



2022 CER Lunchtime Lectures - Humboldt, Science, and The Geography of Nature

Western Culture and the Study of Nature

January – Natural Philosophy and the Study of Nature

February – Natural History and the Taxonomy of Nature

March – Ecological Imperialism and the Geography of Nature

April – Physical Geography and the Science of Nature

Humboldt and the Science of Nature

May – The Science of Nature: Humboldt and the Empirical Earth

June – The Romance of Nature: Science, Imagination, and the Poets of Nature

July – The Invention of Modern Nature: The Earth as a “Natural Whole”

August – The Evolution of Nature: Humboldt, Darwin, and Biogeography

September – The Economy of Nature: Ecology, Culture, and Cosmos

Humboldt and the Geography of Nature

October – The Great Disruptors: Physical Geography as Modified by Human Action

November – The Earth Managers: New Science and Environmental Change

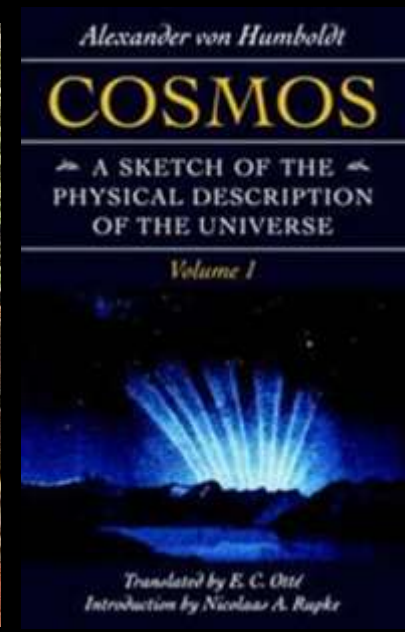
December – The Anthropocene: Gaia and the Geography of Nature





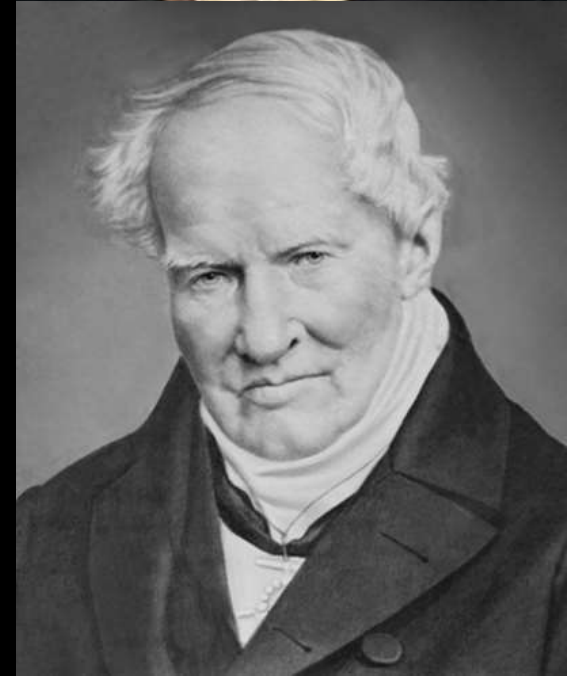
The Romance of Nature: Science, Imagination, and the Poets of Nature

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Austin Water Center for Environmental Research





Alexander von Humboldt 1769-1859



The Humboldt Brothers

A Cultural Education

Wilhelm (1767-1835) and Alexander (1769-1859)



Father died in 1779

Alexander was 9 and his brother, Wilhelm, was 11.



Leaving the brothers in the care of their now twice widowed mother.

Humboldt as a boy with his mother, 1780



"Until I reached the age of 16, I showed little inclination for scientific pursuits. I was of a restless disposition and wished to be a soldier."

Educated by tutors and expected to have careers as Prussian officials like their father...



Wilhelm von Humboldt (1767–1835)

Wilhelm was studious...and has a career as a Prussian diplomat and minister.

Wilhelm 1784



The "Little Apothecary"



The Haskalah - The Berlin Jewish Enlightenment

A Cultural Education 1780s

Wilhelm and Alexander



- Promoted rationalism, liberalism, freedom of thought, and enquiry
- The Jewish variant of the general Age of Enlightenment
- The central figure was Moses Mendelssohn.

The Moses Mendelssohn family

In 1763, Mendelssohn's "On Evidence in Metaphysical Sciences" garnered first prize in a contest staged by the Royal Prussian Academy of Sciences on the question of whether metaphysical truths are able to have the same sort of evidence as mathematical truths. (An essay by Immanuel Kant came in second place.)

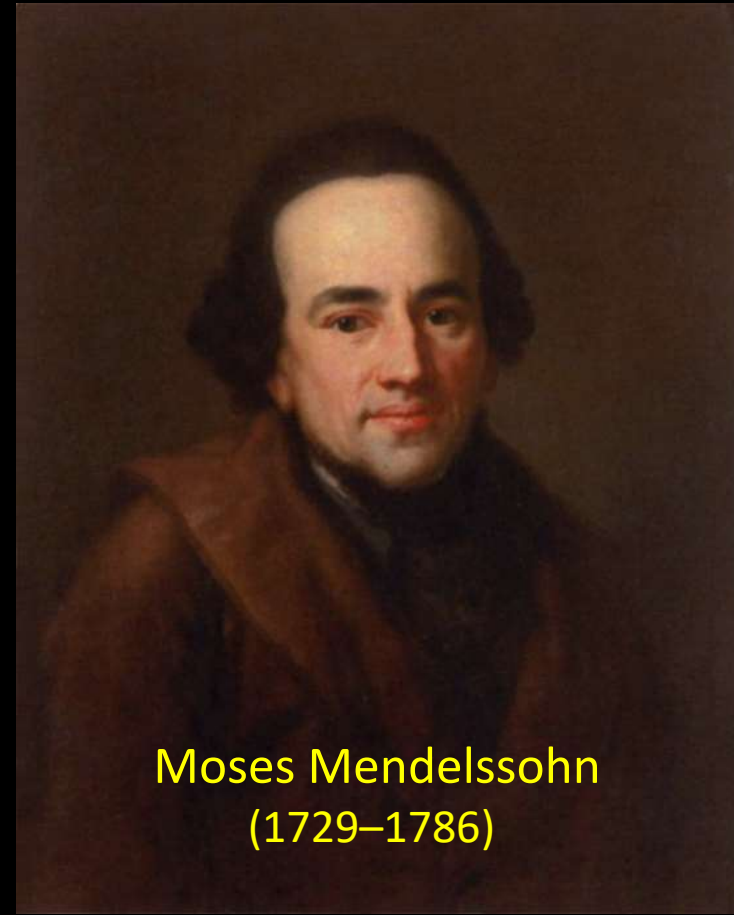


Joseph Mendelssohn
(1770 – 1848)

Sons found
Mendelssohn & Co. was
a private bank based in
Berlin, Prussia.



Abraham Mendelssohn
(1776 – 1835)
Father of Fanny and
Felix



Moses Mendelssohn
(1729–1786)



Fanny Mendelssohn
(1805 – 1847)



Felix Mendelssohn
(1809–1847)

Berlin Salons – A Cultural Education

- Attends lectures of Jewish physician Marcus Herz on physics and philosophy of Kant
- Witnesses electrical experiments, installs Franklin's lightning rod at Tegel
- Learns Hebrew, poetry, and friendship from Henriette
- Tugendbund (League of Virtue)



Marcus Herz
(1747 - 1803)



Henriette Herz
(1764 – 1847)

At the salon of Henriette Herz, Wilhelm meets Caroline von Dacheröden

Secretly engaged in 1789 and marry 1791

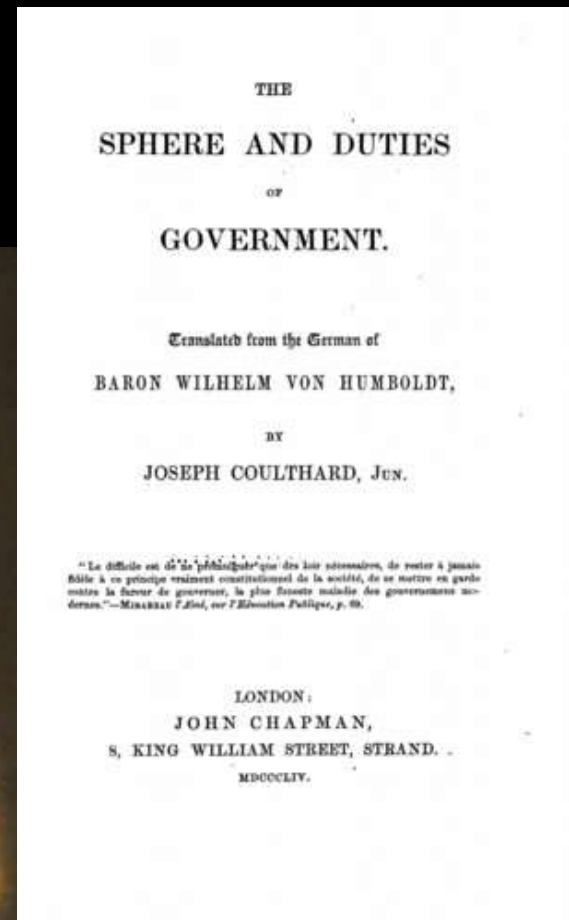
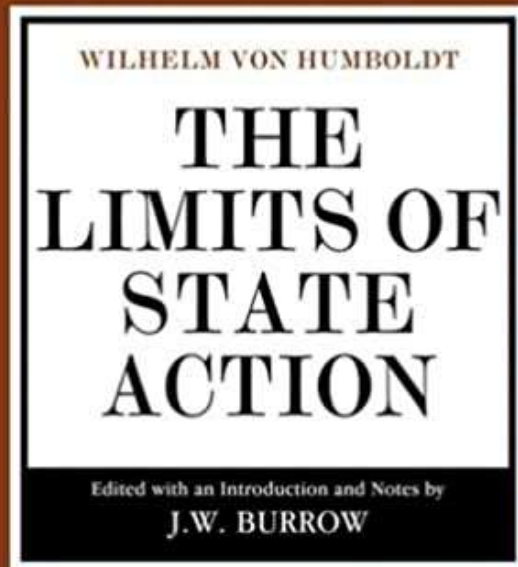
- A highly educated art historian, independent, and part of the Weimar and Jena philosophical and literary community



Political Theorist

Wilhelm wrote *The Limits of State Action* in 1792, at age 25.

The Sphere and Duties of Government. (in English, 1854)



Weimar and Jena 1794 - 1797

- In 1794, Wilhelm and Caroline moved to Jena and Caroline introduces Wilhelm into the Weimar and Jena philosophical and literary community
- Meet Herder, Fichte, Schiller, Goethe and the archeologist Friedrich August Wolf.
- Wilhelm collaborated with Schiller and published two contributions on aesthetics in Schiller's journal *Die Horen*.



The Enlightenment

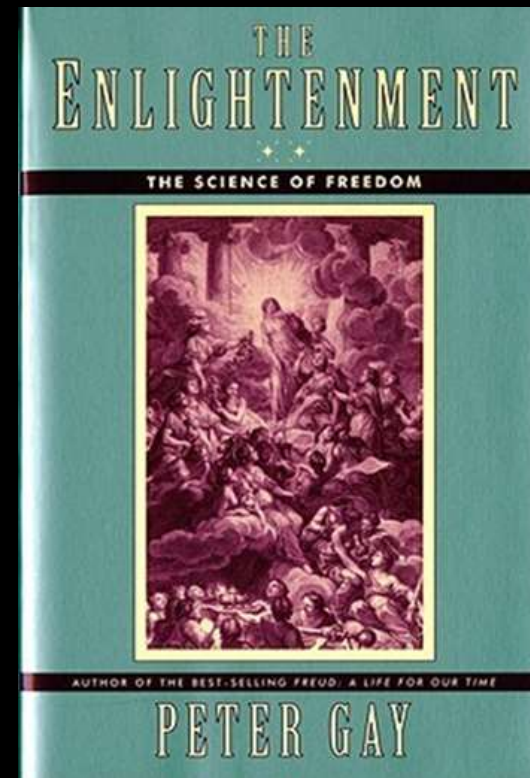
1637-1799



The Age of Enlightenment – The Science of Freedom

1637-1799

- Descartes' 1637 philosophy of *Cogito, ergo sum* ("I think, therefore I Am")
- The sovereignty of reason and the evidence of the senses as the primary sources of knowledge
- Ideals such as liberty, progress, toleration, fraternity
- Constitutional government, separation of church and state
- Scientific method, empiricism, and reductionism
- An attitude captured by Immanuel Kant's essay *Answering the Question: What is Enlightenment*, where the phrase *Sapere aude* (Dare to know)
- Ends with the French Revolution 1789-1799



The sovereignty of reason and the evidence of the senses as the primary sources of knowledge

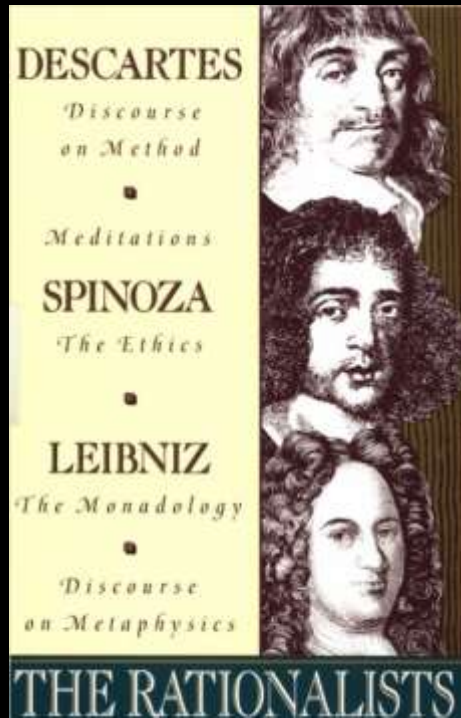
Rationalism

- Innate knowledge
- Knowledge is based on reason and logic
- Mathematics and logic is the paradigm of knowledge
- Genuine knowledge is certain
- Experience (sense perception) does not produce certainty

1596-1650

1632-1677

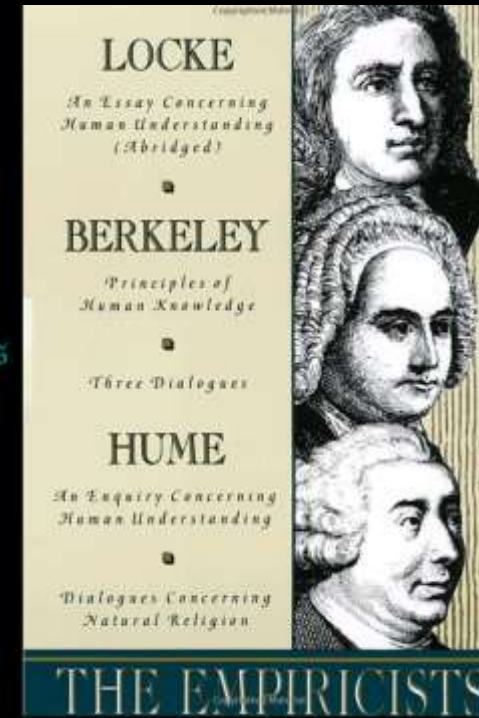
1646-1715



Versus

Empiricism

- No innate knowledge (tabula rasa)
- Knowledge is based on experience and experimentation
- Experimental science is the paradigm of knowledge
- Experience and experiment rarely, if ever, produce certainty
- Problem of mathematics and certainty



1632-1704

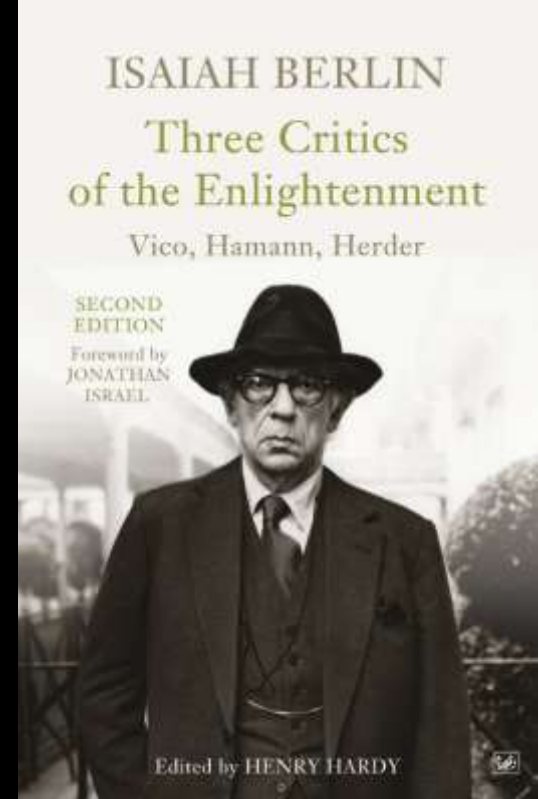
1685-1753

1711-1776

Critics of the Enlightenment – The Contrast

- “What the entire Enlightenment has in common is denial of the central Christian doctrine of original sin, believing instead that man is born either innocent and good, or morally neutral and malleable by education or environment, or at worst, deeply defective but capable of radical and indefinite improvement by rational education in favorable circumstances, or by a revolutionary reorganization of society.”
- Critics of the Enlightenment – “Not a rejection of reason, a conjunction with the creative mind.”
- Vico, Hamann, Herder

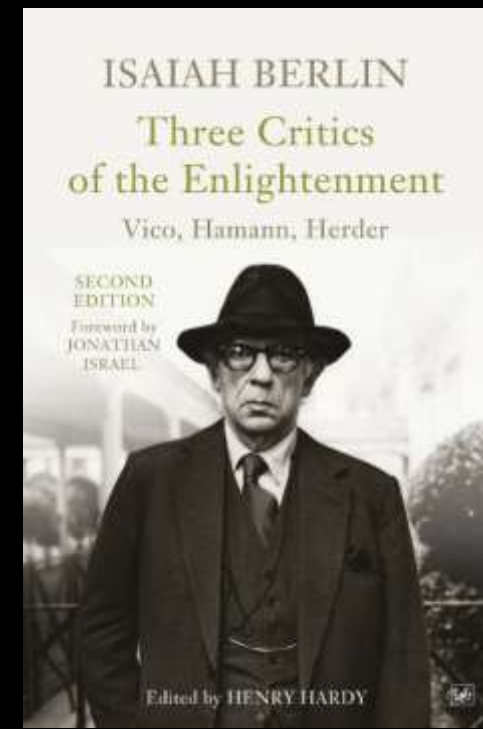
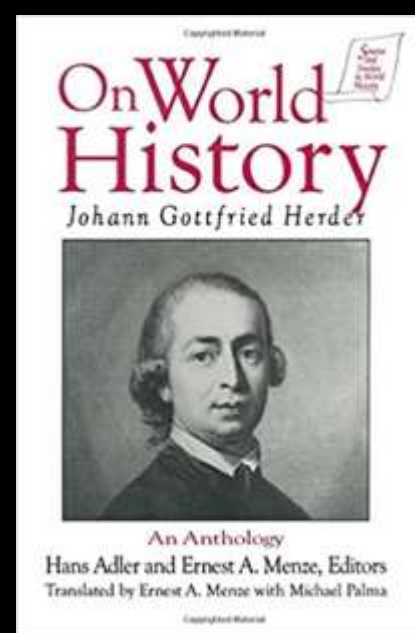
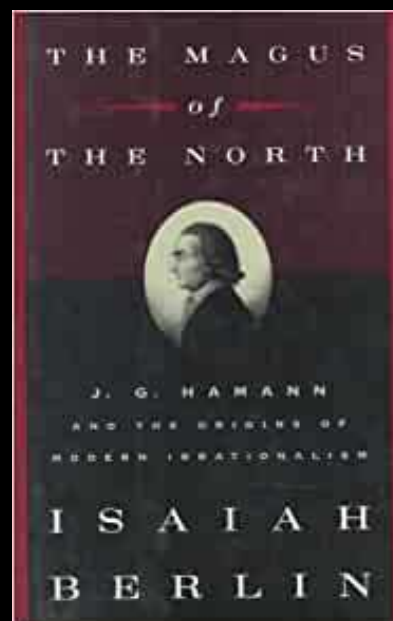
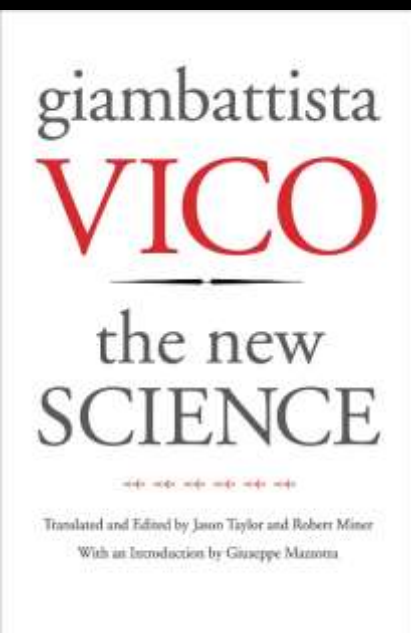
“What they rejected in the philosophy of the Enlightenment was its emphasis on the universal, the objective, the cosmopolitan, and the rule of law. They contended that these abstractions could not do justice to the particular, the historical, the parochial, the wisdom of the idiomatic, the spontaneity of the creative mind, the ineffability and mystery of the individual as well as the national spirit. These are the concrete modes in which we encounter experience.” *Three Critics*



The Contrast between Humanities and Sciences – Vico, Hamann, Herder

- “The specific and unique versus the repetitive and the universal,
- the concrete versus the abstract,
- perpetual movement versus rest,
- the inner versus the outer,
- quality versus quantity,
- culture-bound versus timeless principles,
- mental strife and self-transformation as a permanent condition of man versus the possibility (and desirability) of peace, order, final harmony and the satisfaction of all rational human wishes - these are some of the aspects of the contrast.”

The Sciences and the Humanities



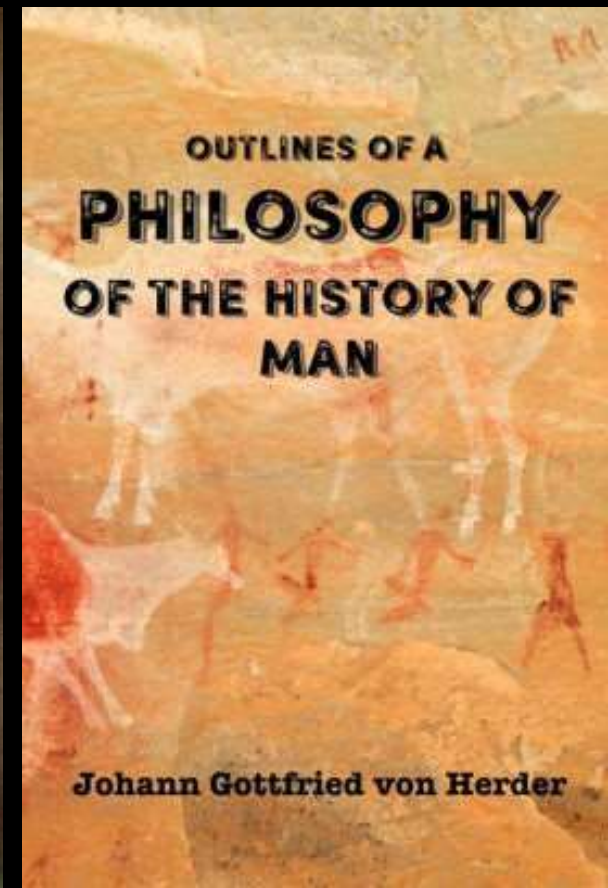
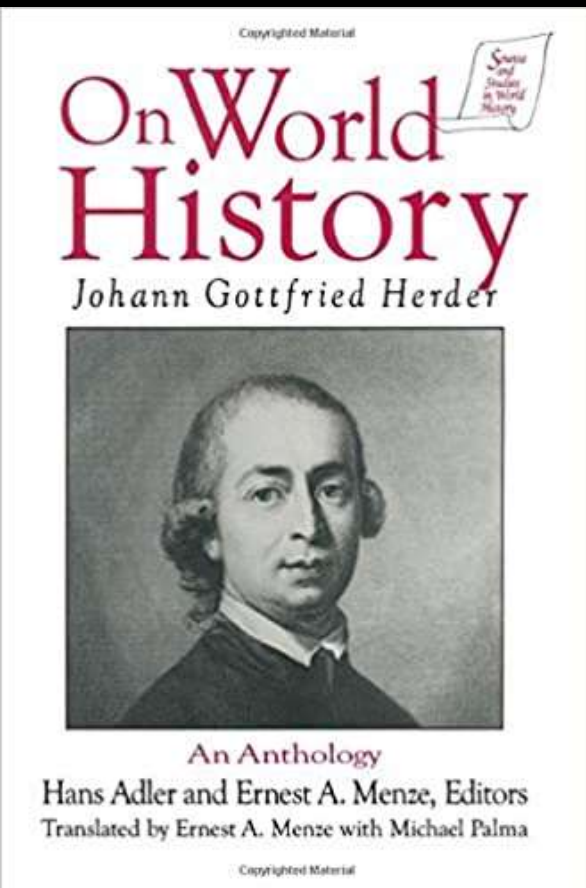
Nature, Culture, and Language

Johann Gottfried von Herder (1744–1803)

“Our earth is a star among stars“

Treatise on the Origin of Language (1772)

Outlines of a Philosophy of the History of Man (1784)



Nature, Culture, and Language

“The civilization of man is not that of the European; it manifests itself, according to time and place, in every people.”

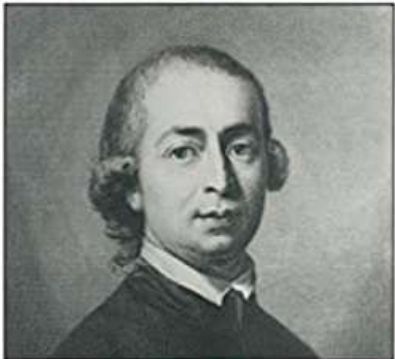
- Herder was one of the first to argue that language contributes to shaping the frameworks and the patterns with which each linguistic community thinks and feels.
- Each language has its own specific linguistic structure, its own identity and that structure itself produces an equally specific worldview. (National Culture)
- Herder endorses a very broad concept of nature that includes culture

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Source and Studies in World History

On World History

Johann Gottfried Herder



An Anthology
Hans Adler and Ernest A. Menze, Editors
Translated by Ernest A. Menze with Michael Palma

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OUTLINES OF A PHILOSOPHY OF THE HISTORY OF MAN

Johann Gottfried von Herder

Herder, Goethe, and German Romanticism

Herder - "A poet is the creator of the nation around him, he gives them a world to see and has their souls in his hand to lead them to that world."

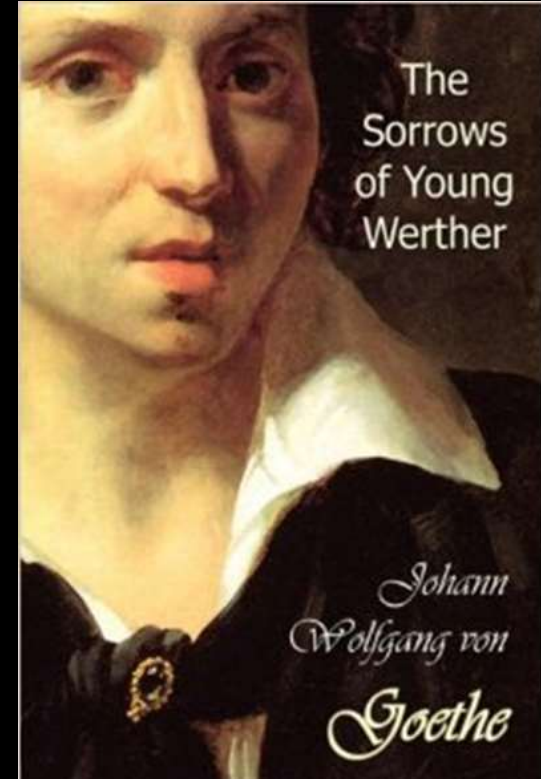
- By 1770 Herder went to Strasbourg, where he met the young Goethe.
- This event proved to be a key juncture in the history of German literature, as Goethe was inspired by Herder's literary criticism to develop his own style.



Sturm und Drang "storm and stress" 1760-80s

Goethe's 1774 novel *The Sorrows of Young Werther* had young men throughout Europe emulating its protagonist, a young artist with a very sensitive and passionate temperament.

- Emotional turbulence and individuality to balance the Enlightenment ideals such as rationalism, empiricism, and universalism
- Individual subjectivity and, in particular, extremes of emotion were given free expression in reaction to the perceived constraints of rationalism imposed by the Enlightenment



Weimar Classicism 1772 – 1805

The Will - Goethe, Herder, Friedrich Schiller

A synthesis of ideas from Romanticism, Classicism, and the Age of Enlightenment - named after the city of Weimar, Germany

Reason and the Will - “The will is the specific character of man, and reason itself is only the eternal rule of his will. All nature acts reasonably; all our prerogative is to act reasonably, with consciousness and with will.” Schiller

Weimar's Courtyard of the Muses (1860) by Theobald von Oer. Schiller reads in the gardens of Schloss Tiefurt, Weimar. Amongst the audience are Herder (second person seated at the far left) and Goethe (front of the pillar, right).



The Sublime and the Beautiful

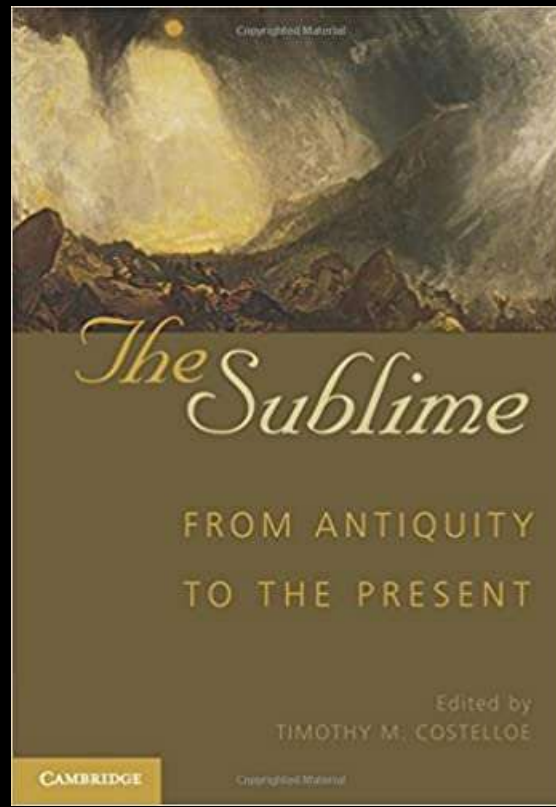
Friedrich Schiller (1759-1805)

Beautiful – “Delight consistent with reason”

Sublime – Awe, Terror, overwhelm reason

“Only if the sublime is married to the beautiful and our sensitivity to both has been shaped in equal measure, are we complete citizens of nature, without on that account being its slaves, and without squandering our citizenship in the intelligible world.”

Schiller *Concerning the Sublime* 1796



German Romanticism 1800 to 1850

The Limits of Reason

Intense emotional response to Nature

- An authentic source of aesthetic experience, placing new emphasis on such emotions as apprehension, horror, terror, and awe—especially that experienced in confronting the new aesthetic categories of the sublime and the beauty of nature.
- The Will - Romanticism assigned a high value to the achievements of "heroic" individualists and artists, whose examples, it maintained, would raise the quality of society.



Caspar David Friedrich,
Wanderer above the Sea of Fog, 1818

Romanticism

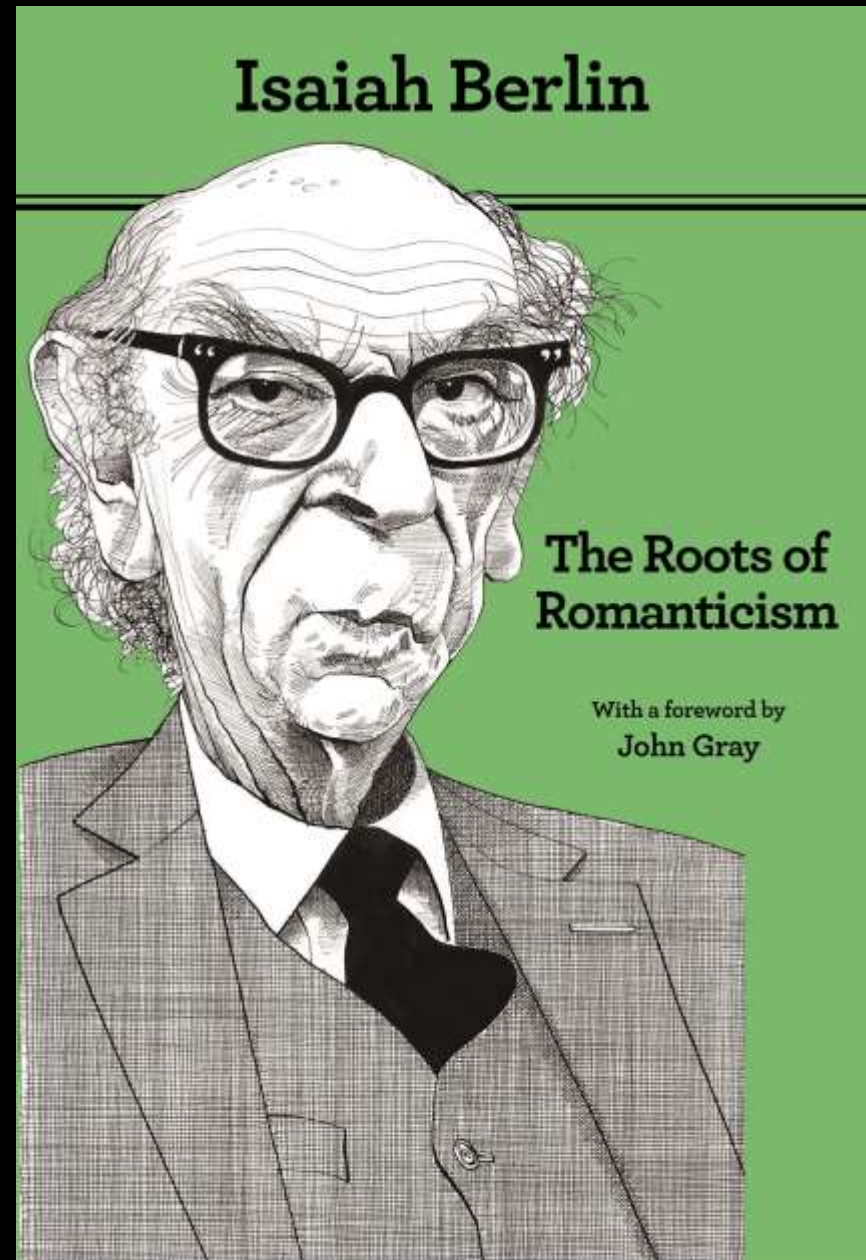
Romanticism embodied -

"a new and restless spirit, seeking violently to burst through old and cramping forms, a nervous preoccupation with perpetually changing inner states of consciousness, a longing for the unbounded and the indefinable, for perpetual movement and change, an effort to return to the forgotten sources of life, a passionate effort at self-assertion both individual and collective, a search after means of expressing an unappeasable yearning for unattainable goals."

Germany – Herder, Goethe, Schiller, Schilling

England – Wordsworth, Coleridge, Shelley

America – Emerson, Thoreau, Muir



Edited by Henry Hardy

American Transcendentalism – The American Myth of Nature

The Romantic idea of Nature transformed into the American Transcendentalist idea of Nature in Ralph Waldo Emerson's essay, "Nature" (1844).

Nature contact as therapy for a diseased, over-civilized heart.

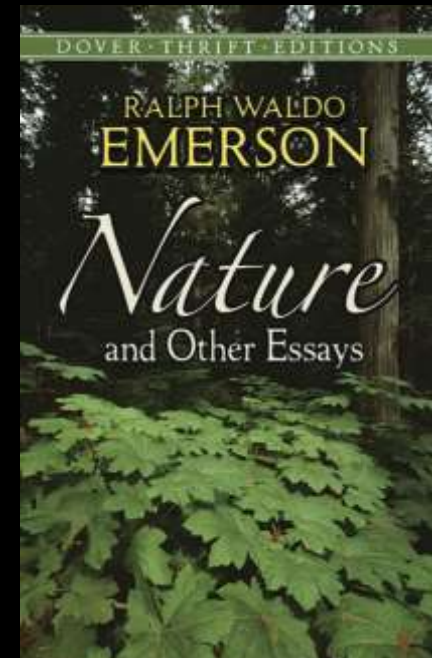
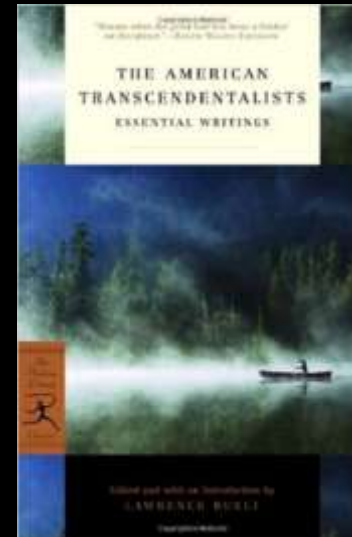
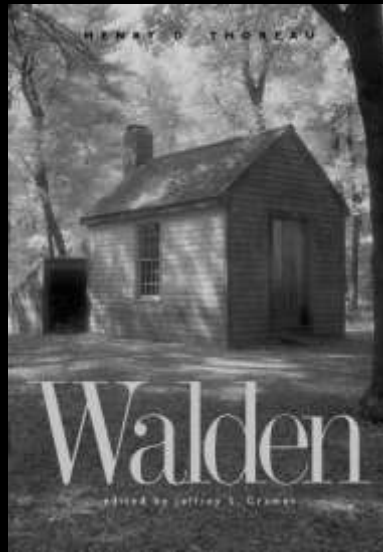
- Nature is a source of sensations--healthy feelings.
- Humans can discover emotional health in nature.
- Such health leads to moral and spiritual clarity.

Thoreau's *Walden* (1854)

Nature is a refuge from the artificial constructs of civilization – the City.



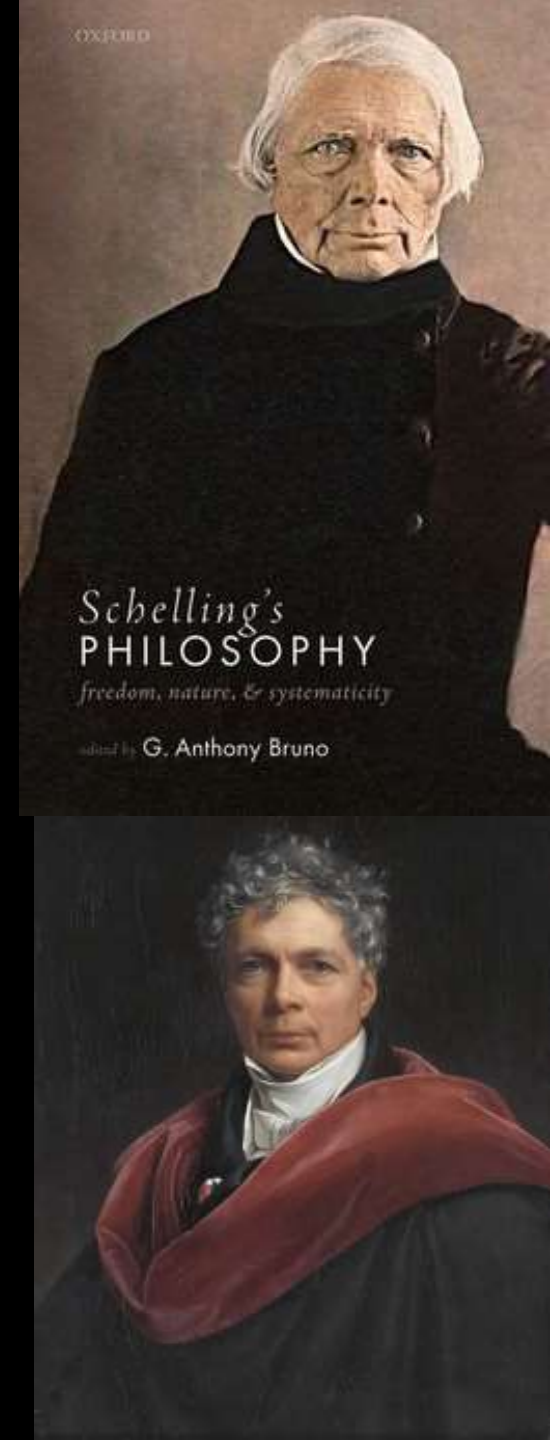
Henry David Thoreau



Natural Science, Romanticism and Naturphilosophie

Friedrich Schelling 1775 –1854

- Naturphilosophie attempted to comprehend nature in its totality and to outline its general theoretical structure, thus attempting to lay the foundations for the natural sciences.
- Schelling held that the divisions imposed on nature, by our ordinary perception and thought, do not have absolute validity.
- They should be interpreted as the outcome of the single formative energy which is the soul or inner aspect of nature.
- Nature is the sum of the physical universe and human self-consciousness – both are equally real.



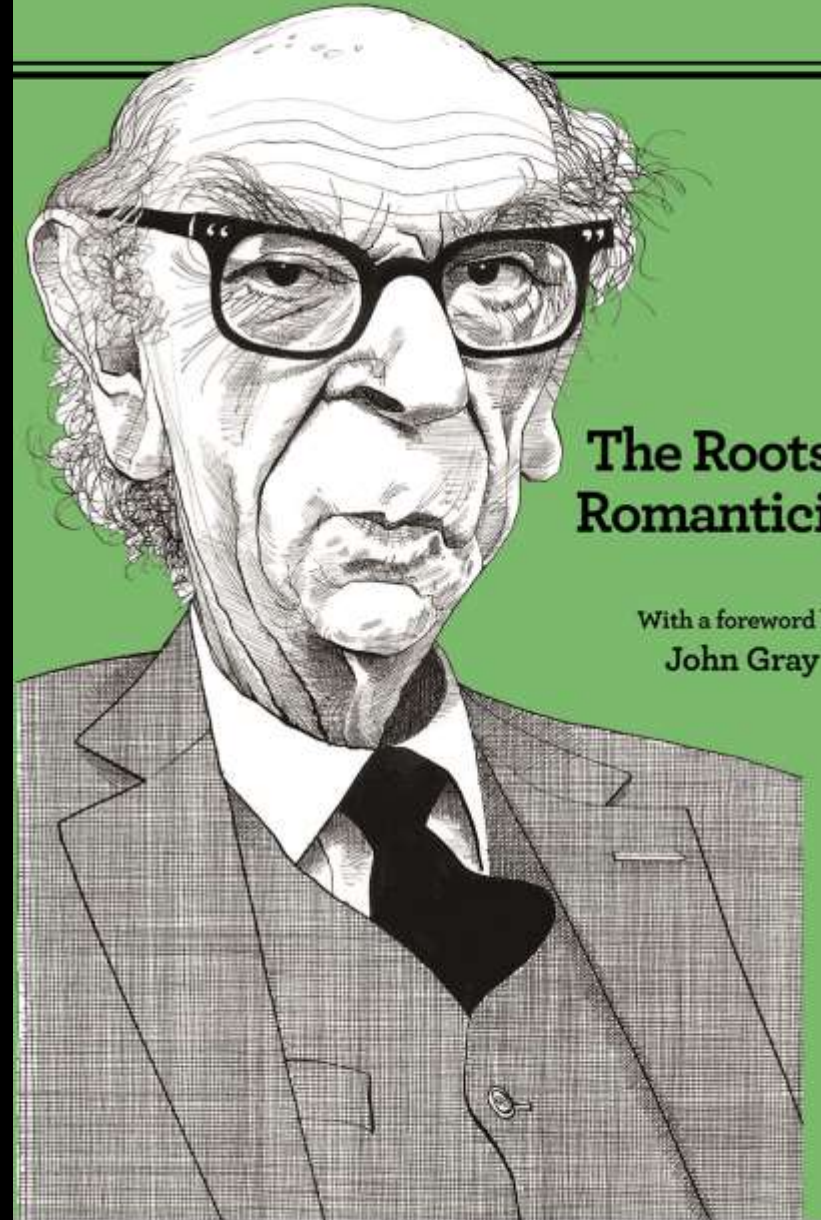
Naturphilosophie and The Artist

“If everything in nature is living, and if we ourselves are simply its most self-conscious representatives, the function of the artist is to delve within himself, and above all to delve within the dark and unconscious forces which move within him, and to bring these to consciousness by the most agonizing and violent internal struggle.”

Romanticism and Reason

“Romanticism rebelled in particular against the constricting order imposed by reason and championed the human will.”

Isaiah Berlin



The Roots of Romanticism

With a foreword by
John Gray

Edited by Henry Hardy

Naturphilosophie - Art and Science

Johann Wolfgang von Goethe (1749—1832)

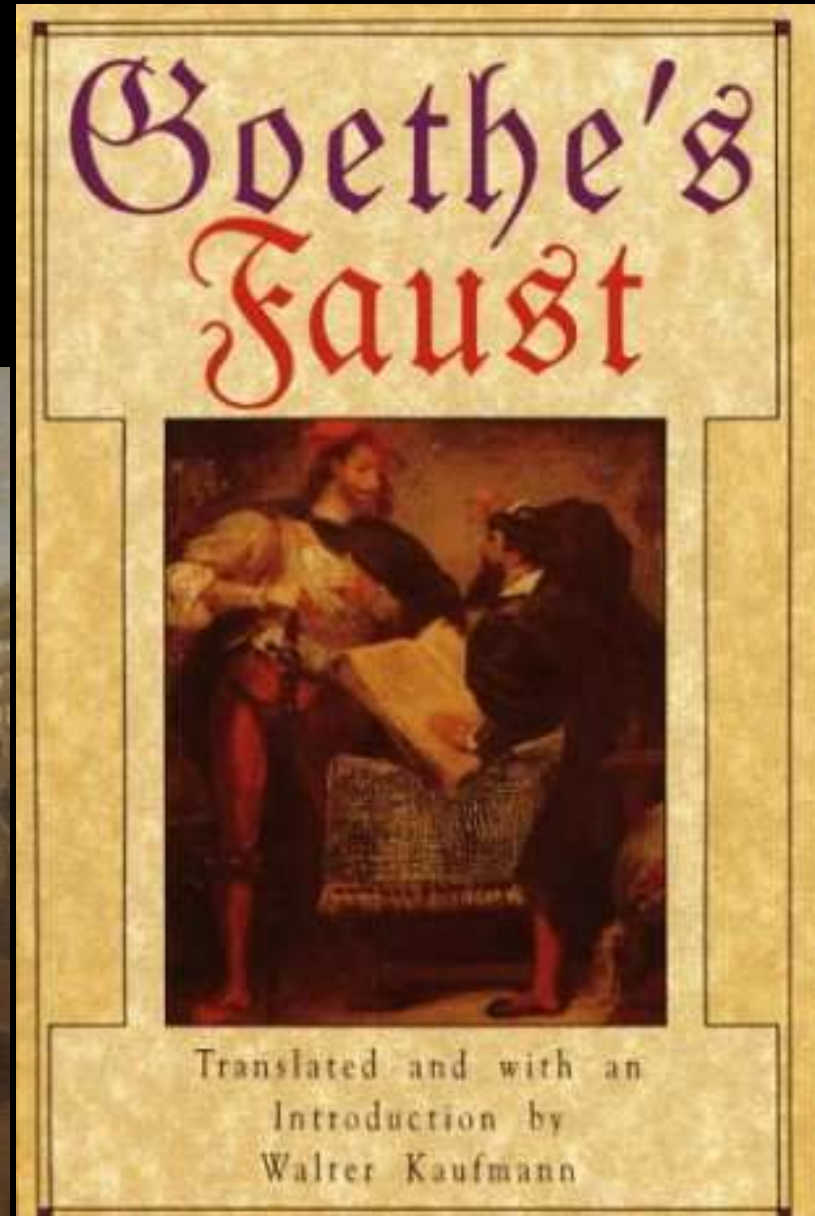
1774: The Sorrows of Young Werther

1790: The Metamorphosis of Plants

1808: Faust Part One

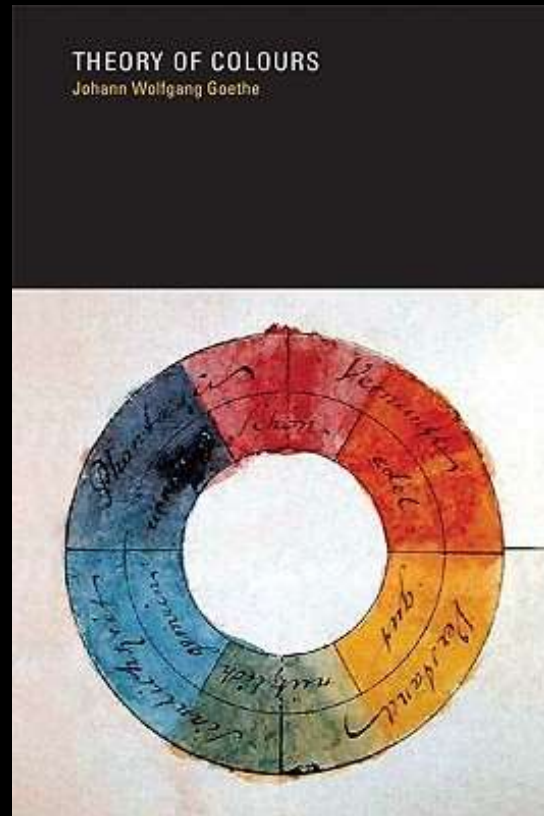
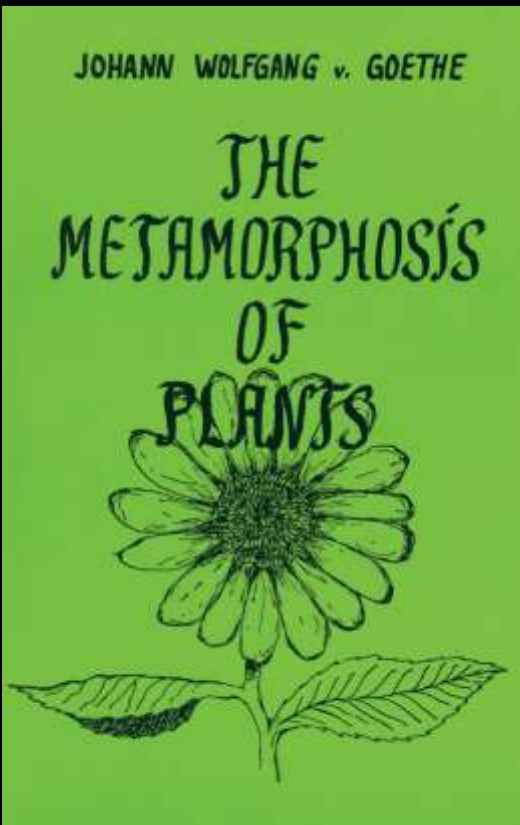
1810: Theory of Colors

1832: Faust Part Two



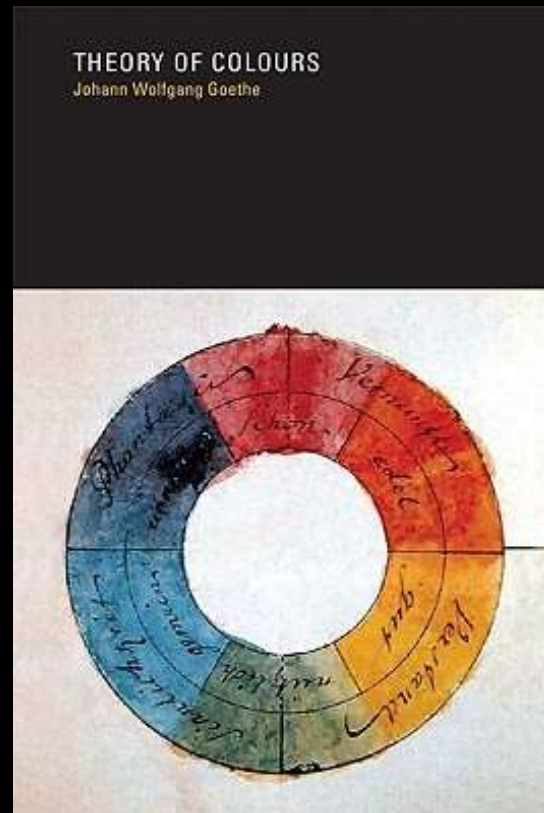
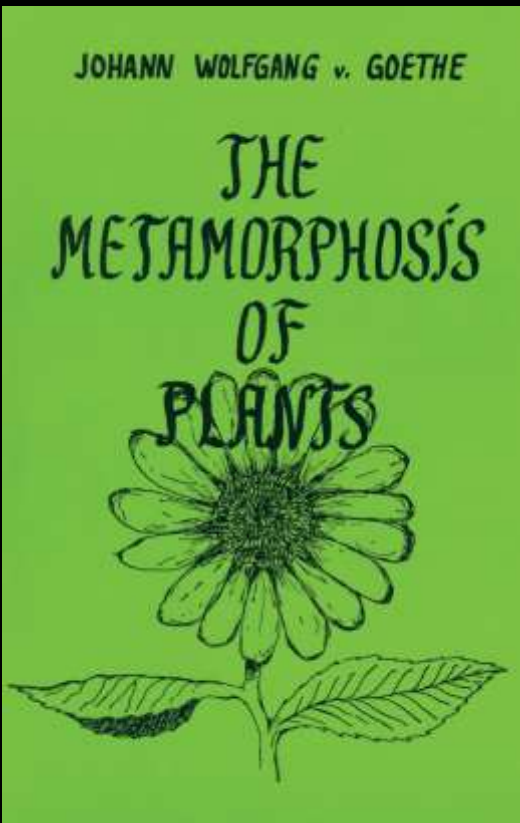
“Goethe’s Way of Science”

- “Delicate empiricism”: observation - reflection – association
- Transcending the split of subject and object via experiment
- Trusting human senses rather than instruments



“Goethe’s Way of Science” – Metamorphosis and Dynamic Nature

- Metamorphosis as essential feature of life, emerging from tensions between opposing tendencies (Light-dark, Inhalation-exhalation)
- He believed that organisms had an internal force, an urform, that gave them a basic shape and then they were further adapted to their environment by an external force. (evolution)
- World as expression of one universal idea (unity versus particularity/reductionism)



Alexander – The Young Scientist

The Flora of Freiberg 1793

- A treatise on the vegetation in and around the mines of Freiberg in Saxony, giving habitat, locality and abundance for each species.
- Dynamic Nature - not just descriptive natural history
- Explanation - How plants and plant communities change (adapt) to their environment
- Metamorphosis – Plants and plant communities changed over time.
- New species could appear and that others could become extinct.



Alexander and Goethe Meet - 1794

This book brought him to the attention of Goethe who had become friends with Wilhelm.

Goethe was now interested in meeting the young scientist to discuss metamorphosis of plants.

An introduction was arranged by Wilhelm, and in 1794 Goethe (45) and Alexander (25) meet in Weimar...

Alexander (standing) with Schiller, Wilhelm and Goethe

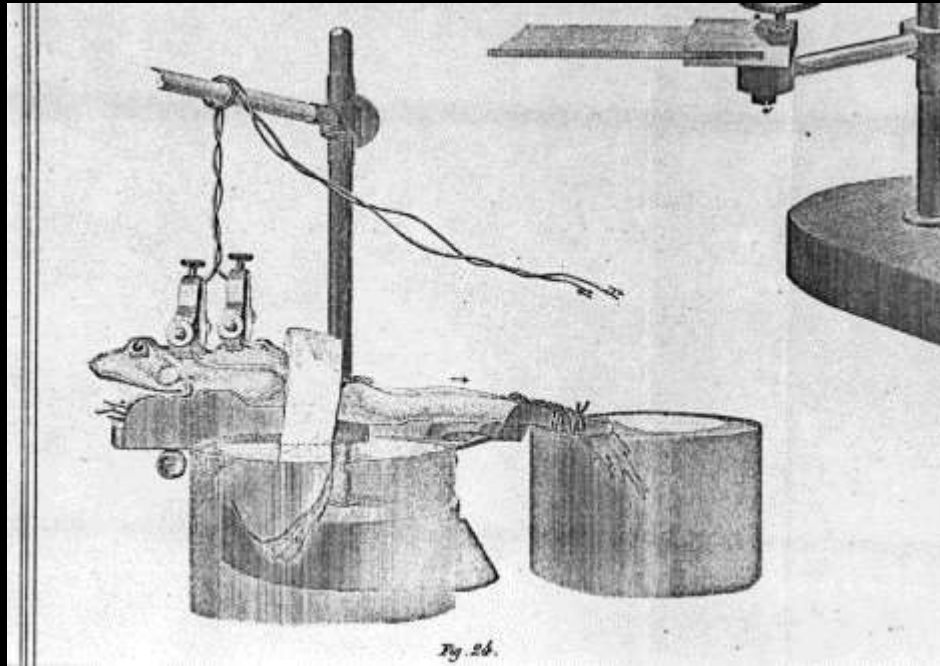


Goethe describes Alexander - 1794

“What a man he is! ... He has not his equal in knowledge and living wisdom. Then he has a many-sidedness such as I have found nowhere else.

On whatever point you approach him, he is at home, and lavishes upon us his intellectual treasures. He is like a fountain with many pipes, under which you need only hold a vessel, and from which refreshing and inexhaustible streams are ever flowing.”

Animal electricity, dissect cadavers





1796 - Mother dies

Wilhelm and Alexander financially independent

- Their mother, Marie-Elisabeth, dies in 1796.
- Wilhelm gets Tegel, the family estate near Berlin.
- Alexander gets freedom.
- Alexander abandons his career as a mining supervisor and devotes himself to his own projects, in particular - an expedition outside of Europe.

In late 1797, Wilhelm and Caroline and their two children move to Paris



- Paris seemed to be the perfect place from which to launch his expedition, so Alexander joined Wilhelm and Caroline there in 1798.
- Paris - the scientific center of Europe - will be Alexander's home until 1827

Wilhelm – The Diplomat

Caroline – The Art Historian

Wilhelm was a Prussian ambassador

- Paris (1797-1801, 1804)
- Rome (1802–1803, 1805–1810, 1817–1819)
- Vienna (1810-1814)



Wilhelm – The Education Reformer

The Enlightenment and the University

- Creates The University of Berlin 1810 - 'The classical German research university'
- His university would not be there to teach what was already known, but to grapple with questions whose answers are unknown.
- He called this search for answers “Wissenschaft” - the wholeness of knowledge.
- In keeping with his Enlightenment beliefs, Wilhelm created a university model based on the principals of freedom in the study of scientific knowledge and the autonomy of instruction, where teaching and research came together in a single institution.



Wilhelm – The Diplomat

Napoleonic Wars and Reaction

- Ambassador at Vienna from 1812 during the closing struggles of the Napoleonic Wars
- Attends the congress of Prague (1813) where he was instrumental in drawing Austria to ally with Prussia and Russia against Napoleon
- Involved in all the post-Napoleon treaties and congresses
- Resists the repression of the ideals of the French Revolution – Liberty, Fraternity, Equality
- The increasingly reactionary policy of the Prussian government made him give up political life in 1819; and from that time forward he devoted himself solely to literature and study and life with Caroline



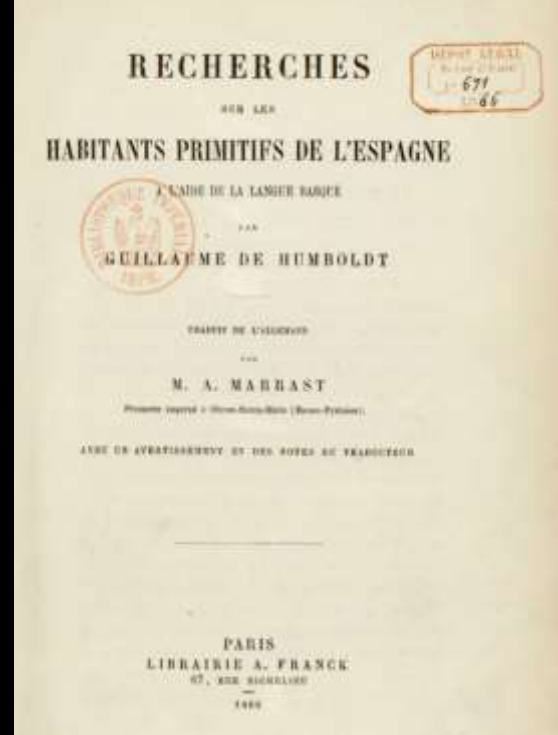
Retirement and Tegel 1820

- In 1820, the 52 year old Wilhelm resigned his last official position and he and Caroline retired to his Tegel estate.
- Wilhelm built one of the most extensive collections of non-European linguistic materials in Europe: lexical lists, texts, grammars ... thanks to his own field work in Spain, France Rome, England and Germany and to the data collected in the Americas by Alexander.

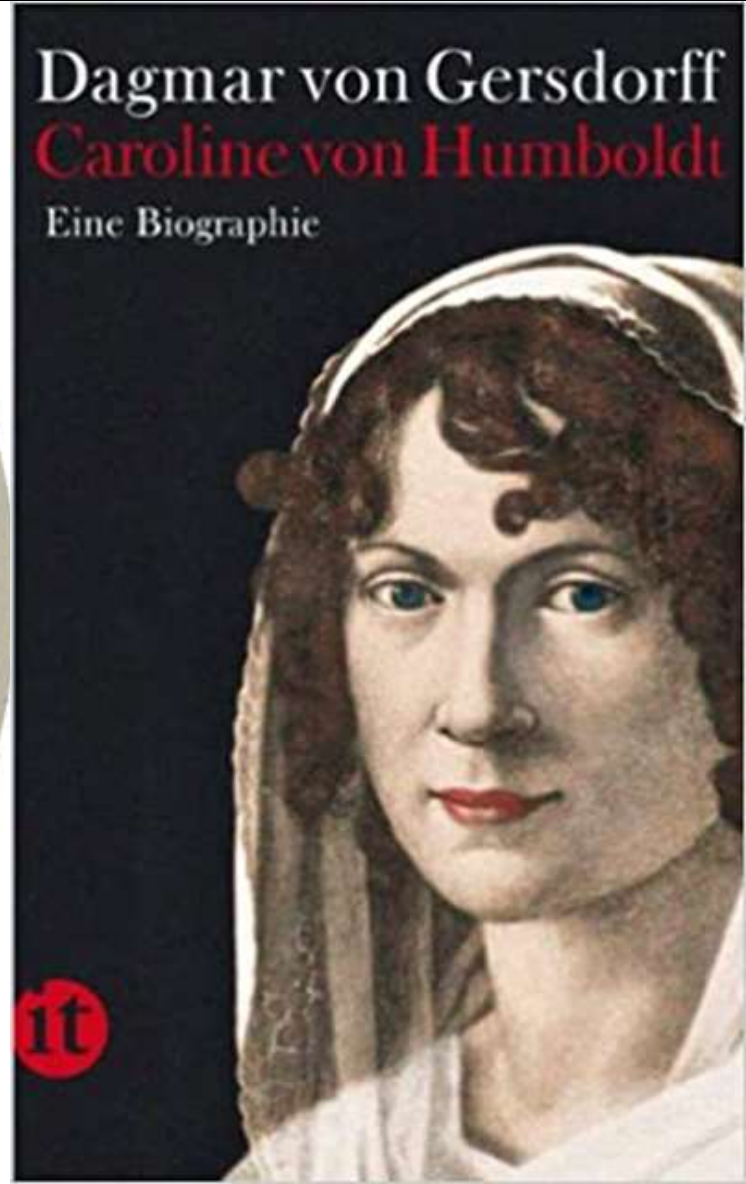


Wilhelm - The Linguist

- "Language is the formative organ of thought."
- Language is not only a means of communication but also a precondition for the possibility of cognition.
- Each language has its own specific linguistic structure, its own identity and that structure itself produces an equally specific worldview. (Herder)
- *Researches into the Early Inhabitants of Spain by the help of the Basque language (1821)*
- By examining geographical place names, Wilhelm argues that at one time a culture speaking dialects allied to the modern Basque language extended throughout Spain, southern France and the Balearic Islands



In 1829, Caroline dies at the age of 63.



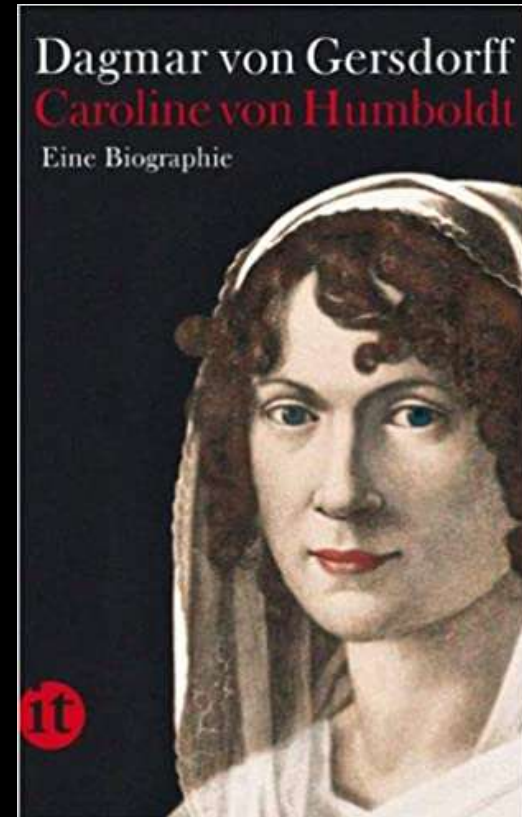
Wilhelm von Humboldt (1767–1835)

- With his eyesight failing, he lived another six years in relative seclusion and dies at the age of 68 in 1835 at Tegel.
- Wilhelm died while preparing a final book on the ancient Kawi language of Java, but its introduction was published in 1836 as *The Heterogeneity of Language and its Influence on the Intellectual Development of Mankind*.
- Alexander will live another 34 years...



The Humboldt Brothers – The Spirit of Europe

<https://explore.psl.eu/en/discover/virtual-exhibits/humboldt-brothers-spirit-europe>



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 Nervenfaser</i> |
| 1798 | 49 | Astronomical observations | 1799–1804 | 30–35 | American Voyages + Bonpland |
| 1805 | 56 | Lectures on physics and chemistry | 1805–1834 | 36–65 | <i>Voyageaux régions équinoxiales du Nouveau Continent</i> |
| | | | 1808 | 39 | <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</i> + Atlas |
| | | | 1862 | postum | <i>Kosmos V + Index</i> |



Goethe dies 1832 at 82 years old

Alexander and Goethe's Perspective on Nature

- Science, Perception, and the Particular

“In the Amazon forests, as on the peaks of the Andes, I had the feeling that the same life infiltrates stones, plants and animals, as well as the swelling breast of humankind, as if animated by a single spirit from pole to pole. Everywhere I felt strongly how powerfully those relationships forged at Jena influence me now, and - thanks to Goethe's perspectives on Nature - I have acquired virtually new organs of perception”

Alexander, *Letter to Caroline von Wolzogen, Berlin, 1806*

“A naturalist only deserves respect if he can depict and present the most strange and most foreign things in their locality, with all their neighboring circumstances always in their own peculiar element.”

Goethe, *The Elective Affinities* 1809



The Enlightenment and Romanticism

The Sciences and The Humanities

Imaginative Understanding

“Two radically different approaches to the world are represented by the tradition of the sciences and that of the humanities.

The first takes as its model the basic pattern of inquiry of the natural sciences, which it regards as applicable to all disciplines and areas of experience.

The second is concerned with the values that are central to culture and history, an area in which there is no cumulative growth of knowledge but only growth of insight and understanding won by ‘informed imagination’ and intuition.”

Vico – The New Science

“Imaginative Understanding”

“the capacity for conceiving more than one way of categorizing reality”

Isaiah Berlin

THE PROPER STUDY
OF MANKIND



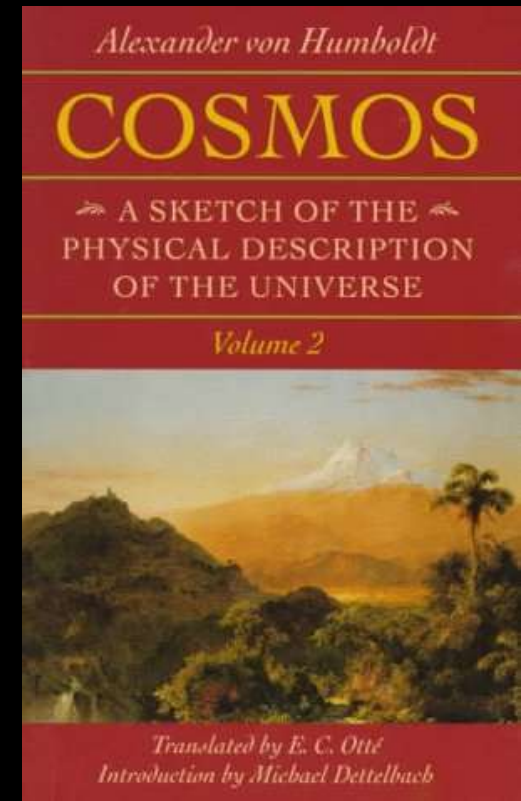
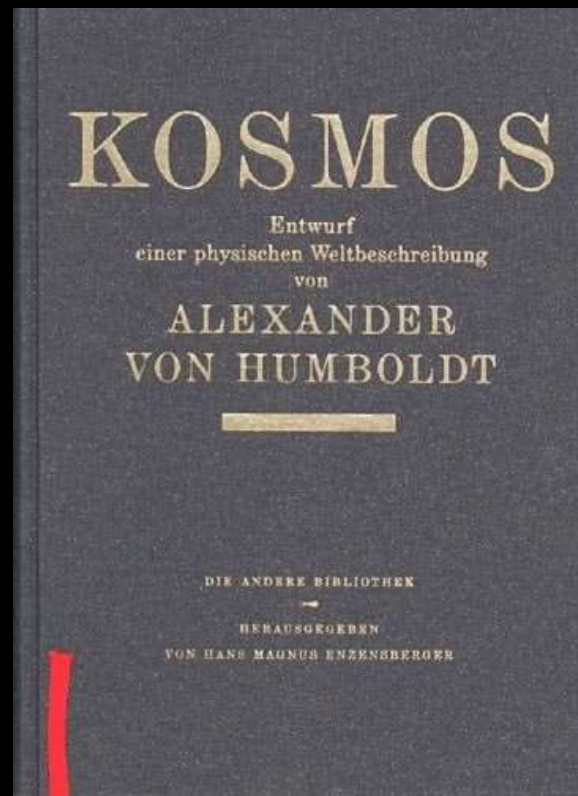
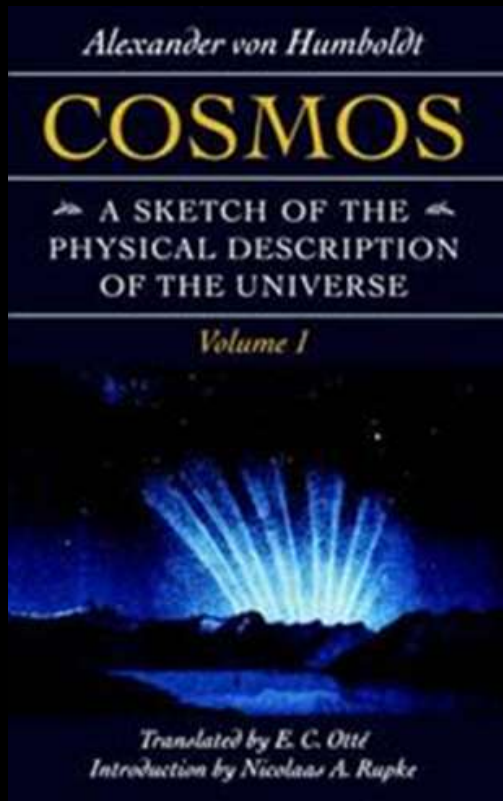
AN ANTHOLOGY OF ESSAYS

“No one makes more sense of the intellectual chaos of the modern world . . .
no one embodies more realistically and intrepidly the hope of human reason.”
—ARTHUR SCHLESINGER, JR., THE WASHINGTON POST BOOK WORLD

Imaginative Understanding and Science

Humboldt's Cosmos "Order and Adornment"

- For Humboldt "cosmos" signifies both the "order of the world, and adornment of this universal order."
- Order refers to the observed fact that the physical universe, independently of humans, demonstrates regularities and patterns that we can define as laws.
- Adornment refers to human imaginative perception of beauty and wonder, which is also part of the universe.



Humboldtian Cosmos - A Vision of the Unity of Nature

- The Cosmos is both ordered and beautiful.
- Nature and the human mind are a unity
- To know nature better is thus to know ourselves better, for knowledge is a deeply human project combining understanding and imagination.
- A dynamic picture of the universe that would continually grow and change as human conceptions of nature and the depth of human feeling about nature enlarge and deepen.



In 1798, Humboldt was appointed by the King of Spain to make the first comprehensive scientific exploration of Spanish America.



Applause

