What would Abraham Flexner say?

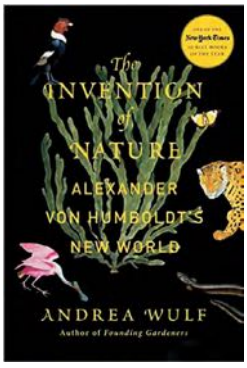
Overall, I think that this is a very worthwhile volume and congratulate the AAHC for taking a timely, insightful, and hard look at the present state of academic medical centers. The book should be of interest to all people in academic medicine—even if they are not involved in administration—if only to understand the changes in their own institutions in the context of fast moving national trends. One can only hope it will also be read by a broader audience so that they may understand the profound changes taking place in these essentially unique American and Canadian institutions the public has long held in high esteem.

Dr. Edelman is Professor of Preventive Medicine, Internal Medicine, and Physiology and Biophysics at the State University of New York at Stony Brook. His e-mail address is:
norman.edelman@stonybrookmedicine.edu.

## The Invention of Nature: Alexander von Humboldt's New World

Andrea Wulf
Alfred A. Knopf, New York, 2015

**Reviewed by Jack Coulehan, MD (ΑΩΑ, University of Pittsburgh, 1969)**




The Humboldt current, a vast stream of cold water that flows northward along the west coast of South America from southern Chile to northern Peru, supports an exuberant variety of marine life, and is, by far, the most productive ecosystem in the world. In his time, the Prussian naturalist Alexander von Humboldt (1769–1859), who discovered this current, was considered the greatest scientist in the world, though today his name is far from a household word.

A true polymath—botanist, geologist, geographer, explorer, and visionary—von Humboldt shares his name with glaciers, rivers, waterfalls, mountain ranges, parks, and towns scattered throughout the world from Greenland to Tasmania—though his accomplishments remain relatively unknown, at least in the English-speaking world. In fact, Andrea Wulf, the author of *The Invention of Nature: Alexander von Humboldt's New World*, makes the extraordinary claim, "more places are named after Humboldt than anyone else."[p7]

Why doesn't von Humboldt appear among the handful of popularly celebrated nineteenth-century scientists? The chief reason, Wulf suggests, resides in the man's variety. His contributions range from innovations in the mining industry (e.g., miners' masks and lamps) to discoveries in volcanism, geomagnetism, botany, ecology, and climatology. However, unlike Charles Darwin and James Clerk Maxwell, whose theories changed the world, the significance of von Humboldt's "big idea" was not fully appreciated until recently. Although most people now appreciate the importance of his theory, they do not associate it with his name. Wulf intends to remedy this situation by showing that Alexander von Humboldt invented our modern concept of nature.

He was born in 1769 to an army officer father—who died when von Humboldt was a young boy—and a wealthy domineering mother. Always adventurous and nature loving, von Humboldt longed to travel and study natural science, but his mother insisted on a practical education and a "useful" career. After studying finance at university, the young man became an inspector in the Prussian Ministry of Mines. He was responsible for visiting mines throughout Prussia, but carved out time to study geology and search historical documents for evidence of possible ore deposits. When his mother died in 1796, von Humboldt's inheritance freed him to pursue his chief ambition, a prolonged journey of scientific exploration. After obtaining the best scientific instruments available, in 1799 he and his companion, Aimé Bonpland, set out on a five-year odyssey through the Spanish colonies in South America, Mexico, and Cuba.

Their exploits included climbing Chimborazo, a volcano then thought to be the highest mountain on Earth, where a chasm forced them to turn back at 19,400 feet. No one had ever climbed that high before.

They explored the Orinoco River system, proving that it communicated with the Amazon. South of Quito they discovered the Earth's magnetic equator. And, of course, they collected thousands of specimens.

On the trip home to Europe in 1804, von Humboldt visited the United States, where he struck up an enduring friendship with President Thomas Jefferson, who had just dispatched Lewis and Clark on their epic journey to the Northwest.

Lionized throughout Europe, von Humboldt settled in

Paris to begin the process of analyzing his data and writing about his discoveries. Among his first books were *Essay on the Geography of Plants*, in which he invented the concept of vegetation zones, and *Personal Narrative*, a description of his travels that later served as a model for Darwin's *Voyage of the Beagle*. For more than two decades, von Humboldt remained primarily in Paris and Berlin, refining his theories about what are now called ecology, climatology, and environmental science.

His only other journey of discovery occurred in 1829, when he led a six-month expedition through Siberia.

He died in April 1859 at the age of eighty-nine, several months before one of his greatest admirers published a book called *The Origin of Species*.

Before von Humboldt's time, Europeans viewed the natural world from an instrumental perspective. God created plants and animals for man's use. Wilderness served no useful purpose and was, therefore, to be exploited. Human beings gave meaning to the land by controlling, improving, and cultivating it. However, von Humboldt introduced the idea that nature is "a living whole, not a dead aggregate."[p88] He appreciated the complex interaction of flora and fauna as a natural system that existed for its own sake, without reference to humanity. As Wulf explains:

> Humboldt revolutionized the way we see the natural world. He found connections everywhere. "In this great chain of causes and effects," Humboldt said, "no single fact can be considered in isolation." With this insight, he invented the web of life, the concept of nature as we know it today.[p5]

His systematic observations led him to develop the modern concepts of isotherms, plant geography, ecological systems, vegetation zones, and climate change, the latter of which is of particular importance today. He was the first to demonstrate the destructive effects of human activity on climate. He studied deforestation in Venezuela, showing that it led to soil erosion and crop reduction. He argued that forests enrich the atmosphere with moisture and freshen the air (without, of course, understanding the roles of oxygen and carbon dioxide). He predicted that man's manipulation of the environment might someday lead to deleterious global climate change.

These ideas were originally expressed in *Views of Nature*, "a scientific book unembarrassed by lyricism."[p132] In later life, von Humboldt published *Cosmos*, an immense five-volume work that presented a comprehensive survey of natural history, starting with the origin of the universe. He was the first naturalist to target a general audience in his books, rather than solely writing for fellow scientists.

His works strongly influenced a wide range of major figures, for example, Simon Bolivar embraced the unitary conception of land and nature when developing a revolutionary ethos for South American independence. Darwin studied and annotated von Humboldt's *Personal Narrative* throughout his journey on HMS *Beagle*. Henry David Thoreau incorporated ideas he found in *Cosmos* and *Views of Nature* into his own philosophy. John Muir brought von Humboldt's environmental ideas to fruition.

Two final points about Wulf's excellent biography. First, von Humboldt's sexuality. He never married, and his life was characterized by a series of intense male relationships, beginning with his colleague, Aimé Bonpland. His letters to these men certainly suggest sexual intimacy. However, in the long run, curiosity about a historical figure's sexual practices seems pointless. The much more important issue is von Humboldt's strong and consistent opposition to slavery. In his books on the Americas, he dedicated sections to describing the conditions of slaves and indigenous people. He often expressed disgust for the inhumane conditions in which indigenous people and others were treated. In fact, abolition of slavery was the one issue upon which von Humboldt and Jefferson disagreed.

Reading *The Invention of Nature* left me with a sense of satisfaction. It's not often that a book introduces you to a fascinating character so little understood, yet so influential in creating today's view of the world.

Dr. Coulehan is Emeritus Professor of Preventive Medicine, and Senior Fellow of the Center for Medical Humanities, Compassionate Care, and Bioethics at the State University of New York Stony Brook. He is a member of *The Pharos* Editorial Board, and is *The Pharos*' Book Review Co-Editor. His address is:

51 Pineview Lane
Coram, New York 11727
E-mail: john.coulehan@stonybrookmedicine.edu

## Jonas Salk: A Life

Charlotte DeCroes Jacobs
Oxford University Press, 2015

**Reviewed by Elaine Thomas, MD**

The paralyzing disease poliomyelitis terrified Americans in the 1950s, and Dr. Jonas Salk was cast as their savior when he created a successful vaccine.