

UNDER THE SOUTHERN CROSS
Stories around Humboldt and Bonpland's trip to the New Continent

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We saw the Southern Cross on the night of the 4th of July(...). If a traveler may be permitted to speak of his personal emotions, I shall add, that on that night I experienced the realization of one of the dreams of my early youth.

Alexander von Humboldt ⁱ

Two hundred years ago, on July 9th, 1804, Alexander von Humboldt and Aimé Bonpland left the port of Philadelphia, in the United States, on the French frigate "La Favorite". That day and that place set the end of five years of one of the most magnificent and influential voyages for the comprehension, in the widest sense, of the tropical regions of the New World.

At the end of the XVIIIth century the portion of Middle and South America and the Caribbean ruled by the Spanish crown was almost a *terra incognita*. In the nearly three hundred years elapsed from the arrival of Columbus very little attention was given to the botany, zoology, geology, geography and climatology of the inland portions of America. The news about their natural world were due mainly to few illustrated priests, and they generally were a mixture of facts and fiction, staying in a midpoint between the textbooks and the bestiaries. The expedition of Francisco Hernández Boncalo was the first and only during the ruling of Felipe II in the XVI century, and it was necessary to wait until Carlos III and Carlos IV to see an impulse to the scientific travels, abruptly finished when Godoy, under the reign of Fernando VII, took the power. The missions of Malaspina, Dombey, Ruiz and Pavón, Mutis, Sessé and Mociño, and Azara, are among the few scientific endeavors undertaken by Spaniards in such mega-diverse region. At the same time, the information obtained was frequently kept in secret, as manuscripts at the Archivo de Indias, the Escorial, and/or in the archives of the religious orders and even the Vatican. Probably as a consequence of this secrecy, the Europeans of the XVIII century had no conscience of America; as an example, in the first volume of the "*Encyclopédie...*" by Diderot and D'Alembert, the summa of the knowledge of the illustrated Europe published in 1751, the concept "America" was developed in 50 lines (one fourth of the page), while "Alsacia" was in 900 ... ⁱⁱ

In this context, Humboldt and Bonpland's journey set the difference. Among the many reasons to support this statement, it is necessary to keep in mind that (1) it was probably the first expedition with neither political, nor military aims; (2) it was privately sustained by Humboldt and had no financial support from any government, academia or society, and (3) the gathered information was soon made available for scholars and the general public. In short, it was not a voyage for expansion, conquest or espionage; it was a scientific expedition. But let Humboldt speak by himself:

"..I had in view a two-fold purpose in the travels of which I now publish the historical narrative. I wished to make known the countries I had visited; and to collect such facts as are fitted to elucidate a science of which we as yet possess scarcely the outline, and which

has been vaguely denominated Natural History of the World, Theory of the Earth, or Physical Geography...”

The actors of the five years journey were different in several ways, including origin, fortune, personality and manners. While Alexander von Humboldt was a natural leader, charming but at the same time almost arrogant and vain, the one who took the decisions, did the planning and had the money (if we believe Johann von Schiller’s comments), Bonpland was an undemanding, quiet man, and the perfect follower of the healthy German. The history of this trip has a lot of astonishing facts, and the long lasting friendship of those two dissimilar personalities is one of them.

Humboldt and Bonpland met at Paris in 1798, and between January and May of the following year they travelled through Spain. Those five months were extremely productive. They not only gathered the authorization from Carlos IV to travel to America when the king was with his court at Aranjuez, on March, 1799, but did extensive field research, tested the instruments and met the most prominent Spanish scientists. Humboldt wrote:

“... Many considerations might have induced us to prolong our abode in Spain. The abbé Cavanilles, no less remarkable for the variety of his attainments than his acute intelligence; M. Née, who, together with M. Haenke, had, as botanist, made part of the expedition of Malaspina, and who had formed one of the greatest herbals ever seen in Europe; Don Casimir Ortega, the abbé Pourret, and the learned authors of the Flora of Peru, Messrs. Ruiz and Pavon, all opened to us without reserve their rich collections. We examined part of the plants of Mexico, discovered by Messrs. Sesse, Mocino, and Cervantes, whose drawings had been sent to the Museum of Natural History of Madrid. This great establishment, the direction of which was confided to Senor Clavijo, author of an elegant translation of the works of Buffon, offered us, it is true, no geological representation of the Cordilleras, but M. Proust, so well known by the great accuracy of his chemical labours, and a distinguished mineralogist, M. Hergen, gave us curious details on several mineral substances of America...”

On June 5th, 1799, aboard the frigate Pizarro, they left the port of La Coruña, arriving at the coasts of Cumana on July, 16th. A succinct chronology includes:

1799 – Spain - Canary Islands - Venezuela.
 1800 – Venezuela: Apure, Orinoco and Negro Rivers. Cuba.
 1801 – Cuba - Colombia - Ecuador.
 1802 – Ecuador - Peru.
 1803 – Peru - Ecuador - Mexico.
 1804 – Mexico - Cuba - United States - France.

Back in Europe, the results of the trip were soon evident. The study and publication rhythms were almost frantic and results were numerous and varied, including, according to an enumeration by Humboldt, contributions on:

1. Astronomical observations, trigonometrical operations, and barometrical measurements made during the course of a journey to the equinoctial regions of the New Continent, from 1799 to 1804.
2. Equinoctial plants collected in Mexico, in the island of Cuba, in the provinces of Caracas, Cumaná, and Barcelona, on the Andes of New Grenada, Quito, and Peru, and on the banks of Negro, Orinoco, and Amazon Rivers.

3. Monography of the *Melastoma*, *Rhexia*, and other genera of this order of plants.
4. Essay on the Geography of Plants, accompanied by a physical table of the equinoctial regions, founded on measures taken from the tenth degree of northern to the tenth degree of southern latitude.
5. Observations on Zoology and Comparative Anatomy.
6. Political Essay on the Kingdom of New Spain, with a physical and geographical atlas, founded on astronomical observations and trigonometrical and barometrical measurements.
7. Views of the cordilleras, and monuments of the indigenous nations of the new continent.

It is necessary to add to the list some other papers of lesser extent. In Humboldt's words,

“... I had, during my journey, prepared papers on the races of men in South America; on the Missions of the Orinoco; on the obstacles to the progress of society in the torrid zone arising from the climate and the strength of vegetation; on the character of the landscape in the Cordilleras of the Andes compared with that of the Alps in Switzerland; on the analogies between the rocks of the two hemispheres; on the physical constitution of the air in the equinoctial regions, etc. ...”

The list of co-authors is as astonishing as the journey itself. The astronomical tables were re-calculated by Jabbo Oltmanns (1783-1833) and some of the meteorological results were published along with Dominique Arago (1786-1853), the discoverer of the rotational magnetism and the relationships between the auroras and the variations of terrestrial magnetism. In chemistry, he was assisted by Joseph Louis Gay-Lussac (1778-1850), famous for his studies on the physical properties of gasses. In conjunction with Humboldt, they discovered the molecular composition of water. Mineralogical results had the contributions of Martin Heinrich Klaproth (1743-1817), considered as the father of analytic chemistry and famous for the discovery of uranium, zirconium, and cerium, and of Louis Nicolas Vauquelin (1763-1829), discoverer of chromium, beryllium and osmium, and the one who isolated the first amino acid, asparagine. The zoological results had the contributions of Cuvier and Latreille. Pierre André Latreille (1762-1833) is considered the father of modern entomology, while Georges Cuvier (1769-1832) is famous for his geological and paleontological studies, the author of the principle of correlations of forms, still employed in fossil's reconstructions, and the “Règne Animal”, one of the most influential treatises on the history of zoology. The botanical collection was so impressive that Humboldt asked his old professor Willdenow to study a part of it, but he died in 1812, with almost nothing done. Carl Sigismund Kunth (1788-1850) finally studied the American plants during 22 years; the result was the *Nova genera et species plantarum*, that, with the *Flora Brasiliensis* by Martius, set the basis for the neotropical botany.

The results of the travel through South America had such enormous influence in the ulterior development of the science in general that it is impossible to do a synthesis in few lines. Geographers consider that modern geography started as one of the result of Humboldt and Bonpland's journey, and the same is true for geophysics, biogeography and comparative climatology, just to cite a few. But if the “Grand History” is pretty well known, there are several “modest stories” that probably will contribute to show the importance of Humboldt and Bonpland in unexpected places and times.

INTERACTIONS WITH NEW WORLD SCIENTISTS

Humboldt and Bonpland were received by the most prominent politicians and civil figures in each visited city, but the meeting with two important local scientists contributed to a better understanding of the nature of the New World.

José Celestino Bruno Mutis Bosio (1732-1808), often referred to as the Linnaeus of Latin America, was the leader of the “*Expedición Botánica del Nuevo Reino de Granada*”, an enterprise that started in 1783 and finished 33 years later. The descriptor of the *cinchona* tree in 1772, whose bark contains the almost miraculous quinine from that time, met the explorers at Bogotá in the second half of June, 1801. The interaction was mutually profitable; while the visitors shared the herbaria obtained along the Orinoco, Mutis instructed them on the local flora, giving as present about 100 colourful drawings *in folio* of the most representative plants of Colombia (that were, at the end of the trip, donated to the Museum National d’Histoire Naturelle at Paris).

On September, 29th, Humboldt and Bonpland continued their trip to Quito, a breathtaking journey through torrential rivers, intricate mountain trails, and cold and humid paramos, but fruitful in astronomical, physical and biological observations. On the second day of January, 1802, they met Francisco José de Caldas (1768-1816), native of Popayan. A lawyer by profession, but astronomer, physicist, and mathematician by vocation, Caldas collaborated with Mutis in the botanical survey of Nueva Granada. His meteorological records, together with his contributions on the distribution of plants and animals in relation to the climate were widely used by Humboldt and Bonpland, while his political ideas led him to the execution by shooting in 1816. A mourning Humboldt later wrote:

“... Since I left America, one of those great revolutions, which at certain periods agitate the human race, has broken out in the Spanish colonies (...). Deep resentments, excited by colonial legislation, and fostered by mistrustful policy, have stained with blood regions which had enjoyed, for the space of nearly three centuries what I will not call happiness but uninterrupted peace. At Quito several of the most virtuous and enlightened citizens have perished, victims of devotion to their country. While I am giving the description of regions, the remembrance of which is so dear to me, I continually light on places which recall to my mind the loss of a friend...”

A NIGHT IN JAIL

Not all were greets during Humboldt and Bonpland’s travel. In an enjoyable synthesis on the History of Neotropical Dipterology, Nelson Papaveroⁱⁱⁱ points out an incident that happened in northern Brazil. According to Papavero, while travelling in Southern Venezuela, “... Humboldt and Bonpland proceeded to the point at which the Orinoco joins the Rio Negro, by the Canal of Casiquiare. They arrived at the city of San Carlos, in the frontier between Colombia and Venezuela, near the northern confines of Brazil. During their observations, they crossed to the Brazilian side. Humboldt was treated as a spy by the Portuguese authorities. During the night he was arrested, an all his instruments were confiscated.

“The Portuguese Crown had given orders to Captain General Francisco Maurício de Souza Coutinho, Governor of Pará, to prevent Humboldt’s travel in Brazilian territory. The “*Gazeta da Colônia*” (July 2, 1800) announced alarmingly:

“... a certain Baron von Humboldt, from Berlin, has been travelling through the interior of America, making astronomic observations in order to rectify certain errors in the existing maps, and collecting plants (...). Under this pretext this stranger may hide plans for the propagation of new ideas and new religious principles among the loyal subjects of this

domain. His Excellency [the Governor of Para] should investigate the case (...); otherwise, it would be extremely dangerous to the political interests of the Portuguese crown, if this were the case ...”

After a night in jail Humboldt was released, instruments and collections were returned and he followed the trip to San Fernando de Atabapo.

THE MEETING WITH THOMAS JEFFERSON

In 1804, the last six weeks of the travel were expended in the United States, three of them as hosts of the President Thomas Jefferson. They arrived with the recommendations of the ambassador in Cuba, Vincent Gray, who indicated to James Madison, then Secretary of the State that “... *he [Humboldt] will have it in his power to give you much useful information relative to the country adjoining...*”. On June 7th, Jefferson wrote to Caspar Wistar “... *I have omitted to state above the extreme satisfaction I have received from Baron Humboldt’s communications. The treasures of information which he possesses are inestimable...*”^{iv}. And of course they were. More important than the discussions on natural history held with Charles Willson Peale at Philadelphia, was the information provided on the visited lands, the maps allowed to copy, the presentation of the idea of a channel through the Isthmus of Panama and the geographic and political essay of fourteen manuscript pages about the population, geography, and resources of Texas, under the Spanish crown at that time.

HUMBOLDT AND DARWIN:

Charles Darwin, the author of the theory of evolution by natural selection, wrote in his *Autobiography*^v:

“... During my last year at Cambridge, I read with care and profound interest Humboldt's “Personal Narrative” This work, and Sir J. Herschel's “Introduction to the Study of Natural Philosophy”, stirred up in me a burning zeal to add even the most humble contribution to the noble structure of Natural Science. No one or a dozen other books influenced me nearly so much as these two...”

In his trip around the world Darwin preferred two books, the “Principles of Geology”, by Charles Lyell, and Humboldt’s “Personal Narrative...”, and it is valid to say that the young naturalist aboard the *Beagle* saw the world through Humboldt’s eyes. The quotations of Humboldt are frequent (5 times in his *autobiography*, 22 in “A naturalist's voyage round the world”, just to mention two significant books), and they became correspondents in 1839. But the literary fascination was not reflected in Darwin’s opinion after a personal meeting (on January 29th, 1842^{vi}), as written in his *Autobiography*:

“... I once met at breakfast at Sir R. Murchison's house the illustrious Humboldt, who honoured me by expressing a wish to see me. I was a little disappointed with the great man, but my anticipations probably were too high. I can remember nothing distinctly about our interview, except that Humboldt was very cheerful and talked much...”

HUMBOLDT, BONPLAND, LILLO AND THE DEVELOPMENT OF THE BOTANY IN ARGENTINA

On July 31st, 1928, Dr. Miguel Lillo (1862-1931) was awarded by the Universidad Nacional de La Plata with the prize “Perito Moreno”, constituted by a medal and \$ 30,000, an extraordinary amount of money in that period. Lillo, who had a peculiar personality, rejected

the distinction saying that he was not a racing horse that ran for cash... Knowing his love for books, the money was changed into two collections bought at Weigel's antiquarian shop in Leipzig. One was the "*Flora Brasiliensis*", by Martius, and the other, the 30 volume set of the *princeps* edition "*Voyage aux régions équinoxiales du Nouveau Continent*", by Humboldt and Bonpland. After Lillo's death, the trustees of Miguel Lillo's Found at Tucumán, Argentina, used the "*Voyage...*" as a model for the publication of the "*Genera et Species Plantarum Argentinae*", considered by Unesco as one of the most influential contribution in science of the 20th Century.

HUMBOLDT'S HOPE, TO CONCLUDE

"... I even venture to indulge the hope that this work will be thought worthy of attention when passions shall be hushed into peace, and when, under the influence of a new social order, those countries shall have made rapid progress in public welfare. If then some pages of my book are snatched from oblivion, the inhabitant of the banks of the Orinoco and the Atabapo will behold with delight populous cities enriched by commerce, and fertile fields cultivated by the hands of free men, on those very spots where, at the time of my travels, I found only impenetrable forests and inundated lands..."

ⁱ Unless otherwise cited, textual transcriptions are excerpts from Humboldt and Bonpland's "Personal narrative of travels to the equinoctial regions of America during the years 1799-1804", in translation from the french by Thomasina Ross (1851).

ⁱⁱ From Arciniegas, G., 1975. *América en Europa*. Buenos Aires: Editorial Sudamericana, 335 pp.

ⁱⁱⁱ Papavero, N. 1971. Essays on the history of Neotropical Dipterology, with special reference to collectors (1750-1905). Vol. I. Museu de Zoologia, Universidade de São Paulo, 216 pp.

^{iv} Excerpts from The Alexander von Humboldt Digital Library Project, <http://www.ku.edu/~maxkade/humboldt/subwashington.htm#june9>

^v From Darwin, Francis, ed. *The Life and Letters of Charles Darwin*. New York: Basic Books; Scholarly Press, 1959.

^{vi} Fide Chirino G., L. & D. Yudilevich L. 1999. Humboldt y Darwin. <http://www.ciencia.cl/CienciaAlDia/volumen2/numero4/articulos/articulo8.html>

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