



# Baron Friedrich W.K.H. Alexander von Humboldt

## History of Geology James S. Aber

Born: 14 Sept. 1769, Berlin, Germany.  
Died: 6 May 1859, Berlin, Germany.

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## Abstract

Humboldt was a German aristocrat, natural scientist, explorer, geographer, geologist, archeologist, and liberal; he was the last great universal man. Birth to a rich family assured him of financial freedom to pursue his ambition of exploration and discovery during most of his long life. He achieved early success in the Prussian Department of Mines, where he revitalized the ancient gold mines of the Fichtel Mountains. After his mother's death in 1796 and receiving a large inheritance, he turned his full attention to exploration of the tropics.

He received a royal passport to explore throughout the Spanish New World Empire in 1799 and embarked on a private 5-year expedition. He eventually visited the Canary Islands, Venezuela, Brazil, Guiana, Cuba, Colombia, Ecuador, Bolivia, Peru, Mexico, and the eastern United States. The next three decades were devoted mainly to writing and publishing a 30-volume report, *Voyages de Humboldt et Bonpland 1799-1804* (1805-34). During this time he also wrote *Aspects of nature* (1808) and *Geognostic essay on the trend of rocks in two hemispheres* (1822). Among his many geological contributions, he named the Jurassic System.

In 1829 at age 60, Humboldt suddenly had another great opportunity--a whirlwind expedition through Asia, across Russia and Siberia to Mongolia. A modest 3-volume work on *Asie Centrale*

was published as the result several years later. The remainder of his life was consumed in writing his monumental masterpiece, *Cosmos*, a 5-volume encyclopedia in which he developed the unity of all natural and human phenomena. This "last great work of the last great universal man" enhanced his reputation enormously as the greatest natural scientist of his day.

## Introduction

Humboldt was a German natural scientist, archeologist, explorer and geographer, who undertook two major expeditions to the New World (1799-1804) and to Asia (1829). He was the last great **universal man** and a humanitarian liberal. In geology, he made pioneering observations of stratigraphy, structure and geomorphology; he understood the connections between volcanism and earthquakes. Humboldt named the Jurassic System.

Humboldt had an aristocratic birth. He spent much of his childhood at Schloss Tegel, the family estate 12 miles north of Berlin. He developed an early interest in the natural world and came to be called the "little apothecary" because of all his rock, insect and flower collections. Humboldt was exposed to science during his teenage years through contacts with friends; no formal science instruction was available at that time in Berlin. His older brother was an excellent student, while Alexander was frail and weak. He seemed to excel only at painting and had an uncertain future.

In 1789 Alexander joined his brother at Göttingen University, the foremost German university. There he was exposed to physics, chemistry, geology, and other sciences, in which he developed lifelong interests. He met Georg Forster, who had participated in Cook's second circumnavigation of the world (1772). Humboldt and Forster travelled to England in 1790. The trip was a revelation to Humboldt, and next year in revolutionary France he became a lifelong liberal. Humboldt dedicated his life to exploring the Earth and understanding nature.

Humboldt applied in 1791 for a position with the Prussian Ministry of Industry and Mines. He was instructed to complete courses at the Freiburg Academy, a goal he had hoped for. At that time, Werner was at the height of his career, which meant a rigorous training for young Humboldt. In 1792, he was appointed assistant inspector in the Dept. of Mines. The probationary period was skipped, owing to Humboldt's brilliant student career, his aristocratic birth, and his independent income. Humboldt found himself entirely out of place in the lazy, corrupt bureaucracy of the Prussian government. Nonetheless, he gained permission to inspect mines in outlying districts. He was quickly promoted to Chief Inspector because of his thorough reports.

Humboldt revitalized the ancient gold mines of the Fichtel Mountain district in 1793. This was a spectacular achievement, which included a school for miners, safety equipment, and health improvements. In 1795 he had a series of promotions and diplomatic assignments. The highest governmental and scientific positions were within his reach. Meanwhile, he carried out literally

1000s of scientific experiments. He came close to inventing the battery, but failed to recognize what he had created. He never forgave himself later in life for this one scientific oversight.

During this period, Humboldt went through a series of incomplete love affairs, both with men and women. He was apparently ambivalent and unfulfilled in this regard. He remained a lifelong bachelor totally consumed with his devotion to science, exploration, and knowledge. In 1796, Humboldt's mother died of cancer leaving a large estate to him. He resigned his post in the mining department in 1797; he was free at last to follow his ambitions.

## New World Exploration

Humboldt attempted to realize his dream of exploration and discovery, but a series of setbacks kept him in Europe. In 1799 with Aimé Bonpland (botanist) whom he had met in France, Humboldt arranged to meet with the Spanish King and Queen in Madrid. They were impressed with his ability to speak Spanish, his credentials, and his plan to explore the Spanish New World Empire. It was a vast region extending from California to Chile, including the Caribbean. Most was virtually unknown to science; it was *terra incognita*.

Humboldt and Bonpland were granted royal passports to explore throughout the empire. They departed for South America on June 5, 1799 with the best scientific instruments--sextants, compasses, telescopes, microscopes, etc. Humboldt was not merely seeking observations, specimens and measurements; he was embarking on an extraordinary effort to *find out about the unity of nature*.

They eventually visited the Canary Islands, Venezuela, Brazil, Cuba, Colombia, Ecuador, Bolivia, Peru, Mexico, and the eastern United States. They conducted a great amount of geographical surveying and mapping. They collected geological, zoological, botanical, and ethnographic specimens, including more than 60,000 rare or new tropical plants.

Humboldt and Bonpland landed at Cumaná to escape a typhoid outbreak on their ship, July 16, 1799. From Caracas they crossed the desolate llanos (plains) where Humboldt conducted experiments on the dreaded electric eel, a 6- to 9-foot fish that can deliver a shock up to 650 volts. They journeyed by large canoe up the Orinoco River to the "Great Cataracts." The region of the upper Orinoco was virtually unknown even to the Spanish. It was an extremely dangerous environment with alligators, jaguars, and swarms of biting insects. They accomplished an overland portage of seven miles to the Rio Negro of the Amazon system in Brazil, where the Portuguese had a warrant for Humboldt's arrest as a spy.

Near San Carlos, they continued into the legendary "Casiquire Canal," a unique waterway of inland delta connecting the Orinoco and Amazon systems. At times they had no food, and conditions were almost unbearable. This desolate region is little changed today; it is remote,

inhospitable, and undeveloped. At Esmeralda, Humboldt observed the manufacture of a potent poison, curare. He actually tasted the poison, which is effective only in the bloodstream, and he obtained samples. On June 13, 1800, they finally reached civilization again at Angostura in Guiana.

This amazing journey was only the first leg on Humboldt and Bonplan's expedition. After a brief stay in Cuba to store specimens, they were off again for an overland trip across the Andes Mountains from Cartagena to Lima. The journey lasted 1½ years reaching Lima on Oct. 22, 1802. Half a year was spent at Quito, where Humboldt studied several prominent volcanoes. In June 1802, he climbed near the summit of Mt. Chimborazo, then thought to be the world's highest mountain (20,720 ft). Humboldt reached 19,286 feet, a record for his day.

From Lima, Humboldt and Bonplan sailed to Guayaquil and thence to Acapulco in 1803. Humboldt charted and made observations on a cold ocean current along the Peruvian coast, which now bears his name--**Humboldt Current**. They spent about a year in Mexico, based in Mexico City, and then set sail for Havana in March 1804 to pick up stored materials. The expedition finished with a brief, whirlwind tour through the eastern United States. They met with President Jefferson, who had just made the Louisiana Purchase. Humboldt was a source for much information about the Spanish empire in Mexico and California. Humboldt was overwhelmed by freedom and liberty in the United States (except slavery). He departed for France in June 1804 and returned to a hero's welcome.

Most of the next 30 years were devoted to writing and publishing reports. A series of 30 volumes were produced between 1805 and 1834, *Voyage de Humboldt et Bonplan 1799-1804*, in French. Publication was tremendously expensive and paid for mostly by Humboldt himself. The volumes were scarce and costly then and now. Other works by Humboldt during this time include *Aspects of nature* (1808), a popular work for laymen, and *Geognostic essay on the trend of rocks in two hemispheres* (1822), a major geological work. All this was accomplished amid changing political fortunes, as Napoleon first conquered Europe and then was defeated (1814).

## Later Life

In 1829 at age 60, Humboldt suddenly had another great opportunity--an expedition through Asia, across Russia and Siberia, to Mongolia. All expenses were paid by the Russian treasury. The primary objective was to learn more about the Ural mining district. Humboldt correctly predicted that gold would be discovered, and it was in the same year. The expedition took place by horseback and steamer boats. The entire trip was completed in only nine months, and he was back to Berlin by year's end. Humboldt secretly despised the Russian government and found the landscape bleak and monotonous.

*Asie centrale*, a modest 3-volume work, was published several years later. Humboldt was

influential in setting up a chain of geomagnetic observatories from St. Petersburg, across Russia, to Alaska. This was part of a growing worldwide network. Physically Humboldt remained strong and healthy, and he undertook diplomatic missions for Prussia. In 1832 he met and encouraged young Louis Agassiz with a financial gift.

### **From a letter written by Humboldt in 1834**

*I have the crazy notion to depict in a single work the entire material universe, all that we know of the phenomena of heaven and earth, from the nebulae of stars to the geography of mosses and granite rocks--and in a vivid style that will stimulate and elicit feelings. Every great and important idea in my writing should here be registered side by side with facts. It should portray an epoch in the spiritual genesis of mankind--in knowledge of nature. But it is not to be taken as a physical description of the earth: it comprises heaven and earth, the whole of creation.*

Humboldt began to write his final masterpiece, *Cosmos*. It was a monumental project that was a race against death. Volume one appeared in 1845, at age 76. Additional volumes came out every few years. Volume five was half finished at his death in 1859. *Cosmos* was much more than an encyclopedia; it was a unification of all natural and human phenomena backed up by detailed factual observations. It was an instant success, quickly translated into many languages from its original German. A contemporary English version is more than 2000 pages. It was the "last great work of the last great universal man." His reputation was enhanced enormously.

Humboldt died peacefully on May 6, 1859. His last request was to be buried at state expense, a lavish funeral the likes of which Berlin normally reserved for royalty. He was buried on the family estate at Schloss Tegel.

## **Historical Assessment**

There is no question that Alexander von Humboldt was the foremost natural scientist of the early 19th century. His accomplishments inspired many others to explore and discover the natural world. Although geology was only a portion of his vast repertoire, he was certainly among the most influential geologists of his day. Time has not dimmed his importance. Indeed Humboldt's reputation is just as strong today, two centuries after his New World expedition, as while he was alive.

Already in the early 19th century, the scientific disciplines were becoming well defined and increasingly separated in their methods and philosophies. Humboldt attempted to unite all manner of natural phenomena to understand the *heaven and earth, the whole of creation*. Few others have attempted such a grand undertaking. Throughout the 20th century, scientific

disciplines continued to subdivide into ever smaller and more specialized fragments. Only in the late 20th century, with the advent and tools of space exploration, has science again moved toward a holistic understanding of the complexity of the Earth's environmental system. A new interdisciplinary approach, known as **earth-system science**, has emerged. Humboldt would have been pleased.



## Related Websites

- Alexander von Humboldt [Foundation](#) for the promotion of international academic exchange.
- Alexander von Humboldt [in the Net](#).
- Natural history legacy of Alexander von [Humboldt](#).

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