An Inordinate Fondness for Beetles. The Hero's Journey of Alfred Russel Wallace

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Abstract Alfred Russel Wallace was a self-taught (he left school at 13) British naturalist, a self-described "beetle collector" who explored 4 years in the Amazon and 8 years in Southeast Asia. During his Asian sojourn in the mid-nineteenth century he covered some 22,500 km through territories which are now Malaysia, Singapore and Indonesia. Wallace made his voyages without formal government support, without a floating base camp (like Charles Darwin had with HMS Beagle), without infrastructure, and without much cash. During his epic journey Wallace caught, skinned and pickled 125,660 specimens of "natural productions" including 212 new species of birds, 900 new species of beetles and 200 new species of ants. Consider just the logistics – how could one man, on a tight budget and without organizational support, often living rough in rainforests, collect, identify, mount, preserve and transport 8,000 bird skins and 100,000 insects? If Wallace did nothing more than collect and identify new species he would have left an important scientific legacy. But the breadth of his interests raised him to the top tier of scientists.

His travels through the Malay Archipelago, supported by his knowledge of geology, helped him develop his understanding of the dynamics of island biology. He observed that the "natural productions" he found in western Indonesia and Peninsular Malaysia were different to those in eastern Indonesia, due to changing sea levels and a combination of shallow seas and deep oceanic trenches. By studying these differences he developed a west-east boundary which came to be known as the "Wallace Line," the dividing point between (western) Southeast Asian fauna (elephants, tigers, monkeys and apes, hornbills) and fauna of the (eastern) Austro-Malayan realm (kangaroos, birds of paradise, marsupials). He campaigned against: vaccination, vivisection, "flat earth," gambling, foreign aid, welfare state, "junk" food, sweatshops, "red-tapism," child labor, and women's labor in coal mines. He promoted: women's liberation, food and drug controls, income tax, labor unions, food stamps, and a minimum wage.

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And what led Wallace to develop his contributions to the theory of natural selection, first the Sarawak Law (written during the period he spent in Sarawak as the guest of the White Rajah of Sarawak, James Brooke), and then the famous Ternate Paper in which he outlined the concept "the fittest would survive."? Wallace sent the Ternate Paper to Charles Darwin (who up to that point had not published one word on evolution) and at that point the conspiracy theorists get involved. Did Darwin and Wallace arrive at their similar ideas independently? Did Wallace get sidelined in the quest for priority by the more prominent and well-placed Darwin?

1 Introduction

Imagine Alfred Russel Wallace studying the maps in the Royal Geographical Society in London. It was late in January 1853, around the time of his 30th birthday, and he had recently returned from a 4-year adventure in the Amazon basin. In Brazil he tasted the thrill of collecting (and the difficulties and isolation of living in the poorly-explored tropics). More practically, he saw that he could make a modest living by sending specimens to his beetle agent in London for sale to British collectors. He encountered "savage man." He wrote several scientific papers and began his climb up the British scientific hierarchy. But like all heroes' journeys, his return home to England was bittersweet – he lost most of his collection and just about lost his life when the leaky brig on which he was sailing caught fire and sank 700 miles east of Bermuda.

Wallace was relieved to be back on *terrra firma* and happy to enjoy home cooking, but nevertheless needed to get back on his horse and travel again. But where? Return to South America, perhaps the Andes this time? Central America? The Congo basin? The Indian subcontinent? Oceania? No doubt he considered these destinations and any one of them would have been a suitable choice for the curious young man. So why did he choose to apply for a grant from the Royal Geographical Society for support to travel to the Malay Archipelago? Partly because that region offered the chance for him to gather additional evidence to develop his as-yet-unpublished theory of evolution, partly the fact that the Malay Archipelago had an abundance of unusual insects, birds and animals which he could collect, pickle and sell for a good profit in England.

But I like to think that Wallace, talking with people who had seen more of the world than he had, was moved by another consideration: the sheer poetry of destinations in the Malay Archipelago.

2 Travels in the Malay Archipelago

Sumatra and Ternate. Yogyakarta and Malacca. Singapore and Sarawak. Banda Naira and Bandung and Bencoolen. Names to excite the spirit. And nourishing the spirit was as much a Wallace trait as deciphering the mysteries of natural history and man's place in the universe.

Wallace got his travel grant – first class passage to Singapore – and between 1854 and 1862 spent 8 years in territories and colonies which are now Singapore, Malaysia and Indonesia.

The Malay Archipelago is the book he wrote about his Asian travels. It is, by any standard, one of the great travel books.

But what makes this work so impressive?

First, there is the boyish adventure of it all – not all of it cakes and ale. Wallace left school at 13, wandered in the British countryside collecting beetles, learned surveying from his brother and then saved up a pittance to travel far, initially to the Amazon and then to Southeast Asia where he often lived rough and isolated in alien lands without a formal support structure. Wallace needed at least a dozen men to move camp, something he did more than a hundred times during his 8 years in Asia. Charles Darwin, by contrast, used the H.M.S. Beagle as a floating base camp where he could return after a relatively brief shore exploration to the comfort of decent food, camaraderie, and clean clothes (although, to be fair, he had to share a cramped cabin with the ship's eccentric captain Robert Fitzroy). But Wallace faced problems more significant than moving camp. He persisted in spite of almost constant, and sometimes life-threatening, irritations like malaria, capsizing, incessant rain, infections, fungal invasions, giant snakes and thieving hired help.

Wallace wasn't a brave explorer in the Speke or Burton mold. Wallace admitted in his autobiography, perhaps a touch disingenuously: "[My deficiencies] have been my want of assertiveness and of physical courage, which combined with delicacy of the nervous system and of bodily constitution, and a general disinclination to much exertion, physical or mental, have caused that shyness, reticence, and love of solitude which, though often misunderstood and leading to unpleasant results, have, perhaps, on the whole, been beneficial to me."

Second, while exploring the Malay Archipelago Wallace came up with some of the more important scientific breakthroughs of the Victorian age. He identified how geological changes resulted in western and eastern Indonesia having different faunas, and different races of man – the dividing line he identified later become known as the Wallace Line, with elephants, tigers, monkeys and hornbills to the west and kangaroos, birds of paradise and marsupials to the east. He noted how changing sea levels created unique island species. He elaborated on the principle of mimicry, first posited by his Amazon travel companion Henry Walter Bates. And, in his most recognized accomplishment, he developed a groundbreaking theory of how natural selection leads to the evolution of species.

Third, he was an underdog on a classic hero's journey. In social terms, Wallace fought above his weight. He came from a middle class (and cash poor) upbringing but quickly came into contact with the aristocracy of the British scientific establishment. *The Malay Archipelago* helped establish Wallace as a scientific force.

Fourth, he cast his intellectual net widely; in the book he asks whether the tribal people he lived amongst were really more civilized than their European cousins, whether colonialism was a force for good for people in the tropics, what was the role of women in creating more equitable and productive societies, and whether the British social model represented the pinnacle of social evolution. He was remark-

ably productive – his lifetime output is a staggering 769 publications, including 508 scientific papers and 22 books, totaling some 10,000 pages of printed matter.

Fifth, he was flexible, able to be calculating and sentimental. We like our heroes to be complex and unpredictable. Notably, he writes how he shot an adult female orangutan to obtain her skin and skeleton and finding, when she fell from the tree, that she had been nursing a baby, which survived the fall. He adopted the infant and gushed: "I must tell you of the addition to my household of an orphan baby … which I have nursed now more than a month … I am afraid you would call it an ugly baby, for it has dark brown skin and red hair, very large mouth … I can safely say, what so many have said before with much less truth, 'There never was such a baby as my baby,' and I am sure nobody ever had such a dear little duck of a darling of a little brown hairy baby before." Sounding like a doting grandfather, he tells how he raised the infant and the antics of the baby orangutan and its playmate, a hare-lip monkey. Ultimately, the small red ape died, and Wallace, practical to the last, calmly boiled the corpse to obtain a valuable skeleton that he could sell in England.

Lastly, what makes the book special is Wallace's voice. While Wallace maintains a straight-forward tone in much of the book, his exuberance for life erupts frequently, particularly when he describes the thrill of discovering a new species of butterfly or beetle. In one of several such passages he describes the rush he felt when he captured a new butterfly on the isolated island of Bacan: "The beauty and brilliancy of this insect are indescribable, and none but a naturalist can understand the intense excitement I experienced when I at length captured it. On taking it out of my net and opening the glorious wings, my heart began to beat violently, the blood rushed to my head, and I felt much more like fainting than I have done when in apprehension of immediate death. I had a headache the rest of the day, so great was the excitement produced by what will appear to most people a very inadequate cause."

In geographic terms, the Malay Archipelago covers the region that now includes Malaysia, Singapore, Indonesia, Brunei, the Philippines and East Timor; some descriptions of the region include Papua New Guinea. Wallace never made it to the Philippines as originally intended; Malaysia, Singapore and Indonesia were his home for 8 years.

The Malay Archipelago is sometimes called Insular Southeast Asia; more than 25,000 islands in all. Wallace visited some 30 of them, some huge and well-known like Sumatra, Java and Borneo, others tiny and so obscure – like Watubela, Waigeo, Bacan – that most people today in the cosmopolitan Indonesian capital of Jakarta would have difficulty finding them on a map.

Wallace wrote: "This Malayan region is indeed remarkable in many respects. It is the largest Archipelago in the world. It contains the two largest islands in the world, one of which, Borneo, could embrace within its limits the whole of the British Isles from the Land's End to the Orkneys, and surround them on every side with a green ocean of tropical forest. It contains, in the great volcanic belt that runs through its whole extent, a vast number of active volcanoes, and is unequalled for the frequency of its eruptions and earthquakes....

> In the animal world, the most remarkable productions are the man-like orang-utang, found only in Borneo [Wallace was wrong, the animal also is found in Sumatra], and the lovely birds of Paradise, confined to the remote islands of New Guinea; while edible birds' nests and mother-of-pearl-shell are valuable and interesting products almost restricted to this region.

It is also a region of bewildering cultural diversity; indeed it is a truism that cultural diversity parallels biological diversity. Wallace compiled 57 vocabularies during his 8 years in Asia. By some standards he was merely scratching the surface, since Indonesia alone is home to some 735 languages (no one is quite sure of the exact number). According to one source, 637 of those languages are as endangered as the region's tigers, rhinos, orangutans and Komodo dragons, with each having less than 100,000 native speakers.

Like a modern baseball fan, Wallace was fascinated by numbers and statistics, indeed, he calculated his success to a large extent on what kind of numbers he could put up.

He traveled some 22,400 km (14,000 miles) and collected an astonishing 125,660 specimens; when these got sorted out he had discovered among them 900 new species of beetles, 200 new species of ants, and among the butterflies 50 new species of the Family Pieridae and 96 of the 130 known species of the Family Papilionidae.

He kept meticulous field notes and in his careful hand noted the statistics of his achievements:

> On good nights [in Sarawak] I was able to capture from a hundred to two hundred and fifty moths, and these comprised on each occasion from half to two-thirds that number of distinct species.
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> When I arrived at the mines [in Sarawak] … I had collected in the four preceding months 320 different kinds of beetles. In less than a fortnight I had doubled this number, an average of about 24 new species every day.
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> [Bacan island] was a glorious spot, and one which will always live in my memory as exhibiting the insect-life of the tropics in unexampled luxuriance … October 15th, 33 species of beetles; 16th, 70 species; 17th, 47 species; 18th, 40 species; 19th, 56 species – in all about a hundred species, of which forty were new to me.

Let's put Wallace's collecting into context. Even today, with our Tupperware containers and plastic bags, with our Gore Tex, with nylon tents and solar powered generators and internet connections to the world's taxonomic literature, with freeze-dried food and water purification systems and a thousand other helpful gadgets, gizmos and tools, it's uncomfortable to spend a night or two in the rainforest, particularly during the rainy season. The moisture seeps in everywhere, nasty biting bugs slip through the mosquito net, and sleep is uncomfortable and fitful. Wallace of course had none of our modern gadgets. Just making himself comfortable would have been difficult. Then try to understand how he managed several related tasks, each tricky in itself: collecting, taxonomy, preservation. How did he manage to skin thousands of birds and store them without camp dogs eating the carcasses? How did he pin tiny critters like ants and beetles in collecting bottles? How did he stop ants from eating his butterflies? How did he skin an orangutan and then butcher the corpse and boil away the muscles and flesh to get a taxonomically-useful, and

commercially-viable skeleton? (The camp gear he lugged around included a giant skillet and kegs of local rice alcohol to preserve orangutan skeletons – the level of alcohol dipped dramatically if Wallace didn't keep the moonshine out of the reach of his porters). How did he pack all those specimens, knowing that they would have to endure extremes of heat and cold on a multi-month journey to reach his beetle agent Samuel Stevens in London?

History portrays explorers as fearless individuals who brave the elements alone, stoic, unflappable, and with immense strength of character and fortitude. But, actually, all explorers, the great as well as the ignored, rely on often-unheralded people to assist in their odyssey. Magellan had Enrique of Malacca, Lewis and Clark had Sacagawea.

Alfred Russel Wallace had Ali, and without Ali's assistance it is unlikely Wallace would have been as successful as he was.

Ali was perhaps fourteen and living in Sarawak when Wallace hired him as a cook and assistant. Ali accompanied Wallace on most of his Asian travels. Ali took on increased responsibility; he learned to collect and mount specimens and soon was organizing travel (just imagine the negotiations with self-important village chiefs, unreliable porters and laborers, and greedy merchants, whose eyes no doubt grew large when they saw a white man like Alfred come to buy supplies). I don't want to overstate Ali's importance, after all, he was just a naïve teenager when he started out, but Ali did become a valuable and trusted operations officer and friend. Wallace called him "my faithful companion."

3 Wallace's Legacy

In spite of his numerous accomplishments public attention almost always reverts to a discussion of Wallace's relation with Charles Darwin.

Outside of biology circles, Wallace is best-known, if he is recognized at all, for developing the theory of natural selection. Indeed, in his autobiography he wrote that one of his objectives in travelling to the Amazon, and later to Southeast Asia, was because "I begin to feel rather dissatisfied with a mere local [UK] collection; little is to be learnt by it. I should like to take some one family to study thoroughly, principally with a view to the theory of the origin of species." His first published notes on such a theory were written while Wallace was holed-up during the rainy season in the Borneo bungalow of James Brooke, the White Rajah of Sarawak. The appropriately termed Sarawak Law, published in 1855, states a principle that to a modern reader sounds almost simplistic: "Every species has come into existence coincident both in time and space with a pre-existing closely allied species".

Three years later, Wallace, suffering from a malarial fit, wrote what has become known as the Ternate Paper, a fully-thought out ten-page scientific paper that proposed a theory which Herbert Spencer later coined "the survival of the fittest." In his autobiography Wallace described his eureka-moment: "Why do some die and some

live? And the answer was clearly, that on the whole the best fitted live. From the effects of disease the most healthy escape; from enemies, the strongest, the swiftest, or the most cunning … Then it suddenly flashed upon me that this self-acting process would necessarily *improve the race*, because in every generation the inferior would inevitably be killed off and the superior would remain – that is, *the fittest would survive* … I waited anxiously for the termination of my fit so that I might at once make notes for a paper on the subject. [italics Wallace]".

In the spring of 1858 Wallace sent his Ternate Paper to Charles Darwin. Darwin was astonished (and likely disturbed) by Wallace's well-thought out paper and wrote to his friend, the noted geologist Charles Lyell: "I never saw a more striking coincidence; if Wallace had had my manuscript sketch, written out in 1842, he could not have made a better short abstract of it." Darwin sought the advice of Lyell and botanist Joseph Hooker. With Darwin's approval, Lyell and Hooker called a special meeting of the Linnean Society in London and read Wallace's paper along with two shorter unpublished communications from Darwin. Up to that time Darwin had not published one word on evolution, although he had been working for years on the question of how species evolve. Some people think that Darwin, in spite of collecting evidence for years, did not understand the mechanism until Wallace inadvertently gave it to him. Some people argue that Darwin (and his friends) were so concerned with maintaining priority that they sidelined Wallace.

Historian Daniel J. Boorstin writes: "If a Greek dramatist had contrived two characters to show how fate could bring men by opposite paths to the same destination, he could hardly have done better than invent Darwin and Wallace. Darwin, the elder by a dozen years, had been dedicated by his wealthy family to a career in the Church. All his life Darwin did his best to follow Lyell's advice 'never to get entangled in a controversy, as it rarely did any good and caused a miserable loss of time and temper.' Tediously gathering specimens and evidence over two decades, Darwin seemed led to his theory of natural selection almost against his will. The impoverished Wallace, inspired early with a suspicion of religion and all established institutions, was hasty to embrace theories and plunge into controversy. When he was only 22, Robert Chambers' popular *Vestiges of the Natural History of Creation* had converted Wallace to an unshakable conviction that species arose through a process of evolution, and his trip to the Amazon was for facts to convince others. By his later trip through the Malay Archipelago … he aimed to gather conclusive evidence … Wallace's essay "On the Law which Has Regulated the Introduction of New Species" (Sarawak Law) was published 3 years before the paper he sent to Darwin," Boorstin said. "The facts of geographical distribution that provided the cautious Darwin with questions supplied the brash Wallace with answers".

The fact is that Wallace never directly challenged Darwin's claim to priority. Just the opposite. Using three different typefaces Wallace dedicated *The Malay Archipelago*: "To Charles Darwin, author of 'The Origin of Species,' I dedicate this book, not only as a token of personal esteem and friendship, but also to express my deep admiration for his genius and his works." In *The Malay Archipelago* itself Wallace mentions neither the Sarawak Law nor the Ternate Paper.

In spite of Wallace's decision to let Darwin do the heavy lifting in regards to evolutionary theory (or perhaps because of it) Wallace rose to the top ranks of British scientists.

Charles H. Smith, professor of Library Public Services and science librarian at Western Kentucky University, who runs a respected website devoted to Wallace, feels that Wallace was lauded during his lifetime and immediately thereafter, and his relative anonymity to modern readers is a recent phenomenon. Smith says: "At the time of his death in 1913 he may well have been the most famous scientist in the world … [observers referred] to him in the following glowing terms: 'England's greatest living naturalist'; 'the acknowledged dean of the world's scientists'; '[one of the two] most important and significant figures of the nineteenth century."

Like all good travel books *The Malay Archipelago* entertains. It teaches us something about the places being visited. It has layers of narrative, insight and unanswered questions. And most important, it shines a light into the psyche of the writer.

I have been following Wallace's trail for some 40 years. I wish I could travel in time and chat with this quirky, opinionated yet private man. Failing that, I carry a tattered copy of *The Malay Archipelago* and find comfort and stimulation in its pages.