The Shaping of Alexander von Humboldt

Alexander von Humboldt was born on 14th September 1769 in Berlin to wealthy aristocratic parents; his godfather was the future King of Prussia, Friedrich Wilhelm II. Coming from an intellectually connected family, he was given the best education available at the time. His mother arranged for her sons (Alexander and his brother Wilhelm) to be tutored by enlightenment thinkers who inspired independent and liberal thinking in the boys. From a young age, Alexander (henceforth simply referred to as Humboldt) enjoyed being outdoors, and even as a young child, spent time observing nature, collecting insects, plants, and stones.

Humboldt was born at a time characterised by increasing globalisation, with European colonial powers expanding their empires to distant tropical countries, especially in South America, Asia, and the Africas. This period was also the time of explorations, scientific revolutions and discovery by European powers. The industrial revolution in England, and subsequently in Europe, resulted not only in the transformation of industries but also brought innovations in technology that impacted all aspects of life. The invention of microscopes and telescopes, the uncovering of mechanical laws of nature by Newton, among others, were allowing scientists to uncover the laws that govern the natural world. Learning and living through this age of enlightenment was surely an exciting time for Humboldt. Thanks to his excellent education and his natural curiosity, Humboldt found himself yearning to be part of discoveries, explorations, and adventures in faraway tropics. Having read books by James Cook and others who travelled the world only fuelled his desire to leave Germany and travel, especially to the tropics, which were very different from Europe.

Despite his interest and desire to explore and undertake scientific explorations, Humboldt was unable to do so, as he was dependent on his mother for financial support. In deference to his mother’s wish for him to enter the civil services, at the age of 21, he enrolled in a mining academy. Here, he was exposed to the latest theories in geology. After his studies, he was made a mining inspector, enabling him to travel across the Prussian empire, collecting data on rocks, minerals, and various plants growing in the distinct environment of mines. He published many books during this period, including on subterranean plants, and basalts found along river Rhine, a major river in northern Europe. In his free time, Humboldt continued to engage in

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his scientific ideas and experiments; he was especially passionate about understanding ‘animal electricity’ better through physiological and anatomical experiments.

It was during this time that the German philosopher Immanuel Kant published his famous work *Critique of Pure Reason*, in which he argued that our senses influence the way we observe and understand Nature and its underlying ‘laws’. This book forced many intellectuals, including Humboldt, to question their ideas of subjectivity and objectivity, especially when it came to deciphering the ‘laws’ of Nature. Humboldt, as a young naturalist, was forced to contemplate his understanding of Nature vis-a-vis his empirical research and his own emotional responses to Nature. Coincidentally, Kant also lectured on physical geography, whose outlook and work hinted at the need for an interdisciplinary and holistic understanding of Nature. The influence of these ideas can be seen in Humboldt’s outlook and his work [2].

Humboldt, working as a mining inspector, was not only conducting studies in geology and mineralogy but also in physiology and botany. In a world of super-specialisations, it is worth pausing to appreciate the breadth of Humboldt’s knowledge. He was well-versed in geology, zoology, botany, and natural history. Goethe, the famous German poet, who was a close friend and collaborator, claimed that Humboldt was one of the rare people who could hold forth on so many fields. Such understanding of various fields empowered Humboldt to envision a unified and interconnected Nature.

At the age of 29, the death of his mother left Humboldt with a substantial inheritance that gave him the freedom to pursue his interests. He decided to fulfill his dream of traveling and exploring, especially to the tropics and used his inheritance to acquire the best instruments available at the time, including telescopes, compasses, microscopes, meteorological equipment (in all about 42 pieces of equipment!). After spending time exploring various options, he approached the Spanish kingdom to grant him permission to travel to their colonies in South America. Having acquired the permissions, Humboldt set off in 1799 to South America along with a team that included the botanist Aimé Bonpland. As we will see below, Humboldt collected plants, animals, and rocks, measured the heights of mountains, took meteorological measurements, and studied volcanoes among other things. Others had collected before him; what set his explorations apart was his approach to viewing Nature as unified and interconnected, and his ability to synthesize across fields.

**South America and the Intellectual Growth of Humboldt**

After months of travel across the Atlantic ocean, Humboldt finally reached South America, which turned out to be one of the most important expeditions he undertook in his life. His expeditions across South America shaped his scientific thought, and much of it should be cred-
ited to his diverse areas of interest, meticulousness, and desire to look at the bigger picture. He was constantly drawing parallels, comparing the species and ecological communities he encountered in South America with those in Europe, linking their presence with environmental conditions. Humboldt was not merely collecting, he was also observing the landscape, paying particular attention to what he saw as the destruction of the natural environment.

The dominant Western intellectual perspective up until this point placed humans at the center of the natural world, and believed that Nature was made for human use. Humboldt espoused the view that Nature was constructed by laws and processes outside the purview of human control. Moreover, Europeans of the time favored ‘neat’ Nature, with manicured lawns and organized fields; these were considered superior to the wild, which seemed chaotic and inscrutable [3]. Humboldt, however, found that the more he observed Nature, the more sophisticated and organized its ‘chaos’ was. Humboldt’s view of Nature was an important departure from the Western scientific and intellectual ideas prevalent at the time and influenced his ideas on ecological degradation.

The first major expedition he undertook in South America was along the Orinoco river, one of the largest rivers in South America, to determine if the Amazon and the Orinoco basins were connected, as had been suggested by some [4]. He observed, collected specimens, and took measurements. He met locals and indigenous communities from whom he learned enthusiastically. The locals told him of the rapidly falling water levels of Lake Valencia. He got to work and collected data from around the lake. The lake’s water level was regulated by a balance between the water coming in from small streams and loss by evaporation. From his data and observations, he realized that the rapid decline in water levels was due to the clearing of forests around the lake. He connected the various changes in the landscape—increased clearing for agriculture and loss of forests that exposed soil and reduced water retention—to the falling water levels of the lake. He linked intact forests to the regulation of ecosystems and climate and concluded that deforestation, therefore, would negatively impact both ecosystems and climate, becoming, perhaps, the first to raise an alarm about the future impacts of human-induced climate changes.

After his long and arduous trip along the Orinoco, Humboldt then traveled across the Andes mountain range, along with Bonpland and Carlos Montúfar. He was interested in observing volcanoes (of which there were many) and biodiversity along the mountains. He took meticulous measurements of air pressure and temperature and noted the biodiversity that he observed along the elevational range of Andes. He discovered the magnetic equator of the Earth and that it lies below the geographical equator. Many scientists at the time were beginning to recognize that the Earth was much older than what was accepted at that time, and it was thought that volcanism had an important role to play in earth building. Humboldt decided to climb
Chimborazo, a steep and impressive volcanic mountain, in an attempt to understand the role of volcanoes in Earth's geological history and formation. The climb was challenging, more so because of all the sensitive instruments that had to be carried. But Humboldt and his team nearly reached the summit of the mountain, and were the first to measure the air pressure near the summit of Chimborazo, which was considered the tallest mountain at that time.

Humboldt was also able to gather some important insights from observing the diversity of plants and animals as he traversed the Andes. He noted that species composition changed along with elevation and that there were some similarities between species in Europe and in the Andes. Furthermore, he also noticed that the pattern of the shift in species communities along elevation was similar to patterns of species changes across latitude in Europe. His work in the Andes consolidated his view of Nature as unified in its organization. After his travels along the Andes, on the return voyage along the coast, he obtained measurements of the cold oceanic current that pulls along the coast of Peru, which is now named the Humboldt current in his honor.

From South America, Humboldt traveled to Cuba, Mexico, and the then newly created United States of America. In Cuba, he witnessed firsthand the destruction of large swathes of forests for sugar production and noted that such intense monoculture would threaten forests and natural landscapes in the region. He noted that colonialism would destroy the environment and place the local populations at risk of starvation. He was also an abolitionist, maintaining that slavery had no place in society. His views on South America, indigenous communities, and Nature deviated from those that were prevalent in Europe and among the colonial powers, making him an exception in the colonial history of the region [3]. He then traveled to the United States of America, whose founding principles he admired. After spending time in the country, discussing, debating, and traveling, Humboldt finally returned to Europe, 5 years after his voyage to South America, with 1000s of crates of information, collections, and journals. Along the way, Humboldt made many long-lasting friendships and collaborations, including with Simon Bolivar, and George Washington among others.

**Russian Expedition and Cosmos**

In 1804 he returned to Paris, which Humboldt considered as a center for science, where he began organizing his collections. He continued to conduct experiments, study his collections, and discuss his findings and theories with his intellectual circle of friends. He reluctantly moved to Berlin subsequently when he was offered a position in the court of King Fredrick Wilhelm III of Prussia. Here, he devoted his time to writing books based on his explorations in the Americas. He wrote two books at this time, *Essays on the Geography of Plants*, and
Views of Nature, both of which were well received. He continued to work on his books and manuscripts, while at the same time trying to organize a trip to the Himalayas, with an intention to compare patterns between the Andes and the Himalayas. However, despite many attempts, he was not given permission by the East India Company to visit India. Moving back to Paris, he continued to engage with other prominent scientists and intellectuals of the time, whilst being immersed in his work.

Humboldt differed from others of his time, as he did not care for personal wealth (often giving it away to other upcoming scientists), remained unmarried, with many young men as companions. Despite what could be considered eccentricities, he was much respected and loved by his colleagues and friends. He also financially supported many young scientists, including Louis Agassiz, from his personal reserves. These actions clearly depict that he believed inaccessibility should not hinder the growth of scientists and thinkers, and we continue to fight inaccessibility even today.

After spending many years in Paris and publishing many more books, Humboldt returned to Berlin in 1927. During this time, he was able to secure an invitation to visit the Ural mountains from the Russian administration. He was invited to visit mines to advise the country on their mining industry. Humboldt saw this as an opportunity to get additional information from Altai mountains to add to his data from the Andes. Even though he couldn’t visit the Himalayas, the Altai mountains still represented a different mountain system from which he could get more insights. Nearly 60 years old, he undertook the arduous journey across Russia, from St. Petersburg to the Altai mountains. He traveled for months, reviewing mines. He finally reached the Altai mountains, collected plants, and made measurements. This trip, his last exploration, was the impetus for him to start an international collaboration to study geomagnetism.

Humboldt never retired from his ideas, writing, or science. Returning to Berlin in 1843, he continued to give lectures and meet eminent scientists of his day and began working on one of his most important books—Cosmos—which was the culmination of decades of studies and investigations into Nature. It was a mammoth undertaking, connecting natural sciences—from astronomy to individual species. The first volume was published in 1845, and the fourth when he was 84. He worked on this book right up to his death, demonstrating his dedication to science. But the fifth and last volume was published posthumously. Cosmos remains one of the most extensive works in connecting cosmic, Earth, and biological sciences today, truly unmatched in its breadth and depth.

During his lifetime, Humboldt met with and influenced other young naturalists, including Charles Darwin, who looked up to Humboldt and was inspired by Cosmos’s interconnected perspective of the world. Unfortunately, Humboldt did not live to read Darwin’s On the Origin
of Species. Humboldt inspired several other young thinkers, intellectuals of the time, including Henry Thoreau and Ernst Haeckel, among others. Humboldt’s death on 6th May 1859 at the age of 89 sent ripples of shock across the world, but needless to say, he lives through his work and all the things named after him around the world!

Acknowledgement

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Suggested Reading


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