ALFRED RUSSEL WALLACE – THE SARAWAK EXPERIENCE

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***ALFRED** Russel Wallace (1823-1913) was an extraordinary collector and naturalist; he was a keen observer of nature and was meticulous in his work. He came from a poor family, left school at the age of 14 to work as a surveyor and taught himself geology, botany and entomology through extensive readings and practical experiences at collecting and preserving specimens. On 1st November 1854 he arrived in Sarawak and spent about three months in Santubong, nine months in Simunjan and three weeks at Peninjau Hill. He amassed thousands of specimens and many, especially insects, were new discoveries. He was the first to acknowledge the richness of Sarawak's biodiversity saying, "during my whole twelve years collecting in the western and eastern tropics, I never enjoyed such advantages in this respect as at Simunjon coal-works". He is credited with a theory on the geographical distribution of species known as the Sarawak Law, which he wrote at Santubong. He is well known for his Wallace Line, an imaginary line east of Borneo and Bali that separates the fauna of Australia and New Guinea from the rest of South East Asia. Perhaps his greatest contribution to evolutionary science, although not fully acknowledged, is his theory on the origin of species, which he wrote and sent to Darwin from the Indonesian island of Ternate.*

Introduction

Alfred R. Wallace arrived in Sarawak, at the invitation of Rajah James Brooke, on 1st November 1854 and stayed until 25th January 1856. He was one of the first to acknowledge the rich biodiversity in Sarawak and wrote, *"during my whole*

twelve years collecting in the western and eastern tropics, I never enjoyed such advantages in this respect as at Simunjon coal-works" (Wallace, 1890). His collections from Sarawak alone numbered in the thousands and many, especially insects, were new at that time. While at Santubong, Sarawak, he wrote his first major paper on speciation entitled *"On the Law which Has Regulated the Introduction of New Species"* (Wallace 1855). Shortly afterwards he developed this theme as a coherent theory on the origin of species through natural selection. He forwarded his paper on the subject to England where, in 1858, it was presented at a meeting of the Linnean Society of London jointly with a paper by Charles Darwin. Darwin himself acknowledged Wallace as co-author of the theory, but it is Darwin's name that remains most famously associated with the concept of evolution through natural selection. Wallace has not been accorded proper recognition for his work in this field. His contribution to zoogeographical science is, however, commemorated by "Wallace's Line", an imaginary line that separates the fauna of South East Asia from that of Papua New Guinea and Australia. In this year of 2005, exactly 150 years after writing his famous *"Sarawak Law"*, Wallace's presence in Sarawak and his contribution to natural science are being commemorated in the *"International Conference on Biogeography and Biodiversity: Wallace in Sarawak 150 Years Later"*.

Alfred R. Wallace was a philosopher, professional collector, naturalist and explorer extraordinaire. What made the man? The answer may be found in the story of his childhood and his travels to Sarawak. Thus this article draws attention to two periods of Wallace's life – his childhood in Wales and England, and accounts of his travels to Sarawak. It is a story of resilience, self-education and a relentlessly enquiring mind. The purpose is to inspire those for whom struggle seems to be the order of the day – with the promise of triumph at the end. The rest of the story can be found

in the many books and articles on Wallace as well as his own works including, *"The Malay Archipelago"*, (1890) and *"My Life: A Record of Events and Opinions."* (1905)

A Humble Beginning

Alfred Russel Wallace was born on 8 January 1823 in a cottage by the river near the town of Usk in Wales, UK., the 5th child of Thomas Vere Wallace and Mary Anne Greenell. Alfred had two older brothers, William and John, two older sisters, Eliza and Frances and a younger brother Herbert. From the very beginning Alfred was acquainted with nature. He had fond memories of the free-flowing river, and the time he spent with his siblings in the fields and woods at the river bank (Raby, 2001).

Although Thomas Wallace was a lawyer by profession, he never held a steady job, and as a result the family often faced financial difficulties. The family had to move houses as frequently as Thomas Wallace changed job and workplace. When Alfred Wallace was five years old, the family moved to Hertford, where Alfred attended Hertford Grammar School.

Just like any other schoolboy of his age, Wallace had his likes and dislikes. He did not like Latin and grammar. He did not mind the extended rest from school while recovering from a severe bout of scarlet fever. In one frightening episode, Alfred almost drowned when he fell into the deeper part of the river. After he had gone under twice and swallowed water, his brother John went in and pulled him out (Wilson, 2000). A few years later, he was to suffer another humiliation when the headmaster forced him to use a black calico over-sleeve that his mother made to protect his cuffs and elbow (Raby, 2001).

Despite their financial difficulties (Wallace's pocket money was one penny per week), books were among the few resources

the family had – perhaps because Thomas Wallace was educated and was a member of the local book club. Alfred learned to read and write fluently at a young age, despite his dissatisfaction with the education he received at Hertford school. By the age of 14, Alfred has read most of the popular books of that time.

In December 1836 Alfred left school and went to live in London with his brother John for about six months. In the evenings, they would go to the "Hall of Science" a few blocks away and read books and magazines. They attended lectures on the teachings of Robert Owen who made quite an impression on young Alfred. After this he joined his brother William to learn surveying and a bit of geology. It was during this time, while surveying the countryside of Neath in south Wales that he developed an interest in botany. He taught himself the subject by reading Lindley's *Elements of Botany* and Loudon's *Encyclopedia of Plants*. When not surveying, Alfred would spend his time walking around the countryside collecting plant specimens, drying and identifying them – a pastime William did not entirely approve.

Later, when there was no more survey work, Alfred became a schoolmaster in Leicester. With a modest salary of £30 a year, he renewed his membership with the town library and started to read widely on the exploits of travellers to distant lands, especially South America. Among the books he read were William Prescott's *History of the Conquest of Mexico* and *History of the Conquest of Peru* and Alexander von Humboldt's *Personal Narrative of Travels in South America*. However one of the books that impressed him most was Thomas Malthus's *Essay on the Principle of Population*. Malthus argued that only the fittest survived in the struggle for life, thus giving Alfred a clue for his paper on the origin of species many years later.

It was while at Leicester that he met with another young self-taught entomologist, H.W. Bates. In Bates, Wallace found an

Alfred Russel Wallace

enthusiast not only in collecting, but also someone with whom he could exchange specimens, ideas and reaction to readings. The combination of financial independence, Malthus and Bates marked Leicester as crucial in Alfred's development (Raby, 2001). This was the beginning of his interest in beetles that eventually led to a publication in *The Zoologist* in 1847.

His passion for natural history collections thoroughly aroused, Wallace visited the British Museum in London, and museums in Paris. He was particularly impressed with the natural history collections and friendly atmosphere at the Paris

museum. The two weeks in London and Paris strengthened his determination to be a professional collector or, rather, "to use the profession of collecting in order to pursue his growing preoccupation with species and their origin" (Raby, 2001). The idea of a joint expedition that he and Bates hatched earlier became more and more appealing; the only question being which exotic places they should investigate. The publication of a book *A Voyage up the Amazon* by William Edwards in 1847 basically settled the issue.

On 26th April 1848, Wallace and Bates left Liverpool on board the ship *Mischief* and reached the Brazilian coast at Salinas exactly one month later. Wallace spent four years collecting in South America. Tragically, all these collections were lost when his ship caught fire on its way back to England. Nevertheless, through his correspondence, scientific presentations and other writings, Wallace's reputation as an explorer and naturalist had risen as a result of this expedition.

During the eighteen months between his arrival from South America and his departure to the East, Wallace attended meetings of the Zoological and Entomological societies, and made frequent visits to the British Museum, and committing most of the exhibits to memory. In 1853 he read two papers to the Royal Geographical Society based on his expedition to South America. At one of the meetings of the Royal Geographical Society in London, Wallace met Rajah James Brooke, a fellow member of the Society. Brooke offered him a safe access to Sarawak in Borneo, thereby partly influencing Wallace's destination for the next phase of his exploration. Arriving in Singapore in 1854, Wallace again met James Brooke who reiterated his offer of assistance for Wallace to explore the territories under his rule. This affirmed Wallace's decision to come to Sarawak.

Wallace in Sarawak

Wallace arrived in Sarawak on 1st November 1854 after having spent the previous 6 months in Singapore and Malacca. After spending the Christmas of 1854 with the Rajah and his friends, Wallace went to Santubong village, at the mouth of the Sarawak river, where Rajah Brooke had built a bungalow. Here, under the towering silhouette of the landmark coastal peak, slightly feverish, but inspired by a clarity of vision based on his experiences in tropical rainforests, he composed his thoughts into an essay entitled *"On the Law which Regulated the Introduction of New Species"*. Based on his observation and understanding of organic geography and geology he deduced a hypothesis that is known as the Sarawak Law – *"Every species has come into existence coincident both in space and time with pre-existing closely allied species"*. He then went on to show how this law explains *"the system of natural affinities, the distribution of animals and plants in space, the phenomena of representative groups and the phenomena of rudimentary organs"*. The key idea was that a species evolves gradually when its members are separated from each other for a long time by physical barriers such as high mountain ranges or a large expanse of sea. When he finished the essay he sent it to Samuel Stevens, his agent in London, to forward to the editor of the *Annals and Magazine of Natural History*. This paper, published in 1855, was Wallace's most important contribution to the advancement of scientific thought while in Sarawak (Wallace, 1855).

He spent the first 4 months collecting along the Sarawak River Basin from Santubong to Bau. However because of the rain, opportunities to collect were sporadic and his results were disappointing to him: in four months he only collected "320 different kinds of beetles".

In March 1855, he went to a coal mine that has just been

opened in Simunjan. This proved to be very productive and he remained there for nine months collecting beetles and other insects in immense quantity and variety . He wrote, *"Now, during my whole twelve years collecting in the western and eastern tropics, I never enjoyed such advantages in this respect as at Simunjan coal-works"*. By paying one cent for every insect specimen, he was able to obtain many fine specimens of insects (Wallace, 1890). In less than a fortnight Wallace has doubled what he had collected in four months at the river basin. Among the other specimens that one of the Chinese workers brought to him was a large tree frog from the genus *Rhacophorus* (later named after him – Wallace's flying frog), the first specimen to be described at the time. Although his butterfly collection was not very large, one species fascinated him because of its beauty and size. This he named after his friend Rajah James Brooke.

While at Simunjan, he also took the opportunity to study the orangutan, which were then common in the forests along the Simunjan river and its tributaries. In letters and articles sent to scientific publications, he described vividly his experiences while hunting these magnificent animals. He was probably the first in Sarawak to record the measurements of an assortment of orangutans that were freshly killed, and also to hand raise an orphaned baby orangutan – albeit unsuccessfully. He described the habits and habitats of orangutans, especially their use of virgin peatswamp forest of the Simunjan area, and their frequent forays into settled land to feed on the fruit trees planted by the Dayaks. Wallace deduced that the orangutan's absence from the Sarawak river valley or in the drier hill forest compared to the swamp forest of Simunjan is probably attributed to the disturbance caused by human activities in these more accessible areas.

Wallace left the Simunjan coal mines on 27th November 1855 and arrived in Kuching in early December, having gone up

Wallace: Discovered new animal species in Sarawak 150 years ago

Meet to expound work by naturalist

KUCHING: The work of British naturalist Alfred Russel Wallace in Sarawak in 1855 will be capitalised on to generate international interest so as to promote the state as a centre for speciation, biogeography and biodiversity studies.

Records show that when he was in Sarawak 150 years ago, Wallace came up with significant ideas in the understanding of biological diversity and organic evolution.

Wallace's special interest was in insects (beetles and moths) and his scientific contributions to the state included the discovery of new species of fauna, said Universiti Malaysia Sarawak (Unimas) Institute of Biodiversity and Environmental Conservation director Dr Andrew Alek Tuen.

These species included Wallace's flying frog and Rajah Brooke's Birdwing butterfly.

"Some of the insect specimens collected by Wallace have yet to be described," Dr Tuen said in a media briefing on an international conference on biogeography and biodiversity here yesterday.

Jointly organised by Unimas and Sarawak Development Institute, the conference from July 13 to 15 is on the theme *Wallace in Sarawak – 150 years later.*

Dr Tuen said Wallace's stay in the scenic Santubong near here had inspired him to write an essay entitled *On the law which regulated the introduction of new species.*

Wallace, then aged 31, travelled and collected extensively beetle and moth specimens in the Sarawak River basin, Simunjan and Sadong River.

Wallace, who spent at least six months in Singapore and Malacca before arriving in Kuching on Nov 1, 1854 and stayed with Rajah Brooke, published *The Malay Archipelago* in 1869.

Dr Tuen said the upcoming conference had generated much interest among foreign researchers as about 20 papers had been submitted.

He said there were plans to set up the Wallace Study Centre at Unimas, and a Wallace Corner at the university library, and also create a website on Wallace.

(Source: The Star, 2 March, 2005)

the Sadong River and then by land to the upper reaches of Sarawak Kiri, across Land Dayak country. In his book *The Malay Archipelago*, Wallace described vividly his overnight stay at each village, the durian fruits and various uses of bamboo by the Dayaks.

Wallace was quite fond of the Land Dayaks (he referred to them as "Hill Dyak") and devoted a whole chapter of his book to them. He described them as *"truthful and honest to a remarkable degree"*. Their simplicity and honesty made them prey to other races who *"cheat and plunder them continually"* (Wallace, 1890). He ranked their moral standards as *"above most uncivilized and even above many civilized nations"* and faulting them only for *"apathy and dilatoriness"*. Wallace noted their small family size, and therefore low population of the Land Dayaks. Ever the philosopher, he explained that this might be due to the hard life the women folks led, having to work in the fields all day long, carry heavy burdens back to their longhouses, and then to cook the daily meals when they arrived. He hypothesized that when living conditions become better, family size will grow and the population increase.

There was no ship to Singapore until January (1856), so Wallace decided to take up Brooke's offer to spend a week at his cottage, named 'Peninjau', which was situated on the shoulder of Mount Serambu. After a Christmas break in Kuching, he returned to this cottage, altogether spending almost three weeks collecting there. This site was particularly productive for moths and on a good night, especially when it rained, he was able to capture 100-250 specimens. He wrote *"during the whole of my eight years wandering in the East I have never found another spot where these insects were at all plentiful"*. He proceeded to describe the exact conditions under which these insects were collected, commenting that the location and design of the cottage partly contributed to his success.

The Strengths and Weaknesses of Wallace's Character

The most admirable qualities in A.R. Wallace were his resilience and a relentlessly enquiring mind. One would have thought that with all his misfortune, being poor not the least of them, he would have given up on his quest for knowledge. As a boy in Hertford, he suffered from a severe bout of scarlet fever. Later while surveying in Wales, he fell into a bog hole and became very sick a few days later, apparently from an extensive abscess of the lungs. In 1845, his brother William died from a fatal attack of pneumonia after catching a "chill" while riding in an open carriage from London to Neath.

Perhaps his greatest misfortune was the loss of his American specimens, notes and journals. He mourned this loss greatly and wrote *"How many weary days and weeks had I passed, upheld only by the hope of bringing home many new and beautiful forms from those wild regions... And now everything has gone, and I had not one specimen to illustrate the wild scenes I had beheld".*

Despite this enormous setback, Wallace was able to write a number of remarkable scientific papers based on his amazing memory, letters to friends and the contents of a tin box he salvaged from the burning ship.

During his travels in the tropics, he was ill on innumerable occasions, recovering only after taking large doses of quinine. He wrote *"At Malacca I had a strong touch of fever, with the old 'Rio Negro' symptoms, but the government doctor made me take large doses of quinine every day for a week, and so killed it, and in less than a fortnight I was quite well and off to the jungle again"* (Wallace 1905). The harsh tropical conditions, the lack of proper medical facilities and care, as well as exposure to pest and diseases to which Europeans in general had little immunity, probably contributed to his frequent bouts of fever.

Wallace however used these periods of forced rest to think and reflect on his surroundings. His major papers on evolutionary science addressing an issue that was topical at the time, the origin of species, were written while recuperating from illness.

Humility was perhaps one of Wallace's greatest strengths. After completing his second essay on the origin of species, Wallace sent it to Darwin with a note that if Darwin felt the paper had merit *"would he be so kind as to pass it to Sir Charles Lyell?"* Another example of his humility can be found in how warmly he took to the natives in Sarawak, especially the Land Dayaks. In a letter dated Christmas Day 1855 he wrote *"I have now lived a month in a Dyak's house ...very much pleased with them"* (Wallace, 1905).

Conclusion

Wallace's own story of his stay in Sarawak is told in his classic *The Malay Archipelago*, originally published in 1869. His collections, many of which were ultimately acquired by the Natural History Museum, London and Tring, where they are carefully preserved, and his descriptions of the local environment and the people he met and lived with in Sarawak have contributed significantly to the richness of our knowledge of the state of Sarawak 150 years ago. However it was through his writings on the origin of species, beginning with his Santubong paper entitled *"On the Law which Regulated the Introduction of New Species"*, that Sarawak was brought on par with the rest of the world in its contribution to natural science. It certainly did not take the grandeur of Victorian civilization to inspire great ideas; the magnificence of Santubong Mountain was equally inspiring!

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