

**D** In 1852 when Wallace returned to Barra (Manaus) he found that most of the specimens he had collected had been impounded by customs and hadn't been shipped as expected. He took them with him and set sail for England, but 26 days into the voyage the ship caught fire and sank, taking his precious specimens and notebooks down with it. Wallace and the crew survived for 10 days in leaking lifeboats until they were luckily rescued by a passing cargo ship. Wallace arrived back in England with only a few drawings and notes he had managed to rescue from the burning ship.

**C** After working together for a short period in the Amazon, Wallace and Bates split up, with Wallace spending most of his time in the middle Amazon and on the main northern tributary of the Amazon - the black water Rio Negro. On his return to England, Wallace published the first detailed map and description of the Rio Negro.

**A** In 1831 Darwin joined HMS Beagle on a round the world expedition as the ship's naturalist. It was during this 5 year voyage that Darwin began to realise that life on earth was not unchanging nor species immutable, but rather that gradual change over time was leading to the creation of new species. In September 1835, the Beagle arrived at the Galapagos Islands and Darwin was told how the giant tortoises on the different islands differed in form. Later on when examining the bird specimens which had been collected, he realised that the mockingbird species seemed to be different on the various islands and all closely related to a South American species.

**H** Before Darwin received Wallace's 'bombshell' essay, he had been slowly writing a huge book on evolution, which had ironically been prompted by Wallace's 1855 paper and the worry that someone like Wallace might publish the theory of natural selection before he did. Once the paper with Wallace had been published in August 1859 Darwin went into overdrive, rewriting and condensing the text of his planned book. It was published only 15 months later in 1859 with the title 'On the Origin of Species by Means of Natural Selection', and it became the focus of debates about evolution from that point onwards. Darwin and Wallace's original essay was eventually largely forgotten and Darwin ended up receiving most of the kudos for the discovery of the revolutionary idea of natural selection.

**B** In May 1848 Wallace and his friend Henry Walter Bates who had first introduced him to entomology, arrived at Para (Belém) at the mouth of the Amazon. Wallace was to spend 4 years exploring the Amazon whilst Bates spent 11 years collecting and became famous for his discovery of Batesian mimicry.

**F** In February 1855, whilst in Sarawak, Wallace wrote a paper entitled 'On the Law Which Has Regulated the Introduction of New Species'. It was published in September 1855 and proposed the following law: Every species has come into existence coincident both in time and space with a pre-existing closely allied species. The paper clearly describes how species have evolved over time, with some becoming extinct and new ones evolving from earlier forms. It also describes how volcanic islands are populated by species from the nearest mainland and only when isolated for very long periods do new species form. The paper was written at a time when the general belief was that species were unchanging and created by God. At this stage Wallace had not yet discovered the mechanism that drives evolutionary change. Lyell whose work on geological change had inspired Wallace, read this paper and brought it to the attention of Darwin.



**G** In February 1858 whilst suffering from a fever (probably malaria), Wallace suddenly realised how new species are formed. As soon as he had sufficient strength he wrote an essay entitled 'On the Tendency of Varieties to Depart Indefinitely From the Original Type' and sent it with a letter to Darwin, asking him to pass it to Lyell. Darwin had mentioned to him that Lyell (who Wallace didn't know) had found his 1855 paper noteworthy and Wallace probably thought that Lyell would therefore be interested to learn about his new theory since it explained the evolutionary 'law' he had proposed in the 'Sarawak Law' paper. When Darwin received Wallace's essay in June 1858 he was horrified, as it described the same theory he had thought of about 20 years before but never published. In order to ensure that Darwin would share the credit for the idea, his friends Lyell and Joseph Hooker decided to present Wallace's essay plus some unpublished extracts from Darwin's writings on the subject to a meeting of the Linnean Society of London on the 1st of July 1858. A few weeks later these manuscripts were published together as a scientific paper with Darwin and Wallace's names as co-authors. This was the first paper to clearly explain the theory of evolution by natural selection - an idea which was to transform biology and much else.

**E** In March 1854 Wallace left England on a collecting expedition to the Malay Archipelago (Singapore, Malaysia and Indonesia). He was to remain in the region for 8 years and to visit all of the main islands, in the process becoming the foremost authority on the region. During his trip he discovered what became known as Wallace's Line - an invisible line running between Bali and Lombok and Borneo and Sulawesi. It follows the course of a deep ocean trench and marks the eastern extent of Asian fauna and the western limit of the Australian fauna. Islands to the west of the Line were joined together during glacial periods when the sea level was lower, while the islands to the east of it were never connected to those to the west. Sulawesi and the islands between it and New Guinea were not connected during periods of lower sea level because the water between them is too deep. The plants and animals on them have therefore been isolated for a long time and many unusual species have evolved. This region was named Wallacea after Wallace.

Produced in association with the Wallace Memorial Fund [www.wallacefund.info](http://www.wallacefund.info)

**Alfred Russel Wallace 1823 - 1913**

Alfred Russel Wallace was born in Usk, Wales on January 8th 1823. His father Thomas was a solicitor by training, who lived off an inheritance which ultimately proved insufficient to support his family. Wallace attended Hertford Grammar School but was forced to find work when he was 14 because his parents could no longer afford the fees. From 1837 to 1843 he worked primarily as a land surveyor and became interested in natural history. In 1845 he read the book 'Vestiges of the Natural History of Creation', which convinced him that life on Earth had evolved from earlier forms. So interested in the subject did he become that he suggested to his friend Henry Walter Bates that they travel to the Amazon to collect and study animals and plants, with the goal of understanding how evolution works. They sailed to Brazil in 1845, finding their expedition by selling duplicates of the bird and insect specimens they collected. A shipwreck on his journey home in 1852 destroyed half his precious collection but, undaunted, in 1854 he set off to Southeast Asia on a second collecting expedition which would last 8 years. It was there in 1858 that he discovered natural selection and in August that year he and Darwin jointly published an article explaining their revolutionary idea. Wallace returned to England in 1862 and went on to do much important work in biology and other subjects, including establishing modern biogeography (the study of the geographical distribution of living things).

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- Peru - Amazonian biodiversity research (living on research ships and working on river dolphins, piranhas and caiman)
- Transylvania - Carpathian mountain foothills biodiversity research (effects of changes in traditional farming practices on biodiversity with brown bears and wolves)
- France & Italy - Alpine and Mediterranean ecology
- Greece - Island ecology with sea mammal and herpetofauna studies plus a dive training course
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- China - Tibetan plateau and mountain valley biodiversity research (cranes and Prydzewski's gazelles and baseline biodiversity surveys of the Uting mountains)
- Indonesia - lowland forests and coral reefs endemic rich forests and largest marine research times working in the centre of the Coral Triangle - the most biodiverse rich reefs in the world)

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**Charles Robert Darwin 1809 - 1882**

Charles Darwin was born in Shrewsbury, England on February 12th 1809. His mother Susannah was a daughter of the famous potter Josiah Wedgwood I and his father Robert was a wealthy medical doctor and financier. Charles attended Shrewsbury School and afterwards studied medicine at Edinburgh University. However, he found that he was not cut out for a medical career and so instead did a degree at Cambridge University in order to enter the clergy. At Cambridge Darwin became fascinated with natural history and in 1831 having graduated he joined a survey expedition on HMS Beagle and spent the next 5 years travelling around the world. Darwin had read Lyell's book 'Principles of Geology' which argued that the world was not unchanging as many then thought but was actually the result of millions of years of gradual change. Darwin believed that Lyell was correct and during his travels he focused on geology, building on Lyell's work to develop new ideas on subjects such as how coral atolls form. On his return to England Darwin became convinced that species gradually change through time - they evolve. As early as 1838, after reading an essay by Malthus on human population growth, he had begun thinking about the possibility of what was to become known as natural selection. However, only on receiving Wallace's essay in 1858 was he forced into publishing his thoughts. He then lucratively produced his famous book 'On the Origin of Species' which appeared in November 1859.

