

BEYOND HUMBOLDTIAN SCIENCE AND GOETHE'S WAY OF SCIENCE:
CHALLENGES OF ALEXANDER VON HUMBOLDT'S GEOGRAPHY

With 5 figures and 2 tables

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Zusammenfassung: Jenseits Humboldtianischer Wissenschaft und Goethes Wissenschaftsverständnis: Herausforderungen der Geographie Alexander von Humboldts

Der Beitrag beschreibt einige wegweisende Arbeiten Alexander von Humboldts (1769–1859) vor dem Hintergrund seiner Korrespondenz mit Johann Wolfgang von Goethe (1749–1832) sowie seiner Reisen durch Amerika (1799–1804). Zwei unterschiedliche Wissenschaftsverständnisse werden gegenübergestellt: Das „Humboldtianische“ und das „Goethesche Wissenschaftsverständnis“. Beide strebten stärker nach direkter Beobachtung und Studium der Natur als die im 18. Jahrhundert üblichen und kontrastierenden Methoden des Enzyklopädismus einerseits und der Naturphilosophie andererseits. Die „Humboldtianische Wissenschaftsauffassung“ betonte Objektivität sowie Maß und Zahl als Grundlage der Verallgemeinerung von Ergebnissen, während der Goethesche Ansatz auf Harmonie ausgerichtet war, die Beobachtungen sorgfältig in harmonische Zusammenhänge einbettete sowie die unvermeidbare Subjektivität menschlicher Wahrnehmung und menschlichen Verstehens propagierte. Elemente beider Vorgehensweisen sind im Werk A. von Humboldts evident. Aber es gibt auch ästhetische und empirische Facetten seiner Weltsicht, die es ihm ermöglichen, die Spannungen zwischen Objektivität und Subjektivität, zwischen makroskaligem Überblick und mikroskaligem Schauplatz, zwischen wissenschaftlicher Erklärung und künstlerischer Präsentation der Ergebnisse zu überwinden. Diese Überbrückung erfolgt durch diskursive Strategien, die auf mindestens vier Kardinaltugenden der Humboldtianischen Geographie basieren: (1) Maßstab und Lage; (2) Zeitlichkeit; (3) gesellschaftliche, soziale und kulturelle Kontexte sowie (4) der Poesie landschaftlicher Visualisierungen.

Summary: This paper describes some pioneering works of Alexander von Humboldt (1769–1859) in the light of his correspondence with Johann Wolfgang von Goethe (1749–1832), and his travels in the Americas (1799–1804). Two contrasting interpretations are sketched, i. e., those of “Humboldtian science” and “Goethe’s way of science”, both of which sought more direct observation and study of nature than those which had become conventional in the contrasting eighteenth century approaches of *Encyclopédisme* and *Naturphilosophie*. Humboldtian Science emphasized objectivity and rigour in measurement and eventual generalization of results, while Goethe’s way emphasized careful attunement to the observation process itself, and the inevitable subjectivity in human perception and understanding. Elements of both approaches are evident in the work of Humboldt. But there are aesthetic and experience-based facets of his overall vision which enable the work to transcend tensions between objectivity and subjectivity, macro-scale survey and micro-scale theatre, scientific explanation and artistic representation. This transcendence has been achieved through discursive strategies which highlight at least four cardinal sensitivities in Humboldt’s geography: (1) scale and location, (2) temporality, (3) sociality and cultural relativism, and (4) the poetics of landscape visualisation.

Introduction

The life and work of Alexander von Humboldt (1769–1859), polymath scholar and celebrated patriarch of the geographical sciences in Europe, again evokes attention at the bicentennial of his pioneering trans-Atlantic expeditions (1799–1804). Interpretations of his wide-ranging achievements are myriad, some perhaps revealing quite as much about the interpreters’ own worlds and concurrent agenda as they do about the scholar and his works. This paper attempts to locate Humboldt’s scholarly work in the context of his times by appealing to two distinct, and in some ways contrasting, perspectives: those of so-called “Humboldtian Science” on the one hand, and those associated with “Goethe’s Way of Science” on the other. Elements of both are easily discernible in Humboldt’s writings but,

the paper argues, Humboldt’s cosmic vision for a science of the humanly-inhabited earth transcended both of these. This vision was no doubt marked by experiences in the Americas of the late eighteenth century; however, many of the cognitive and practical challenges broached in Humboldt’s *oeuvre* have enduring salience for science and humanity today.

¹⁾ This paper is based on an invited plenary presentation at the International Conference on *Humboldt y la Ciencia Americana* Mexico City, August 15–19, 1999. I gratefully acknowledge the support of my colleague Professor ANNGRET SIMMS who graciously supplied copies of source materials from her extensive collection on Alexander von Humboldt. Thanks are also due to STEPHEN HANNON for graphic illustrations.

The terms Humboldtian Science and Goethe's Way of Science are twentieth century inventions, designed to encapsulate two distinct styles of enquiry into nature which were ventured during late eighteenth and early nineteenth centuries in Europe. Here was a context where nature provided new puzzles for scientists and philosophers (Fig. 1). Fresh data from geographical explorations were exciting popular imaginations, commercial ambitions, political challenges and intellectual discussions in elite and popular circles, and especially in the Court of Weimar. The Tropics especially stirred debate throughout Europe on issues of health and disease, racial diversity, tradable commodities as well as colonial administration.

Among the diverse scholarly approaches to the study of nature in late eighteenth century there was a marked contrast between those assumed by *Encyclopédisme* and *Naturphilosophie*. *Encyclopedistes* such as D'Alembert and D'Holbach projected images of nature as mechanical system – part of their optimistic vision of a better world based on the power of science and technology and politics. Such “explanations” of nature, which ignored its spiritual and aesthetic dimensions, and the prospect of applied mechanics in human affairs, evoked hostile reactions from so-called “Nature philosophers” such as Schiller, Herder and Hegel in Europe, Emerson and Thoreau in New England. Both Humboldtian Science and Goethe's Way of Science – each in its own way – sought more direct observation of nature than either of these approaches allowed. While Humboldtian Science emphasized objectivity and rigour in measurement and eventual generalization of results, Goethe's Way of Science emphasized careful attunement to the observation process itself, and the inevitable subjectivity in human perception and understanding. In the former, focus of attention is on the products of scientific enquiry and on the verifiability of its analytical procedures, while in the latter, focus rests on the scientist's gaze, and on the experience of nature as essential component of general *Bildung* (liberal education).

While resonance to both interpretations may easily be found in the work of Humboldt, there are other, in fact more enduring, dimensions to his extensive *oeuvre*. His creation was a modern field of Geography, the aims and scope of which still beckon, almost like “an impossible dream” on the horizons of that discipline. Appeals to aesthetic and ethical aspects of humanity's relationship to environment enable Humboldt's work to transcend tensions between objectivity and subjectivity, macro-scale survey and micro-scale theatre, scientific explanation and artistic representation. This is achieved in large part through an ingenious rendering of landscapes which evoke images of nature as

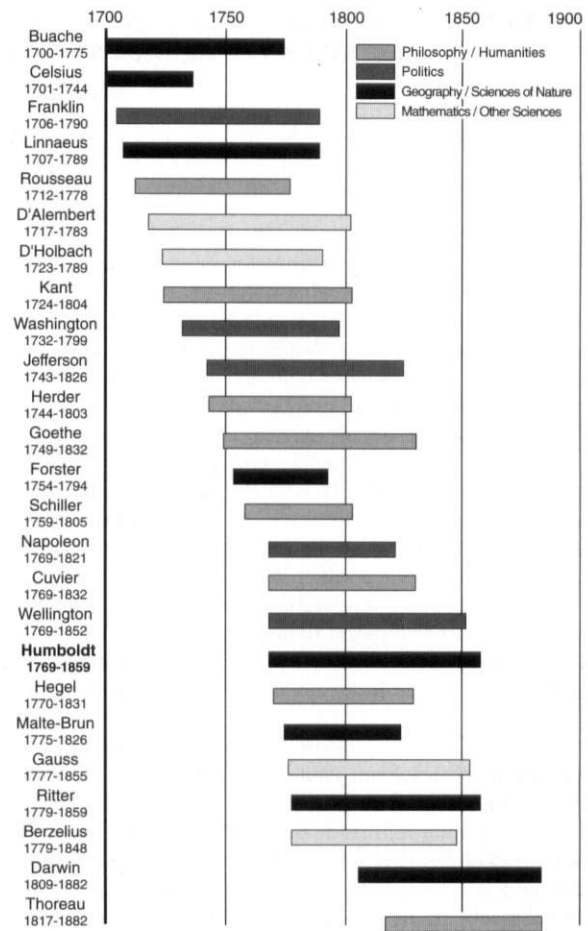


Fig. 1: Some contemporaries of Humboldt
Einige Zeitgenossen von Humboldt

diorama, involving interactions among multiple living forms, including humans. Epitome expression of this integrative and catalytic style can be found in his *Essai sur la géographie des plantes* (1805), so amply illustrated with examples from all corners of the globe, particularly the Americas.

Alexander von Humboldt (1769–1859)

Towering personality of Enlightenment times, Humboldt has been the subject of voluminous commentary, commemorated in street-names and statues, monuments and myths, an ocean current, river, a lake, a glacier, a mountain range, a lily, several ships and at least one Salzburg café. His career details have been carefully documented by historians of science and his published works retain an enduring appeal for geographers worldwide (BIERMAN 1989; BOTTING 1973; KELLNER

1963). Privately tutored and exposed to a diverse range of intellectual interests in childhood, three of these continued to evoke passion throughout his lifetime. First was natural history: 'flowers, butterflies, beetles, shells and stones were his favourite playthings' (BOTTING 1973, 12); he often wandered alone in the woods, collecting items which he then mounted and classified in various lists and sequences. Reminiscing later to a friend he wrote: 'The sight of exotic plants, even of dried specimens in a herbarium, fired my imagination and I longed to see the tropical vegetation in southern countries with my own eyes'². The germ of geographical exploration should, of course, be ascribed to a second major influence, that of George Foster, companion on Cook's circumnavigation of the world, and also an ardent "scientific traveller", whom he met at C. G. Heyne's house in Göttingen, that especially aroused his desire to travel. With Foster, Humboldt wrote later 'a new era of scientific travels began – that of comparative anthropology and geography. George Foster was the first to describe with charm the varying stages of vegetation, the climatic conditions, the nutrients in relation to the customs of people in different localities ...' (Cosmos I, 72. Cited in KELLNER 1963, 14). Thirdly, from vicarious studies during those early years in Berlin, Frankfurt and Göttingen, he imbibed the ethos underlying the French Revolution, ideals of which struck lasting chords throughout his lifetime (MAINGUET 1969, 79–83). But his main vocation was that of "scientific traveller" (DU 1970, 1):

'From my earliest youth I had been possessed by a passionate desire to travel in far-off countries, little visited by Europeans ... Having grown up in a country lacking direct contact with the two Indies and settled later in mountainous country far from the sea-coast and famed mainly for its intensive mining industry; I sensed an ever-growing impulsion towards the sea and extensive journeys ... All that which is far off and only indistinctly discernible captivates the imagination.'

It was especially this prospect of taking scientific enquiry beyond the confines of laboratory that was to constitute one of the central features of a *genre* to be labelled Humboldtian Science.

Humboldtian Science

The term Humboldtian Science has been used to denote a wave of early nineteenth century research conducted in a variety of fields ranging from 'astronomy and the physics of the earth and the biology of the

earth all viewed from a geographical standpoint, with the goal of discovering quantitative mathematical connections and interrelationships' (CANNON 1978, 77). Though not all facets of this *genre* were invented by Humboldt, it is to him that credit is given for 'elevating the whole complex into the major concern of professional science for some forty years or so' (*Ibid.*). Four of its essential elements were:

- A new insistence on accuracy ... of all instruments and all observations;
- A new mental sophistication, expressed as skepticism for past theories;
- A new set of conceptual tools: isomaps, graphs, theory of errors;
- Application of these tools to a wide variety of real phenomena, seeking laws concerning interrelationships of the physical, the biological, and even the human.

Humboldt's American expeditions were revolutionary. Previous explorers had reported on exotic phenomena but Humboldt added not only accurate measurements and scientific explanations, but also presented research results a variety of graphic, tabular and cartographic modes (GODLEWSKA 1999). Now scientists could move beyond controlled laboratory conditions and venture into the field of real life situations and engage in questions at scales potentially spanning the globe. There is little wonder that such a scientific endeavour acquired the label Humboldtian; but how well does the term capture the spirit of Humboldt's own attitudes toward science?

'It would seem that Humboldtian science, the science of measuring world-wide variables, could not come into existence even as late as 1770 because the available instruments were still too crude' (CANNON 1978, 96). For *insistence on accuracy* – of all instruments and all observations – there can be little doubt about Humboldt's rigour. Through his earlier work on barometric and geomagnetic measurements in Freiburg and Salzburg, he was thoroughly familiar with instruments and understood the importance of controlled and monitored observations. An inventor of instruments and techniques himself he was impatient about the apparent delay in applying these in scientific travel. 'I saw with regret', he wrote in the introduction to his *Voyage*, 'that whilst the number of accurate instruments was daily increasing, we were still ignorant of height of many mountains and elevated plains; of the periodical oscillations of the aerial ocean; of the limit of perpetual snow within the polar circle and on the borders of the torrid zone; of the variable intensity of magnetic forces, and of many other phenomena equally important' (HUMBOLDT 1851, x–xi). The supply of instruments carried along was truly impressive; at times, too, on

² Letter to Swiss geographer Pictet dated 3 January 1806.

the rugged mountainous terrain this must have been oppressive (HUMBOLDT 1851, xii). No effort was spared to assure precise measurements. Yet, as Cannon noted, 'Any romantic can climb a mountain; the Humboldtian wanted to use its height as a laboratory of observing extreme conditions of existence' (CANNON, *op. cit.*, 78). But for Humboldt instruments were only tools for higher scientific ends. Setting out for the Canary Islands he wrote to Friesleben in June 1799 (DE TERRA 1955, 86–87):

'... I shall collect plants and fossils, and make astronomical observations with the best of instruments. Yet this is not the main purpose of my journey. I shall endeavour to discover how nature's forces act upon one another and in what manner the geographic environment exerts its influence on animals and plants. In short, I must find out about the harmony in nature.'

The aim was therefore not simply the accumulation of 'insulated facts' (HUMBOLDT 1851, x); rather it was to understand the interconnections among diverse orders of reality. 'The great problem of the physical description of the globe, is the determination of the form of these types [of stony strata, plants and animals], the laws of their relations with each other, and the eternal ties which link the phenomena of life, and those of inanimate nature' (*Ibid.*, xi).

A second essential feature of Humboldtian Science was its contempt for easy theories of the past. Humboldt was certainly skeptical of Plutonian accounts on the formation of the earth's surface such as those taught by Werner at Göttingen. Nor had he much regard for physical geography textbooks, e. g., those of Buache, which ascribed explanatory power to hydrographic processes: 'It is, however, by a false application of the principles of hydrography that, from the depths of their armchairs, geographers have sought to determine the direction of mountain chains in countries where they think they know the exact course of the rivers' (BECK a. BONACKER 1969, xlix–l). Any theoretically-sound explanation of river systems, let alone explanations of their surrounding physiography, demanded direct work in the field, as he himself had vindicated in the case of the Orinoco (HUMBOLDT 1823, 78–80):

'It is from the intimate knowledge of the influence exerted by the inequalities of the surface, the melting of snow, periodical rains and tides, on the swiftness, the sinuosities, the contradictions, the bifurcations and the forms of the mouths of the Danube, of the Nile, of the Ganges and of the Amazon, that we form a general theory of rivers, or rather a system of empirical laws, that includes all that is common and analogous, in local and partial phenomena.'

The study of terrestrial magnetism, Cannon pointed out, was one which actually did produce an analytical law by the 1830s and this provided a model (CANNON

1978, 81). Could the same not be applied to meteorology, the tides? Humboldt preached that all matters which vary with geographical position should be measured, in their variations, such as the impact of the sun in different locations and at different heights (HUMBOLDT 1851, Vol. II; see also GODLEWSKA 1999).

A third hallmark of Humboldtian Science was the use of graphic and quantitative tools. Maps, cartograms, and other graphic techniques invented and/or employed by Humboldt were quite innovative in their day. The *Geognostical Essay* opened up new horizons with comparative cross-sections of geological structures revealing superimposition of various formations (HUMBOLDT 1823, vii, 17–19, 35–36, 465). Most characteristically Humboldtian were the global maps of geomagnetic fields, volcanic phenomena, oceanic and atmospheric conditions and the diverse Iso-maps, most basic of which was the global distribution of isotherms (HUMBOLDT 1807, 1813)³. Humboldt himself may not have been the inventor of isoline techniques⁴, but certainly the *genre* of global thematic mapping received a significant boost through his work. Indeed his experiments with isolines and various novel cartographic techniques were both evocative and analytically effective (HUMBOLDT 1807, 1813). Isothermal conditions were later to become the essential cartographic grid on to which diverse global distributions would be plotted in the Berghaus' *Physikalischer Atlas*: maps of global wind systems, ocean currents and precipitation patterns, as well as the global distributions of cultivated crops, reptiles, birds and human populations (BERGHAUS et al. 1849, 1851).

Humboldtian Science thus marked a triumph for empiricism and, aided by more powerful analytical instruments, rendered nature a legitimate domain for direct observation, measurement and explanation. Alexander von Humboldt's work on earth magnetism, geology, botany, hydrographic and climatic patterns – and particularly the salience of isothermal maps as bases for understanding patterns of vegetation, settlement, health and disease – all qualify as ideal illustrations of this *genre*. An alternative set of interpretations could, however, be rallied to his work. In many ways his reflections on nature, landscape and life resonate with quite a contrasting approach to science, i. e., approaches intimated in the writings of Johann Wolfgang von Goethe (1749–1832). Goethe's Way of Science

³ Humboldt's essay "On Isothermal Lines" was published serially in English translation in the *Edinburgh Philosophical Journal* from 1820 to 1822.

⁴ Halley had developed isoline techniques to represent patterns of magnetic declination almost a century earlier.

daringly revealed subjective aspects of nature experience, unmasking the salience of aesthetic and emotional dimensions in human understandings of nature, ways of life, and humanity's relationships to environment. In contrast with the alleged objectivity of Humboldtian science, Goethe's way emphasized *Gegenständliches Denken*, an object-based mode of understanding, a so-called "delicate empiricism" which implied an intimate engagement with phenomena so that they could reveal themselves in their full context to the observer, thereby eliciting new organs of perception (SEAMON a. ZAJONC 1998). There are echoes of these objectives in Humboldt's personal narratives, and also in his essays on plant geography, the subject most closely associated with Goethe.

Goethe's Way of Science

Johann Wolfgang von Goethe (1749–1832), most celebrated for his poetic legacy, was also keenly interested in science. Yet the directions assumed by *Encyclopédistes* perturbed him. D'Holbach's (1770) *Système de la nature* appeared to him as 'so dark, so Cimmerian, so death-like, that we found it a trouble to endure its presence, and shuddered at it as at a spectre' (GOETHE 1971, 108):

'A system of nature is announced; and ... we would willingly have heard both particulars and generals about suns and stars, planets and moons, mountains, valleys, rivers and seas, with all that live and move in them ... But how hollow and empty did we feel in this melancholy, atheistical half-night, in which earth vanished with all its images, heaven with all its stars. There was to be matter in motion, right and left and in every direction, without anything further, it was to produce the infinite phenomena of existence' (*Ibid.* 109–110).

Neither was he impressed with the *Naturphilosophie* of the day. 'For philosophy in the proper sense', Goethe wrote, 'I had no organ' (HA XIII, 25)⁵. Invited to the Weimar Court in 1775 by Duke Karl August, he proceeded to sway opinions in the direction of empirical observations of nature. Schiller, who visited Weimar when Goethe was in Italy, lamented in a (1787) letter to Körner (MAGNUS 1949, 18):

'The spirit of Goethe has molded everyone in his circle. He and his whole local sect are marked by a proud contempt of philosophical speculation and inquiry, coupled with an attachment to nature sometimes driven to the point of affectation, a resignation to the five senses – in short, a certain childlike simplicity of the mind.'

Schiller was equally harsh in his judgements of Humboldt. Ten years later in another letter to Körner (Cited in DU 1970, 613–614) he wrote:

'... A small-minded restless vanity inspires his entire work. I cannot find in him a single spark of purely objective interest;

and ... it seems to me that he shows a shallowness of intellect that is most unfortunate in those subjects which he treats. He shamelessly applies naked analytical reason to the measurement of nature: to nature which is venerable, inscrutable and forever ungraspable. [Alexander impresses very many, and wins most times in comparison with his brother, because he has a mouth (*Maul*) and usually makes an impression. On any absolute scale of values, however, I cannot at all put them equal to each other, to me Wilhelm is so much more worthy of respect.]'

The judgement reveals quite as much of Schiller's biases as it does about Humboldt who, at that time and throughout his career, believed in empirical observation, scientific procedures, as necessary foundations for knowledge of nature⁶. Relationships among these three – Goethe, Humboldt and Schiller – were no doubt quite complex (MAINGUET 1969, 50; 74–78), but there is strong evidence that Goethe's interest in science was strongly influenced by Humboldt (SÄLLSTRÖM 1995). 'It is useless to attempt to express the nature of a thing abstractly' he wrote in the Preface to his *Theory of Colour*, '... colours are the deeds of light; its deeds and sufferings; thus considered we may expect from them some explanation respecting light itself' (HA XIII, 315). Empirical enquiry for him should involve several stages – observing, experimenting, reflecting, and associating – at each phase of which the observer should be constantly aware of the stance from which objects were being regarded (HA XIII, 317). His own botanical and anatomical experiments in Jena, however, were all conducted with the conviction that there was far more unity in nature than was generally supposed, and also that humanity was far more closely related to the rest of creation than idealist philosophers would acknowledge. Far from decrying the value of sensory perceptions, too, Goethe wrote: 'The senses do not deceive; it is judgement that deceives' (Maximen und Reflexionen, no. 295. HA XII, 406). For him the eye is an organ that

⁵ HA refers to Hamburger Ausgabe, the 14 volume edition of TRUNZ, ERICH (Ed.) (1981): *Goethes Werke, Naturwissenschaftliche Schriften*. München.

⁶ Many years later, on 11 May 1858, when invited to contribute to a memorial volume for Schiller, he wrote, (BIERMANN 1989): 'I have never been close to Schiller in my entire life ... The great man also seems to have a very low opinion of my abilities ...' He wrote in a letter to Körner: 'Alexander von Humboldt has limited reason' and even added prophetically: 'in spite of all his restless activity he will never achieve anything great in his field. I read this verdict in printed form when I came back from my Siberian journey ... My good man, you should not ask scientists to contribute to the grand memorial you are erecting; rather you should only invite those who can energetically supply eloquence for their feelings and admiration.'

is eminently active in the *systole* and *diastole* of transmitting percepts from the outer world to the eye of the mind, while at the same time creating new ones inwardly in response, adding them to those received from without (HA XIII, 446, no. 590).

‘The eye owes its existence to the light. Out of indifferent animal organs the light produces an organ corresponding to itself, and so the eye is formed by this light for the light so that the inner light may greet the outer ... If the eye were not sun-like how could we perceive the light?’

All too often, he believed, the methods and recording instruments of conventional science separated the student from the thing studied and led to inaccurate understanding. ‘The eyes of the spirit should work in living connection with those of the body’ he wrote, ‘for one otherwise risks seeing yet seeing past a thing’ (GOETHE, trans. 1989, 106). In fact, anticipating somewhat a point which is now taken-for-granted in philosophy of science, he noted: ‘Every act of seeing leads to consideration, consideration to reflection, reflection to association, and thus it may be said that in every attentive look on nature we already theorize’ (HA XIII, 317). ‘Yet how difficult it is not to put the sign in the place of the thing; how difficult to keep the being (*Wesen*) always vividly before one and not to slay it with the word’ (HA XIII, 452). ‘The highest thing would be to comprehend that everything factual is already theory. The blue of the heavens reveals to us the fundamental law of chromatics. One should only not seek anything behind the phenomena: they themselves are the theory’ (HA, XII, 432, no. 488. Trans. F. AMRINE).

Goethe labelled this new approach to a science of nature as a delicate empiricism that ‘makes itself in the most intimate way identical with its objects and thereby becomes actual theory’ (HA XII, 435, 509). Beginning with empirical phenomena – simple observations, one could reach higher awareness by varying the conditions under which the phenomenon appears. Thus the pre-conditions for its appearance become apparent. Such instances he termed ‘scientific phenomena’. But one should not linger at this level of understanding: the scientist should seek the *Urphänomen* (lit. ‘archetypal phenomenon’) – the highest level of experience for the natural scientist. In his *Italienische Reise* he noted the one fundamental form (“the leaf”) proceeding through all changes of shape (HA XI, 375):

‘... it occurred to me that within the organ of the plant which we are wont to term the leaf lies hidden the true Proteus, who is able to conceal and to reveal himself in all formations. Forwards and backwards the plant is always leaf, and leaf alone, so inseparably united with the future seed that one is unable to think one without the other.’

Scientific understanding is therefore not so much a discursive, explanatory process as a moment of insight or

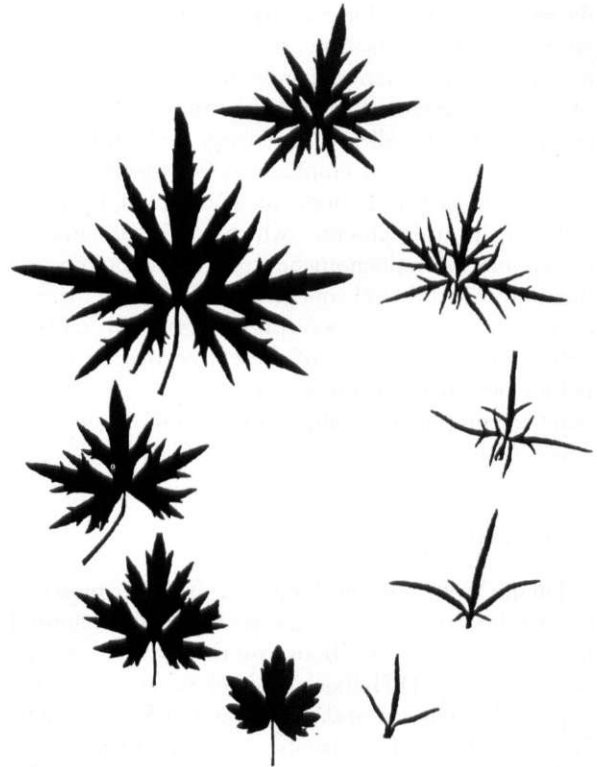


Fig. 2: Leaves taken from the common buttercup (*Ranunculus acris*). Ordered from bottom of stem (lowest left) to top (bottom right)

Source: BRADY (1998, 94). Reprinted with permission from State University of New York Press.

Blätter des gemeinen Hahnenfuß (*Ranunculus acris*). Angeordnet von den bodennahen Blättern (unten links) bis zu den Spitzentrieben (unten rechts)

aperçu. ‘Each phenomenon in nature, rightly observed, wakens in us a new organ of inner understanding’ (GOETHE 1952, 235; cf. HA XIII, 38). In a letter to Soret (1823) he wrote ‘In science ... all efficacy lies in the *aperçu*’. Instead of searching for causal explanations – one should not anyhow separate cause from effect – the phenomenon should be taken as a whole within the ‘essential circumstances under which the phenomenon occurs’ (HA XIII, 446, no. 591). The *Urphänomen* = the primordial pattern or process of a thing (essential core of a thing that makes it what it is and what it becomes)⁷⁾. In his *Metamorphose der Pflanzen* (1790) Goethe recognised the *Urphänomen* of the plant as arising out of the interplay between two opposing forces: the ‘vertical

⁷⁾ Schiller complained to Goethe that his *Urphänomen* was synonymous with the Platonic ideal, but Goethe refused to accept that characterization (BRADY 1996).

Table 1: Career interests: Goethe and Humboldt

Interessen im Verlauf des Werdegangs bei Goethe und Humboldt

GOETHE 1749–1832			HUMBOLDT 1769–1859		
YR	AGE	INTERESTS/PROJECTS	YR	AGE	INTERESTS/PROJECTS
1778	29	Geology, mineralogy, osteology			
1784	35	<i>Os intermaxillare</i> ; botany and zoology			
1790	41	<i>Metamorphose der Pflanzen</i> ; Colours	1790	21	<i>Mineralogische Beobachtungen über einige Basalte am Rhein</i>
1791	42	<i>Beiträge der Optik</i>	1794	25	Visit to Goethe
			1797	28	<i>Versuche über die gereizte Muskel und Nervenfasern</i>
1798	49	Astronomical observations			
1805	56	Lectures on physics and chemistry	1799–1804	30–35	American Voyages + Bonpland
			1805–1834	36–65	<i>Voyageaux régions équinoxiales du Nouveau Continent</i>
					<i>Ansichten der Natur</i>
1810	61	<i>Entwurf einer Farbenlehre</i>			
1814	65	Studies on cloud formations			
1825	76	<i>Versuch einer Witterungslehre</i>			
			1827	58	Lectures on Physical Description of Earth
1832	82	Studies on the rainbow			
			1834	65	Started work on <i>Kosmos</i>
			1843	74	<i>Asie Centrale ...</i>
			1845–1858	76–89	<i>Kosmos I–IV</i>
			1853	84	<i>Kleinere Schriften + Atlas</i>
			1862	postum	<i>Kosmos V + Index</i>

tendency' (the plant's inescapable need to grow upward) and the 'horizontal tendency' (the nourishing, expanding principle that gives solidity to the plant). Pivotal is the primordial leaf, from which all plants spring and to which they invariably conform⁸⁾ (Fig. 2). In the same year he began the study of colour – a study which lasted until he published his *Theory of Color* in 1810.

For Goethe thus, the rift between subject and object is bridged as thought becomes *Anschauen* and *Anschauen* thought. As thought comes alive in nature, and nature comes alive in the activity of thinking, knowledge of world and knowledge of self unite at a higher level:

'... Man knows himself only to the extent that he knows the world; he becomes aware of himself only within the world, and aware of the world only within himself. Every object, well contemplated, opens up a new organ in us' (HA XIII, 38).

Four essential features of "Goethe's Way of Science" might be summarised as follows:

– New ways to study nature (beyond *Encyclopedisme* and *Naturphilosophie*):

⁸⁾ Similarly in *Einleitung in die vergleichende Anatomie* (1795) he shows the symmetry and perfect adaptation of means to ends which prevails in every part of organized nature and which man should emulate (SELSS 1875, 128).

'Delicate empiricism' involving observation – reflection – association

Gegenständliches Denken: object elucidated in context

– Transcending split of subject and object:

Experiment as mediator: Trusting human senses rather than instruments

Eye as organ to perceive unity in diversity: *Anschauen* as constructive

– Metamorphosis as essential feature of life, emerging from tensions between opposites:

Light – dark, Diastole – Systole, Inhalation – exhalation

Urphänomen (e. g. the leaf): Cause and effect inseparable

Nature study and *Bildung*: metamorphosis of the scientist

– World as expression of universal idea.

Humboldt and Goethe

Though separated in age by twenty years, Goethe and Humboldt found many common interests (Tab. 1). In March 1794 they met in Jena, a context where lively debates stirred on questions of science and philosophy



Fig. 3: Vignette of the dedication panel of Humboldt's *Ideen zu einer Geographie der Pflanzen*
 Source: HEIN, W.-H. (1985) (Hrsg.): Alexander von Humboldt. Leben und Werk. Frankfurt a. M., 51.

Vignette der Widmungstafel zu Humboldts *Ideen zu einer Geographie der Pflanzen*

among scholars such as Hegel, Kant, Schiller, and Alexander's brother Wilhelm von Humboldt. This was the year when his inspiring companion, George Foster, died at age 40, and Alexander had been employed by Prince Hardenberg in the preparation for the peace of Basle between Prussia and France.

Now aged 25, he had completed civil service duty as Inspector of Mines, invented safety lamps and a gas mask, conducted electric experiments on live animals (and even on himself). He was still interested in botany, a field which also intrigued Goethe. At age 45, Goethe had already completed work in geology and biology, *Os intermaxillare* (1784) and *Beiträge der Optik* (1791). The frontispiece of Humboldt's *Ideen zur einer Geographie der Pflanzen* (1809) left little doubt of his conviction that there was room for the poetic as well as the analytical in the study of plants (Fig. 3).

By 1794 Goethe had reached a kind of plateau in his scholarly efforts – *Faust* had not yet begun (BOTTING 1973, 37). But Alexander von Humboldt was among a chosen few who were welcomed at both Jena and Weimar. 'He is a true *cornu copiae* of natural science', Goethe wrote to Karl-August, 'His company is very stimulating and interesting indeed. You couldn't learn as much from books in a week as he teaches you in an hour' (cited in BOTTING, *op. cit.* 38). The benefits were mutual. Humboldt remarked 'Being with Goethe is like being equipped with new organs' (*Ibid.*). The two men attended lectures by Loder on tendons and ligaments

and it was at this time that Goethe shared his own views on comparative anatomy. Alexander was apparently quite impressed and it was due to his urgings that Goethe agreed to complete his *Einleitung in die vergleichende Anatomie* (MAGNUS 1949, 22, 97). Both men maintained scholarly endeavours throughout their lifetimes (Tab. 1). Recognising the value of dialogue between their two approaches to nature, Goethe wrote on June 18, 1795 to Alexander (GEIGER 1909, 292):

'Do tell me, from time to time, about your experiences and be sure of my vital interest in participation. Your observations start from the *Element* and mine from the *Gestalt*, so we could not hasten too much to meet each other in the middle. I am grateful for the share in your works that you also will give me publicly; I am indeed flattered by this proof of your friendship.'

In 1797, Humboldt again spent three months in Jena, associating with Goethe and Schiller (BIERMANN 1989, 94). Impressions from this time were vital for Humboldt's future work.

Humboldtian science and Goethe's way: Reflections on transatlantic voyages

Already in Teneriffe Humboldt was struck by elements of the natural surroundings – fragrances, luminosity, shifting horizons and vistas which were not easily measurable but nevertheless essential aspects in the observation of nature. Overlooking the port of Oratava, he reported: 'The seeming proximity in which, from the summit of the peak, we behold the hamlets, the vineyards, and the gardens of the coast, is increased by the prodigious transparency of the atmosphere ... In every zone, an object placed on a level with the sea, and viewed in a horizontal direction, appears less luminous than when seen from the top of a mountain, where vapours arrive after passing through strata of air of decreasing density ... In proportion as the air is pure and serene, the solution of the vapours becomes more complete, and the light loses less in its passage (HUMBOLDT a. BONPLAND 1851, 82). Did this not reveal awareness of an essential maxim in Goethe's Way – trusting the senses and also acknowledging qualitative variations in light and colour? 'The goals for which I strove', he wrote in *Ansichten der Natur* (HUMBOLDT 1808, 1–2), 'were to depict nature in its prime traits, to find proof of the interworking of (natural) forces, and to achieve a sense of enjoyment which the immediate view gives to sensitive man ...' Nature study, he noted, demands multi-sensory perception (*Ibid.* 283):

'The impression which is left on us by observation of nature is less determined by the character of the landscape, than by the illumination through which mountains and plains

appear – now in the ethereal blue of the sky, now in the shadow of low floating clouds. Similarly, descriptions of nature impress us more or less according to the degree to which they agree with the needs of our feelings; for the physical world is mirrored vividly and truly in the inner feelings.'

The very first product from his American observations, *Naturgemälde der Tropenwelt: Geographie der Pflanzen in den Tropen-Ländern, ein Naturgemälde der Anden* (Tübingen, 1807) was dedicated to Goethe (BIERMANN 1989, 116) (Fig. 3). Goethe was thrilled. In a letter dated 3 April 1807 he regarded this as 'an honour which could not be more delightful' (GEIGER 1909, 299–300). He read the text carefully, and also tried to visualize these exotic scenes graphically – applying his own principle of understanding via a process he called *Exakte Sinnliche Phantasie* (lit. exact sensorial fantasy):

'I have read through the volume several times with great attention and I have begun – even without the promised cross-sectional diagram, to imagine a landscape myself where, at a scale of 4 000 toises [approx. 8 000 m] to a page, the heights of the European and American mountains are sketched side by side; the snowlines and the vegetation are also sketched⁹. I enclose a copy of this sketch, partly for fun, partly seriously, and I ask you to make corrections on it with feather pen and with colours if you like, and also to make some notes on the page and return it to me as soon as possible.'

Humboldt's cross-sectional diagram was slow in coming so Goethe sent a reminder, with a request for his CV, and an assurance that reports from the Tropics were a most valuable resource for social obligations at Weimar Court: 'I find nothing more interesting and suitable than to lay your works before [our revered reigning Duchess, the Princess and some ladies] as bases for discussion on general issues, as you yourself have done (GEIGER 1909, 299). Two years later, on 5 October 1809, Goethe wrote from Jena to thank Humboldt for accepting responsibility for a young colleague named Voigt, and enclosed his latest novel, *Wahlverwandtschaften*, noting 'You will certainly be happy to find your name uttered by such beautiful lips'¹⁰. He adds 'What you have achieved for us goes far beyond the prose itself; indeed poetry should count you among its full-blown heroes' (GEIGER 1909, 303). Humboldt responded, 3 January 1810 (GEIGER 1909, 304), deploring his tardiness in writing, but openly revealing his debt to Goethe (*Ibid.* 304–306):

'Nature and art are closely affiliated in my work. If you are pleased with my work then realise how important your over-

whelming influence has been for me. I have no right to expect a letter from you but I admit that a public word from you, a simple manifestation of your pleasure with my work, the mention of my name in any of your writings, would give me great pleasure.'

His views on Voigt are positive, and useful in confirming his support for "Goethe's Way":

'The young Voigt is well disposed for studies of nature ... [he] shows a pleasant blend of observation, feeling and abstraction. Nature must be experienced through feelings; those who only observe and reach abstractions can spend a life-time classifying plants and animals in the hot tropics and believe that they describe nature but they will never get close to it. In one's capacity to experience nature success and failure are closely associated. If feelings are unfocussed the result will be only dreams of nature phenomena ...'

In 1810 Paris, Humboldt is gloomy and longs to be back in the tropics: 'The desire to experience nature in all its grandeur – the solitude of forests under the free sky – have now dampened my spirit. But this fortunately does not disturb my work and does not let my courage sink. My health – a lot of rheumatic pains as a result of damp forest in the tropics, a sore arm, I will not talk about any of these. I will feel better as soon as I will be back in a hotter climate' (*Ibid.*). 'And what about your great optical work which is so eagerly awaited? I hear that most of it has been printed. Let it come out quickly so that you can observe the results of your great work.' Between 1817 and 1824 Goethe indeed published volumes *On Natural Science* and *On Morphology* 'Without these activities', he claimed, 'I would never have come to know man as he is' (cited in ZAJONC 1998, 23).

Scant though it may be¹¹, correspondence between Goethe and Humboldt does reveal some elements of mutual influence. Humboldt certainly acknowledged his debt to Goethe in a letter to Caroline von Wolzogen from Berlin, 14. 5. 1806 (BIERMANN, *op. cit.* 180):

'In the forests of the Amazon River, as on the edges of the high Andes, I got the feeling – that, as if animated by a spirit from pole to pole, one single life has been infiltrated into stones, plants and animals, as well as in the swelling breast of mankind. Everywhere I became filled with the feeling of how powerfully those relationships which were forged at Jena are influencing me now, and how, uplifted by Goethe's perspectives on Nature, I have almost acquired new organs of perception'.¹²

¹¹ Humboldt claimed that he had burned most of his correspondence.

¹² 'The idea is eternal and unitary', Goethe wrote, 'All that of which we become aware and of which we can speak are only manifestations of the idea' (HA XII, 366, no. 12; BRADY 1998).

⁹ In 1813 Goethe ordered his wall chart to be printed (MAGNUS 1949, 119).

¹⁰ Otilia: 'How I long to hear again the narratives of Humboldt!'

Twenty years later, in the course of his Siberian journeys, he met Goethe again and wrote enthusiastically to his brother Wilhelm on December 13, 1826: 'I cannot describe the good will by which I was received at the Weimar Court by Goethe, by the Russian Grand Duchess, whose daughters are truly noble ... Goethe is wonderful, full of energy and amiable ...' (GEIGER 1909, 199). In November 1827 Humboldt entertained large public audiences to a series of lectures on a physical description of the earth – a series which became the basis of his *Cosmos*. In a letter to Zelter dated 28 January 1828, Goethe praises these lectures (KELLNER, *op. cit.* 116):

'I must now mention the great pleasure which Humboldt's magnificently rich colloquium on the miracles of nature gave me, a colloquium held in front of a most respectable audience of thousands. There is a man of my own kind who gives what he has, without grudge and without knowing to whom. He does not get any favours from it; there is no artifice, no mere wordiness. Even when he is wrong, it is a pleasure to believe him.'

Later he wrote to Count Sternberg (MAGNUS 1949, 33–34):

'I am like an ancient mariner who has spent his life traveling from isle to isle in the ocean of Nature; who has observed the rarest marvels ... but who, paying heed to oar and sail and helm, has been unable to devote himself to these tempting sights. Now at long last I have learned and seen with my own eyes that the immeasurable abyss has been fathomed; that the infinite variety of form deriving from utter simplicity has been lifted into the light of day in all its interrelationships; and that the great work, beyond all belief, has been truly done.'

Cosmic cornu copiae. Scientific and poetic dimensions of Humboldt's oeuvre

Beyond elements of Humboldtian Science and of Goethe's Way, there are other unique and perennially striking features of Humboldt's work as a whole. Humboldtian Science is epitomised in the quest for comparative and general insight into meteorological, volcanic, or botanical phenomena; daringly innovative theories and hypotheses still worthy of exploration were framed, and cosmic horizons sketched on the interconnectedness of all life on earth which anticipated by two centuries some cosmological theories and Gaia-thinking of the late twentieth century. Goethe's way of science is also discernible in *Gestalt* impressions of particular scenes and places – of *dioramas* which afforded tangible expression of unity in diversity, particularly in the Tropics. Beyond the evidence of personal involvement – experientially-grounded narrative – there are elements of

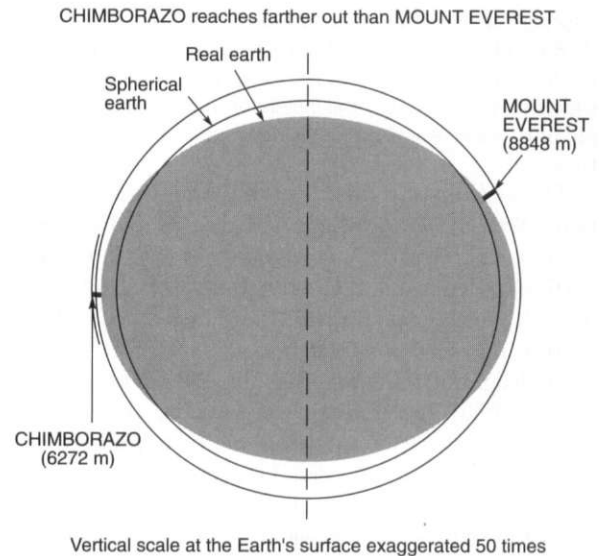


Fig. 4: Chimborazo from the Earth's Centre

Because the earth is flattened at the poles, Chimborazo, which is located close to the Equator, extends more than 1 km out from the centre of the earth than Mount Everest, even though the latter, measured from sea level, is more than 2 km higher. This figure exaggerates the vertical scale by a factor of 50 near the surface of the earth.

Source: Sketch by BERTRAM BROBERG

Chimborazo vom Erdmittelpunkt

Weil die Erde an den Polen abgeflacht ist, erscheint der Chimborazo, der in der Nähe des Äquators gelegen ist, über 1 km höher als Mount Everest, obwohl Letzterer, auf das Meeresniveau bezogen, mehr als 2 km höher ist. In der Abbildung ist die Vertikale 50fach überhöht

Humboldt's discursive style which enabled his texts to open wider horizons than those of either Humboldtian Science or of Goethe's Way. First, there is a sensitivity to scale, spatial distribution and comparative method; secondly, there is sensitivity to temporality, rhythmicity, dynamism and change in all aspects of physical and human worlds; thirdly, there is sensitivity to social worlds, harangues against Eurocentrism and slavery, and appreciation of universal bonds among human civilizations; fourthly, and perhaps most importantly, his visual language and succinct graphic expressions of landscapes and lifeways. His most important legacy, however, perhaps consists in the poetics of his discourse, i. e., the invitations to discovery, in many fields, on the intimate reciprocities of art and science, on the role of Nature in literary imagination and landscape painting, and on the philosophical import of direct sensory experience of the natural world. And nowhere are these features better exemplified than they are in

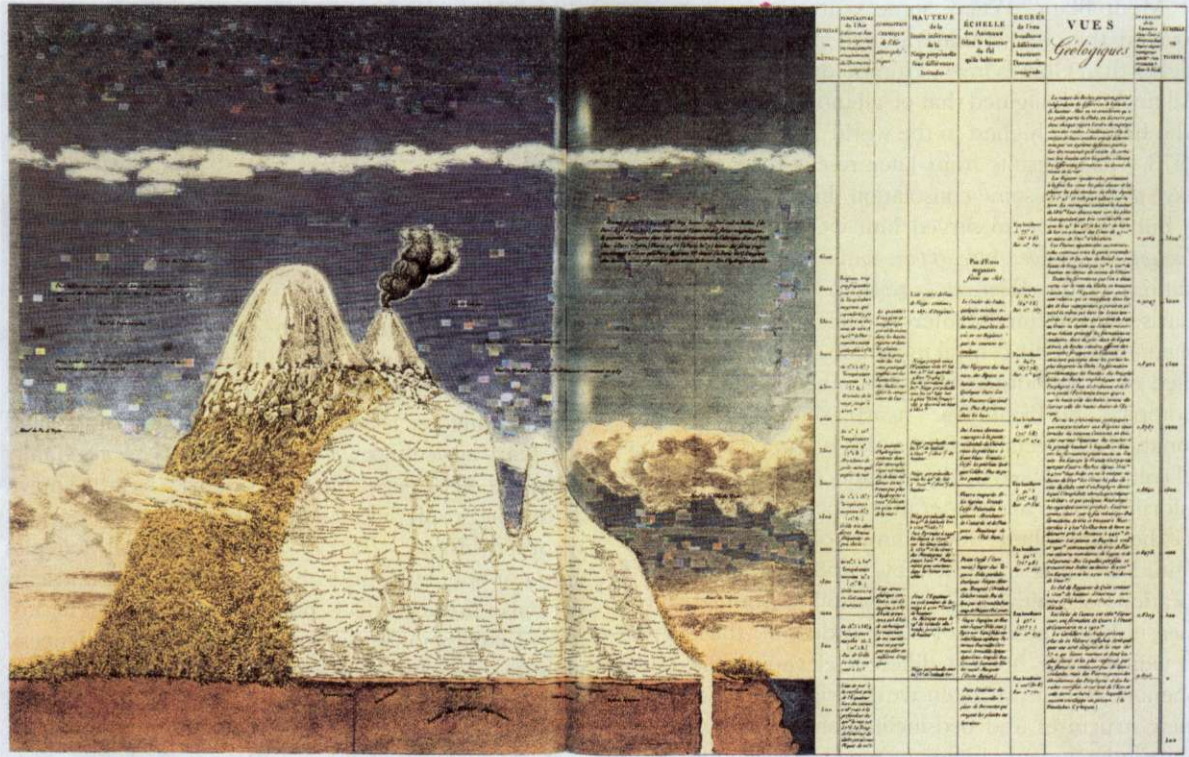


Fig. 5: Géographie des plantes équinoxiales. Tableaux des Andes et Pays Voisins

Source: Voyage de Humboldt et Bonpland: voyage aux régions équinoxiales du nouveau continent, Vè partie: Essai sur la géographie des plantes. Paris: Theatrum orbis terrarum 1805. (Facs intégral de l'édition 1805–1834).

Geographie der Pflanzen in den Tropenländern; ein Naturgemälde der Anden

the succinct *Essai sur la géographie des plantes* (1805), a work which bristles with insight and contains in microcosm the main themes of his *Cosmos*¹³.

– Scale and location: Comparisons and contrasts between Old World and New abound in Humboldt's enquiries into bio-physical features of the earth. He enjoys demolishing earlier theories regarding the age of the earth, the size and elevation of the continents, the lower limits of the snowline in different parts of the earth, and most especially the flora and fauna which carpet its surface. Chief among his innovations as *physicien*, of course, were not only the maps of geomagnetic fields and magnetic declinations, but also the firm establishment of vulcanism as one major cause underlying the formation of mountain chains. Geographically-speaking, it was not just the locations of

phenomena which mattered, it was their distributions in multi-dimensional space and time. As narrator of scientific travel he frequently pauses to remind readers of the stances from which phenomena were being viewed. On the foreground of Plate XVI of *Vues des Cordillères* he notes: (HUMBOLDT 1814, 234–235):

‘The plain of Tapia which I have sketched the group of Chimborazo and Carguaiazo, has an absolute elevation of 2891 metres; it is only a sixth less elevated than the top of Etna. The summit of Chimborazo does not therefore surpass the height of this plain more than 3640 metres, which is 84 metres less than the height of the top of Mount Blanc above the priory of Chamonix; for the difference between Chimborazo and Mt Blanc is nearly equal to that which is observed between the elevation of the plain of Tapia and the bottom of the valley of Chamonix.’

Alexander, Bonpland and Montufar climbed, with all their instruments through thick fog and their barometer recorded a height of nearly 19 286 feet, a world record at the time. Humboldt was proud to note that measurements could be made with the magnetic needle at a height which was 1100 metres higher than the top

¹³ The *Essai sur la géographie des plantes* was announced as a lecture to a course on mathematical and physical sciences at the Institut national dated, according to the French Republican Calendar, 17 Nivôse de l'an 13.

of Mont Blanc. When, some years later, it was discovered that the Himalayas had peaks considerably higher than Chimborazo, Humboldt was disappointed: 'All my life I imagined that of all mortals, I was the one who had risen highest in the world' (Cited in BOTTING 1973, 155). Results from later research would surely have given him some consolation (Fig. 4).

But Chimborazo served him well. Sketches in the *Tableau physique des Andes et pays voisins* – intended as illustrations of the *Essai sur la géographie des plantes* – summarises lessons on the interconnectedness of terrestrial phenomena. One central mountain, presumably modelled on Chimborazo, with two others – presumably Cotopaxi and Pichincha – nearby show the altitudinal zonation of vegetation forms; this is framed with parallel columns marked off by altitude, containing relevant information on air temperature, chemical composition of the atmosphere, lower limits of snow in various latitudes, zones inhabited by various animals, zonal locations of cultivated crops, visibility from sea level, measures of intensity of solar radiation, the degrees at which water boils at different elevations, electrical phenomena, and an extensive description of rock types, their structures and bed-inclinations which (although quite independent of climate) may be relevant for plant growth (Fig. 5).

Anomalies in the distribution of vegetation types also evoked reflections on scale and location. On the Central Mexican plateau, for example, one found oak and pine growing at elevations between 1500 and 3000 meters. 'On the eastern slopes of the Cordillera, in the valleys of Xalapa, one finds a vast forest of liquidambar: the soils, vegetation and climate have the character of temperate lands; a case which one could not find anywhere else at this elevation' (*Ibid.* 16). The reason has to do with the shape of the American continent – expanding spatially northwards (much more than in Europe); this makes the climate of Mexico colder than it should be, given its latitude and elevation above sea-level (*Ibid.* 16–17). In Europe, by way of contrast, the fracture of the Straits of Gibraltar and the formation of the Mediterranean basin has prevented the migration of African plants to southern Europe – one finds very few of these north of the Pyrenees. To understand patterns on any landscape, therefore, one needed to understand the diverse timescales involved.

– Temporality: For Humboldt nothing was regarded as static on planet earth: all phenomena were in process of evolution, however diverse were their temporal rhythms. Still perhaps seeking some kind of *Urphänomen*, Humboldt was fascinated by the germs of cryptogams which, he noted, 'would seem to be the only ones which nature develops spontaneously in all climates'

(*Ibid.* 20). 'To sort out the big question of plant migrations', he insisted, 'plant geography must descend into the interior of the globe' (*Ibid.* 21–22):

'... to the graves of our planet's first vegetation¹⁴). It would find petrified fruits of India, palm trees, tropical bamboo, buried in the frozen ground of the North; it could witness the occurrence of equatorial life such as elephant bones, crocodiles – recently discovered in Europe: were these brought to temperate climates by currents in a submerged world, or did these regions themselves once nourish palm trees, crocodiles and bamboo?'

Humboldt was more inclined toward the latter opinion. He speculates on possibilities of climate change and 'perturbations of our planetary system' before commenting on records of plant domestication and sedentary agriculture (*Ibid.* 23–24). Plants have certainly migrated, he affirms, 'but their origins is as little known as the origin of different human races as far back as recorded history' (*Ibid.* 23–24). Agricultural activities vary not only by latitude, he continues; plant nutrients vary also in their effects on human passions. The history of navigation and wars are replete with evidence of contests over dominance of the 'vegetable kingdom': 'see how the geography of plants is linked to the political and moral history of humanity' (*Ibid.* 29–30).

Such ruminations about spatio-temporal elements in global vegetation struck a chord with scholars such as Charles Lyell (1797–1875) and Charles Darwin (1809–1882). Lyell, schooled in the descriptive and local-area based geology practiced in Britain at the time, not only found Humboldt's "catastrophism" a refreshing alternative to Neptunist, he also found the links between geology and biology, as intimated in the *Essai* to be quite liberating. Lyell continued to research the intersection zones of geology and biology, using the isothermal lines as basis for his own investigations into climate change. Darwin, too, was inspired by the *Essai*, and even more by the *Personal Narrative to the Equinoctial Regions of America*. The Dragon Tree of Teneriffe lured him to the tropics' (ARMSTRONG 1999). Arriving in Rio de Janeiro in 1832, Darwin wrote to Henslow, 'I formerly admired Humboldt, I now almost adore him; he alone gives any notion of the feelings which are raised in the mind on first entering the Tropics (Darwin to Henslow, May 18, 1832).

¹⁴) There is a warning, however (*Ibid.* 21): 'We still know so little about products of the earth's interior that we should refrain from all general conclusions; otherwise we risk falling into the same error that some geologists make when they construct models of the entire globe on the basis of the hills closest to home.'

– Sociality and cultural relativism: A third major feature of Humboldt's work was his apparent fascination with sociality as essential feature of living beings – of plants, animals and humans. All living forms, in his worldview, belonged to one of two broad types – social or individual. 'The geography of plants', he noted, 'includes not only vegetation in terms of altitudinal zones where they occur, not only in terms of barometric pressure, temperature, humidity and electrical tension in which they live; it also makes the distinction, as among animals, between two different ways of life – or one might say, different habits. Some grow separately, isolated from others ... others assemble in societies like ants and bees, covering vast expanses and excluding all heterogeneous species ... These associative plants are more common in temperate than in tropical lands. There vegetation is less uniform and therefore more picturesque ...' (HUMBOLDT 1805, 15–16). In the dense forests of Amazonia, he ventured to speculate, 'if the rivers did not interrupt the continuity, the monkeys who are virtually the only inhabitants of these tracts, could transport themselves from the northern hemisphere to the southern hemisphere simply by leaping from branch to branch' (*Ibid.*).

On human sociality, Humboldt remained deeply impressed with the ideals of the French and American Revolutions and firmly believed in progress, including the prospect of political emancipation from colonial powers. Slavery is intolerable, and no irony is spared on white plantation owners and their treatment of servants; the livelihood of *cargueros* an enigma:

'They talk in this country of going on a man's back (*andar en carguero*) as we mention going on horseback, no humiliating idea is annexed to the trade of *cargueros*; and the men who follow this occupation are not Indians, but mulattoes, and sometimes even whites ... The usual load of *carguero* is six or seven arrobas (75–88 Kg) ... journeying eight or nine hours a day over a mountainous country ... their backs sometimes as raw as those of beasts of burden. ... travellers have often the cruelty to leave them in the forests when they fall sick; ... they earn by a journey from Ibaguè to Carthago only twelve or fourteen piastres (60–70 francs) in a space of fifteen and sometimes even twenty-five or thirty days; we are at a loss to conceive how this employment of a *carguero* ... is eagerly embraced by all the robust young men who live at the foot of the mountains. The taste for a wandering and vagabond life, the idea of a certain independence amidst forests, leads them to prefer this employment to the sedentary and monotonous labour of cities' (WILLIAMS 1814, 65).

The bafflement leads to a strong case for cultural relativism. 'Nothing is more difficult than a comparison between nations who have followed different roads in their progress towards social perfection. The Mexicans and Peruvians must not be judged according to the principles laid down in the history of those nations

which are the unceasing objects of our studies' (WILLIAMS 1814, 31). Humboldt not only uncovered treasures of indigenous South American civilizations, their languages, art, ways of life, belief systems and political structures, he freely criticised the Euro-centrism of conventional histories (HUMBOLDT 1814, WILLIAMS trans., 2): 'We shall be surprised to find, towards the end of the fifteenth century, in a world we call new, those ancient institutions, those religious notions, and that style of building, which seem in Asia to indicate the very dawn of civilization'. And, still keeping alive the question of whether cultural differences should be ascribed to diffusion or to independent invention, '... A small number of nations, far distant from each other, the Etruscans, the Egyptians, the people of Tibet and the Aztecs, exhibit striking analogies in their buildings, their religious institutions, their division of time, their cycles of regeneration, and their mystic notions. It is the duty of the historian to point out these analogies, which are as difficult to explain as the relations that exist between Sanscrit, Persian, Greek, and the languages of German origin; but in attempting to generalize ideas, we should learn to stop at the point where precise data are wanting ...' (*Ibid.* 10–11). Still, in Goethean spirit, he clings to the image of unity in diversity even among human cultures: 'The nations of America, except those which border on the polar circle, form a single race, characterized by the formation of the skull, the colour of the skin, the extreme thinness of the beard, and the straight and glossy hair ... we shall acknowledge, in this great family of the human race, one single organic type, modified by circumstances which perhaps will ever remain unknown' (*Ibid.* 14–15).

– Poetics of landscape visualisation: Humboldt's language was a visual one, and his renderings of landscape – so central to all his work – touched on aesthetic and ethical dimensions of humanity's relationship to the natural world (BUNKSÉ 1981; GODLEWSKA 1999). Sketches of tropical forest scenes, volcanic phenomena, animals and plants – all of which were later edited and polished by hired artists – were ultimately perhaps quite as important for their evocative appeal as they were for succinct communication of scientific results. The *Witz* of landscape, to use Franco Farinelli's phrase, enabled him to appeal simultaneously to many audiences in America and Europe: showing Nature as engaging focus for artists and literary scholars and at the same time a legitimate focus for scientific enquiry (FARINELLI 1999). Landscape was to become his most effective method of evoking themes such as sense of place and regional character; he also deliberately challenged artists to take up the challenge of depicting real life settings in the Tropics.

Table 2: Humboldt's physiognomic taxonomy of plants for the landscape painter (*Ibid.* 31)

Humboldts physiognomische Taxonomie der Pflanzen		
ITEM	PHYSIOGNOMIC (LANDSCAPE) TYPE	EXAMPLES
1	Scintaminées (<i>musa, heliconia, strelitria</i>)	
2	Palmiers	Palm tree
3	Fougères arborescentes	Tree fern
4	<i>Arum, pothos and dracontium</i>	Arum lily
5	Fir (<i>Saxus, pinus</i>)	Fir
6	<i>Folia acerosa</i>	Sycamore, maple
7	Tamarins (<i>Mimosa, gleditsia, portieria</i>)	Tamarin fruit
8	Malcacées (<i>Sterculia, hibiscus, ochroma, cavanillesia</i>)	
9	Lianes (<i>Vitis, paullinia</i>)	creeper
10	Orchids (<i>epidendrum, serapia</i>)	Orchids
11	Raquettes (<i>cactus</i>)	Prickly Pear
12	Casuarines (<i>equisetum</i>)	"Horsetails"
13	Graminées	Grasses
14	Mousses	Mosses
15	Lichens	Lichen

'One of the most majestic and most awful views I ever beheld in either hemisphere' Humboldt described the volcano of Cotopaxi (WILLIAMS 1814, 115–125). 'Its absolute height is ... double that of Canigou; and consequently eight hundred metres higher than Vesuvius would be, were it placed on the top of the Peak of Teneriffe' (*Ibid.* 118). Here also was a fearsome force, in 1738 its flames 'rose nine hundred metres above the crater, and in 1744 'its roarings were heard ... at a distance of two hundred leagues ... in 1768 the quantity of ashes ejected was so great that [in neighboring towns] day broke only at three in the afternoon' (*Ibid.* 118–119). Yet, he noted, 'The form of Cotopaxi is the most beautiful and regular of the colossal summits of the high Andes' (*Ibid.* 120–121):

'It is a perfect cone, which, covered with an enormous layer of snow, shines with dazzling splendor at the setting of the sun, and detaches itself in the most picturesque manner from the azure vault of Heaven. This covering of snow conceals from the eye of the observer even the smallest inequalities of the soil; no point of rock, no stony mass, penetrates this coating of ice, or breaks the regularity of the figure of the cone.'

Frederick E. Church and other artists responded eagerly to the challenge of basing their sketches on accurate scientific data (BUNKSÉ 1981). Church's "The Heart of the Andes" and "Cotopaxi" projected that

same unity in diversity of the tropics which Humboldt had expressed in words and maps. This new *genre* of landscape painting evoked sufficient public awareness of the values of nature that led to the establishment of America's first National Parks of Yellowstone and Yosemite (EDWARDS 1999, 52). 'It is the absolute beauty of forms', Humboldt notes (*Ibid.* 30–31) 'the harmony and contrast which emerges from their assemblage which constitutes the the character of nature in a particular region'. He then proposes a taxonomy of 15 vegetation types based on their overall physiognomy rather than their botanical composition (Tab. 2, from HUMBOLDT 1805, 31).

And indeed it would be 'A project worthy of a distinguished artist to study the physiognomy of these groups of plants which I listed, not in the greenhouse or botanical text books, but in nature itself' (*Ibid.* 32).

Concluding Reflections

Attempts to situate geographical knowledges in their respective historical and cultural contexts can be instructive. Intellectual historians to date, however, have tended to focus on particular facets of scholarly practice, e. g., progress in analytical acuity within specialised fields, in theoretical insight on particular phenomena, and/or break-through practical applications in technology and engineering. Less attention has been accorded to two other facets of scholarly endeavour, i. e., *Poesis* (lit. evoking discovery) and *Bildung* (general liberal education). At the dawn of a new millennium it is perhaps to the *Poesis* and *Bildung* facets of Humboldt's work that attention should be drawn today (BUTTNER 1993).

The *Essai's* graphic language evokes moments of insight, of intuitive perception, when the universal is seen within the particular, the whole present in the part, as fragments to the hologram. Metamorphosis, so central to Goethe's method, was recognisable for Humboldt in not only plant morphology and in the global spread and regional constellations of vegetation forms; it was also a goal for the scientist: (HUMBOLDT 1805, 30–31):

'... the person who is sensitive to the beauties of nature finds here also a reason for the influence which vegetation can have on the tastes and imaginations of people. He will enjoy examining what it is that one calls vegetation character, and the variety of sensations which stirs in the soul of the person who contemplates it ... The simple aspect of nature, the view of fields and woodland, yields a pleasure which is essentially different from the impression received from studying the particular structure of an organized being. Here, it is the detail which interests us and excites our curiosity; there, it is the whole, the overall mass, which stirs our imagination ... What

a striking contrast between the forests of the temperate zone and those of the equator, where the naked and slender palm tree trunks rise above the flowering acajous, and extend their majestic portals into the air? What is the moral cause of these sensations? ... How does environment ... influence the habits and sensitivities of people?'

Eager also to improve *Bildung* among Europeans, he describes Andean valleys, noting that 'The native in tropical regions also knows all those plant forms which nature has supplied around him: the land affords for him as varied a spectacle as the azure vault of the sky which does not hide any of its constellations' (*Ibid.* 34):

'European people do not enjoy a similar advantage. Those plants which languish in greenhouses either for love of science or of luxurious fad are only a shadow of the majestic tropical plants, many of whose forms are still unknown. But the richness and perfection of their languages, the imagination and sensitivity of their poets and painters, are means of compensation. It is through imitative art that we can retrace the varied picture of tropical lands. In Europe, an individual isolated on an arid coast could gain intellectual pleasure from images of far-away places: if his soul is sensitive to works of art, if his spirit is sufficiently open to stretch toward the major conceptions of physical geography, then from the depths of his solitude, even without ever leaving his home, he could gain all that the intrepid naturalist has discovered through his travels through oceanic breezes, exploring subterranean caves, or climbing snow-covered peaks.'

The *Essai* concludes with an affirmation of artistic and scientific, analytical and reflective, Humboldtian and Goethean approaches to studies of nature (*Ibid.* 35):

'It is thus that the lights of civilisation can bring the greatest pleasure to us as individuals: they enable us to live in past and present; they assemble around us all that nature has produced in different climates, and places us in contact with all people on earth. On the strength of discoveries already made, we can launch ourselves into the future and, foreseeing the consequences of [natural] processes, establish forever the laws to which nature subjects itself. Involvement in such research affords that intellectual delight, that moral freedom which fortifies us against the blows of destiny, and against which no external power could prevail.'

'Of all geographers nurtured in the Western tradition', Glacken commented, 'Humboldt in this passage and in his voluminous writings on the same subject in later life clearly sees a common ground shared by geography and aesthetics' (GLACKEN 1967, 546). 'It is true', he continues, 'that many geographers have often written on themes of nature appreciation and beauty of natural scenery, but this writing was then and is today a literary rather than a professional *genre*' (*Idem.*). In his work as a whole, and epitomised perhaps in the *Tableau physique des Andes et pays voisins*, aesthetics join analytics, observation links with experience, scientific knowledge with human understanding through in-depth study of the earth's biosphere.

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