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## Naturalists in Paradise: Wallace, Bates and Spruce in the Amazon.

John Hemming, 2015. Thames & Hudson, New York. 368 pp.

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John Hemming has done a marvelous job of reviewing the lives and contributions of three outstanding British naturalists who worked during the middle and late 19<sup>th</sup> century: Henry Walter Bates, Richard Spruce, and Alfred Russel Wallace. I should start off by pointing out that John is particularly well qualified to compile a book on those naturalists since he has spent considerable time in the field in South America, including with indigenous groups, and served admirably as the President of Royal Geographical Society in London for 21 years. Trained as a historian, John has published over a dozen outstanding books on the Amazon and Andes (*Tree of Rivers: The Story of the Amazon* was required reading in my Amazon course which I taught for many years at the University of Florida). I am proud to have many of John's books in my library. I am also fortunate to possess the first editions of the books profiled in John's latest book: *The Naturalist on the River Amazons*, John Murray, London, 2 vols., (1863) by Bates; *A Narrative of Travels on the Amazon and Rio Negro*, Reeve & Co., London (1853) by Wallace; and *Notes of a Botanist on the Amazon & Andes*, Macmillan, London, 2 vols., (1908) by Spruce. The latter was published posthumously at the initiative of Wallace.

All three naturalists spent about a decade in the Amazon, sometimes crossing paths. They supported their work by selling part of their collections in England, dispatched on sailing vessels from Belém at the mouth of the Amazon. Spruce was a botanist, Bates was particularly interested in gathering insect specimens although he collected other fauna, including birds, while Wallace preserved birds, fish, and insects. Many of the specimens collected were new to science. Interestingly Bates never went to university, yet he made extraordinary contributions to the emerging biological sciences. All three naturalists made interesting observations on the cultural life of the region, including some indigenous groups. Sadly, few ecologists, botanists, and zoologists today stray far from their specialties. However, in the Amazon at least, archaeologists have taken the lead in organizing multidisciplinary teams that include botanists, zoologists, soil scientists, anthropologists and geographers to better understand the historical ecology of the region.

In addition to the thousands of new species of insects that Bates collected, his field work in the Amazon provided insights into how certain species of butterflies evolved patterns and colors on their wings similar to species that were toxic to predators. Even though these mimics lacked protective toxins, predators avoided them. This phenomenon was later called Batesian mimicry. Bates was one of the first European travelers in the Amazon to warn of the dangers of over-exploitation of the giant river turtle (*Podocnemis expansa*) known in Brazil as tartaruga. He estimated that some 48 million eggs of this turtle species were being destroyed annually in the upper Amazon and Madeira rivers to make oil used for cooking and lighting. He turned out to be correct: populations of this one-meter-long turtle, which once were so numerous that the clacking of their shells (carapaces) could be heard for miles when they congregated for nesting on sandy beaches during the dry season, crashed at the close of the 19<sup>th</sup> century. And they have never recovered.

Ideas about evolution germinated in the mind of Wallace during his collecting forays in diverse habitats in the Amazon. Those ideas were coming to fruition as Charles Darwin was preparing his landmark book on the *Origin of Species by Means of Natural Selection* published in 1859. Although Darwin beat Wallace to the publishing finish line with that novel theory, both authors were on amicable terms and admired each other's work. And Wallace elaborated on the theory of evolution in his book *The Malay Archipelago* published in 1869, thirteen

years after this book on the Amazon. His field research in Southeast Asia illuminated patterns in the distribution of animal species: he came up with the Wallace line noting that evolution had taken a different course in parts of the region even though continental drift had not yet been elaborated. Wallace was also most curious about petroglyphs and rock art in Amazonia and took pains to draw some of them. Tragically some of his drawings and collections perished in the wooden sailing vessel he was on while returning to England when the boat caught fire and had to be abandoned. In addition to fauna, Wallace was also fascinated with ethnobotany and produced another landmark book, *Palm Trees of the Amazon and their Uses*, which was published in 1853.

Richard Spruce was an intrepid plant explorer particularly interested in liverworts and mosses, but he also collected many other plant families and has several species named after him including *Hevea spruceana*, a close relative of the rubber tree (*Hevea brasiliensis*), *Heisteria spruceana*, *Marlierea spruceana*, and *Heteropsis spruceana*. He also took the trouble to collect sacred trumpets and other instruments made by indigenous peoples, some of which are on display at Castle Howard in Yorkshire. He was one of the first explorers to hint that some landscapes in the Amazon might be anthropogenic. For example, along the upper Rio Negro he mused that the density of pataua (*Oenocarpus batana*) palms in some areas was akin to someone having sown the seeds in the forest. Pataua fruits are used to make an oil-rich and satisfying drink. And in parts of eastern Amazonia, the density of fire-tolerant tucumã (*Astrocaryum vulgare*) palm struck him as possibly due to human disturbance of the landscape. In spite of declining health, Spruce undertook collecting missions in the eastern slopes of the Andes in Peru and Ecuador to gather seeds of *Cinebona* spp., the bark of which was gathered to obtain quinine for treating malaria. His quinine tree excursions led to the establishment of plantation trees in India thus saving of many lives.

I had the privilege of attending a conference in honor of Richard Spruce organized by the late Richard Evans Schultes at York University in 1993. I remember Richard exclaiming “Spruce lives!”. I recall being deeply touched when I visited the gravesite of Richard Spruce at the Terrington Church near Castle Howard; his tombstone reads “Richard Spruce, traveler and author of many botanical works, born at Ganthorpe Sept. 10<sup>th</sup> 1817, died at Cooneythorpe Dec. 28<sup>th</sup> 1893”. Along with other attendees at the conference, I also visited the semi-detached stone cottage on the Castle Howard Estate where Spruce passed away.

If there is ever a second edition of *Naturalists in Paradise*, I would like to suggest a few changes. One or more maps depicting routes traveled by the Bates, Spruce, and Wallace would be helpful.

John mentions “virgin forests” 18 times in his 368-page book. That term is problematic as the “virginity” of the Amazon forests is increasingly called into question as more and more archaeological sites are discovered, including in interfluvial areas, and anthropogenic forests are identified. Another term used, “primeval forest”, suggests that the forest has never been touched. Even in areas that have never been cleared for agriculture, people for thousands of years have transformed forests by other means, especially by discarding seeds of fruit trees around their campsites.

John states that “cacao trees (*Theobroma cacao*) grow naturally from the western Amazon to southern Mexico” (p. 96). More likely cacao is native to western Amazonia and was taken to Central America in precontact times where indigenous peoples of Mexico invented chocolate. Cacao trees then became naturalized in some parts of Central America, especially the Yucatan Peninsula.

Distilled manioc spirit is mentioned (p. 110, 159); manioc has long been fermented to make beer, but I am not aware the brew was ever heated to distill more potent liquor. No distilled alcoholic drinks were made in the New World prior to the arrival of Europeans. Hard liquor has been consumed in large quantities since colonial times, but it was derived from fermented sugarcane juice (sugarcane was introduced from the Old World).

The species name for the tracajá turtle (*Podocnemis unifilis*) is misspelled (p. 124). Genipap (*Genipa americana*) is a tree, not a bush (p. 134).

Piaçava is misidentified as *Attalea funifera* (p. 155). That species of palm is found in the Atlantic forest of Brazil, especially in Bahia, and is used for obtaining fiber. Piaçava fiber in the Amazon is obtained from another palm, *Leopoldinia piassaba*, which is confined to low-lying sandy soils in the Upper Rio Negro watershed.

The Uaupés, an affluent of the Rio Negro, is described as a white river in which mosquitoes can breed (p. 183). In 2012 I traveled up the Uaupés for two days in an outboard motor boat until I entered a southern affluent, the Tiquié. The Uaupés and its lower affluents are all black water rivers, the same dark tea color of the Negro.

Wallace is described as taking a “pheasant” by boat to Belém (p. 223). I have never seen a pheasant in the Amazon; these birds in the Phasianidae are native to Asia. More likely Wallace was taking along a guan or a curassow (members of the Cracidae family), which are still hunted for food.

In all, John has produced yet another useful book that is sure to gain a wide readership. And deservedly so.