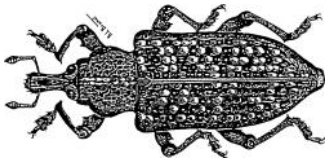
The life and times of Alfred Russel Wallace

As reported by the members of the Society for Insect Studies in December 2013 on the centenary of his death



Acknowledgments

We thank all those who contributed on the night or later with material for this issue.

In particular, for giving permission to use many of the Wallace-related images in this issue, we thank **George Beccaloni, the Wallace family, and the Wallace Memorial Fund.**

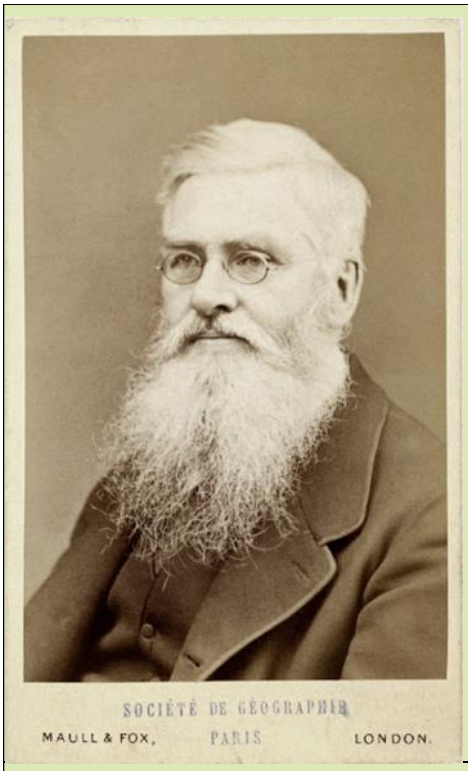
Images taken at the meeting were by Gary Harris. President, Graham Owen, made Certificates for Presenters. The magnificent model of a barque was made by Joe Stivala.

In addition to presenters whose write ups are in this issue we thank Len Willan, who brought several books on Bates, Wallace and Darwin, listed in the show and tell items. Len gave a fascinating insight into these pioneers and their interrelations with one another.

The Botany Bay diamond beetle,

Chrysolopus spectabilis, is the Society emblem. It was described by Fabricius in 1775 from specimens collected by James Cook's party at Botany Bay in 1770.

Second Edition with minor corrections, May 2015



Alfred Russel Wallace on Sept. 14 1878, aged 55. This is an original print in carte de visite format. Photographer: Maull & Fox, London. Restored and uploaded to Wikipedia by Jebulon - Bibliothèque nationale de France. Copyright of scan: Public Domain. [Source: http://wallacefund.info/]

INTRODUCTION: ALFRED RUSSEL WALLACE

The 7th of November 2013 was the centenary of Alfred Russel Wallace's death. Wallace, working alone and with other influential biologists such as Darwin, was a pioneer in modern evolutionary biology.

The SFIS marked the occasion by dedicating the 2013 Christmas meeting to Wallace. Members gave short presentations, and on display were books, a model barque similar to some of the ships Wallace travelled in, information on his collections and specimens of species described from his travels.

This special issue of the SFIS Circular is a compilation of many of the presentations plus some additional material, scans and photos kindly supplied by the Wallace Memorial Fund website and Wallace-related items that have come to the attention of members. Editing of pieces has been minimal to retain the original essence of contributor's writing. Any facts included or opinions expressed are from individual authors.

Whilst every attempt has been made to ensure information and images are appropriately credited and permission obtained for use, there may be items that have slipped through. We apologise if any such omissions have occurred—please contact the Editor.

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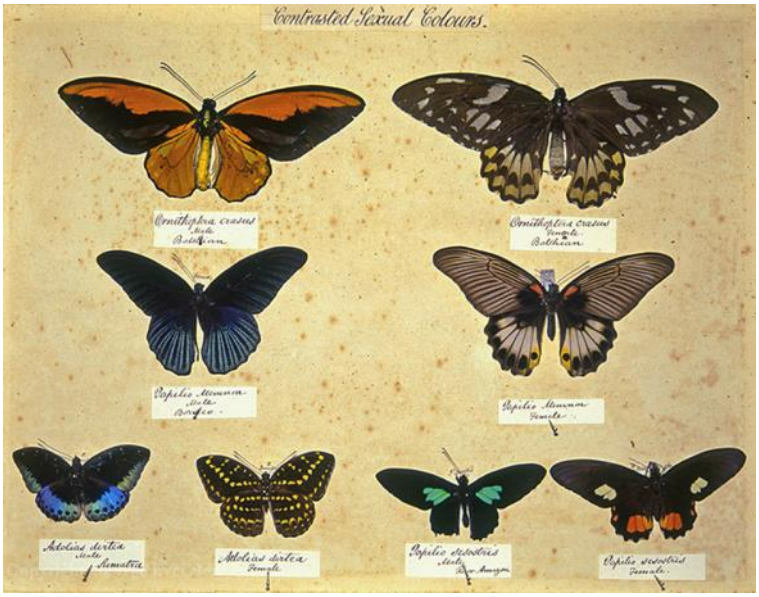
Drawer of moths and butterflies from Alfred Russel Wallace's private insect collection. This shows the collection before it was purchased by the Natural History Museum, London and transferred into different drawers. Copyright George Beccaloni

Drawer of butterflies from Alfred Russel Wallace's private insect collection. These are all members of the family Pieridae - one of Wallace's favorite groups of butterflies. This shows the collection before it was purchased by the Natural History Museum, London and transferred into different drawers. Copyright George Beccaloni



Drawer of butterflies illustrating sexual dimorphism (where the sexes are different in appearance) from Alfred Russel Wallace's private insect collection. This shows the collection before it was purchased by the Natural History Museum, London and transferred into different drawers. Copyright George Beccaloni

Alfred Russel Wallace

A short account of his life and his ant Collections

Ken Brash

Who was Alfred Russel Wallace?

He was born in the small Welsh village of Llanbadoc in Monmouthshire, and was the seventh of nine children. His father Thomas, had a degree in law, but never actually practised. Through some bad investments and business deals he lost most of his inheritance and when Alfred was about five, the family moved to Hertford, where he attended Hertford Grammar School until about 1836 when, due to a further decline in the family's fortunes, he had to be withdrawn.

He moved to London to stay with his brother John, but later took an apprenticeship under his surveyor brother, William. Wallace practised as a surveyor until an economic downturn saw him take a teaching job at Collegiate School in Leicester, where he taught mapmaking, drawing and surveying.

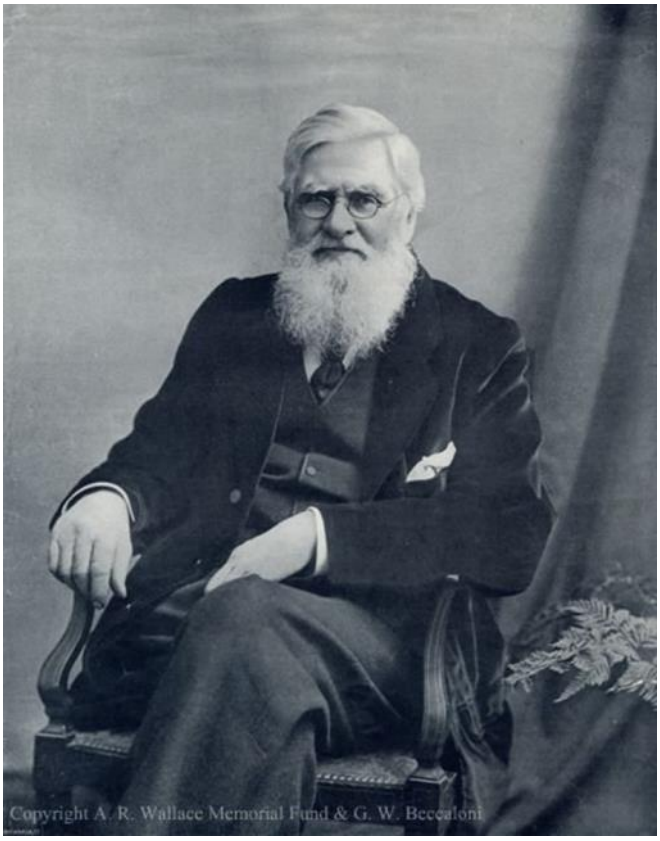
It was here that he met Henry Bates, a young entomologist, and it is probable that at this point his interest in entomology and natural history in general began.

After a short period teaching, there followed several business ventures and finally on the death of his brother William, he took over his brother's business, but was unable to make a go of it. He then took a job as a surveyor and, due to travelling around the countryside for work, he was able to indulge in his new found passion for collecting insects.

He kept in touch with Bates and read works such as "Vestiges of the Natural History of Creation", by Robert Chambers, Darwin's " Voyage on the Beagle" and "Principles of Geology" by Charles Lyell. All this, together with reading accounts by early explorer naturalists, such as Baron von Humboldt and, of course, Darwin, he decided that this was what he intended to devote the rest of his life to, exploring distant places and collecting their local fauna.

To this end he contacted Henry Bates and persuaded him to join with him on an expedition to Brazil to collect insects and other types of native fauna to sell to collectors back in the UK.

It was at this stage that his interest in, and pursuit of evidence for, the transmutation of species increased. That is the physical change of a species into something different, due to environmental or ecological changes in the conditions in which they lived.

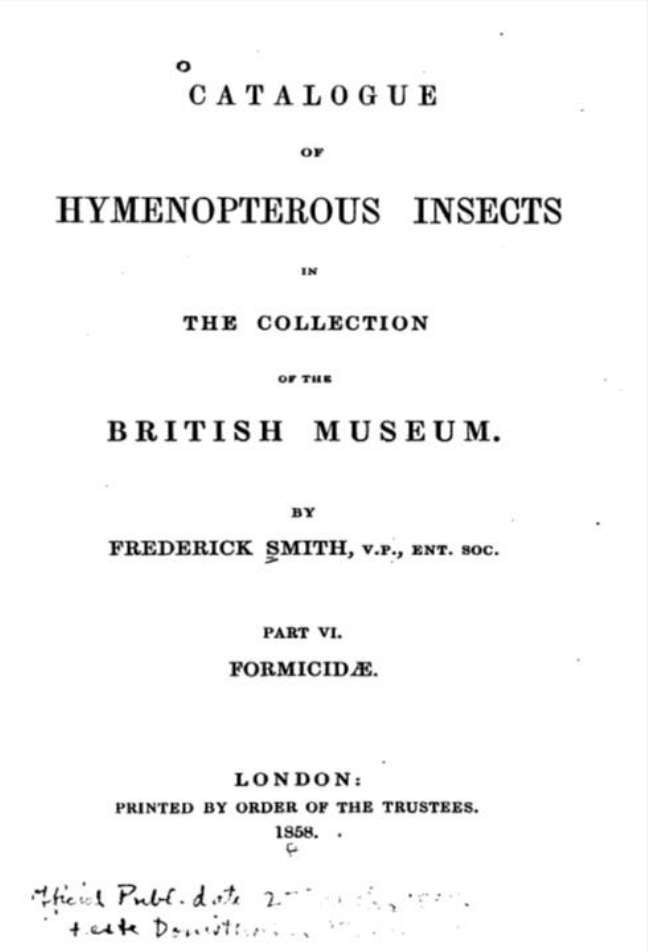


Alfred Russel Wallace in 1895. Photographer: London Stereoscopic & Photographic Co. Ltd., 106 & 108 Regent St., W., London. First published in Borderland 3 (April 1896). Scanned from The Sphere, November 15, 1913: 163. The painting of ARW by Roger Remington in the Linnean Society is based on this photo. Copyright of scan: A. R. Wallace Memorial Fund & G. W. Beccaloni.

This first expedition proved a disaster for, on his return journey to the UK, the ship caught fire and all Wallace's specimens were lost. When he finally got back to the UK he had to live on the proceeds of the insurance payout and the sale of specimens he had sent back from the Amazon.

During this period Wallace wrote several papers on various subjects connected with his journeys in Brazil and communicated with numerous UK naturalists, including Darwin.

Wallace's next venture, which is probably the one for which he is most remembered, was his travels through



CATALOGUE

OF

HYMENOPTEROUS INSECTS

IN

THE COLLECTION

OF THE

BRITISH MUSEUM.

BY

FREDERICK SMITH, V.P., ENT. SOC.

PART VI.

FORMICIDÆ.

LONDON:
PRINTED BY ORDER OF THE TRUSTEES.
1858.

From: John van Wyhe, ed. 2012-. Wallace Online. (http://wallace-online.org/)

the Malay Archipelago. It was during these travels that he collected the vast majority of species of ants that make up a significant collection.

The collection in this region was spectacular with over 126,000 specimens, of which over 80,000 of them were beetles. Wallace also was responsible for some outstanding work on birds of paradise, which was quite ground-breaking at the time.

In the eight years of travelling around the Archipelago and studying its fauna, he concluded that there was a geographical line that determined what species existed on each side of it, in a way isolating the fauna on each side. This occurred across a strait, which later became known as the Wallace Line. It would seem from later studies of the region to be due to the very strong currents flowing through the strait, thus preventing the movement of species by means of driftwood from one side to the other.

During this period Wallace, based on observations during his wide-flung exploration of the Malay Archipelago, conceived the idea of natural selection. In 1858, whilst in Indonesia, he described his ideas in a letter to Darwin, prompting Darwin to announce his own theory on which he had been working for many years. Work by the two authors describing their versions of the theory of evolution, were announced at a meeting of the Linnaean Society in 1858.

Wallace was one of Darwin's most staunch defenders, and was in turn greatly admired by Darwin.

In 1869 he finally published "The Malay Archipelago" (dedicated to Darwin), which was an account of his travels and studies in that region and which became an instant success. Both Darwin and Charles Lyell praised it highly.

The Wallace Legacy Preserved.

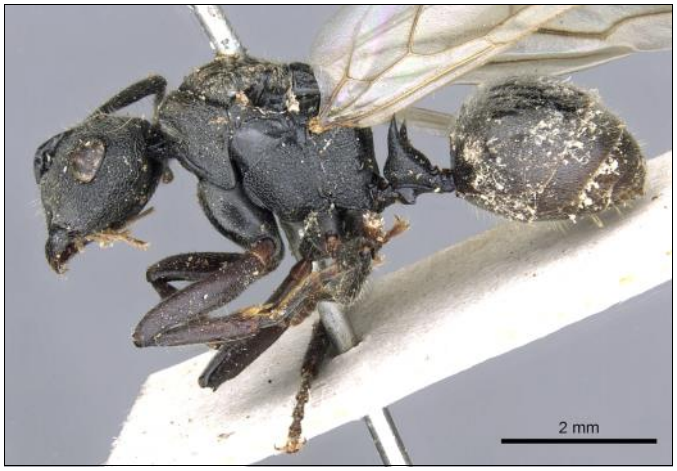
I was fortunate to have contact with Dr George Beccaloni, who is in charge of the British Natural History Museum's "Wallace 100 project 2012-13". George has played a major role in this project by ensuring that all information given out by the museum is factual, arranging various public engagements to promote the project and to be the public face of the project acting as official spokesman. He worked tirelessly on overseeing the creation of events by the Natural History Museum and was pivotal in production of a bronze statue of Wallace to stand in the museum

In spite of his very busy schedule, he took time to send me a special link to the museum's archives, enabling me to put together a comprehensive catalogue of ant species, which I brought along to the Wallace evening in December.

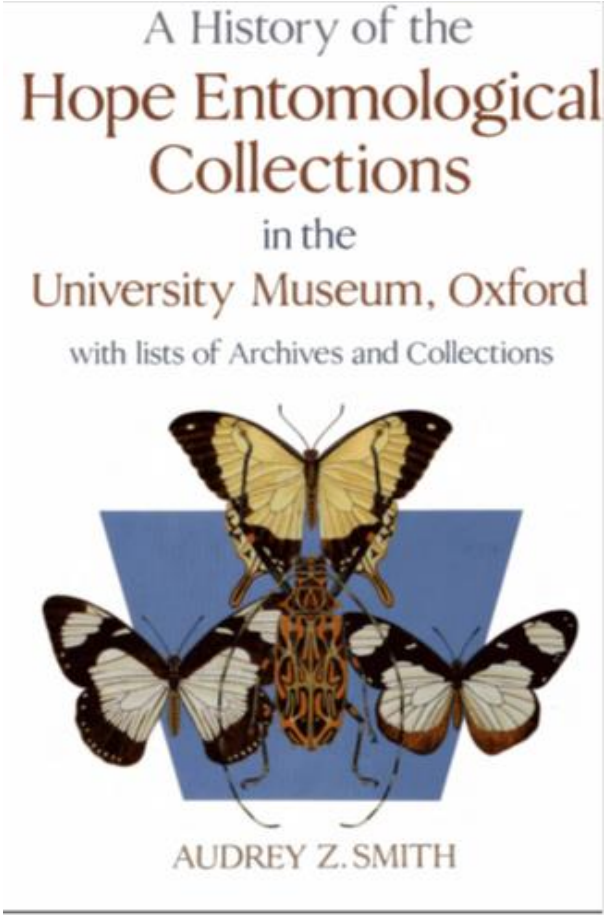
This catalogue was compiled by Frederick Smith (1805-1879). Smith published widely on hymenopterous insects of the British Isles as well as on exotic fauna. He was the person to describe and monograph bees and ants collected by Alfred Russel Wallace during his voyages in Southeast Asia.

Frederick Smith was the first entomologist to publish descriptions of more than a hundred ant species that still hold validity today. Totalling 702 new species and subspecies names, of which 489 are still valid, 209 became junior synonyms and four are deemed unavailable.

He described 25 new ant genera of which 16 still stand. Among these, there are well known genera of ants such as *Oecophylla* and *Polyrhachis*, both described from material brought to England by A. R.



Polyrhachis piliventris, holotype collected by Wallace, named by Smith (from www.AntWeb.org by Zach Lieberman)



Wallace. *Cataulacus*, *Cerapachys*, *Paraponera*, *Strumigenys*, and *Tetraponera* are examples of large or otherwise known genera Smith named.

I also owe a vote of thanks to Dr James Hogan who is the curator of the Hope Entomological Collection, at the Oxford University Museum. James sent me a list of ant species collected by Wallace, listed and described by Frederick Smith and collated from the collection lists.

This collection includes not only specimens of insects, collected by several naturalists, including several species by Wallace, but also copies of communications between academics spanning over 100 years.

The Hope Entomological Collections were passed to the University Museum, Oxford as a Deed of Gift by Rev. Frederick William Hope in April 1850. Hope was a wealthy amateur entomologist. Hope, who was an entomologist by avocation, received an excellent education in the natural sciences. He went to Christ Church and earned a B.A. degree in December 1820 and an M.A. Degree in April 1823. At Oxford, Hope developed a fascination for zoological studies. He received a curacy in Shropshire to earn his living, but Hope never worked as a minister because of health reasons. Hope married Ellen Meredith, who supported him in his interest in the natural sciences. Frederick Hope was well known among British intellectuals. In fact, Darwin called him, "my father in Entomology."

Myrmica trachylissa (now *Pristomyrmex trachylissus*), holotype collected by Wallace, named by Smith (from www.AntWeb.org by Will Ericson)

I shall finish this article in the same way I finished my presentation, by saying that it is in memory of a great man of science, who has regrettably been, for the most part, forgotten and overshadowed by another great man, Charles Darwin. However, with the efforts of George Beccaloni at the British Natural History Museum, more and more people will become aware of Wallace's legacy.

Route of Alfred Russel Wallace's journey (heavy black line) around the Malay Archipelago, from his book 'The Malay Archipelago'. Copyright George Beccaloni

The Ternate Letter

Alfred Russel Wallace's "..sudden intuition"

Dennis Collins

Human history reveals that great advances in scientific thinking can often be traced back to a seminal event. One such event occurred on July 1st 1858, when Charles Darwin presented several scientific papers to the Linnean Society in London. These papers presaged the publication of Darwin's famous "On the origin of species" in November 1859.

Included with the papers was a letter received in the preceding month by Darwin from a self taught English beetle collector, Alfred Russel Wallace. The letter was sent from a small island, Ternate, located in the Moluccas group of the Eastern Malay Archipelago and contained Wallace's observations and conclusions regarding, among other things **"The Tendency of Varieties to depart indefinitely from the original type."**

A.R. Wallace, according to his biographies, was a risk taker, a brave man of fortune, a ferociously dedicated naturalist/collector, a renaissance man, a hard working field naturalist. The 100th anniversary of his death on the 7th of November 1913 has rightly focused attention on his contribution to the advancement of evolutionary science. Wallace was credited with discovering over 5000 species, 200 which still bear his name. It is likely these numbers would have been higher if Wallace had better credentials within the scientific community.

When Darwin presented his papers, without Wallace's knowledge, the Ternate letter was read and later published in the Linnean Society's Proceedings. There are, on close examination, differences between Darwin's and Wallace's viewpoints, but to the Victorian audience and members of the Linnean Society the differences were obscured by the furore caused by such an earth shattering contradiction of the prevailing "universal law". The presentation at the time was referred to as "The Darwin/Wallace theory of Natural Selection". Subtly Wallace's name and association with the theory was diminished and further obscured by the publication of Darwin's *On the Origin of Species*.

Darwin was seriously encouraged to expedite finalising his treatise by his supporters, notably Lyell, who after reading Wallace's letter, urged Darwin to publish. Darwin's painstaking accumulation of evidence, lacked the drive or confidence to confront the orthodoxy. It would be reasonable to assume that Wallace's Ternate letter had a profound impact, and gave Darwin the impetus he lacked.

The Ternate letter lacked headings and would have been a heavy read, however, in 1890 Wallace republished the letter in "Contributions to the theory of natural selection, a series of essays", giving a much clearer insight into his theories. Wallace appears to be have been a self effacing character, embarrassed by the attention he received at the time, and later wrote that he had been given more honour and credit than he deserved and that his letter was **"sudden intuition, hastily written."**

In the foyer of the British Museum stands an impressive marble statue of Charles Darwin. Recently added, next to Darwin, was a portrait of A.R. Wallace, honouring his achievements and his legacy.

Left: Island of Ternate, Indonesia at sunset in 2012. © George Beccaloni. Above, Pencil sketch of Ternate Island (left), Tidore Island (middle) and Morotai Island (right) (all in the Moluccas, Indonesia) by Wallace, c. 1858-1861. Scan ©: A. R. Wallace Memorial Fund

Alfred Russel Wallace

A précis of his life

Grahame Jackson

I had the usual boyhood heroes, such as the Duke of Wellington and Lord Baden Powel of Scouting fame, but it wasn't until I was in my forties that I added my adult hero, Alfred Wallace, to the list. This came about as I made several trips to Indonesia to collect butterflies and travel in some of the islands that Wallace collected in, and so began to understand his contribution to natural history, albeit in pioneering circumstances.

Alfred Russel Wallace was born at Usk, Monmouthshire, in 1823 in what was then England but for administrative purposes was considered part of Wales. He was forced to leave Grammar School at the age of 14, as his parents could no longer afford the fees. From 1837 to 1848 he worked mainly with his brother (who was a land surveyor) and became interested in natural history. Wallace prevailed on his friend Henry Walter Bates to accompany him to the Amazon River (middle part) and on the main northern tributary to collect and study animals and plants. However they split up after a short period, but Wallace spent four years (1848 - 1852) there before returning to England. Wallace had left specimens at Barra (Manaus) for shipment to England some months previously, but they were impounded by Customs and not sent. So when he set sail he took them with him, but the ship caught fire and sank just 26 days into the voyage, taking all his specimens and almost all of his notes with it. After spending 10 days in leaking lifeboats with the crew, he was rescued by a passing cargo ship.

1853 – Wallace writes a book on "Travels and Travails".

1854 – Undeterred, Wallace sets out again, only this time to the Islands of the Malay Archipelago, exploring and collecting more than 125,000 specimens. His collections reveal many contradictions to the theory of the independent creation of the species.

1858 – Wallace sends Charles Darwin a paper outlining his ideas about evolution by natural selection. This rouses Darwin, whose own theory is 20 years old but as yet unpublished. It is decided that Wallace's paper and Darwin's work be jointly presented to the Linnean Society in London, where Darwin had influential friends.

1860 – Darwin sends a copy of his book "On the Origin of Species" to Wallace, who reads it and writes to a friend: "Mr Darwin has given the world a new science".

1862 – Wallace has now been in the Malay Archipelago for eight years and visited all of the main islands, and in the process becomes the foremost authority on the region.

Wallace Line – This is an invisible almost perpendicular line running between Bali and Lombok, and Borneo and Sulawesi, and which follows the course of a deep ocean trench. The Wallace Line marks the eastern extent of Asian fauna and the Western limit of the Australian fauna. The two sides were not connected during periods of lower sea level and therefore the plants and animals became isolated and many unusual species have evolved.

1869 – Wallace publishes his most famous work, "The Malay Archipelago" which he dedicates to his friend Charles Darwin.

1870 – Wallace writes another book "Contributions to the theory of Natural Selection". He had written extensively on his return to England and indeed right up until the time of his death.

1913 – Wallace dies on 7th November and is buried in a public cemetery. In 1915 a medallion inscribed with his name is placed in Westminster Abbey.

Postscript – Having travelled to some of the places where Wallace collected in 120 years before, I am in awe of his achievements and resilience, existing as he did on a modest income in that debilitating climate.

[Editor's postscript: 2013 – a statue is erected to Wallace: see p. 20]

The Origin of the Wallace Line

Michael McNally

A cursory glance at a map of the Malay Archipelago (Figure 1), as named by Alfred Russel Wallace, does not indicate the Line through Lombok Strait to be different to other channels in the island chain. Non aquatic species have spread island to island in other regions of the world, on the wing, on the wind and across open water on floating debris. Why would this waterway limit the spread of non aquatic species?

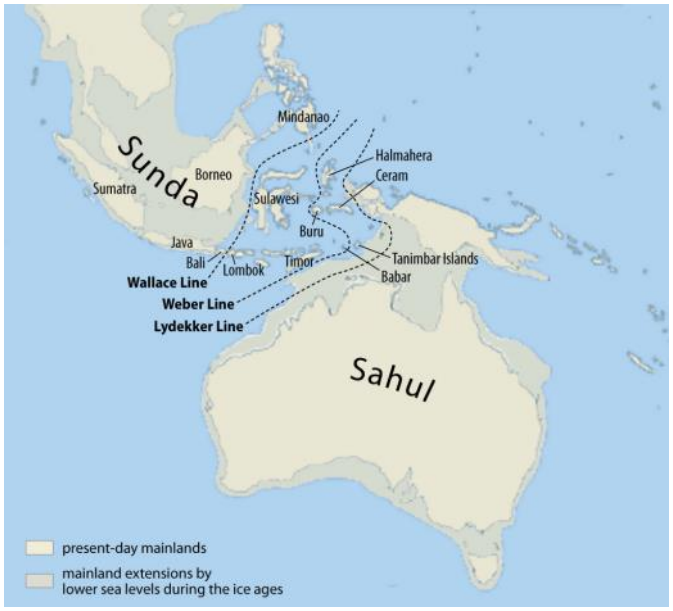
The variation in species across the Wallace Line originates from the separation of Gondwanaland from the super continent Pangea approximately 100 million years ago[1]. This enabled evolution to occur on Gondwanaland independently of the other land masses. Later Gondwanaland broke up leading to the formation of the Indo-Australian Tectonic Plate, which is currently moving northward at a rate of 6 to 7 centimetres per year[2]. This slow boat ride of the continental tectonic plate would have provided the time necessary for the evolution of the species.

The Lombok Strait is located between the islands of Lombok and Bali, in the biogeographical region of Wallacea. Wallacea encompasses the islands and waterways between West Papua and Borneo. Today, Lombok Strait is 60km long, 20km wide at its narrowest and a minimum depth, at the sill, of 250 metres[3]. The sea floor 40km from the sill in the south drops to 2000 metres and to the north, 1200 metres[4]. The Lombok Strait has recorded tide velocities as high as 3.5m/sec[4]. The tide has also been observed to stratify, flowing north and south simultaneously[4]. As the current flows across the sill, upwelling of currents occur. The high velocity current and upwelling of the water through the Lombok Strait results in the formation of large eddies. The migration of species across this fast turbulent waterway on the surface would have been perilous.

The high velocity of the currents in Lombok Strait arises from the sea level height difference, an average of 16 cm[5], which occurs due to ocean tides. The Pacific Ocean tides moving east to west are choked by the islands to the north of Wallacea and the Malay Peninsula. It is due to this restriction of the ocean tidal flow that a difference in sea level occurs. Has this sea level difference in Lombok Strait always been present?

There are possibly three recent factors which would have led to changes in the current velocity flowing through Lombok Strait. Firstly, the formation of the Torres Strait 10,000 years ago[1]. The velocity of the Torres Strait current has been measured at 0.6 metres per second[6] .Although this figure is much lower than the present flow rate through Lombok Strait, Torres Strait is 150km wide and very shallow. The shipping channel is only 11 metres deep[7]. The volume of water moving under tidal influence, in the Torres Strait, would be similar to that flowing through the Lombok Strait today. The opening of Torres Strait would have reduced the volume flowing through Lombok Strait consequently reducing the velocity.

The second factor was the creation of the Arafura Sea, Timor Sea and the Gulf of Carpentaria. These would have provided a reservoir of water for tidal flow into the Indian Ocean immediately south of the Malay Peninsula. This would have reduced the sea level difference across the Lombok and other straits and conse- ▶



Map of Sunda and Sahul and the Wallace Line, the Lydekker Line and the Weber Line (Maximilian Dörrbecker (Chumwa); CC BY-SA 3.0)

quently the velocities across these straits.

Thirdly, the Ice Age 20,000 years ago resulted in a drop in sea level of 125 metres[2]. The remaining water channels within Wallacea were considerably reduced (Figure 1). As the region in the Pacific Ocean supplying the volume of tidal water would not been appreciably reduced, therefore, the velocity of water through the Lombok Strait would have greatly increased.

These three factors, the absence of Torres Strait, the tidal water reservoirs of Arafura and Timor Sea together with the Ice Age would have led to a large increase in water velocity flowing through Lombok Strait. The present day large eddies in Lombok Strait would have been maelstroms. Under such conditions, it is impossible to imagine any species trapped on floating debris crossing Lombok Strait or other narrow waterways, such as the Ombai and Sape Straits in the Malay Archipelago. Therefore, the only means of transport for species migration is above the water surface.

For those species requiring wind for their dispersal the distances between islands, under the local tropical conditions, was too large. The frequent monsoon rains with predominant wind directions of south, east and north with moderate force, were not conducive for wind borne propagation of species. Strong winds easterly or westerly, without rain, would be needed to carry them between islands.

An additional feature of Wallacea is the Indonesian Throughflow. This is part of the global deep ocean water currents (conveyor belt) that flow between oceans. Approximately half of this flow is through the Timor Passage, one third through the Ombai Strait and one sixth through the Lombok Strait[8]. Unfortunately, changes in the volume of the Indonesian Throughflow in the last 50,000 years is still being investigated and therefore its contribution to speciation in the region would only be conjecture.

Other more specific “Lines”, that follow the strong currents through Wallacea, have been proposed. It was the astute work of the naturalist, Alfred Russel Wallace, who expanded and formalised the previously reported faunal discontinuity, that existed in this unique part of the world. It was in the Malay Archipelago that he crystallised his ideas on natural selection, the keystone of evolution. It was after his death, in 1915, that the theory of continental drift became popular. His meticulous cataloguing of species would not only have assisted in the understanding of evolution of species but also provided hard evidence for the theory of continental drift.

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Moluccan beetles. A woodcut from Alfred Russel Wallace's book 'The Malay Archipelago'. The large beetle is a male Indonesian Long-armed Chafer Beetle (*Euchirus longimanus*). © George Beccaloni

The Naming of the Golden Birdwing

Graham Owen

I have had in my mind how I thought I was going to present this talk for most of the year, but when we called for speakers and subjects I told Helen, our editor, that I was going to talk on Wallace's naming of *Ornithoptera croesus lydius.*

Helen came back quick as a flash and said but Wallace did not name *O. croesus lydius,* my heart sank. I thought I had wasted 11 months and a lot of money, which will become obvious in a minute.

Helen pointed out that Wallace named *croesus* and when a new subspecies is named the original subspecies is named *croesus croesus* so that any variants do not get confused with the original.

I should have known this and ladies and gentlemen one of the reasons you get a professional newsletter is thanks to Marita's design and layout and Helen's spell check and fact check.

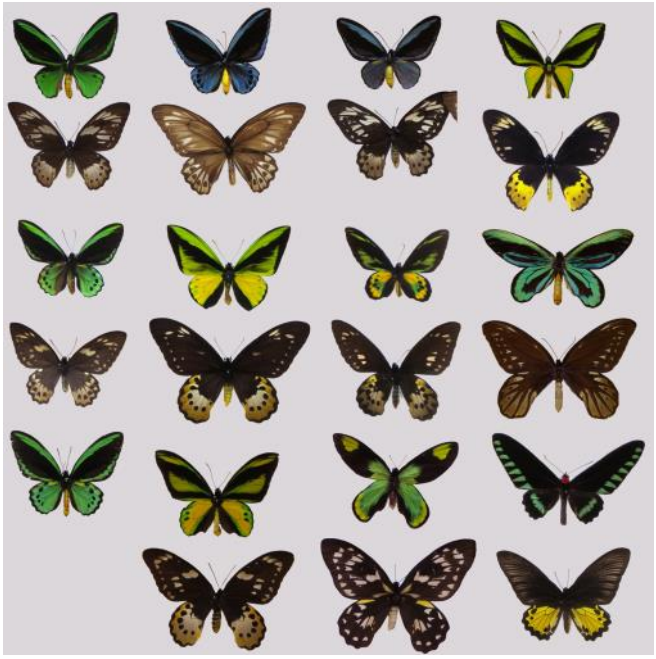
I have a book on birdwings that have a *priamus* (green male) and *urvillianus* (blue male) and *croesus* (gold male) and have listened to the arguments over the years that blue and yellow make green and that these are the same butterfly but missing one of the pigments similar to the cicadas, green grocer, yellow Monday and blue nurse reported in last month's circular.

Helen prompted me to look back through some of old books to see if I could justify my wrong impression. What I discovered shocked me more than I was expecting.

In the 1950s and 60s as a young boy I only had 8 *Ornithoptera,* 2 *Trogonoptera* and 5 *Troides* to dream about - birdwing wise.

Ornithoptera priamus
O. urvillianus
O. croesus
O. goliath
O. chimaera
O. victoriae
O. paradisea
O. alexandrae

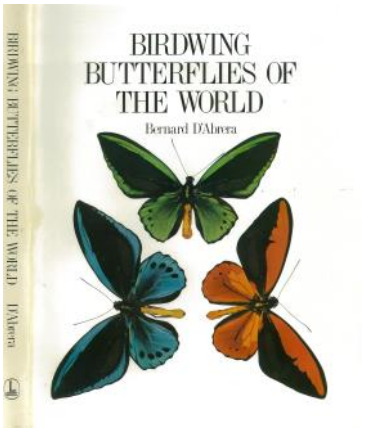
Then D'Abrera put out his birdwing book in the 70s. He increased a young mans dreams by describing 36 *Ornithoptera,* 5 *Trogonoptera* and a massive 54 *Troides.*



Birdwing butterflies, male and female below in each pair except bottom right. Column 1 (left): *Ornithoptera priamus poseidon, O. p. richmondia, O. p. euphorion* (male only); Column 2: *O. urvillianus, O. goliath, O. chimaera*; Column 3: *O. aesacus, O. rothschildi, O. victoriae*; Column 4: *O. paradisea, O. alexandrae, Troides aesacus* and *Trogonoptera trojana* (males only). Not all to scale. (Graham Owen, Helen Smith)

The most common of the green birdwings is *O. priamus*, named after King Priam of Troy by Linnaeus in 1758.

D'Abrera split *priamus* in to 10 different forms. He split *croesus* in to 2 being *lydius* (the most common) and *croesus.*



Today the splitting is mind boggling.

King Priam's green birdwing has been split in to 23 sub-species that are further divided in 126 forms. ▶

Ornithoptera priamus poseidon, male, and female below (Graham Owen)

O. aesacus male, and female below (Graham Owen)

◄ Interestingly, King Priam's oldest son Aesacus has his name attached to a blue birdwing that has separate species status. Still considered quite rare, it was named by Ney in 1903, but because it was named from only 1 male and 2 females did not get official status until 1987 and now has 5 forms (outside *priamus).*

King Priam's birdwings include:

O. priamus priamus named by Linnaeus 1758, today split in 7 forms

O. p. hecuba named after Priam's wife by Rober in 1891 but today split in 16 forms

O. p. macalpinei named by Max Moulds in 1974 after David McAlpine from the Australian Museum

O. p. urvillianus named by Guerin-Meneville in 1838, the first blue birdwing, and ...

O. p. impensus	1 form
O. p. albiro	1 form
O. p. arruana	11 forms
O. p. pronomus	1 form
O. p. euphorion	7 forms – yellow male (not related to *croesus*)
O. p. richmondia	4 forms
O. p. gebeensis	1 form
O. p. teucrus	3 forms
O. p. kassandra	1 form – another of Priam's kids
O. p. poseidon	56 forms – he built Troy's fortifications
O. p. aureus	1 form – a green butterfly named after a Roman gold coin of 4AD
O. p. sterrensis	1 form
O. p. demophanes	2 forms
O. p. boisduvali	1 form
O. p. caelestis	2 forms (blue form male)
O. p. admiralilatis	1 form
O. p. bornemanni	2 forms
O. p. wituensis	1 form
O. p. miokensis	4 form (blue form male)
23 sub-species	126 forms

Are you confused yet?

In summary:

Ornithoptera priamus priamus discovered 1758 (green)

Ornithoptera priamus urvillianus discovered 1838 (blue)

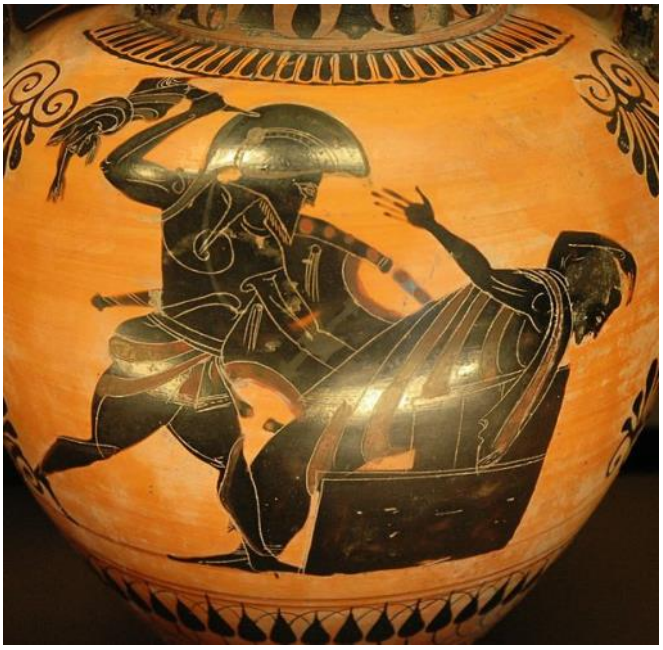
Ornithoptera croesus croesus discovered 1859 (gold)

Even though *croesus* looks a lot like the blue and green forms of King Priam's birdwing it is considered a separate species and is today split in to 5 species that have 22 forms (so thank you again Helen!).

The 5 sub-species are;

croesus croesus	3 forms
croesus lydius	13 forms
croesus wallacei	3 forms
croesus helios	1 form
croesus toeantei	2 forms

To help join the dots and bring this to a conclusion ►



Death of King Priam design on amphora (Marie-Lan Nguyen / Wikimedia Commons (Public Domain))

Detail from The Procession of the Trojan Horse in Troy by Domenico Tiepolo (1773), inspired by Virgil's Aeneid (Public domain, from Wikipedia)

◀ I need to give you a quick refresher in Greek mythology and ancient coins.

At the time Linnaeus named *priamus* after King Priam of Troy, Troy was an ancient Greek myth. In 1865 excavations began that subsequently proved Troy did exist in 9 different forms from 3000-2600 BC right up to 85BC to 500 AD. This extended the knowledge of human civilisation from 700BC to 3000BC.

Priam presided over Troy during the Trojan wars of Trojan horse/Helen of Troy fame. He was fabled for many things, he married several times (or had concubines) he fathered 50 sons and many daughters. Many insect names today immortalise his family.

His first wife, Arisbe gave birth to his first son Aesacus (now a separate birdwing species). He divorced Arisbe in favour of Hecuba whose name also adorns a birdwing. Hecuba gave birth to 19 sons and some say an equal number of daughters, a good number of whom adorn insects discovered in recent times: Polydorus, Hector, Alexander, Helenus, Menelaus, Achilles. Priam kidnapped Helen Queen of Sparta, wife of Agamemnon – the cause of the 10 year war between the Greeks and the Trojans, which the Greeks won when they deceived the Trojans by offering the Trojans a large statue of a horse which turned out to be full of Greek warriors.

The walls of Troy were said to be so impressive – 8m tall and 5m thick – that they were built by Poseidon and Apollo (both good butterfly names). It was rumoured that Priam of Troy had fabulous wealth in the vein of Tutankhamun who ruled from 1332BC to 1323BC. Schliemann, who excavated the site at Troy, found a great number of treasures that included a copper shield, copper cauldron, 8750 gold rings, gold buttons, gold bracelets, electrum cup and silver knife blades. Schliemann called them the "treasures of Priam" believing them to be the jewels of Helen. He even adorned his wife Sophia calling her his beautiful Helen.

Schliemann turned Troy into a “mole hill” and it is now thought that the treasures he found came from several eras. The copper objects were probably from the bronze age period of King Priam but the gold is more likely from a later period.

And so to Croesus, Lydia and first coins.

Coinage is a reflection of human history: it was the result of a need for a convenient medium of exchange. It was an indication that mankind had evolved beyond a barbaric state. The Chinese invented tradable ▶

Treasures of Priam, large diadema (I. Sailko CC BY-SA 3.0) (left); Sophia Schliemann, wife of Heinrich Schliemann, wearing treasures discovered at Hisarlik (Public domain, from Wikipedia)

Electrum on display in the Australian Museum (Helen Smith)

Above: Early 6th century BC Lydian electrum coin (one-third stater denomination (Classical Numismatic Group, Inc. http://www.cngcoins.com; CC BY-SA 3.0) Below: Silver hemistater and 1/12 gold stater (right) of King Croesus; note bull facing lion (Graham Owen)

◀ objects about 1,000 BC but both the Lydians and Chinese (independent of one another) invented coinage for use as currency about 700 BC.

Lydia was a small but wealthy state in Asia Minor with the capital Sardis. (Sardis exists today as a town in Turkey 60km east of Izmir). The Lydian Empire became a powerful empire during the 8th century BC considered advanced in the industrial arts, the manufacturing and dying of woollen goods and carpets.

One of the bases for prosperity was the copious quantities of electrum, a natural alloy of gold and silver found in the sands from the Pactolus River.

Someone had the idea of making lumps of electrum of the same size and purity, then stamping them with a seal to show that they had value and could be used as a trading medium.

In the last quarter of the 7th century BC, around the time of King Alyattes, the Lydian State invented a coin made of electrum which had a lion's head as its symbol. This is thought to be the world's first true coin.

However this early coinage soon ran in to difficulties as electrum can vary enormously in relation to proportions of gold and silver, problems further compounded by

Anatolia Ancient Regions (MinisterForBadTimes CC BY-SA 3.0 via Wikimedia Commons)

adding more silver or copper during the smelting process.

During the reign of Lydia's last king, Croesus 561-546BC, the technology for separating electrum in to its component parts of gold and silver was discovered. So King Croesus of Lydia is credited with inventing the first pure silver coins; the first pure gold coins; in fact the first bi-metallic currency.

These coins are known as staters a word that basically means "standard coin" and which has no specific denomination such as we have for dollar or pound.

The basic standard for this series of coinage is that a basic gold stater weighed around 8.19 grams with 10 silver pieces equalling 1 gold piece of the same weight. Small change was issued in fractions that were divided into by threes and twos i.e. 1/2, 1/3, 1/6, 1/12, 1/24, 1/48 and even minute items such as 1/96 and 1/192.

As long as gold and silver contents remained stable the coins would circulate at this fixed ratio. This was the world's first bi-metallic currency and this concept of coinage in more than one metal each with a fixed relationship to the other would be the rule until modern times.

Lydia fell to the Persians in 545BC but the concept had already spread to other parts of the ancient world.

This method of hammering coins this way lasted for more than 2,000 years and until the 16th AD.

King Croesus differentiated his coins from early coins by adding a bull confronting the lion.

Since spending my children's inheritance to obtain examples of these two "million day" old coins the most frequent question I have been asked is what was ▶

O. croesus croesus male, and female below (Graham Owen)

◄ their purchasing power?

My research suggests that 1 gold stater would sustain a whole family for a month or 1/12 gold stater per week or 2-1/2 silver staters per week. This has to be viewed in the light of barter and trading of goods continued alongside currency i.e. not all the family's needs were by way of purchases. The main role they played was for merchants trading goods and payment of military (soldiers) or other "public servants".

And so now to *O. croesus croesus* as named by Wallace. I should start by recounting Wallace's diary entry. It has to be reprinted in almost every book on the subject. It has become a fable or folk law in the same exciting way as Andreas' account of finding his first *Hyperion.* It was during a visit to Bacan island in 1859 that Alfred Russel Wallace first observed a female of *Ornithoptera croesus.* It took, however, as much as three months before he finally managed to catch the first specimen, a male. His triumph was a direct result of his identification of shrubs with yellow flowers, *Mussaenda,* to be attractive to the imagoes of *O. croesus.*

Wallace's account of his capture given in "The Malay Archipelago" is well known and has been published again later by several authors:

O. croesus lydius male, and female below (Graham Owen)

"During my very first walk into the forest at Batchian, I had seen sitting on a leaf out of reach, an immense butterfly of a dark colour marked with white and yellow spots. I could not capture it as it flew away high up into the forest, but I at once saw that it was a female of a new species of Ornithoptera or "bird-winged butterfly," the pride of the Eastern tropics. I was very anxious to get it and to find the male, which in this genus is always of extreme beauty. During the two succeeding months I only saw it once again, and shortly afterwards I saw the male flying high in the air at the mining village. I had begun to despair of ever getting a specimen, as it seemed so rare and wild; till one day, about the beginning of January, I found a beautiful shrub with large white leafy bracts and yellow flowers, a species of Mussaenda, and saw one of these noble insects hovering over it, but it was too quick for me, and flew away. The next clay I went again to the same shrub and succeeded in catching a female, and the day after a fine male. I found it to be as I had expected, a perfectly new and most magnificent species, and one of the most gorgeously coloured butterflies in the world. Fine specimens of the male are more than seven inches across the wings, which are velvety black and fiery orange, the latter colour replacing the green of the allied species. 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.

“II had decided to return to Ternate in a week or two more, but this grand capture determined me to stay on till I obtained a good series of the new butterfly, which I have since named Ornithoptera Croesus. …”

“...I was thus able to bring away with me more than a hundred of both sexes, including perhaps twenty very fine males, though not more than five or six that were absolutely perfect. "

And so to wrap up....

D'Abrera attributes the main difference between *croesus* and *lydius* being the darker form female in *croesus.* However I believe he was actually saying a great deal more, albeit subtly.

Ornithoptera croesus croesus was the first gold birdwing to be discovered and so it was named after the King who has been attributed with inventing the first gold coinage.

Named by Alfred Russel Wallace in 1859 after King Croesus of Lydia

Described forms:

mf. *croesus* Wallace, 1859

mf. *lydoides* Fruhstorfer, 1900

O. croesus croesus males have gold spots like gold coins on the outer edge of the hind wings.

In *O. croesus lydius* the gold spots are replaced with black spots and in the other forms the "gold coins" are either absent all together or have black spots

Named by Felder 1865

King Croesus came from the ancient Kingdom of Lydia

Described forms:

mf. lydius Felder, 1865 (= *flammeus* Niepelt, 1931)

mf. berchmansi van den Bergh, 1928

mf. nigra van den Bergh, 1928 (= *nigrocinacta* Rousseau-Decelle, 1935)

mf. boutoni Haugum & Low, 1979

mf. watsoni Haugum & Low, 1981

mf. olivei Parrott & Deslisle, 1987

mf. pannis Parrott & Deslisle, 1987

ff. lydius Felder, 1865

ff. nudus Parrott & Deslisle, 1987

ff. fusca Sumiyoshi, 1989

ff. Jeanne-d'arcae Deslisle, 1996

ff. reducta Goussey, 2005

Alfred Russel Wallace, being the co-author of the theory of evolution, a theory that the church of the time vehemently disagreed with (you could compare their displeasure to proponents and antagonists in today's climate change debate) he named it after a king that left an indelible record more than 500 years before Christ existed.

He unwittingly proved that Croesus was a more reliable subject than King Priam and his family and friends.

I wonder actually if the mythology surrounding Priam was cause enough to separate *croesus* from the already established *priamus* group. If you look at any of the *croesus* forms in a flat plane they appear green and so if the blue *urvillianus* falls in the *priamus* species then perhaps so should *croesus.*

Thanks to Helen I learned a lot in a very short space of time. I know I came the long way round to get to this point but hopefully you found it interesting.

O. croesus toeanti male, and female below (Graham Owen)

Spider patronyms in honour of Alfred Russel Wallace

Helen Smith

'Patronym' is the term used for a species name that honours a person.

I started with spiders partly because they are a group I am familiar with, and partly because there is an excellent online taxonomic list (http://wsc.nmbe.ch/).

I searched each family in turn (there are over 100) for the terms 'alfred', 'russel' and 'wallace'; only the surname returned any hits. Many could be discounted fairly easily because I knew of famous local Wallaces who were far more likely to be the subject. For instance, in Queensland, Doug Wallace (1923–2012), who started and ran the Rockhampton Arachnological Society, has several patronyms. In the USA, the arachnologist Howard Wallace has many species in his name.

This left me with a shortlist of six candidate *wallacei* spider species in five papers.

Actinopus wallacei (Actinopodidae): Cambridge, F. O. P.- (1896). On the Theraphosidae of the lower Amazons: being an account of the new genera and species of this group of spiders discovered during the expedition of the steamship "Faraday" up the river Amazons. *Proc. zool. Soc. Lond.* **1896:** 716-766. (728 pl 35)

Friula wallacii (Araneidae): Cambridge, O. P.-. (1896). On some new and little-known spiders (Araneidae). *Proc. zool. Soc. Lond.* **1896:** 1006-1012. (1009 pl 52)

Gasteracantha wallacei (Araneidae), *Plexippus wallacei* (Salticidae): Thorell, T. (1881). Studi sui Ragni Malesi e Papuani. III. Ragni dell'Austro Malesia e del Capo York, conservati nel Museo civico di storia naturale di Genova. *Ann. Mus. civ. stor. nat. Genova* **17:** 1-727. (13 and 628)

Nephila wallacei (Nephilidae): Thorell, T. (1877b). Studi sui Ragni Malesi e Papuani. I. Ragni di Selebes raccolti nel 1874 dal Dott. O. Beccari. *Ann. Mus. civ. stor. nat. Genova* **10:** 341-637. (449)

Asceua wallacei (Zodariidae): Bosmans, R. & P. Hillyard. (1990). Spiders of the family Zodariidae from Sulawesi, Indonesia (Arachnida: Araneae: Zodariidae). *Bull. Br. arachnol. Soc.* **8:** 147-160. (158 f. 51-55)

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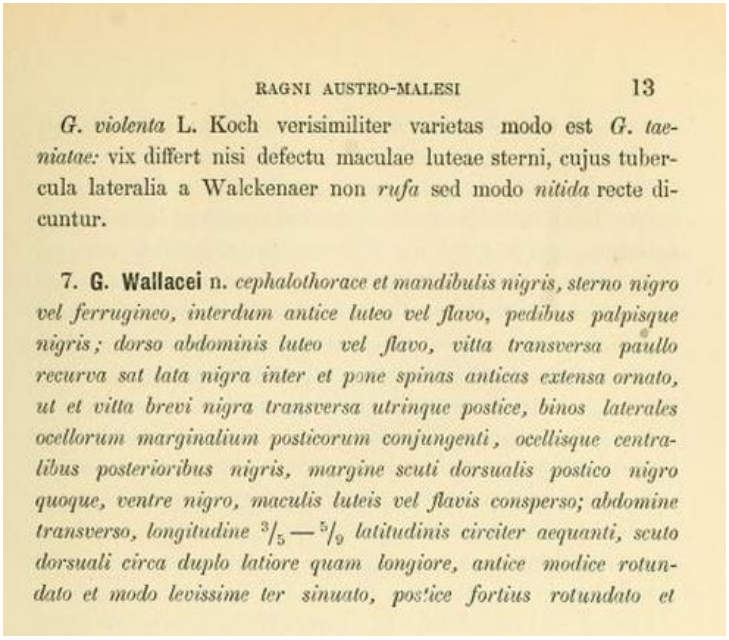

RAGNI AUSTRO-MALESI 13

G. violenta L. Koch verisimiliter varietas modo est *G. taeniatae:* vix differt nisi defectu maculae luteae sterni, cujus tuberc ula lateralia a Walckenaer non *rufa* sed modo *nitida* recte dicuntur.

7. **G. Wallacei** n. *cephalothorace et mandibulis nigris, sterno nigro vel ferrugineo, interdum antice luteo vel flavo, pedibus palpisque nigris; dorso abdominis luteo vel flavo, vitta transversa paullo recurva sat lata nigra inter et pone spinas anticas extensa ornato, ut et vitta brevi nigra transversa utrinque postice, binos laterales ocellorum marginalium posticorum conjungenti, ocellisque centralibus posterioribus nigris, margine scuti dorsualis postico nigro quoque, ventre nigro, maculis luteis vel flavis consperso; abdomine transverso, longitudine $^3/_5$—$^5/_9$ latitudinis circiter aequanti, scuto dorsuali circa duplo latiore quam longiore, antice modice rotundato et modo levissime ter sinuato, postice fortius rotundato et*

Description of *Gasteracantha wallacei*, and image of *G. taeniata* (Jan Messersmith, http://www.messersmith.name/wordpress/2010/01/13/stinky-river-the-balek-wildlife-sanctuary/)

Singulum marem vidi, in ins. Yule (Roro) a L. M. D'Albertis captum.

302. **P. Wallacei** n. *cephalothorace in fundo fusco-piceo, fascia marginali latissima e pube alba formata utrinque cincto, pone oculos posticos fusco-ferrugineo- et, in medio, albo-pubescenti, sub oculis lateralibus anticis quoque fusco-ferrugineo-pubescenti, area interoculari aeneo- vel aureo-squamulosa, margine clypei flaventi-piloso; pedibus obscure testaceo-fuscis, tibiis et metatarsis anterioribus nigricantibus, illis subter nigro-pilosis, metatarsis posterioribus apice nigris, tarsis saltem posterioribus testaceis; abdominis dorso obscure fusco, ferrugineo-fusco-pubescenti, cingulo lato albo circumdato, ventre nigro, fascia media longitudinali angusta alba; palpis totis fusco-testaceis et pube densissima alba tectis.* — ♂ ad. *Long.* 8—8 1/3 *millim.*

Mas. — Mari speciei insequentis, *P. Bleekeri*, valde similis est, pedibus brevioribus et robustioribus, palpis fusco-testaceis dense albo-pubescentibus totis, cet., tamen sine negotio internoscendus.

Description of *Plexippus wallacei*, and image of Juvenile *Euryattus sp.* (Greg Anderson, http://www.arachne.org.au/01_cms/details.asp?ID=1905).

The spiders

The first, *Actinopus wallacei* named by FOP Cambridge turned out to be for another Wallace – a plantation owner who had put up the collector on his travels.

Next, the araneid *Friula wallacii* is one of the few unambiguous ARW spider patronyms I found. The author, the Reverend O. Pickard-Cambridge apparently sent a copy of his publication to Wallace's daughter Violet, following Wallace's death in 1913 to let her know of his respect for her late father. The paper, entitled 'On Some New and Little-Known Spiders', was published in the Proceedings of the Zoological Society of London, 15 December 1896. (You can see the drawing and description on the NHM Wallace site at http://www.nhm.ac.uk/nature-online/collections-at-the-museum/wallace-collection/item.jsp?itemID=109). The spider depicted had been collected by Wallace himself. Strangely, for such an impressive animal, I can find no recent records or modern photographs on the Internet.

The three species described in Thorell's papers must remain as 'probables' because Thorell did not in general give an etymology (meaning for the name). However, the region and dates are consistent with A.R.W. Two of the three names are now synonymized.

Gasteracantha wallacei (Araneidae) is currently *G. taeniata* (see image previous page). This species looks very similar to the species *G. fornicata*, which occurs in northern Queensland.

Plexippus wallacei, a jumping spider, is described from northern Queensland. This is another mystery species and until the group gets revised, it is unclear which species is represented by this name. Thorell compared the species to *P. bleekeri*, a more widespread and well known species. Both species have since been transferred to the genus *Euryattus* (above).

Nephila wallacei is now in synonymy under *Nephila vitiana*. *Nephila* species are better known as golden orb weaving spiders. The long bodied and long legged *N. pilipes* from tropical areas of Australia and Asia is rather similar to *N. vitiana*, except the latter has a red sternum.

The final species, *Asceua wallacei,* is another that is definitely attributed to AR Wallace, and is the only recently described species in the list. The etymology reads "The species is named after Alfred Russel Wallace, the well-known entomologist ▶

N. pilipes by John Tann, from Atlas of Living Australia

to whom the expedition to Sulawesi was dedicated." As is common in taxonomic papers, the whole animal is not illustrated; however, the spider pictured below left is an unidentified *Asceua* species, also from Sulawesi.

The introduction in the paper (above) explains the reference to the expedition being dedicated to Wallace. It is highly probable that there are other species named in Wallace's honour based on insect specimens recorded on this expedition. Finding insect patronyms would be another, much larger, project, but some are already listed at http://wallacefund.info/plants-and-animals-named-after-wallace

Asceua sp. (Kathrin Stenchly: http://www.cacaospiders.com).

Introduction

"Project Wallace", a major expedition to North Sulawesi (Celebes, Indonesia), was organised by the Royal Entomological Society of London* to commemorate its 150th anniversary and the centenary of its Royal Charter. Alfred Russel Wallace was a former fellow of the Royal Entomological Society and his famous work in the Indo-Australasian Region is immortalised in the use of the name "Wallacea" for the faunal transition zone between Australasia and Asia. The forests of this region are extremely rich in species and those of Sulawesi are of particular interest because of the high levels of endemicity for which the island is famous.

The expedition occupied the whole of 1985; both authors participated during October and November. The expedition's base camp was situated in the Dumoga-Bone National Park just west of Kotamobagu. This is a large region of unspoilt rain forest ranging in altitude from 200 to 1800 m. Collections were also made by the authors on an excursion to the Tangkoko Batuangis National Park near the extreme north-east point of Sulawesi. Material collected in the Dumoga-Bone N.P. by C. L. & P. R. Deeleman in July 1982 is also included here.

(p. 147: Bosmans, R. & P. Hillyard. (1990). Spiders of the family Zodariidae from Sulawesi, Indonesia (Arachnida: Araneae: Zodariidae). *Bull. Br. arachnol. Soc.* **8:** 147-160. (158 f. 51-55)).

A reiteration of Show and Tell December 2013 Wallace meeting

An array of books by and relating to Alfred Russel Wallace were shown at the meeting.

Mark Weatherly brought along three volumes written by Wallace.

My Life. (A Record of Events & Opinions) Alfred Russel Wallace. 1908. Chapman & Hall.

Darwinism (An Exposition of the Theory of Natural Selection with some of its Applications) Alfred Russel Wallace. 1889. Macmillan and Company.

The Malay Archipelago, (The Land of the Orang-Utan and the Bird of Paradise, A Narrative of Travel With Studies of Man and Nature). 1890. Macmillan and Company.

Len Willan brought *Darwin's Moon, A Biography of Alfred Russel Wallace*. By Amabel Williams-Ellis. Blackie & Sons Ltd 1966.

Fred Swindley showed photographs of Darwin, Wallace, Thomas Huxley and Joseph Hooker from the 2009 book *Darwin's Armada* by Iain McCalman. Penguin Viking.

Gary Harris brought *An Inordinate Fondness for Beetles. (Campfire Conversations with Alfred Russel Wallace on People and Nature based on Common Travel in the Malay Archipelago)* by Paul Spencer Sochaczewski. Editions Didier Millet Pty Ltd 2012

Len Willan brought *Henry Walter Bates, Naturalist of the Amazons* by George Woodcock. Faber & Faber 1969, also *A Naturalist in Cannibal Land* by A.S Meek. T. Fisher Unwin 1913.

Ken Brash displayed literature relating to ant type specimens collected by Alfred Russel Wallace sourced from the Hope Entomological Collection at The University of Oxford and the Natural History Museum.

Gary Harris

A model of a barque similar to "The Mischief" in which Wallace sailed to South America

Built and presented by

Joe Stivala

(Gary Harris)

Graham Owen writes:

20/4/1848 Henry Walter Bates and Alfred Russel Wallace left England on the relatively small 192 ton square rigger called HMS Mischief.

Although it was rated A1 by Lloyds of London, it was small enough to be battered about in high winds which rose soon after launch with waves that flooded the decks and washed part of the bulwarks away.

Like so many landlubbers, Darwin included, Wallace spent much of the first part of the voyage "in his berth prostrate with sea sickness".

This barque (ship) in today's measurements was 31m x 7m x 3.6m LWH and was likely crewed by 70 men. In this day and age it is hard to fathom how they managed to fit this many on board particularly when you compare today's ships. A 20,000 tonne ship would be crewed by 15.

A typical crew for 200 tonne barque would include

3 lieutenants

1 ship's master

3 masters mates

3 midshipmen

20 able seamen

3 servants for the lieutenants

4 servants for master and master's mates

1 surgeon

1 surgeon's mate

1 clerk *

4 boatswain *

1 carpenter *

1 quarter master *

1 sail maker *

1 captain's cook *

1 crews cook *

1 Cooper *

1 Poulterer *

1 Barber *

1 Tailor *

1 Butcher *

▶

◄ 15 servants or mates for those with an *asterisk.

This before we take into account the passengers, who included Henry Walter Bates, Alfred Russel Wallace, plus their library and collecting gear which also sailed on the Mischief.

Below is some information sent in response to an enquiry about the various boats used by Wallace to the Australian National Maritime Museum.

Dear Graham,

After many hours of searching in our collection and through digitized resources on the web I've only been able to find a little information for you.

None of the books about Wallace that are available freely online seem to mention much more than Wallace himself in his published accounts and biography. "a barque of 192 tons" "one of the few vessels trading to Para"

Both the barque Mischief and brig Helen were registered in and traded regularly from Liverpool. The shipping columns of the British newspapers recording the Mischief sailing regularly to and from Para over a period of several years see British library newspapers http://www.britishnewspaperarchive.co.uk/?gclid=

Here are copies of the entries from various registers of shipping giving information about the vessels ownership and construction

Jorgeson and Helen are in Lloyds register

Mischief is in the Register veritas.

The keys to bother register abbreviations are included as well to help you interpret the entries.

This was also a time when Lloyds did not comprehensively list Liverpool registered ships and to complicate matters further there are several Mischief's listed in Lloyd's register in the 1840's but no barques.

Perhaps the Merseyside Maritime Museum http://www.liverpoolmuseums.org.uk/maritime/archive/ may be able to help with more information that it's put together for the anniversary or give you a suitable illustration of similar vessels.

I'll send another email with shipping movement and reports of losses

I'm sorry not to uncover anything startling for you but I hope this is of assistance to you in your research

Kind regards

Frances Prentice
Manager Library Services

Australian National Maritime Museum

Thank you Frances!

Wallace Memorial Statue

Thanks to the efforts of a dedicated group who were insistent that Alfred Russel Wallace should receive the credit due to him, this statue now stands as a memorial to a great naturalist.

The statue is in bronze of naturalist Alfred Russel Wallace (1823-1913) by Anthony Smith. He is looking up at a bronze model of a Wallace's golden birdwing butterfly (*Ornithoptera croesus*). The statue was commissioned by the Wallace Memorial Fund and was given to the Natural History Museum, London, where it was unveiled by Sir David Attenborough on November 7th 2013 - the 100th anniversary of Wallace's death.

"Bronze statue of Alfred Russel Wallace" by George Beccaloni - CC BY-SA 3.0 via Wikimedia Commons

Alfred Russel Wallace

8.1.1823 – 7.11.1913

Fred Swindley

The following account of Alfred Russel Wallace has been taken from **Iain McCalman's book, *Darwin's Armada* (Penguin, 2009)** in which he also has separate accounts on Darwin, Hooker and Huxley. The section on Wallace also tells of the interrelations between these four biologists. [Editor: what follows are three extracts from Fred's rather longer article that complement the contributions from other speakers].

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Alfred read a controversial best seller *Vestiges of the Natural History of Creation*, written by Robert Chambers, but published anonymously. This was probably the most influential intellectual experience of Wallace's life. The *Vestiges* hinted at a rejection of the literal Biblical creation story and instead a materialist interpretation of the origin of life on earth.

The *Vestiges* prompted Wallace to decide to go to the Amazon and earn his living as a specimen collector. He hoped also to find facts that might prove the concept of evolution through natural laws. He easily persuaded Henry Bates to accompany him and Henry's father offered a small loan to supplement their savings.

They went to London to try to raise more finance. At the British Museum they studied the disorderly collection of Brazilian specimens. Edward Doubleday – curator of butterflies – told them that the northern region of Brazil would furnish enough rare specimens to finance the trip. William Hooker of Kew Gardens (father of Joseph Hooker) promised to buy any unusual botanical specimens, and gave them references for introduction. Thomas Horsfield, curator of the East India Museum, gave invaluable advice on how to preserve and transport delicate insects and bird specimens.

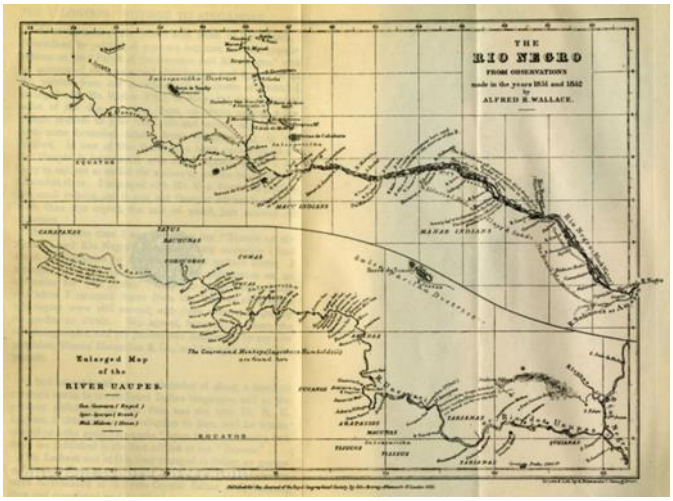
They were also lucky enough to meet the American William Edwards, who had written the travel book *A Voyage up the River Amazon*, which was one of their sources of inspiration to go to Brazil. He offered some valuable tips, and suggested that they use Para, a small trading port connected to the Amazon, as a base which would be convenient for transporting their specimens. They also met Samuel Stevens, a reputable collectors' agent, who offered to pay them 3 pence a specimen.

The two left Liverpool on the ship *Mischief* on the 15th April 1848. They arrived off the coast of Brazil six weeks later, 26th May 1848, six miles from the village of Salinas.

When they realised that the vegetation around the town was useless for collecting they went further afield. They began collecting a steady stream of insects, dried plants and bird skins. After two months, they had collected 3635 specimens, including 553 species of butterflies, 450 of beetles and 450 of other orders, for forwarding to Stevens. After about 6-8 months they decided to collect in separate sites.

Wallace's youngest brother Herbert who preferred to be called Edward, and a talented botanist Dr Richard Spruce arrived. Alfred and Edward travelled for three weeks up the Amazon to the village of Santarem. They collected there for several months, and then went to Barra, at the confluence of the Amazon and the Rio Negro.

The brothers, too poor to buy western provisions, ate the same food as their Indian helpers. Alfred managed to cope with this, but Edward was more squeamish, of a different nature, and probably could not take the daily hardships. Edward stayed at Barra, while Alfred set off alone up the unexplored Rio Negro. He had the constant trouble of finding and keeping Indian guides for their mode of water travel. He travelled up the Rio Negro, and the Orinoco River and its tributaries into Venezuela, where no naturalist had ever been.



Alfred Russel Wallace's map of the Rio Negro river in Brazil, as published by Wallace in the Journal of the Royal Geographical Society in 1853. Copyright George Beccaloni

He spent lonely months on the Rio Negro and the Orinoco. He had hoped to collect the "Gallo", an orange and maroon bird, one of the most beautiful in Brazil. He did capture some glossy blue specimens of the umbrella bird, but never saw a legendary white version, if in fact it did exist.

Wallace had suffered from dysentery, and malaria despite heavy doses of quinine. He was attacked by mosquitoes, sand flies, wasps, leeches and buffalo gnats. Tick-like chigoes laid eggs under his toe nails, and they had to be pricked out each night. Vampire bats attacked exposed skin while he slept. At times his hands turned purple and swelled so that he could hardly write. Because of the humidity, his specimens were in constant danger of getting mould.

Alfred returned to Para in June 1852. Edward, who had been waiting for a ship back to England, had caught yellow fever and had died on the 8th June 1851. Alfred's boxed collections were still at Para. The customs had kept them until his return.

After nearly four years in Brazil, Wallace embarked for England on the *Helen*, a 235 ton brig. Three weeks after leaving Brazil, on the 6th August 1852, Captain Turner said to Wallace "I'm afraid the ship's on fire…". The fire was to quickly take hold, and they had to take to the ship's longboat and gig. Wallace only had time to grab a couple of shirts, a tin box containing some old note books, some drawings of plants and fish. All his crates of specimens and also his books of sketches, and voluminous notes and records, were burning in the ship's hold. Wallace had also taken aboard five monkeys, two macaws, twenty parrots and parakeets, five small birds, a Brazilian pheasant, and a toucan. Wallace saw his menagerie of parrots and monkeys huddling on the bowsprit until they finally died in the flames. Only one bedraggled parrot was dragged from the water.

The nearest landfall was Bermuda, 700 miles distant. They suffered from the hot sun, adverse winds and thirst. On the 15th August, some 200 miles from Bermuda, they were picked up by the brig *Jordeson*, bound for England. This probably saved their lives. The ship was old and slow. It survived a fearful storm, and they had to beg food from passing ships because of the double crew aboard. They docked at Deal on 1st October 1852, a total journey of 80 days.

Wallace arrived back in England with no specimens, no qualifications, no clothes, no money and no patron, and only a few notes and records. Despite all he had been through, Wallace still wanted to return to the tropics and somewhere remote, which was the only way to recover his lost income, and his credibility. He first had to regain his strength.

He was able to claim two hundred pounds insurance money for his lost collections. He was thus able to rent a house for himself and the rest of the family, his mother and sister, Fanny and her husband.

He decided to explore the Malay archipelago, after reading of its description, in Goodrich's book, "*Universal History 1851*", as a new world, with a vegetable and animal kingdom unlike any other country. It appeared to have rainforests second only to that of Brazil's and only Java had been worked over by naturalists. There were four hundred volcanoes, and more than 17,500 islands, some of which were very distant from the nearest continental land mass. Hence it promised to be an evolutionists' paradise for studying the effects of organic and geographical change across time and space.

This time Wallace spent months preparing for his trip. He studied and sketched collections of the British Museum, the Linnean Society and at Kew Gardens. He purchased a large catalogue of all known species of birds and their locations, which included specialised information about Malay species. He decided against collecting plant specimens. He knew that he would need an assistant to help in preservation of specimens, and to act as a carer in case of illness.

Sir Roderick Murchison had been attracted by Wallace's book *On the insects used for food by the Indians of the Amazon*, and the fact that Wallace was willing to dirty his hands in his travels in the Amazon. Murchison, as a geologist and president of the Royal Geographical Society, was one of British's top Scientists. He secured enough money to pay the fare for Wallace and his assistant Charles Allen, to Singapore. Wallace and Allen eventually reached Singapore on 20 April 1854.

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[Jumping on to the discovery of the Wallace line …]

Wallace decided that it was time to leave Borneo, and to head to less explored islands such as Celebes, Moluccas, Timor and New Guinea. He intended to travel to Makassar, the capital of Celebes, a country very little explored by European naturalists. Because of the prevailing winds, he had to go to Singapore first to get a vessel to Makassar. He missed the intended ship by a day, and filled in time around Singapore collecting and polishing his Malay. It was recommended that he go to Bali or Lombok for a better chance of catching a trading ship to Celebes. He reached Bali after a 22 day passage. The intense cultivation on Bali caused even common species to be scarce and there were no ships expected to Celebes in the immediate future. After 2 days he decided to cross the 15 mile Lombok Strait, to the town of Ampanum on Lombok, hoping to get a ship from there to Celebes. He again just missed a trading ship to Makassar, and there wouldn't be another for months.

There were few birds and insects around the town, so with his new Malay assistant (Allen had proved useless) and a Malaccan shooter, they went by outrigger to the southern end of the bay, where the uncultivated country was said to be rich in bird life. The countryside

Map of the Malay Archipelago showing Wallace's Line. From Wallace's 1863 paper On the Physical Geography of the Malay Archipelago. Journal of the Royal Geographical Society, 33: 217-234. Copyright of photograph: G. W. Beccaloni.

was different to that of cultivated Bali, but it was the bird life which proved a surprise to Wallace, "I now saw for the first time the many Australian forms that are quite absent from the islands westward". As McCalman puts it, "with these understated words, Wallace had announced one of the most important scientific discoveries of his life. Australian species were everywhere."

Wallace didn't yet feel confident enough to tell Darwin, that he had discovered a natural boundary that marked the division between the faunal regions of Asia and Australia. On the Asian side there were numerous large mammals, on the Australian side very little but marsupials, none of which were ever found in Asia. He did write to his friends Samuel Stevens and Henry Bates of his discovery.

He believed that the western part of the archipelago to be a separated part of continental Asia, and the eastern part a fragmentary prolongation of a former Pacific continent. He stayed two and a half months on Lombok; six years later Thomas Huxley would give Wallace's boundary the name "Wallace's Line". It was redefined in 1910.

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[Jumping on again, to when Wallace was based at Ternate …]

In February 1858 Wallace got another bout of malaria; while lying helplessly on his bed, he pondered on various subjects which came to his mind.

One subject which came to his mind was Malthus's "principles of population" from the book he had read 12 years before. He thought on its explanation of how disease, accidents, war and famine could be checks to keep (human) populations down. It occurred to him that the same principle could apply to animals. In brief, in every generation the inferior would be killed off, and the superior would survive, that is, the fittest would survive. He did not write down about this happening until many years later. However it was Malthus which now gave him the key insight to the driving mechanism of evolution, the origin of species. He was not to know, that Charles Darwin in 1837-38 had re-read *An Essay on the Principle of Population* after returning from his Beagle voyage, and had come to the same conclusion.

Again, as Wallace put it "The more I thought it over, the more I became convinced that I had at length found the long-sought-for law of nature that solved the problem of the origin of species." McCalman writes, "He had found the motor that explained how varieties were driven to become new species, in competition with the parent species that had originally produced them". Wallace wrote a paper of his hypothesis entitled "On the Tendency of Varieties to Depart Indefinitely from the Original Type".

In late September 1857 he had written to Darwin, to ask him if he intended to discuss the origin of humans in his book. Darwin had replied promptly on 22 December 1857 saying "I think I shall avoid the whole subject [of human evolution], as so surrounded with prejudices". He said that he looked forward to Wallace's paper on the Aru Islands and consoled Wallace about his apparent neglect of his Sarawak Law paper by telling him that Sir Charles Lyell had been very impressed by his arguments.

Wallace sent a copy of his new paper to Darwin on 9 March 1858, with an accompanying letter hoping that it would supply "the missing factor to explain the origin of species" which they had been looking for. He also asked Darwin to show his new paper to Lyell, if he thought it sufficiently important. Lyell had read Wallace's "Sarawak Law" paper in the winter of 1856, and had seen more in it than Darwin had. He had realised that Darwin might be in danger of not being the first to publish on the theory of evolution. Darwin had at that time dismissed Lyell's warning.

Two years before Wallace had posted his new theory

and letter to Darwin, near the end of April 1856, Darwin had invited Joseph Hooker, Thomas Huxley and three young naturalists for a stay at his home for an extended weekend. Darwin had wanted to find out what these people thought about him publishing his theory on the origin of species. He had kept his theory secret for 18 years except from his friend Sir Charles Lyell (Wallace would have known nothing of this).

On the 18 June 1858, when Darwin read Wallace's letter and his new theory "On the tendency of Varieties…" he believed that his life's work was finished. He now realised that if Wallace's theory was published, it would forestall all of his own original work of the last 20 years. As Darwin saw it, the main difference between them was that Darwin had focused on domestic breeding examples, and Wallace on animals in the wild. McCalman explains that Darwin overlooked important differences in his anguish: historians Desmond and Moore (*Darwin*, p. 468) have pointed out that "Darwin, a liberal, believed that extinction occurred by 'a cut-throat competition among individuals'; Wallace, a socialist, believed that the environment operated to eliminate unfit individuals or populations".

Darwin was again in a quandary, should he publish his theory before that of Wallace's, and probably lose the self-respect of his peers. He wrote to Lyell and Hooker for help in his dilemma.

At this time Darwin was having family worries. His daughter Etty, 15, had been showing signs of diphtheria, a few days later on the 23 June, the baby son Charles contracted scarlet fever, and his daughter Annie had died 4 years earlier. Darwin's wife Emma was his first cousin and Darwin worried that in-breeding may have weakened his children.

Hooker wrote to Darwin suggesting a joint publication, but Darwin's baby Charles had died the previous evening and he felt so overcome and useless that he couldn't care about priority at the time, but he did send papers to Hooker.

A joint publication was organised by Hooker at the Linnean Society for 1 July 1858; a reading of a paper, at such an institution was considered as a publication. Darwin's paper was read first which suggested that he had priority. There have been accusations that Darwin deliberately changed the date of arrival of Wallace's letter, and committed intellectual piracy of Wallace's theory against his; other evidence shows that Darwin had written letters 10 months before Wallace's theory arrived, on the complete theory of natural selection. McCalman concludes that Darwin therefore had no case to answer on the charge of plagiarism. However it would seem that Darwin's friends, Lyell, Hooker and associates, conspired to ensure that the theory of natural selection was seen in Darwin's favour. Darwin, with Hooker's prompting, published his famous *On the Origin of Species* after he had recovered from the loss of baby Charles, 1859.

Darwin had been concerned as to how Wallace would react to the joint publication of their theories, on 1 July 1858. It was a relief to him when he received a letter from Wallace in January 1859. Wallace said that he was grateful for the recognition given to him. Wallace was later to agree with Hooker and Lyell's claim that the vocation of science had benefited by their intervention. (That is, they had access to the Linnean Society, a prestigious scientific institution, for the joint publication at that time, whereas Wallace did not).

Wallace returns to England

Wallace returned to England in spring 1862. (McCalman gives no information regarding Wallace's last 3 years, before returning to England). His face was emaciated due to recurrent malaria and his body covered in boils. He had prematurely greying hair and a long white beard. He had been away for 8 years in the Malay tropics. He had undertaken more than 14,000 miles of rough sailing, and collected more than 12,000 specimens.

It was several months before Wallace had enough strength to visit Darwin. He praised Darwin's *On the Origin of Species* to everyone he met. The admiration was mutual and they formed a very close relationship.

Wallace had a lot to catch up on, as the scientific field had changed immensely during his absence. The "evolutionary war" was still on, and he joined in the 'war', with pro Darwin reviews, papers and articles. Huxley briefed him on how the suggested ancestral relationship between apes and mankind had become the central battleground of the anti-Darwinists. Wallace was ridiculed for writing papers which praised the abilities of Malays and Negroes. He attacked the record of British settlers in the Empire for their treatment of the indigenous peoples. In 1864 he wrote an influential paper "The Origin of Human Races and the Antiquity of Man, Deduced from the Theory of Natural Selection". In his paper he argued that in the remote past, a great evolution of the human mind had occurred, from which arose consciousness and development of morals.

Wallace became a spiritualist, which was fashionable at the time. This may have been brought about by an emotional need, following the break-up of his first love affair, and the death of his mother. In 1869-70 he published a review and paper in which he now suggested that the law of natural selection could not explain the evolution of the human consciousness, and that a higher intelligence had guided the growth of the human mind. Wallace's turnabout naturally upset Darwin and the evolutionists. It did not get much following from creationists.

Darwin was to publish *The Descent of Man* a year later which enlarged on the same arguments about the origin and evolution of man that he had put to Wallace a year earlier, 1870. McCalman writes, "It was wholly unnecessary [Darwin] said, to introduce a higher intel-

ligence to explain man's development; the incremental gradations of evolutionary complexity from primate to human over eons were enough to account for consciousness, signs of which could be seen in both his own and Wallace's investigations of animal behaviour over many years".

In December 1879, Darwin received a visit from Arabella Buckley, a former secretary to the now late Sir Charles Lyell. She, as a fellow spiritualist, was a confidante of Wallace's and knew that Wallace was in dangerous financial straits. Wallace, like his father, was hopeless with money, and was squandering most of the earnings from his collections and books on poor investments. He was now happily married to a botanically minded wife, and they had two children. However he was struggling to educate his children.

Arabella Buckley wanted Darwin, and the now Sir Joseph Hooker, to use their influence to obtain a small government pension for their friend. Darwin put the idea to Hooker, who refused to help, saying that Wallace had 'lost caste' with his adhesion to spiritualism and other things (Wallace would have been unaware of all of this). Meanwhile, Wallace without a steady income decided to write a popular book, entitled *Island Life: The Geographical Distribution of Animals*, which ironically he had dedicated to Sir Joseph Hooker. Both Darwin and Hooker thought highly of the book. Darwin saw the opportunity to revive the idea of a pension for Wallace. This time he decided to approach Huxley. Huxley was in favour of the idea, so Arabella Buckley drew up a memorandum of Wallace achievements for Huxley to edit. They listed Wallace's three greatest scientific accomplishments:

- his outstanding collections from the Malay Archipelago;
- his original contribution to the discovery of the theory of natural selection;
- his brilliant application of that theory to the geographical distribution of animals.

Darwin added a fourth: his contribution to explaining the mechanism of colouration in animals.

Wallace's book, *Island Life*, had now changed Hooker's attitude to Wallace. Huxley finally won him over in regard to a pension for Wallace. Darwin wrote a personal letter to Prime Minister Gladstone, and also wrote letters to everyone who might exercise some influence in the matter.

Gladstone received the request early in January 1881. He knew enough of Darwin's status in the world of science to action it quickly. On the 7th January 1881, Darwin received a letter from Whitehall stating that Mr Wallace would be awarded a civil service pension of 200 pounds a year for his services to science.

Darwin wrote to Huxley and to Wallace, to tell them the

Wallace's unique gold version of the Darwin-Wallace medal of the Linnean Society of London. Awarded to him in 1908 on the 50th anniversary of the reading of the Darwin-Wallace paper in which evolution by natural selection was proposed for the first time. © A. R. Wallace Memorial Fund

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good news. The letter to Wallace arrived on his 58th birthday; Wallace said that he had never received a better present. He knew now, that he could give his children a proper education and with his occasional income from writing, ensure a comfortable life.

Wallace was to continue campaigning for social justice and writing on all facets of science. In 1908, at the Linnean Society, Wallace was issued with a gold Darwin-Wallace medal, stamped with their bearded faces. This was on the commemoration of their joint publication. Sir Joseph Hooker was presented with a silver copy of the medal. In the same year, Wallace was awarded the Copley Medal and an Order of Merit. In 1909, at the Golden Jubilee of the publication of Darwin's *Origin*, he gave the official Royal Institution lecture, in which he said that Darwin had given the world a theory which surpassed all others in its understanding of our planet. (Wallace, himself of course had contributed greatly to all of this, but he received less credit than did Darwin).

Alfred Wallace had come from being thought of as a mere collector, to being acknowledged by the British Scientific community.

Charles Darwin died of a heart attack on 19 April 1882, and was buried in Westminster Abbey on 26th April 1882.

Huxley died of a heart attack on 29th June 1895.

Hooker and Wallace both died peacefully in their sleep. Hooker in December 1911, and Wallace in 1913. Each had resisted efforts that may have had them buried in Westminster Abbey. However they were commemorated in the Abbey, with a plaque on 1st November 1915.

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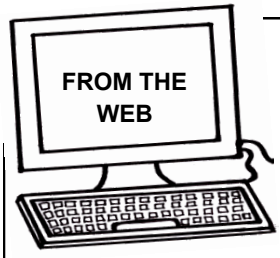
Fred concludes:

Perhaps the theory of evolution should be known as the Darwin-Wallace Theory of Evolution.



Wallace on the Web

These two websites run by George Beccaloni of the Natural History Museum, London. There are links in these sites to many other resources:

http://wallacefund.info/
http://wallaceletters.info/content/homepage

Further Wallace links from David Emery: "Wallace online" http://wallace-online.org/

You may wish to check out these 2 BBC you tube doccos on AR Wallace by Bill Bailey;

Episode 1; http://www.youtube.com/watch?v=TXBHwJr3oNQ
Episode 2; http://www.youtube.com/watch?v=D3vFHXM-KvA

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