Alexander von Humboldt: A Biographical and Bibliographical Sketch

Ingo Schwarz[1]

Cover sheet

Alexander von Humboldt

1769 born in Berlin (Tegel castle near Berlin as his birthplace is possible)
1775-1787 education by private tutors in Berlin and Tegel
1779 death of the father Alexander Georg von Humboldt
1787-1792 studies at Frankfurt (Oder), Göttingen, Hamburg, Freiberg in Saxony
1788 studies botany with Carl Ludwig Willdenow in Berlin
1790 journey with Georg Forster to Belgium, the Netherlands, England, and France
1792-1796 successful professional career in the Prussian Mining Department
1793 starts a "free mining school" at Steben in Upper Franconia from his own funds
1796 death of the mother, Maria Elisabeth von Humboldt, née Colomb
1796-1799 preparations for the American expedition in Jena, Vienna, Salzburg, Paris, Madrid
1799-1804 great American expedition in what is today Venezuela, Cuba, Columbia, Peru, Ecuador, Mexico, United States; travel companion: the botanist and physician Aimé Bonpland
1800 navigation on the Orinoco, Casiquiare river, and Rio Negro
1802 ascent of the Chimborazo
1804-1805 Humboldt in Paris, reports on journey
1805-1807 in Berlin, efforts to reform the Berlin Academy of Sciences; geomagnetical observations
1807-1827 in Paris, with short interruptions only; work on the publications about the American journey (29 vols., 1805-1836), cooperation with fellow scientists, among them the botanists Aimé Bonpland, Carl Ludwig Willdenow, Carl Sigismund Kunth, and the astronomer Jabbo Oltmanns
1808 first edition of "Ansichten der Natur" ("Views of Nature") appears; second edition: 1826; third edition 1849
1827 return to Berlin
1827/1828 "Cosmos lectures" in Berlin
1828 meeting of the "Association of Physicists and Physicians" in Berlin; Humboldt and Martin Hinrich Lichtenstein are presidents

[1] I wish to thank Dr. Tobias Kraft (Berlin, Academy Project "Travelling Humboldt – Science on the Move") for valuable suggestions.

1829 expedition to Russia and Central Asia as guest of the Russian Emperor; organizer count Georg von Cancrin; travel companions: the zoologist Christian Gottfried Ehrenberg and the mineralogist Gustav Rose

1835 death of his brother Wilhelm von Humboldt

1842 Humboldt becomes the first chancellor of the peace division of the order *pour le mérite*

1843 publishes "Asie centrale" (3 vols.), his main publication on his 1829 expedition

1845 the first volume of "Kosmos" appears, volume two: 1847; volume three: 1850; volume four: 1858; (volume five: 1862)

1859 Humboldt dies in his apartment in Berlin, Oranienburger Strasse 67.

HUMBOLDT, FRIEDRICH WILHELM HEINRICH ALEXANDER VON

b. Berlin (?), September 14, 1769; d. Berlin, May 6, 1859

When Alexander von Humboldt died in 1859, he was commemorated in public events across Europe and the Americas to honour the most famous German naturalist and explorer of his day. In the following years, his statues were unveiled in cities like New York, Chicago, Philadelphia, St. Louis, Berlin, and Mexico City. Still today, hundreds of geographical features such as rivers, currents, mountains, but also universities, museums, schools, civil societies, streets, and parks – both in Europe and the Americas –, as well as plants and minerals, and even a mare on the moon bear his name.

Alexander von Humboldt was born on September 14, 1769. Biographers usually refer to Berlin (Jägerstrasse 22, today home of the Berlin-Brandenburg Academy of Sciences and Humanities) as his birthplace, though Tegel castle, where the family spent the summers, cannot be completely excluded as his place of birth.

The father, Alexander Georg von Humboldt (1720-1779), came from a family of Prussian military and civil officers. He had served in the Seven Years War and as chamberlain to the wife of the Prussian successor to the throne. Among Maria Elisabeth von Humboldt's (née Colomb, 1741-1796) ancestors were French Huguenots, Scotsmen and Germans. A. G. v. Humboldt was her second husband with whom she had two sons: Wilhelm (1767-1835), statesman and linguist, the organizer of the Berlin University in 1810, and Alexander. The brothers are often referred to as Prussian Barons, and occasionally they used this title themselves. It is possible that they believed an oral family tradition according to which they were entitled to do so. As Kurt-R. Biermann (1919-2002) has pointed out, it was only in 1875 that Wilhelm von Humboldt's male descendants were officially allowed to use the title Baron (Freiherr).

The generous and friendly father died early. The mother's relationship to her sons has often been described as strict and downright frosty. But it is thanks to her that the brothers received an excellent

education. Among their tutors were Joachim Heinrich Campe (1746-1818), educator and author, the historian and political writer Christian Wilhelm von Dohm (1751-1820), the philosopher Johann Jacob Engel (1741-1802), and the politician Gottlob Johann Christian Kunth (1757-1829). Kunth allowed them to enter the circles of the "Berlin Enlightenment". Though a personal meeting with the Jewish philosopher Moses Mendelssohn (1729-1786) has not been proven, his influence in Alexander's education is very clear. Together with his brother, Alexander took part in public lectures on science and philosophy, organized by the physician Marcus Herz (1747-1803), and was introduced to the salon of his wife Henriette (1764-1847). This early contact with educated and successful Jewish families formed Alexander's thinking. Until the end of his life, the intellectual culture of Berlin's liberal bourgeoisie and the ideals of the French Revolution of 1789 remained part of his political creed.

On October 1, 1787, the brothers enrolled at the University of Frankfurt (Oder). Here Alexander studied "Cameralia" (state driven economics), since his mother wanted him to become a senior officer in the Prussian government. After one semester, he returned to Berlin where he befriended the botanist Carl Ludwig Willdenow (1765-1812). Humboldt's subsequent studies in botany were in fact the starting point of his plans to visit foreign countries. The influence that Johann Friedrich Zöllner (1753-1804) exercised on Humboldt's education in terms of technology, chemistry, mathematics deserves further studies.

In April 1789, Alexander followed his brother to Göttingen where he spent two semesters at one of the newest German Universities. Here he studied natural sciences, mathematics, and classical philology. Among his teachers were the naturalists Johann Friedrich Blumenbach (1752-1840) and Johann Beckmann (1739-1811), the physicist, mathematician, and satirist Georg Christoph Lichtenberg (1742-1799) and the philologist Christian Gottlob Heyne (1729-1812). They laid the foundation for his lasting love of the sciences and antiquity as well as his high respect for the work of mathematicians.

In Mainz, Humboldt met Heyne's son-in-law Georg Forster (1754-1794), a participant in James Cook's (1728-1779) second journey around the world. Forster encouraged Humboldt to publish his first book *Mineralogische Beobachtungen über einige Basalte am Rhein* (1790) in which he took the position of the "Neptunists", arguing that all rocks, including basalt, were products of sedimentation. Later in his life, he changed his mind, though, after studying vulcanism.

Between March and July 1790, Forster and Humboldt went on a trip to Belgium, the Netherlands, England, and France which the former described in his *Ansichten vom Niederrhein* (*Views of the Lower Rhine*) (1791) and which strengthened the latter's desire to see remote countries. In England, Humboldt met, among others, the famous botanist Sir Joseph Banks (1743-1820) and the chemist Henry Cavendish (1731-1810), who first acquainted him with Antoine Laurent de Lavoisier's (1743-1794) works.

In August 1790, Humboldt went to Hamburg where he took courses in economics at Johann Georg Büsch's (1728-1800) School of Commerce. These studies are often under-estimated since they do not

seem to fit into the typical education of a naturalist. However, questions of trade and economy always played an important part in Humboldt's geographical works; in particular, new trade routes such as a connection between the Atlantic and the Pacific and the fluctuations in the supplies of gold attracted his interest until the end of his life.

Humboldt completed his formal education at the Mining Academy at Freiberg in Saxony. Here he studied mining and geology with the leading "Neptunist" of his time, Abraham Gottlob Werner (1749-1817). Andres Manuel del Río (1764-1849), a student of Lavoisier's, encouraged Humboldt's studies in chemistry. His experiments related to the influence of light on plant life resulted in his second book *Florae Fribergensis specimen* (1793). Humboldt's guide and instructor in Freiberg was Johann Carl Freiesleben (1774-1846) with whom he formed one of his close and lasting friendships. A very receptive student, Humboldt obtained the necessary qualification for his profession in only eight months. Shortly after his time in Hamburg, he applied for a position in the Prussian Ministry of Industry and Mining. In March 1792, he started his professional career as Assistant Inspector (Assessor cum voto) in the Department of Mines. Soon he was sent to the newly subdued Franconian Principalities in order to inspect mines and factories, which belonged to his Department. The reports he submitted revealed his talent and competence. Thus, he soon received a promotion to Chief Inspector of Mines (Oberbergmeister). In the following years, he made dozens of proposals to improve the productivity of mines, salt works and factories, organized a school for miners – in the beginning at his own expense – and invented life-saving devices for miners as well as a lamp that could function in choke-damp. Karl August von Hardenberg (1750-1822), the Prussian Governor of Ansbach-Bayreuth, consulted Humboldt in questions of trade and commerce and took him to a secret diplomatic mission. Besides this, he continued his scientific research, turning to so-called animal-electricity. As many of his contemporaries, he was looking for a specific "vital force", which he hoped to find in experiments partly carried out on his own body. The results were published in *Versuche über die gereizte Muskel- und Nervenfaser* (2 vols., 1797).

As early as 1794, he had the idea to write a book on the history and geography of plants. Two years later, he first mentioned a plan to work out a physical description of the world. These projects were to materialize later-on.

In March 1794, Humboldt and Johann Wolfgang von Goethe (1749-1832) met in Jena where Wilhelm von Humboldt had moved shortly before in order to be close to Friedrich Schiller (1759-1805). Goethe and Alexander von Humboldt were congenial personalities who benefitted from their exchange of ideas. They were empiricists and had a common interest in nature. Goethe's striving to find the "original phenomenon" influenced Humboldt in his search for the typical. Goethe's idea about unity and harmony in the universe can be found in Humboldt's concept of nature as a "living whole that is kept in motion and

balance by interior forces" which is still expressed in his *Kosmos*. Humboldt's desire to present his research findings in an artistic manner was certainly stimulated by Goethe and Schiller.

In November 1796, Maria Elisabeth von Humboldt died of breast cancer, leaving her sons with a remarkable fortune. Being financially independent, Alexander left the Mining Department where he had reached the high rank of Chief Councillor of Mines (Oberbergrat). Now he used the time to prepare a great expedition. In Jena, he completed his galvanic experiments, partly in cooperation with Goethe, and began to acquire the techniques necessary for zoological and botanical preparations, geographical measurements, etc. In Vienna's Botanical Gardens at Schönbrunn, he could study exotic plants; in Salzburg, he practiced the usage of the sextant and the barometer. Together with his friend, the famous geologist Leopold von Buch (1774-1853), he undertook short expeditions.

In Paris, where he arrived in May 1798, he was able to establish personal contacts with leading chemists, like Jean-Antoine Chaptal (1757-1832), and Louis-Nicolas Vauquelin (1763-1829). Humboldt continued his studies and reported on his research to the Academy of Sciences. He met his travel companion, the surgeon and botanist Aimé Bonpland (1773-1858), with whom he left Paris six months after his arrival. In Marseille there was no chance for them to sail to North Africa, so they had to proceed to Spain. On their way to Madrid, they determined the geographical position of various places. More important were the measurements of altitudes, which helped them create the first profile of a large area, revealing for the first time that the interior of Spain was a continuous high plateau.

Due to his diplomatic skills and with the help of influential friends, Humboldt was able to receive permission to carry out a scientific expedition to the immense territory of the Spanish colonies. This was a remarkable achievement since these properties were almost entirely sealed off to the rest of the world for both political and economic reasons. Within three centuries since the first seizure and colonization of the American continent, not more than a half-dozen explorations by Spaniards and foreigners had taken place. An important breakthrough for European science had been Charles-Marie de La Condamine's (1701-1774) expedition (1736 to 1743) which was to measure a longitudinal degree at the Equator near Quito. Between 1789 and 1794, an expedition under Alessandro Malaspina (1754-1810) had explored, among others, coastal regions of South America.

Humboldt had clearly defined his goals: "I shall collect plants and fossils and make astronomic observations. But that is not the main purpose of my expedition. I shall try to find out how the forces of nature interreact upon one another and how the geographic environment influences plant and animal life. In other words, I must find out about the unity of nature."

Humboldt and Bonpland left Europe in June 1799 from La Coruña on board the corvette "Pizarro". The Berlin-based private bank Mendelssohn & Friedländer was helpful in supplying Humboldt with the necessary financial means. The journey briefly paused at Tenerife, so that the travellers could

spend a few days exploring its volcano, the Pico de Teide. Six weeks after leaving Europe, the "Pizarro" reached the American continent at Cumaná (in what is today Venezuela) on July 19, 1799. The two explorers were to stay in the Americas for five years, until July 9, 1804. The details of the travels through the Caribbean, the Vice Royalties of New Granada, Peru, and New Spain (today Venezuela, Cuba, Colombia, Peru, Ecuador, Mexico), and the United States of America have often been described. These are only a few of the many outstanding achievements:

- The travellers collected thousands of plants, of which about 3,600 species had been unknown in Europe.
- With the help of sextants, chronometers, barometers, thermometers, a cyanometer, and other instruments, Humboldt collected magnetic, meteorological, climatological, oceanographical, and geological data, and was able to obtain the material he needed for drawing the most reliable maps of the areas visited.
- In his travel journals, he registered observations related to plant geography and plant physiognomy as well as descriptions of ancient monuments of the ancient Mesoamerican cultures.
- On multiple occasions, he recorded the horrors of the transatlantic slave trade, the atrocities and double standards of the Creole elites in slavery societies, the corruption and political shortcomings of the colonial administration as well as the cruel realities of Catholic missionary politics in the American Tropics. His profound criticism of the colonial system is manifested – even though in a more mediated form – in several of his publications.
- Humboldt reported about the production of the poison curare, and he was the first to bring the fertilizer guano to Europe.
- During their famous navigation on the Orinoco and Casiquiare rivers, the travellers explored the natural connection between the Orinoco and the Amazon systems.
- On June 23, 1802, Humboldt tried to climb Chimborazo, which was at that time generally accepted as the tallest mountain in the world. Though he did not scale it to the summit, the altitude of about 5,600 meters that he reached (he believed he had been at about 5,900 meters) set a long-standing record among Europeans of which Humboldt was very proud.

The contributions to science that Humboldt derived from the American journey are numerous. All his conclusions he based on facts and precise measurements, thus sharply departing from the speculative "Naturphilosophie" of his times. *Comparison* was the method, which he applied in all his fields of research. Here are just a few examples:

- His geomagnetic observations led to the perception that the magnetic intensity (today called magnetic flux density) decreases from the poles to the equator.
- His eudiometric measurements of air, which were completed with Joseph Louis Gay-Lussac (1778-1840) in Paris, revealed the fact that oxygen and hydrogen always compound in the proportion of 1 to 2.
- Humboldt observed the amplification of sound at night and gave a qualitative explanation of this phenomenon, which the geophysicist Hans Ertel (1904-1971) has called the "Humboldt effect".
- Humboldt contributed to the development of climatology as a science in itself, he established the field of orography, formulated the fissure theory of volcanology, and introduced the isotherm in meteorology.
- His method of determining the light intensity of southern stars was an original contribution to astronomy.

Humboldt's and Bonpland's botanical collections from tropical America are in terms of taxonomy probably the most important ones ever made. The significance does not stem from the large number of specimens, which the naturalists obtained, nor from the regions in which the specimens were collected, but rather from the fact that the botanical results of the expedition were made known through adequate publications within reasonable time. The description of the new species should have been Bonpland's task but despite a promising start, it proved little to his taste. A cooperation with Willdenow, who had received a significant part of the collection, ended abruptly when the Berlin botanist died in 1812. Humboldt was lucky to find Carl Sigismund Kunth (1788-1850) who was able to complete the work. His most important publication was the monumental *Nova Genera et Species Plantarum* (7 vols., 1816-1825) based on the collection deposited in the Muséum d'Histoire Naturelle, Paris. While Kunth was working in Paris, Willdenow's manuscript names and descriptions were used by botanists in Berlin, which led to the multiplication of synonymous names because of nearly simultaneous publication. With his efforts to supersede the Linnean system in arranging the materials collected by Humboldt and Bonpland, and in extending the more natural system that Antoine-Laurent de Jussieu (1748-1836) had promoted, Kunth contributed to the development of systematic botany.

While staying in Mexico, Humboldt had access to various archives. The material obtained here enabled him to write the *Essay politique sur le Royaume de la Nouvelle Espagne* (*Political Essay on the Kingdom of New Spain*) (1811), one of the first comprehensive descriptions of a country and for many years the most important source of information on Mexico. In this work, Humboldt examined the system of dams, canals, and floodgates that was to protect Mexico City from floods and concluded that, by seeing the water as an enemy only, the Spaniards had caused the destruction of fertile land.

The *Atlas géographique et physique du Royaume de la Nouvelle-Espagne* (1811) is an example of Humboldt's outstanding achievements as a cartographer. The *Carte générale du Royaume de la Nouvelle-Espagne* contained in the atlas was for many years the most important compendium of knowledge concerning the North American Southwest.

During his visits to Cuba, he particularly studied the system of slavery which he characterized as the greatest moral evil that has afflicted humankind, and as an unnatural economic system.

On his way from Cuba to Europe, he spent several weeks in the United States, the political system of which he admired. In May 1804, President Thomas Jefferson (1743-1826) invited the Prussian explorer to Washington. Jefferson wrote: "The countries you have seen are of those least known, and most interesting, and a lively desire will be felt generally, to receive the information you will be able to give." During a short stay in Philadelphia Humboldt reported on his travels to the American Philosophical Society, which elected him to be a member. A written summary of the journey was translated from the French and published by its treasurer John Vaughan (1756-1841). In Washington, D.C., Humboldt met President Thomas Jefferson, Secretary of State James Madison (1751-1836) and Secretary of the Treasury Albert Gallatin (1761-1849). With the latter, he developed a personal friendship later in Paris, where Gallatin served as the American envoy. His research in ethnology was encouraged by Humboldt. In many biographies of the German explorer, a stay at Jefferson's estate Monticello is mentioned. Apparently, this error goes back to a report by the scientist Benjamin Silliman (1779-1864) on a conversation with Humboldt in 1851 in which such a visit was mentioned.

Humboldt's American passport, signed by Madison, mentioned "forty boxes of plants and other collections relating to Natural History." This material, as well as collections previously sent to Europe, eventually reached individuals and scientific institutions in Berlin, Madrid, and Paris, where parts of it have survived.

In 1804, Humboldt returned to Europe. He landed in Bordeaux and went straight to Paris, where his fellow scientists gave him a warm welcome. While in America, he had already sent letters and reports to Europe which were meant for publication. Now, he could report personally and began to organize his materials for publication.

In March 1805, Alexander left Paris with Gay-Lussac for Rome to see his brother Wilhelm, who was at that time the Prussian envoy to the Vatican. Besides, he wanted to compare Vesuvius with the volcanoes he had seen in in New World. Only in November 1805, did he return to Berlin. Here, he concentrated on the reformation of the Academy of Sciences, which he found in a pitiable condition. He proposed that renowned scholars like Claude Louis Berthollet (1748-1822), Sir Humphry Davy (1778-1829), Jefferson, Carl Friedrich Gauss (1777-1855), and Goethe be elected members of the Academy. Already one year later Humboldt left for Paris on a diplomatic mission. Here, he returned to the circles of

congenial colleagues and kept his permanent residence until 1827. Being a foreign member of the Paris Academy of Sciences and the prestigious Société d'Arcueil, he was one of the most influential scholars in the French capital. In this position, he could support many younger colleagues. Most of his time and the rest of his fortune he spent on publications about the American journey. The tremendous materials were used on a project that grew to a series of comprehensive, well-illustrated books, together forming the *Voyage aux régions équinoxiales du Nouveau Continent*. In the so-called large edition in folio and quarto the *Voyage* consists of 34 volumes:

I Relation historique (general description of parts of the travels)	7 volumes
II Zoology	2 volumes
III New Spain (Mexico)	3 volumes
IV Astronomy	2 volumes
V Plant geography	2 volumes
VI Botany	18 volumes

There is also a small edition (entirely in octavo), which differs from the large one not only in size but also in content. The four volumes of *Synopsis plantarum* (1822-1825) appeared only in octavo.

The *Voyage* turned out to be the most expensive and valuable edition ever published on travels by a private person.

The *Essai sur la Géographie des Plantes* (1807) has been regarded as Humboldt's most important book in this series. It was one of the foundations for an understanding of the current distribution of plants and their previous wanderings due to climate, quality of soil, altitude etc. Moreover, the author distinguished between species, which occur as isolated individuals, and those gregarious species, which dominate wide areas. He was the first to call these communities of plants "associations", a term that is still used today.

Humboldt was never able to complete the *Voyage* as planned. The *Relation historique*, for example, covers only the travels in Venezuela and Cuba up to April 1801. Therefore, the Alexander von Humboldt Research Center in Berlin published in 1986 parts of Humboldt's travel journals that cover the rest of the expedition (with subsequent and augmented editions following in 2000 and 2003).

Humboldt's favourite among his own books was *Ansichten der Natur* (first edition 1808; *Views of Nature*; *Aspects of Nature*) in which he tried to present the fundamental results of his journey in popular form. The book was re-published in extended versions in 1826 and 1849. The latter two editions contain the allegorical tale on the philosophy of nature "Die Lebenskraft oder der Rhodische Genius" ("Vital Force, or The Rhodian Genius"), first published in Schiller's monthly *Die Horen* in 1795.

During the years in Paris, Humboldt kept an interest in the struggles for independence in Latin America. In 1804, he met Simón Bolívar (1783-1830) with whom he corresponded in the 1820s. It was

the “Liberator” who called Humboldt “the scientific discoverer of the New World”, and a man “whose wisdom has done more good for America than all the conquerors put together.” With his high moral authority, Humboldt tried to encourage Bolívar to remain a wise and moderate ruler after his victories.

Among Humboldt’s North American acquaintances in Paris, David Bailie Warden (1772-1845) was for a long time the most important one. The Irish-born scientist and diplomat served the United States as consul and later as “cultural ambassador”. He furnished Humboldt with statistical data and other materials on North America. The high respect that Warden enjoyed among European scientists is expressed in Humboldt’s correspondence with Jefferson and Madison.

In April 1827, Alexander von Humboldt returned to Berlin. After having lived in Paris for many years, his hometown appeared to him provincial and dull. However, the famous naturalist did not only deplore the situation, but he also made efforts to change it. He came with an elaborate program to help develop the Prussian capital into a centre of the sciences. In the course of time, the city was to have “the first (foremost) observatory, the first chemical institution, the first botanical garden, and the first school of transcendental mathematics”. In the winter of 1827/28 in his capacity as member of the Royal Academy of Sciences Humboldt gave 62 lectures on physical geography at the University, and at the same time 16 public, free lectures on the same topic at the hall of the “Singakademie”. This was a first breakthrough in Humboldt’s efforts to popularize the natural sciences. One year later, he presided – together with the explorer and zoologist Hinrich Lichtenstein (1780-1857) – over the meeting of the “Association of Physicists and Physicians of Germany” which he regarded “a noble manifestation of scientific union in Germany.” Mainly on his initiative, scientists of international renown like Gauss, Jöns Jakob Berzelius (1779-1848), Hans Christian Oersted (1777-1851), and Charles Babbage (1791-1871) came to Berlin.

Already during his years in Paris, Humboldt had worked on a second great expedition. Plans to travel to India seemed to materialize in 1818, when he was granted the necessary means by the Prussian King. For unknown reasons the plan came to nothing.

On April 12, 1829, Humboldt left Berlin for an expedition to Russia and to Siberia, which was financed by the Russian Emperor Nicholas I (1796-1855) and organized by his Minister of Finance, Count Georg Cancrin (1774-1845). The famous German explorer was accompanied by the zoologist Christian Gottfried Ehrenberg (1795-1876), the mineralogist Gustav Rose (1798-1873), and his servant Johann Seifert (1800-1877). They passed Königsberg, St. Petersburg, Moscow, Kasan, and the northern part of the Ural Mountains on their way to the frontier of Chinese Dzungaria. While returning they crossed the southern Urals, saw the Caspian Sea, Voronezh, and Tula. The principal reason for the trip was to collect material on the mining resources of Siberia for the Russian Government. While Humboldt examined the mines and concentrated on his observations in geology, geomagnetism, climatology and the astronomical determination of places, his travel companions worked in their respective fields. As results

of the expedition, several treatises and books were published, among them *Asie Centrale* (1843). Its main importance lies, according to Humboldt's biographer Lotte Kellner (born 1904), "in the exposition of Humboldt's ideas on the relative contribution of mountains and plateaux to the mean height of continents." Parts of the geological material collected during this expedition are preserved at the Berlin Museum of Natural History.

Between 1830 and 1848, Humboldt visited Paris several times to fulfil diplomatic assignments and to continue his scholarly work. During this time, he completed, as part of the *Voyage*, his *Examen critique de l'histoire de la géographie du Nouveau Continent* (1814-1834), an important contribution to the history of geography for which he utilized the works of the Spanish historian Martín Fernández de Navarrete (1765-1844), newly found documents, and the existing literature, such as the 1828 biography of Christopher Columbus (1451-1506) by the American author Washington Irving (1783-1859).

In the last decades of his life, Humboldt worked on his *Kleinere Schriften*, of which only the first volume appeared in 1853. Primarily he wrote his *Kosmos*, which he regarded as his life's work. In volume I and II (1845 and 1847), he tried to present the entire material world as it was known to the scientists, and the history of physical cosmography in vivid and understandable language. The result was an overwhelming success. During his lifetime, two more volumes appeared in which special research findings were published. Volume V (1862) contains one of the most elaborate indexes ever prepared for a scientific work. It was completed by the philologist Eduard Buschmann (1805-1880).

Because of his achievements, Humboldt was a member of almost all major academies. Besides his scholarly and court activities, he maintained a strong interest in humanitarian causes. On his initiative, a law was passed according to which a slave was set free upon stepping on Prussian soil. At a time of growing racism and hostility to Jews Humboldt spoke of the "unity of the human race," all members of which being "equally entitled to freedom."

As a chamberlain to two Prussian kings, as their advisor in questions of science and art, and as the first chancellor of the peace division of the order *pour le mérite* (from 1842 on), he had various opportunities to support the youth. Here are a few examples of "members of the Humboldt family":

- the mathematician Gotthold Eisenstein (1823-1852),
- the astronomer Benjamin Apthorp Gould (1824-1896),
- the chemist Eilhard Mitscherlich (1794-1863),
- the geographers Carl Ritter (1779-1859) and Heinrich Berghaus (1797-1884),
- the physiologists Johannes Peter Müller (1801-1858) and Emil du Bois-Reymond (1818-1896),
- the Germanists Jacob (1785-1863) and Wilhelm Grimm (1786-1859),
- the Egyptologists Richard Lepsius (1810-1884) and Heinrich Brugsch (1827-1894),

- the composers Giacomo Meyerbeer (1791-1864) and Felix Mendelssohn Bartholdy (1809-1847), and
- the painters Ferdinand Bellermann (1814-1889) and Eduard Hildebrandt (1818-1868).

Humboldt also maintained a strong political awareness. After the revolution of 1848, he envisaged a united Germany as a federation in which the identity of the various Germanic tribes could be preserved. "The peoples," he wrote, "have a right to be governed wisely by those who know their needs best."

After his visit to the United States, he had maintained a special interest in that country. In particular, he followed the progress of the natural sciences. His works and opinions were so influential that the physicist Alexander Dallas Bache (1806-1867) could write: "His name is a tower of strength and his praise the highest attainable. I doubt whether he fully knows how highly we Americans venerate him." Humboldt regretted, however, that in the U.S. "freedom was only a mechanism in the principle of profitability." As early as 1825, he had understood that the spread of slavery would jeopardise the Union. In the Presidential elections of 1856, he gave moral support to the Republican candidate John C. Frémont (1813-1890).

Kurt-R. Biermann has pointed out that Humboldt did not only encourage research into the history, culture and geography of Asian countries. He also foresaw, as early as 1853, that Japan one day would be of great importance in world trade.

Humboldt was a very productive letter writer. To date we know the names of about 3,000 correspondents. A great portion of his correspondence, which is spread over European, American, and Australian archives, is still waiting for publication.

Despite all his achievements, Humboldt is not generally regarded as one of the world's great discoverers and inventors. However, Hanno Beck (1923-2018) was certainly right when he saw him as the most eminent geographer and most influential traveller of modern times. Through his ability to combine observations and to see unity in diversity, Humboldt exercised a great influence on the development of the sciences during the first half of the nineteenth century. Moreover, his strong belief in the progress of humankind and his democratic principles are good reasons for preserving his memory.

In recent years publications have focused on showing that Humboldt "altered the way we view the natural world and our place in it", thus paving the way for an *ecological awareness*.

About the research project on Humboldt at the Berlin-Brandenburg Academy of Sciences and Humanities see https://edition-humboldt.de/

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  Deutsches Textarchiv (German Text Archive), the largest full-text collection of German texts from the 16th to the 20th century, it includes several Humboldt texts, among them the full *Kosmos* and the 1859 German translation of Humboldt's American travelogue (*Relation historique*) by Hermann Hauff. The site has a powerful linguistic search (documentation: https://www.deutschestextarchiv.de/doku/DDC-suche_hilfe) , see for example the search string "China" https://www.deutschestextarchiv.de/search/ddc/search?fmt=html&corpus=ready&ctx=&q=China+%23has%5Bauthor%2C%2F118554700%2F%5D&limit=10

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Contact:
Dr. Ingo Schwarz
Project: Alexander von Humboldt auf Reisen, Wissenschaft aus der Bewegung (Travelling Humboldt – Science on the Move)
Berlin-Brandenburg Academy of Sciences and Humanities
Jaegerstr. 22-23
10117 Berlin
Germany
schwarz@bbaw.de