

ALEXANDER VON HUMBOLDT

Beacon of American Science And Forerunner of NAWAPA

by Timothy Rush

The Passage to Cosmos: Alexander von Humboldt and the Shaping of America

Laura Dassow Walls

Chicago: University of Chicago Press, 2009

Hardcover, 404 pp., \$35.00

The Humboldt Current: Nineteenth-Century Exploration and the Roots of American Environmentalism

Aaron Sachs

New York: Viking Press, 2006

Hardcover, 496 pp., \$25.95

Alexander von Humboldt: A Metabiography

Nicolaas A. Rupke

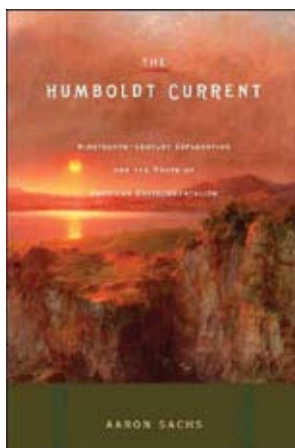
Chicago: University of Chicago Press, 2008

Paperback, 316 pp., \$21.00

Both Aaron Sachs and Laura Walls make significant contributions to a long-overdue subject for Americans: Humboldt's devotion to the success of the American republican ideals, what Lincoln would later term man's "last, best, hope on Earth," and the fecundity of Humboldt's scientific, cultural, and aesthetic influence on the nascent republic, throughout the 19th Century. Both exclaim over the startling vanishing of Humboldt from the American intellectual landscape in the 20th Century, and seek to remedy that amnesia in the 21st.

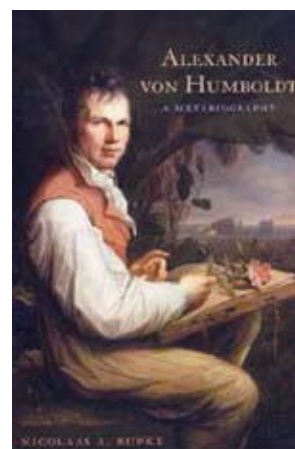
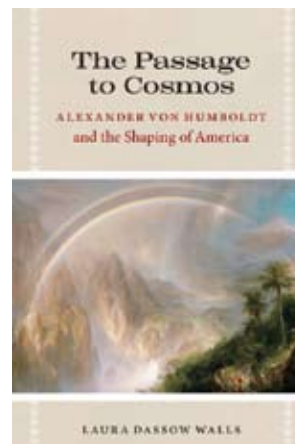
Although they overlook a crucial vector of Humboldt's formative investigations and travel in the international networks of Benjamin Franklin (see this author's "Alexander von Humboldt: A Republican Scientist in the Tradition of Franklin," *21st Century*, Spring 2002), they fill out considerably the subsequent phases of Humboldt's influence in America.

Nicolaas A. Rupke has authored what he terms a "metabiography." Rather than write a biography of Humboldt directly, Rupke exhaustively chronicles the chang-



es in biographical treatments of Humboldt over the succeeding historical periods. His chapter titles by themselves show not only the absorbing and startling shifts in portrayal of Humboldt and his influence, but also something of the immense richness and complexity of that life itself: "Liberal Democrat before the Empire Period," "The Wilhelmian and Weimar Kultur Chauvinist," "The Aryan Supremacist of National Socialism Nazi-fication," "East Germany's Antislavery Marxist," "West Germany's Cosmopolitan Friend of the Jews," and "Today's Pioneer of Globalization." The latest raft of new books would undoubtedly prompt Rupke to add a further chapter, "Forerunner of Environmentalism," although this would be an utterly false characterization, as shown below.

The first 110-odd pages of Sachs's treatment, focussing on Humboldt and his U.S. connections per se, is first-rate material, which brings out, in particular, the enormous affinity between Humboldt's outlook and the Whig political establishment, founded around Henry Clay's and John Quincy Adams's revival of the country's founding Hamiltonian economics. "The mutual understanding



between Humboldt and America's Whig intellectuals in the 1840's was remarkable," peaking with "the appearance of the English translation of the second volume of *Cosmos* [Humboldt's magnum opus of his last decades] in 1848," Sachs correctly emphasizes.

However, the bulk of Sachs's book is dedicated to turning points in the careers, travels, writings, and aesthetics of four individuals whom Sachs sees as exemplary "Humboldtians": J.N. Reynolds (1799-1858), Clarence King (1842-1901), George Wallace Melville (1841-1912), and John Muir (1838-1914). These sections all have some interest, but are not fundamental to understanding Humboldt's thinking and direct influence.

A Treat

Laura Walls's 400-page study is accurately conveyed in its title, *The Passage to Cosmos: Alexander von Humboldt and the Shaping of America*. The book is, in



Humboldt's expedition to the Americas, 1799-1804.

many respects, a treat. Of particular value is the summary of the formative currents in what became known as “physical geography”; the devastating losses of key Humboldt collaborators in Ibero-America’s Wars of Independence; the direct collaboration of Humboldt and John Quincy Adams in promoting the American cause at the 1814 negotiations to end the War of 1812; and the extended treatment of Humboldt’s role in battling the pseudo-scientific rise of “physiological proofs” of the inferiority of darker skinned peoples, which emerged in the 1840s in the United States to buttress the continuance of slavery.

Along the way, Walls drops comments of much more suggestive insight than she herself is aware: “Although the British geographical tradition excluded human beings, the Germans did not,” for one. Another: the Humboldt brothers, Wilhelm and Alexander, shared a suspicion “of the Enlightenment attempt

to reduce the world to abstract principles along Newtonian lines.”

The Green Pest

What is infuriating about the Sachs and Walls books is the axiomatic acceptance of modern environmentalist dog-

mas, as if they were in agreement with Humboldt’s method and outlook, when evidence available in the books themselves, shows such an assertion to be absurd. Admittedly, both authors refute an even more extreme misrepresentation of



Alexander von Humboldt (1769-1859) spent a year in Mexico, studying its physical geography and economy. His detailed map of the country, from which this is taken, was published in 1811 in his Political Essay on the Kingdom of New Spain. The Essay also includes his proposals for major geo-engineering projects to develop the country.



Humboldt's importance to Mexican science is acknowledged in the inscription on this statue, which is located in the Alameda Central (central park) of Mexico City: "From the Mexican Nation to Alejandro de Humboldt—Deserving the thanks of the country 1799-1999." The statue celebrated the 200th anniversary of the beginning of Humboldt's great travels.

ity for water retention, so they could no longer recharge the springs that fed the lake," Sachs writes.

Humboldt generalized the case in the following words: "By felling the trees which cover the tops and sides of mountains, men in every climate prepare at

once two calamities for future generations: want of fuel and scarcity of water."

No one, greenie friend or foe, could take exception to Humboldt's insight and admonition. But such an example hardly supports Sachs's repeated interjections that "watching Humboldt at work, we train our own eyes to see the truth—especially about our own smallness, our humble place in nature."

And Walls somehow darts from the lake in Valencia to the wild assertion that Humboldt's "work on climate change marks the beginning of awareness of global warming." She expands on the theme later, decrying how "... so many of us live in virtual worlds, while the real one, the one we didn't construct, tips into a cascade of climate change that we ourselves ... caused, that we cannot control, and whose consequences we can only dimly foresee."

Contrast this insidious cultural pessimism to the magnificent conclusion of the first volume of Humboldt's *Cosmos*. After citing a quote from his brother Wilhelm, that "the unrestrained development of the physical powers" is "the ultimate and highest aim of society, identical with the direction implanted by nature in the mind of man toward the indefinite extension of his existence," Humboldt concludes:

"From the remotest nebulae and from the revolving double stars, we have descended to the minutest organisms of animal creation. . . ; and here we have been able to arrange these phenomena according to partially known laws; but other laws of a more mysterious nature rule the higher spheres of the organic world, in which is comprised the human species in all its varied conformation, its creative intellectual power, and the languages to which it has given existence. A physical delineation of nature terminates at the point where the sphere of intellect begins, and a new world of mind is opened to our view."

Humboldt and NAWAPA

In sum, Sachs and Walls paint Humboldt as a proto-greenie ready to do battle to reduce man's "footprint" on the globe, a many-faceted impresario of Earth sciences who had an exquisite aesthetic appreciation of nature and a corresponding sense of the "smallness and nearsightedness" of Man, as one of the authors puts it. The authors would surely enlist Humboldt as an authority in denouncing the vast transformation of the West of the North American continent—something 40 times greater than the TVA—envisioned in the North American Water and Power Alliance (NAWAPA).

Ironically, the reason Humboldt's name graces the major river, mountain chain, and inland sink of northern Nevada—bestowed on these features in the mid-1840s, in an area never visited by Humboldt and some 40 years after his one and only, brief stay in the United States—is that Humboldt was seen by several generations of America's frontline explorers, geographers, and geologists, as the guiding spirit of America's development of these parched areas.

Today, Humboldt, an ardent promoter of technological progress in general and great engineering enterprises in specific, would be an emphatic partisan of NAWAPA. In fact, there is no stretch in calling him a father of NAWAPA. Here is the evidence of his paternity:

Three vast human geo-engineering projects for the Americas stand out in Humboldt's panoply of initiatives.

The first proposal was made after he personally verified that the Orinoco River of Venezuela was connected to headwaters of the Rio Negro (a tributary of the Amazon) by a singular, natural canal-like

Humboldt's role, that of Mary Louise Pratt in a 1992 essay "Humboldt and the Reinvention of America."

Walls summarizes Pratt's argument: "Humboldt invented America as 'primal' nature, emptied of human history in order, in the classic imperialist mode, to repopulate it with white European systems and goals," and decries that Pratt's travesty "has become canonical in postcolonial studies. . . the single most often cited treatment of Humboldt by a U.S. American."

But both Sachs and Walls have their own absurdities to deal with, as they try to shove Humboldt into an environmentalist straitjacket. The solitary item from the immensity of Humboldt's 30 major works based on his research and travels, (as well as five volumes of his crowning *Cosmos*), which both authors choose to highlight, is Humboldt's analysis of falling water levels in the Tacarigua Lake near Valencia, in today's Venezuela.

The local inhabitants thought the drop in water level was caused by underground seepage. Humboldt convincingly demonstrated that diversion of the water for indigo crops, and deforestation of the surrounding hills, were the primary culprits. "Humboldt explained that the surrounding soils, once deprived of the trees' root systems, had a greatly diminished capac-

watercourse called the Casiquiare. Humboldt proposed that the interior of South America be developed by linking all three of the great river basins of the continent—the Orinoco, the Amazon, and the Rio de la Plata—into a 4,000-mile vast inland transport and development network.

Put forward two generations before the building of the transcontinental railroad in the United States, Humboldt's conception shared much of the railroad's function in opening the interior of a continent to systematic development, and thus breaking the patterns of coast-based enclaves of colonial economy. Humboldt's vision is still not built today—although it is much discussed and studied.

The second and third of his hallmark geo-engineering projects are contained in his extraordinary *Political Essay on the Kingdom of New Spain*. This lengthy work, the fruit of his roughly one year (1803-1804) spent in New Spain (what is today Mexico), was translated into English the very year of its original publication in French, 1811. (Fortunately, this John Black translation has been reprinted in its complete four volumes in 1966 by AMS Press in New York (available online). Otherwise, modern readers would be stuck with an abridged Borzoi version published in the 1950s by Alfred A. Knopf which “eliminated with regret” exactly these two defining projects!)

Connecting the Oceans

The first of these projects, contained in Book I, Chapter II, pp. 16-45, is an astonishing survey of nine routes for connecting the Atlantic and Pacific coasts of the Western Hemisphere, including with canals. (See illustration, p. 62) As he writes: “We must confine ourselves here to the *problem of the communication between the two seas*, in all the generality of which it is susceptible. We shall present in one view nine points . . . and all offer a greater or less probability either of canals or interior river communications” (italics in original).

The first of these points is an examination of possible connections between the Columbia River and Canadian Arctic rivers, including the Mackenzie. Geographical knowledge of the region at the time Humboldt was writing was too sketchy for him to come to any conclusion on the point. In fact, the river systems are not naturally connected: That will be accom-



Humboldt observed that the Orinoco River in Venezuela (shown here) was connected to a tributary of the Amazon, and proposed a great project to develop the interior of South America by linking the three great river basins of the continent—the Orinoco, the Amazon, and the Rio de la Plata—into a 4,000-mile vast inland transport and development network.

plished with NAWAPA.

The third route identified by Humboldt is the Tehuantepec Isthmus in Mexico. The fourth, involves a crossing at Nicaragua, utilizing the San Juan River and the Lake of Nicaragua. Humboldt finds this the most viable (as did the extended U.S. surveys of 1870-1875), but says many more studies and surveys are needed.

The fifth location is the crossing at Panama. Humboldt devotes more space to this possibility than any other, and with extraordinary prescience observes that because of the difficulties of the terrain, the notion of a sea-level canal “ought to be completely abandoned.” Would that the French effort under Ferdinand de Lesseps 70 years later had had such acumen!

Humboldt then proceeds to point six, the Atrato-Truandó route through the Colombian side of the Darien Isthmus. He concludes with point nine, a speculation that there might be a potential crossing of Patagonia, 7 degrees north of the Strait of Magellan (later proven not feasible).

Wherever the interoceanic canal would be determined to be most viable, Humboldt writes in summary, it would be “an undertaking calculated to immortalize a government occupied with the

true interests of humanity.”

Defeating Tropical Disease

Tellingly, Humboldt recognizes that defeating the vectors of tropical disease will be a prerequisite for such gigantic undertakings. He devotes 70 pages to an exhaustive survey of the extant literature in Europe, the United States, and Spanish America, regarding yellow fever, known in the tropics as “*vómito negro*” for the typical gushing of darkened blood from the mouth in its final stage. To this he adds extensive personal field notes accumulated in his travels, along with tables of incidence of the disease correlated with weather readings gleaned from health records in notorious fever-ridden ports such as Veracruz, Acapulco, and Panama City.

Humboldt does not hit upon the *Aedes aegypti* mosquito vector (that would wait for the work of Carlos Finley, Walter Reed, and William C. Gorgas at the end of the 19th Century), but he shows a *method* of assembling and cross-referencing all data in all variables which eventually would yield the breakthrough. It would not come in time to save the doomed French phase of the Panama Canal enterprise; but the discovery was an indispensable compo-



The East Humboldt range in Nevada looking northwest from Spruce Mountain. Many American locations bear Humboldt's name, not because he was there in person, but because generations of America's explorers and scientists saw him as the guiding spirit of America's development of its Western lands.

nent of the successful U.S. effort 10 years later.

The Mexico Basin

The second great project outlined by Humboldt in the *Political Essay on the Kingdom of New Spain* is a solution to the hydrographic challenges of the basin of Mexico City. He devotes no less than 85 pages to the nature and history of the problem, which bedevils Mexico City to this day. His treatment became legendary, and modern studies continue to refer to his summary of the efforts to deal with the difficulties as a landmark.



The Humboldt River, running east to west in northern Nevada, was named by explorer John Charles Fremont in 1846, and became the strategic route by which the California Trail and the Transcontinental Railroad united the country.

The problem was clear even at the time of the Spanish Conquest. The basin of Mexico City has no natural drainage. The Aztecs built their capital city, Tenochtitlán, as an island city in the middle of one of the large lakes of the basin, connected to surrounding higher ground by causeways. Even so, they suffered periodic floods.

When the Spaniards arrived, they attempted to drain the surrounding lake, (one of four lakes in the broader basin), but likewise faced recurrent devastating floods. The years 1629-1634 were one uninterrupted period of flooding! Over a period of 200 years, up to the very time of Humboldt's visit, a series of large-scale hydraulic works were initiated, which Humboldt called "undoubtedly one of the most gigantic hydraulic operations ever executed by man."

These included a tunnel at Nochistongo (also designated by the name of the nearby town Huehuetoca), to drain the upper lakes at the lowest point in the sur-

rounding hills and mountains. The tunnel collapsed—because, Humboldt noted, the designer failed to use *elliptical curva-*



Photo by William Henry Jackson, ca. 1880s; Brigham Young University

Rock falls at Nochistongo. Humboldt observed that when it was decided to cut the tunnel, the slope was inaccurately engineered, leading to constant rock falls and re-excavations.

ture, of the kind Humboldt, trained as a mining engineer, knew to work for similar conditions in shoring up mine tunnels.

The viceroys then ordered that the rock above the collapsed tunnel be excavated (at times using 15,000 native Indian laborers), to make the passage an open-air cut. But as Humboldt demonstrates, the cut was too narrow for the nature of the surrounding rock, and the passage was routinely blocked by rockfalls for long periods of time. Humboldt prepared a cutaway schematic (see illustration, p. 62) of the levels of the water courses to aid the conceptualization of a more enduring solution.

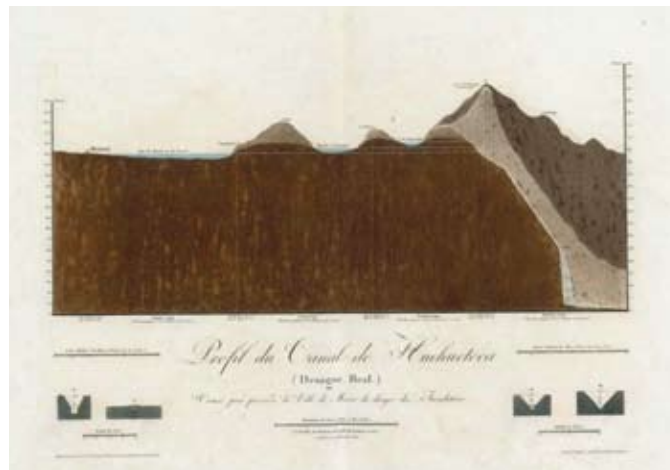
Humboldt notes with interest a proposal just being conceived at the time of his visit, of digging a deep drainage tunnel at a different point in the valley, leading out to the Tequizquiac River. This was indeed the major advance undertaken 150 years later, in the mid-20th Century! He also emphasizes that the brute force work conditions of the Indian laborers had aroused "the most bitter hatred against the desague [drainage cut] of Huehuetoca," and that "a hydraulic operation is looked upon by them in the light of a public calamity, not only because



From Humboldt's *Political Essay on the Kingdom of New Spain*, 1811

Humboldt's map of eight of the nine potential canal and river transport connections he identified, to link the Atlantic and Pacific Oceans. Map VII (center bottom) shows the site that was eventually chosen for the Panama Canal.

Humboldt's cutaway schematic showing water levels around the failed tunnel at Huehuetoca, which was intended to guide the construction of a successful project at the same point. As a mining engineer, Humboldt understood the elliptical curvature that would be needed for a stable tunnel.



a great number of individuals have perished ... but especially because then were compelled to labour to the neglect of their own domestic affairs, so that they fell into the greatest indigence while the desiccation was going on."

It was clear that Humboldt recognized that major technological advances were required to avoid this appalling human toll.

But the most interesting observation from Humboldt, of special relevance to the interacting features of the NAWAPA project, is his passionate attack on those who obstinately defined the problem of the Mexico City basin solely as how to get the water out.

"In all the hydraulical operations of the valley of Mexico, water has been always regarded as an enemy, against which it was necessary to be defended either by dykes or drains. We have already proved that this mode of proceeding, especially the European method of artificial desiccation, has destroyed the germ of fertility in a great part of the plain of Tenochtitlán. Efflorescences of carbonate of soda have increased in proportion as the masses of running water have diminished. Fine savannas have gradually assumed the appearance of arid steppes. For great spaces the soil of the valley appears merely a crust of hardened clay, destitute of vegetation, and cracked by contact with the air."

Modern-day residents of Mexico City, afflicted with frequent dust storms and consequent breathing difficulties during the dry seasons, arising from the desiccated expanses of dried lake-beds and denuded landscape, will heartily assent to Humboldt's admonition.

But the real fun is Humboldt's sketch of a solution: "It would have been easy, however, to profit by the natural advantages of the ground, in applying the same canals for the drawing of water from the lakes for watering of the arid plains, and for interior navigation. Large basins of water ranged as it were in stages above one another facilitate the execution of canals of irrigation."

That is, a human makeover of the entirety of the basin, in a comprehensive application of man's creative powers.

Humboldt was a builder!