artistic treasures Italy presented was informed by his reading about the aesthetic of the classical ideal in the works of the German art historian Johann Joachim Winckelmann. In his appreciation of antique sculpture, Winckelmann not only emphasised their formal beauty, their coherence and proportion, but also their sensual qualities, their smooth, unblemished and graceful contours. He argued that to be able to discern their essential and spiritual value requires serious study, a kind of moral discipline – only thus could one's aesthetic judgement become objective. But such judgement must be a response to the visual presence of the statue, not simply its rational study. Although disagreeing with details of Wincklemann's art history, Goethe found that the principle of his approach 'exactly fits my method of investigating'.[34] Goethe concluded that a similar discipline is needed to see 'pure phenomena' in nature, to form an objective judgement of the essential form in the masterpieces of nature. This neo-classical method appealed to Goethe's growing concern with order, and would form the basis of the order Goethe would subsequently try to exact from his own and others' artistic and scientific activities.

In Italy Goethe not only cultivated his visual sensibility through the study of art, he also spent time reflecting on the rich Italian vegetation. But although Goethe spent a great deal of time travelling through countryside, even traversing the relatively wild interior of Sicily, it was always in gardens that his insights into the order underlying the diversity of plant forms occurred. His most famous epiphany occurred whilst he was in the Public Garden in Palermo, Sicily. Working on a poem inspired by a classical theme, his thoughts turned to the ideal plant form.[35] If Goethe was to uncover the organising principle of plants, it was to be through culture and cultivation, through a disciplined perception of a domesticated nature. Goethe's account of his Italian journey was, of course, an

idealised representation of actual events, but by now such idealisation had become a dominant motif in his writing.

The archetype, if an ideal form, was, Goethe maintained, an ideal or idea that could be discerned in the comparative study of particular forms of plants and animals. When Goethe tried to explain his views on the metamorphosis of plants to Johann Christoph Friedrich Schiller in 1794, he spoke of sketching for Schiller 'a symbolic plant'. In a true symbol, Goethe wrote in his maxims on art, 'the particular represents the general'. The symbolic is the exemplary, what allows itself to be considered as the manifestation of a general law.[36] Goethe's characterisation of the symbol reflects the broader theory of art that he began to articulate in the 1790s, which he conceived in terms of ideal archetypes or *Urbilder*. Goethe held that the ideal of art is not to be found in any particular work of art, yet particular works of art can resemble or present these archetypes, which the works of the Greeks have done most closely. These ancient artefacts became for Goethe the canon of art, prototypes for contemporary artistic production. Thus, although the ideal archetypes remain invisible and are in principle only intuitable, antique artefacts resemble these archetypes and make perceptible in a particular content the intuited ideal.[37] 'Symbolism transforms the appearance into an idea, the idea into an image [*Bild*]'.[38] The image of the archetype was an image that Goethe held he could sketch for Schiller; that is, a concrete, perceptible image. It was Goethe's intention to publish illustrated editions of his morphological works, although he never realised this plan. But the illustrations that he prepared, or had prepared by others, for the projected new edition of *The Metamorphosis of Plants* emphasised the formal and spatial relationships of the different parts of the plant, with reference to the basic leaf form. The illustration of a chestnut, for example, depicts the spatial relationships

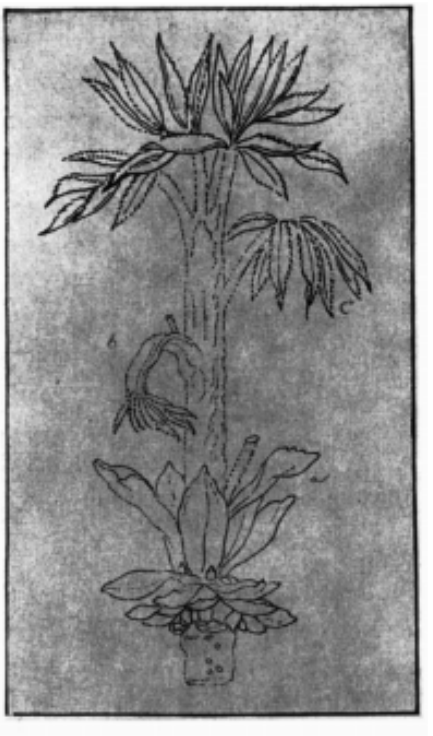


FIGURE 6. 'Schematic Sketch of Opened Chesnut Bud', from Goethe, J.W. 1947–. *Die Schriften zur Naturwissenschaft*, (*Leopoldina-Ausgabe*), ed. R. Matthaei et al., Weimar, Hermann Böhlaus Nachfolger, Vol. 9, Figure XIV: 2, Sketch by Goethe.

of the leaves, nodes and stems relative to one another (Figure 6). It is a symbolic image of an individual plant, in which the accidental is excluded, to focus on necessary form, to represent how the leaf archetype frames or bounds the development of the chestnut.[39]

After his return from Italy in 1788, Goethe wrote a series of essays setting out his views on morphology and scientific method, art and aesthetics. These essays were of a normative character. Goethe, rapidly becoming seen by himself and by others as the embodiment of German culture, set himself up as cultural arbitrator in Weimar, seeking to edify educated Germans through his insights into nature and art. He set out how to improve upon the Newtonian scientific method, an approach he found too fragmented – building their theories on the basis of isolated experiments, Goethe contended that Newtonians went astray because they had to construct the whole mentally, subjectively. Goethe argued that the archetype, the principle of necessity underlying organic form, could only be discerned through his method of disciplined perception.[40] He also set out aesthetic ideals for both the verbal and the visual arts. Although Goethe flirted with Romanticism, he also found it too subjective, too formless. Instead he worked with Schiller on the journal *Die Horen* to establish standards for a classical German literature,[41] and launched journals of art criticism and art competitions to direct the development of German art towards a neo-classical style.[42] These projects were highly political, setting out an ideal of German culture and informed by Schiller's claim of the centrality of aesthetic education to the formation of a free and moral society.[43] Whilst working on these projects, both Goethe and Schiller came to see an important role for themselves in determining what is necessary for the freedom of the German peoples, in establishing themselves as prototypes of classical German art and culture. In Goethe's writings on art and nature during the 1790s, there is a polarity between order and imagination, between earnestness and play, between necessary form and generative activity. His literary products of the period, such as his 1790 *Torquato Tasso*, show a similar polarity in their juxtaposition of characters, with the passionate young poet counter balanced by the judicious elder statesman. But his 1796 *Wilhelm Meister's Apprenticeship* – his major work of this period – also contains an overarching ordering principle, the Tower Society, a secret society of men who watch over and guide the destiny of others. It is a role not dissimilar to that Goethe saw for himself in the cultivation of German culture. The Tower Society is not only an aid to compositional structure, but also a more general symbol of necessity, reflecting Goethe's view of the essential role that an ordering principle must play in society, in art, in nature.

The extent to which Goethe held perception must be disciplined to provide an objective view of nature is made explicit in a 1792 essay, 'Experiment as a Mediator between Subject and Object'. In this essay Goethe argued that an ideal experiment would be comprised of a spatial array of contiguous experiments.

'Studied thoroughly and viewed as a whole, they could make up a single experiment, merely representing a single experience under its most manifold variations'. Such an experiment, Goethe claimed, would have the certainty of a logical proof, which leaves no gaps between the successive arguments requiring an imaginative or speculative leap.[44] Morphology was particularly suited to this form of inquiry as it focused upon manifest form rather than speculating over hidden forces of nature.[45] Through such a method of disciplined seeing the inquirer is able to grasp 'not only how phenomena appear, but also how they should appear'.[46] It provided an enframing by which to see the necessary connection of phenomena, to see the laws of nature, to see the idea of the whole, the archetype, in appearances. It would be an improvement upon Newton's method of investigation, which produced only fragmentary results and thus left too much space for relating phenomena subjectively. It would resolve the epistemological problems of discerning an order of nature that Kant set out in his *Critique of Judgment*. It would also resolve the problem represented so graphically by Friedrich's *Monk by the Sea* of the gap between the human subject and the object of his or her inquiry. If Goethe treated ironically Schiller's attribution to him of the intellectual intuition Kant had reserved for an archetypal intelligence, he did not ironise or to treat reflexively the enframing of nature his method entailed. His ambition was an ideal, objective history of nature.[47]

Burdach, as Professor of Anatomy at Königsburg, sought to institutionalise Goethe's method of disciplined perception and his science of morphology in the structure of both the curriculum and the displays of specimens of the Anatomical Institute established in Königsberg under his directorship. In a lecture delivered at the opening of the institute in 1817, *On the Task of Morphology*, Burdach explained how, through methodical empirical investigation, framed by the structures of the institution, the order of the organic world would be made present to the students and the necessary bonds between individual phenomena would made manifest in a direct intuition. At the end of their study, as a result of the careful arrangement of materials, the student would have an experience 'in which living forms and their interconnections become evident in his soul',[48] the ideal order of archetypes made perceptible.

In Burdach's plan the various senses of necessity in Goethe's view of the organic world are satisfied – natural, normative and practical. It appealed to Goethe, as it was designed to provide a direct intuition of the necessary order underlying organic diversity, the ideal form. Moreover, it was designed according to the precepts of disciplined perception Goethe had lain out in his methodological essays. It also appealed to Goethe, the Weimar administrator, who similarly sought to bring organisation and discipline to his institutional schemes. But for Goethe, such designs were only part of the larger framework of his vision of an ideal German culture.

HUMBOLDT'S PORTRAITS OF NATURE

Humboldt dedicated his 1807 *Ideas towards a Geography of Plants* to Goethe. The gesture was significant, for not only was the *Ideas* the introduction to the thirty volumes published over almost as many years on the results of his expedition to South America, an introduction in which he set out his scientific programme, Humboldt also regarded it as his most important and characteristic work. The frontispiece (Figure 7) shows the Ephesian Diana, as the symbol of nature, being unveiled. The motif of the unveiling of the secrets of nature was common in the second half of the eighteenth century, and can be found in the drafts of *Faust* that Goethe worked on between 1797 and 1806, as well as poems by Schiller and Novalis from the late 1790s.[49] In the vignette that Humboldt commissioned, a stone tablet rests at the feet of the figure of Diana inscribed with

FIGURE 7. 'Dedication to Goethe, Frontispiece', from Humboldt, A.v. and Bonpland, A. 1807. *Geographie der Pflanzen in der Tropen-Ländern; ein Naturgemälde der Anden*, Tübingen, F.G. Cotta. Copperplate engraving by Raphael Urbain Massard, after a drawing by Bertel Thorwaldensens, 1805.

Goethe's precept, 'Metamorphosis of Plants'. Like Goethe, Humboldt sought the original plant forms, what he termed a 'physiognomy of plants'. It is the figure of Apollo, the god of art, which lifts the veil to disclose nature's form. Like Goethe, in Humboldt's work 'nature and art are close siblings'.[50] But Humboldt's was a singular vision, which, unlike Goethe's, focused upon vegetation in relation to the environment and how the physiognomy of plants was modified by the particular conditions of a particular region. Moreover, travelling through the wilds of South and Central America, Humboldt sought to domesticate the extraordinary vegetation he found there not only through a judgment of its basic forms, not only through his aesthetic response, but also through meticulous physical measurements. Indeed, the primary means of Humboldt's cultural enframing of nature was the impressive array of instruments with which he travelled through the Americas. The resulting portrait of nature was one that would stimulate the imagination of many of the next generation of nature's explorers.

In his 1807 *Ideas* Humboldt argued that there is a natural physiognomy peculiar to every region of the earth. His physiognomic divisions deviated from those of the Linnaean botanist, who was concerned with the identification and naming of individual species on the basis of a few parts, the organs of fructification. Indeed, Humboldt, like Goethe, criticised the latter approach for producing but 'miserable registries of nature'. A physiognomy of plants, rather, groups the myriad species of plants into a few *Urformen* or original forms. These are determined from the overall 'character of the vegetation and thus the impression that the sight of the plants and their groups make upon the mind of the observer'.[51] The influence of Goethe's *Metamorphosis of Plants* on Humboldt's approach is clear. Humboldt described sixteen such prototypes, noting that the number might increase as further regions of the earth were explored. But Humboldt was not only interested in determining the basic plant forms. He saw as a central task of the physiognomy of plants the investigation of how the plants of a specific region deviate from the basic forms under the influence of the specific environmental conditions of that region. The range of environmental parameters Humboldt considered was far more extensive than in eighteenth-century histories of nature, including alterations in the magnetism of the earth, in temperature, humidity and air pressure, in the chemical composition and electrical charge of the air, in the blueness of the sky and in the refraction of light. It was an attempt to characterise the total environment. Humboldt was also interested in groups of vegetation, rather than in individual plants, and in how the vegetation and physical environment combine to produce the character of a region. This interest in the geography of plants, in the collective phenomena of vegetation and in how it varies across time and space under the influence of the environment, distinguished his project from Goethe's.[52]

For Humboldt, the impression that a region made on the mind of the observer was an aesthetic impression. The character of the vegetation of a land is found

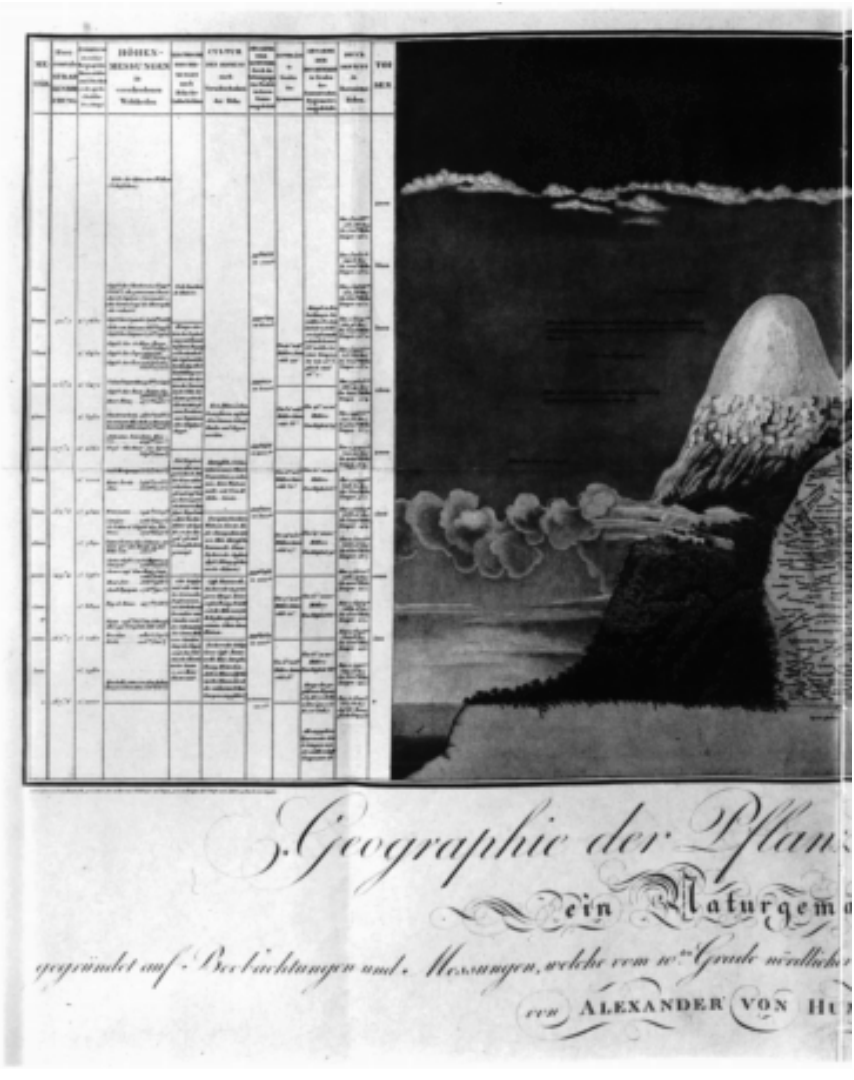
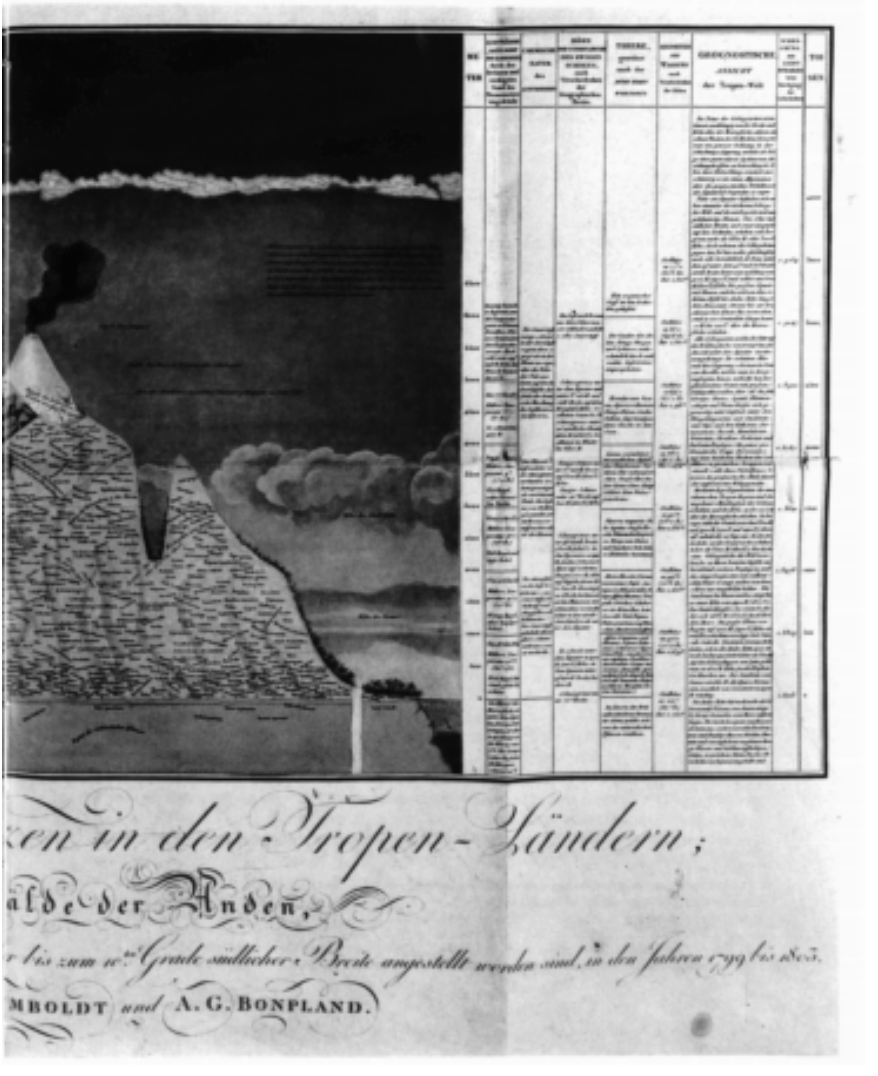


FIGURE 8. 'A Physical Portrait of the Andes', from Humboldt, A.v. 1807. and Bonpland, A.1807. *Geographie der Pflanzen in der Tropen-Ländern; ein Naturgemälde der Anden*,

in the influence that the sight of the plants have on the fantasy and artistic sense of its people. Like Goethe, Humboldt emphasised the visual over the verbal arts. In his *Ideas* he even attempted to represent visually its fundamental ideas in an engraving (Figure 8). The title of a work published the subsequent year, *Views of Nature*, also indicates the intention to paint verbally distinct portraits of nature



Tübingen, F.G. Cotta. After a sketch by Humboldt.

in each of its essays, although Humboldt admitted that 'the attempt to designate in words, that which, in fact, appertains only to the imitative art of the painter, is always fraught with difficulty'.[53] In keeping with his emphasis upon 'nature in its greatness' rather than individual plants, in characterising and cultivating this visual aesthetic Humboldt appealed to the contemporary developing fashion

for landscape painting, rather than the individual classical masterpieces which Goethe studied. Whilst admitting the achievement of the art of Greece and Italy, he claimed the unique value of landscape painting lay in 'a more material basis, and a more earthly tendency' through its combining the contemplation of nature with the forces of imagination.[54] Humboldt argued that the 'delicate artistic appreciation of nature' of the landscape painter is especially suited to portraying the collective phenomena of vegetation, vegetable forms occurring in large masses, in which the form and distribution of leaves, of branches and stems, lose their individuality.[55] It was the landscape artist's impression of the character of a region that Humboldt hoped to convey in his physical portrait and views of nature. He suggested that the landscape artist might in turn benefit from the study of the basic forms of plants detailed in his physiognomy of plants.

Although Humboldt contended that the landscape artist has a particularly cultivated appreciation of the character of vegetation, he argued that all the people of a region are affected by the forms of plants within it. Humboldt made no claim to environmental factors as the sole determinant of human culture, and even suggested that there were primitive types of peoples as there were primitive types of plants, but he did give such factors a significant influence over the direction of culture, over the character of nations and the disposition of human beings. 'This influence of the physical on the moral world – this mysterious reaction of the sensuous on the ideal, gives to the study of nature, when considered from a higher point of view, a peculiar charm which has not hitherto been sufficiently recognised.'[56] It was Humboldt's travels through Spanish America from 1799 to 1804 that convinced him of this influence. In the Torrid Zone, beneath the glowing rays of the tropical sun, he found extraordinarily lush and noble forms of vegetation, a vegetation so exuberant and abundant that its peoples had not been able to conquer and domesticate it. Moreover, because of the great height of whole regions in the tropics, and the consequent cold of such elevation, inhabitants were afforded a spectacle of all the vegetable forms of the earth in a small circumference. What a contrast to the dreary plant forms of his native northern Europe, and the uniform vegetation of its cultivated lands! 'But the rich development of our language, the glowing fancy of the poet, and the imitative art of the painter, afford us abundant compensation; and enable the imagination to depict in vivid colours the images of an exotic nature.'[57] Indeed, Humboldt argued that it was the cultural superiority, the more cultivated aesthetics and morality, of Europeans that provided the ideas and sensibility needed to develop a physiognomy of plants. A considerable portion of Humboldt's plant geography was dedicated to a discussion of the influence of vegetation on the character and culture of the people living in a region, to a discussion of how the character of the vegetation of the earth has been altered by the expansion and migration of human settlement and agriculture, of how 'plants are enmeshed in the moral and political history of humankind'.[58]

Humboldt described in some detail the sixteen *Urformen* comprising his physiognomy of plants, but his exposition of the character of a region and the impression it makes on its inhabitants is only sketched in a few general examples. The majority of the pages in both his *Ideas* and *Views of Nature* are devoted to 'scientific illustrations', exact measurements detailing the environmental parameters of the different regions he visited, at different altitudes and at different times of day and year. Humboldt set sail to the Americas equipped with an exceptional array of scientific instruments. His investment in these instruments was considerable, involving not only the cost of their purchase and safe transport through the tropical wilderness, but also the time needed to learn how to use them effectively according to the standards set by experts in different fields. Such investments in exacting experimental technologies meant Humboldt's measurements during his voyage would be given considerable credit.[59] When he inherited the fortune that made possible his expedition on the death of his mother in 1797, Humboldt spent the next two years searching out the best scientific instruments and techniques for handling them that were available to him. Although employed as a Prussian mining official prior to the receipt of his inheritance, Humboldt had managed to pursue the scientific interests he developed as a young student and had contacts with many prominent scientists upon whose assistance he could call. His publication in 1797 of the results of a comprehensive investigation of the excitation of muscle and nerve fibres had also established his credibility as an experimentalist.[60] The 1797 work paid close attention to a range of experimental factors. His aspiration to a similar exactness in measurements of environmental conditions during his expedition was the reason for his extensive preparation of the requisite instruments and skills. Most of his notebooks and letters from his American trip are filled with records of careful, regular measurements. But the result of these efforts was not solely tables of data. Rather Humboldt used these measurements as the basis of 'a general image [*Bild*] ... uniting all the appearances which the surface of our planet and atmosphere present in [a] portrait of nature'.[61]

Nevertheless, a tension exists between the aesthetic impression of the whole and the detailed measurements in Humboldt's geography of plants. This tension is illustrated in the engraving that accompanied his *Ideas*, in which the central portrait of the Andes is framed by tables of measurements or scales. Only the French title for this 'natural portrait', *tableau physique*, captures the dual facets of the image as a table of data and a picture of a landscape. Humboldt admitted to struggling with the opposing requirements of scientific precision and painterly effect, of representing the exact geographical location of the fundamental plant forms and the impression of the collective phenomena of vegetation. The choice of a profile of the Andes, which encompasses in a small space a great diversity of the physical appearances that the earth offers, compounded these problems. His compromise was to place the tabulated measurements on the borders and to

inscribe the mountain landscape with the Latin names of characteristic vegetation.[62] In the *Views of Nature* Humboldt's solution was to put the 'scientific illustrations' in the endnotes. But neither approach eliminates the tension between the aesthetic image and the scientific measurements. Given the value placed on aesthetic judgment by Humboldt and his contemporaries as a highly cultivated sensibility, the two facets of his *tableau* cannot simply be read as the view of the layman in contrast to that of the scientific expert.[63] Rather, it is as if Humboldt's vision was that empirical science would eventually be able to make explicit and frame objectively what the landscape artist was able to intuit unconsciously, the interconnection of natural phenomena. When Goethe received an early copy of *Ideas*, it was without the accompanying engraving. So he sketched his own image (Figure 9), which he called a 'symbolic landscape'.[64] In this expression, if not in his actual sketch, Goethe captured Humboldt's ambition for his portrait of nature, that, like Goethe's symbolic plant, it should transform 'the appearance into an idea, the idea into an image', and visibly display an ideal and objective history of nature.

FIGURE 9. 'Heights of the New and Old World, figuratively compared', from Goethe, J.W.1947–. *Die Schriften zur Naturwissenschaft*, (*Leopoldina-Ausgabe*), ed. R. Matthaei et al., Weimar, Hermann Böhlaus Nachfolger, Vol. 11, Figure II. Copperplate engraving, after a sketch by Goethe.

Such a 'symbolic landscape' is captured most characteristically by Humboldt in his later isometric maps. Humboldt's geological maps depicted 'symbolic landscapes' by indicating geological forms through pasigraphic signs. He had also made maps tracing the contours of visible surfaces of landmasses.[65] But his maps of isometric lines were conceptually distinct and more ambitious in that they attempted to give a visual representation of the physical laws he perceived in measurements of environmental parameters. His first such map was that of lines of equal intensity of magnetic force in 1804, an extension of the maps of compass variation Edmund Halley had introduced in the early eighteenth century. Tabular displays of data were common in the eighteenth century, it being a standard practice to record measurements taken during sea voyages, instrument readings from experimental trials and statistical information on human populations in ruled columns. Halley's innovation was to combine tables of magnetic measurements from around the globe, including the results from his own sea voyages, with the techniques of nautical experts in interpreting navigational charts and manipulating trigonometric expressions, to summarise mag-

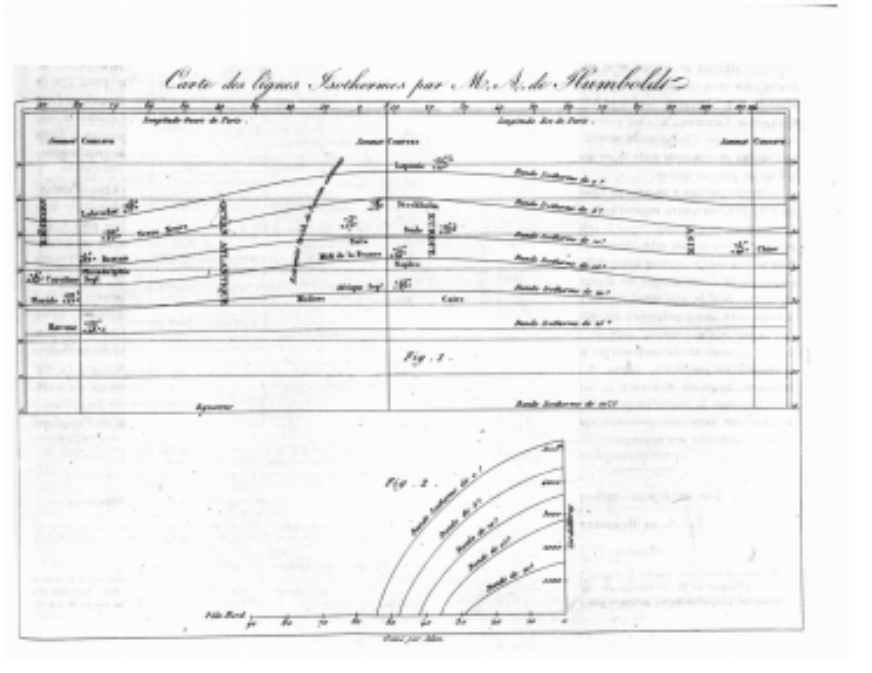


FIGURE 10. 'Map of isothermal lines', from Humboldt, A. 1817. 'Von den isothermen Linien und der Verteilung der Wärme auf dem Erdkörper', *Mémoires de physique et de chimie de la Societé d'Arcueil, 3*: 462-602.

netic data visually in isometric maps.[66] Humboldt's introduction of isothermal maps (Figure 10) in 1817 may also have been influenced by Johann Friedrich Lambert, who was the first to use graphical displays of experimental data. In his 1779 *Pyrometrie*, which Humboldt discussed in the article explicating his isothermal map, Lambert provided graphs figuratively representing variations of temperature over time.[67] Humboldt's isothermal map, constructed on a plane chart and showing no coastlines and only a few place names, actually appears like a graph that represents variations in temperature over space. The map was a solution to a widely discussed problem how to interpret and order large quantities of data. It was a common practice during the eighteenth century to cull and order confused records before tables were published in scientific journals. Lambert argued that by showing smooth curves averaging a mass of measurements, from which deviant data falling outside a calculated range of data were excluded, graphs were able to reveal regularities. Humboldt's map provided such a figurative display of the mean temperature in specific places as well as the interconnection between them.[68] As Michael Dettelbach has argued, such maps were a part of Humboldt's project of a terrestrial physics – a history of nature that mapped the physical characteristics of the earth through the use of instruments that had produced such useful results in Lavoisier's chemistry and other physical sciences. Such maps displayed the interaction of physical forces, their characteristic variations under local conditions, with nature's laws emerging gradually from the labour of measuring and averaging.[69] Humboldt argued that with improving measurements the dots on his isothermal map would become more exact, more contiguous, the gaps closed. The end result, he claimed, would be an objective visual representation the law of temperature variation – a symbolic landscape in Goethe's sense. Humboldt hoped that eventually the data on the geographical distribution of vegetation could be similarly illustrated in an isometric map, a mapping of characteristic variations of general types. Like Goethe, Humboldt did not recognise that his objective mapping of nature was the product of a particular enframing, the product of the technologies he selected to represent it.

Although, as Richard Grove makes clear, Humboldt held liberal political views, supporting the French Revolution and opposing slavery,[70] his portraits of nature, mapping terrain previously unexplored by Europeans, were imperial visions. If his expedition to Spanish America was financed through his inheritance, it was made possible through the endorsement of the King of Spain. Charles IV was persuaded that the former mining official could provide useful information on the mineralogy of the region. Indeed, Humboldt's maps and his physical measurements, his data on the peoples of South and Central America, their histories and their politics, were utilised by diverse imperial and commercial interests in the region during the violent struggles for independence from 1808 to 1828. Mary Louise Pratt has convincingly argued that Humboldt did not

simply impose a European perspective on the America's, but returning home to communicate so powerfully the character the vegetation, the landscape and the peoples of the Americas, he also altered the European's view of their world.[71] But Humboldt also returned home with a vision of how that world might be mapped objectively. Travelling with an impressive array of European instruments, he set new standards for how that was to be accomplished, promoting a scientific imperialism.[72] These instruments were the principal means of his cultural enframing of nature, the tools by which the unfamiliar regions of the world were domesticated, the laws of his geography of plants made visible, and the aesthetic impression of the character of a region rendered an objective portrait of nature.

SCHELLING'S HISTORY OF NATURE

The laws that Humboldt sought to make visible in his isometric maps were empirical laws, figurative representations of the phenomena manifested by his instruments. In the Preface to the German edition of *Ideas* he distinguished his empirical investigations of nature from the *Naturphilosophie* developed by Schelling that he encountered on his return to Europe, which reduces 'all natural appearances, all activity and form, to the never ending strife of the opposed forces of matter'. Whilst arguing for the importance of his portrait of nature, bounded by certain facts, he admitted that Schelling's *Naturphilosophie* promised a portrait of 'a higher sort'.[73] Schelling's *Naturphilosophie* also departed in significant ways from Goethe's, although it was Goethe who was responsible for bringing Schelling to the University of Jena in 1798. The interconnected activity of fundamental forces that Schelling attempted to comprehend could not be made visible or objective in the manner of Humboldt's or Goethe's portrayals of nature. Indeed, Schelling argued that knowledge of how nature is constructed from invisible forces was necessarily a speculative science, that the history of nature required a history of the mind, in the manner of the transcendental idealism of the Jena Professor of Philosophy, Johann Gottlieb Fichte. In Jena Schelling also came under the influence of the circle of early Romantic writers and critics, such as Friedrich Schlegel and Novalis. In his attempt to represent the history of nature, to represent the inner activity and forces of nature, Schelling used the framework of Romantic aesthetics, especially its theory of poetry.

Schelling had developed an interest in *Naturphilosophie* by the close of his studies at a theological seminary in Tübingen in 1796. It was an interest he was able to pursue when, taking a position as a tutor to an aristocratic family, he travelled to Leipzig, an important centre for the study of natural sciences at that time. At Leipzig Schelling engrossed himself in the study of physics, chemistry, physiology and medicine. In the series of works on *Naturphilosophie* that he

subsequently produced between 1797 and 1799, Schelling argued that the activity of nature arises from the concurrence of two opposed principles, an indeterminate pure productivity which pervades the whole of nature, and the specific material conditions of a particular body. In his 1797 *Ideas for a Philosophy of Nature* Schelling contended that any particle of matter can be further analysed into such opposed principles, that no material conditions were refractory to further analysis, in opposition to the theory of Newtonians and Kant that matter was the final substratum or limit of human knowledge. He thus contended that the understanding the nature of matter is no different in kind from understanding the nature of any complex, organised body or indeed the nature of the universe as a whole.[74] In other word, the understanding of any part of the material world is subject to the epistemological problem Kant introduced with regard to the history of nature or nature as a system of empirical laws, the problem of bringing the endless complexity and heterogeneity of nature under a unified conception or idea. In his 1798 *On the World Soul* Schelling argued that the positive principle of pure productivity also recedes into infinity. Penetrating each inidividual entity as the 'common breath of life', he stressed that the positive principle itself is nothing particular or determinate, that in fact language has no term for it, and so to indicate it he made use of the poetic expression of the ancients, 'world soul'.[75] In *On the World Soul* Schelling also extended his *Naturphilosophie* to living organisms. In organic bodies, he argued, pure productivity is restricted within a material sphere, so that its possible activity is limited, but also so that it prevents the material components of that body from falling into stasis. Organic activity is thus the concurrence of activity and constraint, a concurrence of freedom and necessity. Schelling attempted to detail the necessary constraints, the material conditions, of life as far as possible by drawing upon contemporary research in chemistry and physiology. He thus discussed, for example, the role of elements and forces within the environment in the functioning of the living being, from oxygen and nitrogen to light and heat. He also emphasised the importance of productive activity, how pure productivity broke free of its material constraints to give rise to the expressions of life, such as the generation of new forms of life or motion. Schelling argued that the basis of each such expressions of life was not simply a joining of material components, but a dynamic interaction of those components, a complex of organic activity. But ultimately these positive and negative principles are indeterminate; both pure productivity and the tendency to the material recede into infinity, and cannot be represented in a particular form. Schelling's focus was thus on the syntheses arising between these infinite positive and negative principles through their dynamic interaction, syntheses which he represented with the image of a whirlpool. 'Where [a stream] meets resistance, there is formed a whirlpool; this whirlpool is nothing fixed, but something that in every moment is vanishing, and every moment springing up anew.'[76] Nature, in both its inorganic and organic

forms, is that 'middle' [*das Mittel*] between productivity and product, between the free and the fixed, the middle that is ever in a state of formation.[77] Although Schelling expressed an appreciation of Goethe's morphological ideas, in contrast to Goethe, he was primarily interested in the formative activity giving rise to manifest forms, drawing upon Blumenbach's studies of generation. He regarded Goethe's ideal form, his symbolic plant, as the product of this more fundamental activity.[78] Schelling offered a history of nature, but one attempting to penetrate into the internal processes of nature's formation, a philosophy of nature that Humboldt acknowledged as a portrait of 'a higher sort' than the visible laws portrayed by Goethe and himself.

Schelling agreed with Goethe that the inquiry into internal activity was 'a speculative science'. Even Goethe's ideal experiment, which linked contiguous experiments or forms into a single experience, would be unable to make visible the linkages between phenomena that interested Schelling. Schelling did not intend that his *Naturphilosophie* should dispense with all experience. His point was that empiricism 'aims only at the *surface* of nature, and what is objective, and so to speak, *exterior*', whereas his 'speculative science' 'aims at the *inner spring work* and what is *non-objective* in nature'. He argued that even experiment is not objective in that it puts questions to nature that it compels it to answer, and thus contains an implicit *a priori* judgement of nature. Moreover, an experiment can never penetrate beyond the forces it uses as its instruments of inquiry. In contrast to Humboldt's attempt to frame objectively his portrait of nature through precise measurements, Schelling claimed that the phenomena manifested through instruments were dictated by the nature of those instruments and the problems posed by the user of those instruments. Similarly, the arrangement of phenomena in Goethe's ideal experiment depended upon the question the arrangement was designed to answer. Schelling thus called experiment a 'production of nature'. The *a priori* and necessary ground of all natural products, he contended was the concurrence of positive and negative principles, of pure productivity and its limitation. Schelling asserted that an inquiry that aims to view 'its object in becoming', 'seeking the principles of its possibility', is necessarily subjective, what he called 'a construction of nature'.[79] But to 'construct' nature from *a priori* principles, from what is 'non-objective' or subjective in nature is to regard nature as expressing the laws of our mind. In this sense, Schelling regarded an ideal history of nature as a natural history of the mind that traces the genesis of intuitions and concepts of nature in the mind.

Schelling's problem was to bring this history of the mind into identity with the history of nature, to show that the activity of thought or the construction of nature re-enacts the activity of nature or natural production, to show the unity of the ideal and the real. Schelling's initial attempt to construct an ideal history of nature followed the principles of Fichte's transcendental idealism, which he had first encountered as a student in Tübingen, and then more directly and forcefully

in 1798 when he took the position of Professor of Philosophy at the University of Jena, where Fichte was also a Professor. Fichte was concerned with understanding the relationship between the objective and subjective sides of consciousness, of relating phenomenological awareness to conceptual understanding. Similarly, in his 1800 *System of Transcendental Idealism*, Schelling represented the problem of the relationship of matter and form in nature as the problem of the relationship between the matter and form of consciousness. In Fichte's analysis, the phenomenological, objective side of consciousness, by restricting the self's free activity, acts as the means by which we become conscious of the subjective side of consciousness. It was in the activity of the self, the subjective side of consciousness, which generates the *a priori* concepts and ideas by which we construct our theoretical understanding of phenomena, that Fichte was interested. But Schelling found a problem with transcendental idealism in his attempt to construct an ideal history of nature. In this analysis the activity of the construction of the phenomenological, objective element in consciousness remains unconscious; the self, the I, regards this objective element as a foreign element in consciousness, as a not-I. What is of most interest to Schelling, the not-I, the representation of the objective world, remains unconscious and indeterminate, a dark space in Fichte's transcendental idealism.

Schelling concluded his *System of Transcendental Idealism* with the claim that an immediate awareness of the productivity of nature, what remained unconscious phenomena of the mind's activity in transcendental idealism, could only be effected through art. In artistic production, he contended, there is an identity of thought and product. The artist has 'the most perfect knowledge of [the art product], because he is the soul of the work, because it pre-existed in his head before he exhibited it as a reality'.[80] The artist's creative imagination [*Einbildungskraft*] has the power of informing [*Einbildung*] the ideal or universal into the real or particular, and thus has the capacity to comprehend how in natural products particular material is informed by a universal form. Schelling went further and argued that artistic genii uniquely bring an element of necessity to their free creations in that they are involuntarily driven to create their works and in producing them satisfy an irresistible urge of their own nature. The product of artistic genius is thus the result of an identity of free activity with a necessary one. Moreover, the art product, if generated through creative intelligence, breaks loose therefrom, to become objective to intelligence in an external form. Thus, Schelling argued, both artistic production and its product present to consciousness the unification of necessity and freedom, of the real and the ideal. The unconscious construction of nature, the history of nature that occurs within the history of the mind but that remains inaccessible to the reflections of transcendental idealism, becomes accessible through art. Art thus offers an ideal means to comprehend natural production.[81]

The context of Jena is important for understanding Schelling's turn to art in 1800. Discussion on art and aesthetics opened up by Kant's *Critique of Judgment* were further stimulated by writings of Schiller in Jena and Goethe in nearby Weimar throughout the 1790s. But particularly important to the development of Schelling's philosophy of art was the small group of writers and critics who met regularly at the home of August Wilhelm and Caroline Schlegel between 1798 and 1800, a group that included Friedrich Schlegel and Novalis. Schelling also became a participant in the intense dialogues and debates, the intellectual exchange and collective activity, of this close circle of early German Romanticism, the product of which were highly radical theories of critique and poetry, and a new vision of the social function for the writer and critic and indeed a new vision of society.[82]

The 'gulf' between the mind and nature, between the ideal and the real, that Kant's critical philosophy opened up as a problem for reflection, and that became the central problem of Fichte's and Schelling's philosophical systems, also became a central image of early German Romanticism. The Jena Romantics regarded an awareness of incompletion as the heart of modern consciousness; modern art is distinguished by containing its own critique and thus reflection upon its fragmentation in contrast to the sense of natural form and perfection in classical art. Critique draws attention to art's demand for a completion and perfection beyond of any finite instance of it. Hence art's necessarily fragmentary presentation of any systematic whole. In an age of system building, the fragment was the only possible system that they could conceive. As Novalis expressed it: 'Every cause awakens causes; the prime origin is only the first link in the causal sequence. This sequence, however, is infinite forwards and backwards.' 'In interruption resides the concept of continuation, activity. For every reflection presupposes another; it is an act of rupturing.' [83] But if critique, stimulated by philosophical reflections of the time, opened up a sense of rupture between the ideal and its realisation even within works of art, for the Jena Romantics it was only through artistic production that the possibility of bridging that gulf lay. Critical reflection upon an individual work of art draws attention to its incompletion, but also to its potential for completion, by highlighting the creative capacity of the work. Through critical reflection upon the fragmentary work, art is reconstituted as the productive capacity of poesis, and as thus containing the synthetic totality that lies behind or before each of its particular manifestations. Critical reflection makes manifest the fragmentary nature of each work of art, its incompletion, the absence of the work at the heart of every work, the rupture at the heart of all art; but it also penetrates to the formative act which is the essence all art, the fundamental relational act which makes it a potence of completion. To cite Novalis again: 'Romanticising is nothing but a qualitative potentiation'.[84] To quote another Romantic fragment: 'All individu-

als are systems at least in embryo and tendency'.[85] The genre of the fragment is the genre of generation. It was this emphasis on the infinity of origin and ends, and on formative activity, on productivity rather than its completed products, that attracted Schelling to Romanticism.

In giving critical attention to formative activity, the Jena Romantics made a commitment to free artistic expression, a commitment which permitted, or even demanded, the unconventional and revolutionary, demanded eccentricity and dissonance, demanded pushing at the boundaries of tradition and authority, and challenging social norms, a commitment to explore the productive capacity of poesis through the exploration of all possible creative acts. This radicalism of the Jena Romantics also extended to the political. All political thinking and action at the end of the eighteenth century was shaped by the singular events of the French Revolution. As a student in Tübingen, Schelling became involved in a revolutionary circle and was accused of translating and circulating the Marseillaise.[86] Fichte was a notorious supporter of the Revolution, and an advocate of freedom in all domains of philosophy and human activity.[87] The enthusiasm of the Jena Romantics for the French Revolution was immediate and long lasting, and, with the exception of August Wilhelm Schlegel, they continued to support the Revolution even after the execution of the king, even after the invasion of Rhineland, and even after the Terror. Although, like Schiller, they held that the German people were not yet ready for a republican constitution, that the German people first needed *Bildung* and that aesthetics should be the basis of that *Bildung*. But rather than proffering neo-classical exemplars of art and culture after the manner of Goethe and Schiller, they insisted upon freedom of thought as well as action, upon the process of *Bildung* rather than its completed form. They were opposed to the elitism of Schiller and Goethe, arguing that all should participate in critique – Friedrich Schlegel even advocated universal franchise. If by 1798, they were increasingly critical of the egoism, materialism and utilitarianism of modern civil society, and called for a mix of monarchy, aristocracy and democracy, they still did not renounce republicanism and the principles of liberty, equality, and fraternity.[88] Even Novalis, who argued for a turn to Roman Catholicism and the necessity of a charismatic monarch as the inspiration of *Bildung* in a republic, is best understood as not as a reactionary but as a reformist who continued to uphold the ideals of the Revolution.[89] The political theory, like the aesthetic theory, of the Jena Romantics was innovative and critical of established norms.

As writers as well as critics, the focus of the early German Romantic aesthetics was on the verbal rather than the figurative arts. Indeed, Friedrich Schlegel, the leading theorist of this Jena circle, singled out poetry as the highest form of art, arguing that it is able to display the creative activity as a process, rather than as a state of being. He argued that the aesthetic unity of a text is not some clearly manifested objective or formal quality it possesses, but exists only

insofar as the creative activity leading to the work of art is recreated in the narrative and thus can be recreated by its reader. Schlegel famously characterised Romantic poetry as 'as in a state of becoming; that, in fact, is its real essence: that it should forever be becoming and never perfected'.[90] Hovering at the midpoint between the ideal and its realisation, Romantic poetry finds itself in the space of production, of the formation of form, the domain of poesy. It is thus only through poetry as well as criticism that art penetrates to the heart of the formative process that constitutes it. Schelling also privileged the verbal arts over the figurative arts in his philosophy of art. In the figurative arts, such as sculpture or painting, he argued, the unity of form is presented only externally to view, so that the one cannot penetrate into the inner ground of that unity. In the verbal arts, in contrast, the narrative recreates the creative activity of the artist, representing the formative process that alone can bring unity to the work of art.[91]

From the early Romantic perspective, the frameworks which Goethe and Humboldt offered as providing objective views of natural necessity were unsatisfactory in that they focused attention on being rather than becoming, on the visible product rather than its production, on the manifest effect rather than underlying generative processes. In Schelling's terms, Goethe and Humboldt aimed 'only at the *surface* of nature' rather than at 'the *inner spring work*'. Even their frameworks, the technologies they utilised in the 'production of nature', could be subject to further analysis. But in the *Naturphilosophie* that Schelling developed in the early years of the nineteenth century, at the same time as he was working out his philosophy of art, he argued that this '*inner spring work*', this formative activity, necessarily eludes specification as a particular force or metaphysical entity. As providing the relation between matter and form, the particular and the universal, between the real and the ideal at each moment, each point, each potence of mind and nature, it remains an abstract, indeterminate relation without positive being. Hence Schelling called his philosophical system of this period, a negative philosophy.

Schelling's philosophising reveals a tension between an aspiration to frame the absolute identity of the real and the ideal in a complete philosophical system, and his recognition of the failure of any particular philosophical system to do so. It is in his endless rewriting of his philosophy that he comes closest to the concept of Romantic literature, in which incompletion is inevitable. The Jena Romantics provided a radical vision of the cultural enframing of nature by pushing at the boundaries of conventions and norms in art and society. Schelling extended the questioning of normative boundaries to *Naturphilosophie*. He concluded that the history of nature eludes empirical inquiry and even philosophical reflection upon the history of the mind. The history of nature, the process of natural production, remains a dark space in our vision of a philosophy of nature, a formative act that eludes a completed formulation.

CONCLUSION

Friedrich's 1809-10 image *The Monk by the Sea* can be regarded as a vivid representation of Schelling's negative philosophy. Whereas Goethe's symbolic plant and Humboldt's portraits of nature were positive depictions of the ideal form of the natural world, the prototypes or laws necessitating all particular forms, Schelling could only conceive this relation as an absence of positive form. The problematic nature of judgments of the relation between phenomena and their conceptualisation, the rupture at the heart of *Naturphilosophie*, was the central preoccupation of Schelling's different attempts at formulating a philosophical system. It is this aspect of Schelling's philosophy in which Friedrich appears to have become interested. The way in which, in *The Monk by the Sea*, Friedrich separated the monk from the environment before him by the dark, dense strip of sea and clouds, by the disturbing space at the centre of the image that must be continually traversed by the eye in viewing the painting but that continually baffles and slows the eye, by the murky space that in effect dominates the painting and which he repeatedly, reflexively reworked, provides a striking, tangible depiction and experience of Schelling's negative philosophy.

In what came to be called the Age of Reflexion,[92] there was a cognisance of the separation of the human subject from the natural environment as the object of his or her inquiry, and thus the problematic nature of judgments regarding the history of nature. But for Goethe and Humboldt, these judgments could be made determinate. As aids to these determinate judgments, they enlisted particular technologies, a disciplined seeing informed by art or scientific instruments. That they could claim the resulting judgments were determinate was in part through ignoring the reflexive relations between these technologies and the phenomena that they made manifest. Schelling's inability to make a determinate judgment of the history of nature was due to his awareness that each experiment was a 'production of nature', that it compelled nature to answer only specific questions and could never penetrate beyond the instruments of its inquiry. What Goethe and Humboldt claimed as a necessary view of nature was for Schelling a view enframed by the techniques utilised to realise that perspective in a concrete form.

When Novalis claimed in his story *The Novices at Sais* that we should 'treat the history of [nature] as the history of humankind', he was emphasising that our views of nature are inevitably subjective, that each history of nature is the product of a particular enframing. He claimed that the ways of contemplating nature are manifold.[93] Indeed, even within the early German Romantic period there were many distinct views of nature, only three of the more influential of which have been examined here. The preference Novalis indicated in *The Novices at Sais* was, unsurprisingly, the poetic, but he acknowledged the preference of others for different paths. Novalis's claim was not, however, simply that of cultural relativism, but rather that of the necessary fragmentation and incompletion of each of our histories of nature. He understood this incom-

pletion as due to the infinity of the task, and thus the impossibility, of effecting a union between the real and the ideal. Goethe and Humboldt aspired to an ideal image of nature, to establish a normative history of nature, much as Worster does. In contrast, the radical programme of early German Romanticism was 'that it should forever be becoming and never perfected', that the history of nature as well as the history of humankind should be an endless becoming, a continual reflexive reinvention. Schelling, with his emphasis on formative activity and his endless philosophical systems, with his awareness of the impossibility of positively representing 'the *inner spring work*' of nature, came closest to this history of nature. If there is a claim to moral authority in the former history of nature, there is a moral humility in the latter.

NOTES

[1] On Caspar David Friedrich see Koerner 1990; Vaughan 1994, ch. 4; Börsch-Supan 1972 and 1974. For Friedrich's interest in *Naturphilosophie*, see Koerner 1990; Vaughan 1994: 67–8; and Hinz 1968: 219–35.
[2] Koerner 1990: 119–20.
[3] The review by Kleist, Brentanno and Arnim, 'Verschiedene Empfindungen vor einer Seelandschaft von Friedrich, worauf ein Kapuziner', is reprinted in Hinz 1968: 222–26. Also see Koerner 1990: 212–17.
[4] Koerner 1990: 131.
[5] Ibid.: Part §3, 'The Halted Traveller'.
[6] See the discussion of the contrast between Kaaz's and Friedrich's images in Vaughan 1994: 122–3. For a contemporary appreciation of Kaaz's image, see Geller 1961: 65.
[7] Koerner 1990; Vaughan 1994: 7–8; Börsch-Supan 1974: 80–1.
[8] Novalis 1960–75, 1: 84. Novalis is the pen name adopted by Friedrich von Hardenberg. On the coining of this pen name, see O'Brien 1995: 2–4.
[9] Worster et al. 1990; Cronon 1995; Soulé and Lease 1995.
[10] Cronon 1995: 25.
[11] Worster 1990: 1146–7. Also see Worster 1995.
[12] Kant 1912, ii: 451n. On Kant's distinction between a description of nature and the history of nature, see Larson 1994: 85–95; Jardine 1991: 28–9; Lyon and Sloan 1981: 1–3; Sloan 1979; and May 1971.
[13] Buffon 1749-89. On Buffon's natural history, see Sloan 1995; Larson 1994: 83–4 and 137–8; Roger 1997; and Lyon and Sloan 1981.
[14] Blumenbach 1779 and 1790. On Blumenbach, see Richards 2000; Dougherty 1996; Jardine 1991: 25–8; Lenoir 1982: 17–22; Sloan 1979; and Larson 1979.
[15] Treviranus 1802-22. On Treviranus, see Larson 1979; and Hoppe 1971.
[16] Sloan 1995; Blanckaert 1993; Wokler 1993; Glacken 1967; and Marshall and Williams 1982.
[17] Kant 1987: 183–4.
[18] Ibid.: 175–6.
[19] Ibid.: 176–9.

[20] Ibid.: 186–8. For an extended discussion of Kant's *Critique of Judgment* and its relationship to his *Critique of Pure Reason*, see Steigerwald, J. (forthcoming).
[21] Kant 1987: 223.
[22] Ibid.: 188–92, 221–6 and 186–8. On Kant's 'Critique of aesthetic judgment', see Schaper 1995; Bernstein 1992: 18–65; Eagleton 1990: 70–101; Guyer 1979; and Crawford 1974.
[23] See Vaughan 1994: 37–8; and Whyte 1994: 138.
[24] Kant 1987: 261. See Whyte 1994; and Crowther 1989.
[25] Schaper 1995: 384.
[26] An assertion Goethe, famously, made to Schiller on their first meeting. See Goethe 1988: 20. On the contrast between the beautiful and the sublime, see Kant 1987, §23. Also see Goethe's essay 'The extent to which the idea 'beauty is perfection in combination with freedom' may be applied to living organisms' in Goethe 1988: 22–4.
[27] Humboldt 1989: 45.
[28] See Vater 1978 regarding Schelling's failure to arrive at a final philosophical system.
[29] See the characterisation of Goethe as a botanising gentleman in Koerner 1995.
[30] For a different view of the influence of Goethe's administrative duties on his morphology, see Jackson 1994.
[31] Goethe 1952: 88.
[32] On Goethe's dissatisfaction with the Linnaean approach, see Goethe 1952: 159–60.
[33] On Goethe's morphology, see Lenoir 1987; and Bräuning-Oktavio 1956.
[34] Goethe 1962: 138. On Winckelmann, see Potts 1994.
[35] Goethe 1962: 251–52.
[36] On Goethe's conception of the symbol, see Todorov 1977: 201–7.
[37] Benjamin 1996: 178–84.
[38] Goethe 1948-60, 12*:* 470–1.
[39] See Goethe's essay 'On pure phenomena', in Goethe 1988: 24–5.
[40] See the essays in Goethe 1971.
[41] On Goethe's ambitions for establishing a classical German literature, see Reed 1980.
[42] See the collection of essays in Goethe 1980. For Goethe's views on art, see Hofmann 1994; and Gage 1980.
[43] Schiller 1967. See also Beiser 1992, ch. 4.
[44] Goethe 1988: 18.
[45] Goethe 1952: 85–92. Also see the essays in Goethe 1971.
[46] Goethe 1988: 24.
[47] For Schiller's letter to Goethe attributing him with an intellectual intuition, see Goethe 1948–63, 20: 13. For Goethe's note on Kantian philosophy, see Ibid., 16: 877–9.
[48] Burdach 1817: 62. See also Nyhart 1995: 35–48.
[49] On the frontispiece dedicated to Goethe and its sources, see Lichtenstern 1990: 28–33.
[50] Humboldt to Goethe, Jan. 1810, cited in Hein 1985: 51–52.
[51] Humboldt 1989: 64.
[52] On Humboldt's geography and physiognomy of plants, see Dettelbach 1996a and 1996b; Hagner 1995; Nicolson 1987; and Hein 1985.
[53] Humboldt 1902: 223.
[54] Ibid.: 346–7.
[55] Ibid.: 221.
[56] Humboldt 1989: 219.

[57] Ibid.: 230-31. See also Humboldt 1902: 59–62.
[58] Humboldt 1902: 61. See Grove 1995: 364–74.
[59] On the relationships between investment, credit and credibility, see Latour and Woolgar 1986: 238–43.
[60] Humboldt 1797.
[61] Humboldt 1989: 43–4.
[62] Ibid.: 73–4.
[63] As suggested by Dettelbach 1996a: 270. For an alternative reading of Humboldt's portrait of nature, see Hagner 1995.
[64] For details of Goethe's sketch, see Hein 1985: 50–3; and Beck 1985: 310–13.
[65] On Humboldt's maps see Nikolow 1999; Beck 1985; Engelmann 1969; and Robinson and Wallis, 1967. On maps and the history of map making see Harley 1989; Wallis and Robinson 1987; and Robinson 1982.
[66] Fara 1996: 105–17.
[67] Lambert 1779. On Lambert see Hankins and Silverman 1995: 115–25.
[68] Humboldt 1817. Also see Fara 1996: 105–17; Hankins and Silverman 1995: 115–25; and Daston 1988: 112–87.
[69] Dettelbach 1996b: 289–90 and 295–9. It would be interesting to examine to what extent, if any, Humboldt drew upon technologies for representing data being developed in the physical sciences in the early nineteenth century, especially within the scientific community in Paris, where Humboldt resided after his tropical voyage.
[70] Grove 1995: 368–73.
[71] Pratt 1992: 111–43.
[72] See Latour 1990.
[73] Humboldt 1989: 43–5.
[74] Schelling 1988: 17–19, 143–9 and 153–5. Also see Di Giovanni 1979.
[75] Schelling 1856–61, 2: 22 and 25–6.
[76] Ibid.: 3, 289.
[77] Ibid., 2*:* 299.
[78] Ibid., 3*:* 300. Also see Ibid., 2*:* 532–5.
[79] Ibid., 3*:* 275–9. Compare Goethe 1952: 85–95.
[80] Schelling 1856–61, 3*:* 276.
[81] Schelling develops these arguments in 1978, Part VI; and 1989, especially the 'Introduction' and Part I.
[82] On the theory of critique and literature of the Jena Romantics, see Benjamin 1996; Lacoue-Labarthe and Nancy 1988; and Behler 1993.
[83] Cited in Kuzniar 1987: 84 and 83.
[84] Novalis 1960-75, 304.
[85] Schlegel 1991, *AF* no. 206.
[86] Frank 1995: 15–19.
[87] On Fichte's shifting political views, see Beiser 1992: ch. 3; and Breazeale 1988. Fichte published two anonymous essays supporting the Revolution: the first essay, 'Zurückforderungder Denkfreiheit von den Fürsten Europens, die sie bisher unterdrückten: Eine Rede,' in Fichte, 1964–, I, 1: 167-92, was published anonymously in 1793; the second, 'Beitrag zur Berichtigung der Urteile des Publikums über die französische Revolution,' in Fichte 1964–, I,1: 203-404, was published in two installments in 1793 and 1794, also anonymously, but Fichte was widely recognised as its author.
[88] Beiser 1992, chs.9 and 10.

[89] Ibid., ch. 11; and O'Brien 1995: 1–7 and 121–215.
[90] Schlegel, 1991: 31–2.
[91] Schelling, 1989: 201ff.
[92] See 'Introduction: The age of reflexion', in Cunningham and Jardine 1990: 1–7.
[93] Novalis 1960–75, 1: 84–5.

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