

150 Years of Natural Selection

The Forgotten Co-Discoverer

In 2009 the world will celebrate “Darwin year”, the bicentenary of Darwin’s birth and the 150th anniversary of his famous book *On the Origin of Species* (for many the pivotal work on the theory of evolution by natural selection).

Some, however, have started the celebrations early, marking “150 Years of Natural Selection” in an effort to boost the profile of the “forgotten” co-discoverer of natural selection, Alfred Russel Wallace.

In fact, it was on July 1st 1858 that Sir Charles Lyell and Sir Joseph Hooker presented an essay by Alfred Russel Wallace and two unpublished excerpts from Charles Darwin’s writings at a meeting of the Linnean Society of London. In these documents both authors independently explained the theory of natural selection. They were finally published together as the paper “On the Tendency of Species to Form Varieties; And On the Perpetuation of Varieties and Species by Natural Means of Selection” in the Society’s journal on August 20th of that year.

Many have said that after his return from his five year voyage aboard the *Beagle* in 1836, Darwin “sat on the theory for 20 years”. In fact, Darwin was working constantly on the idea. According to a 2007 pa-

per by John van Whye, he followed a pre-planned sequence of study with the aim of backing up his ideas. However, when Darwin planned this research, he greatly underestimated the time it would take and so it was dragged out from 8 to 20 years (*Notes and Records of the Royal Society* 61: 177-205).

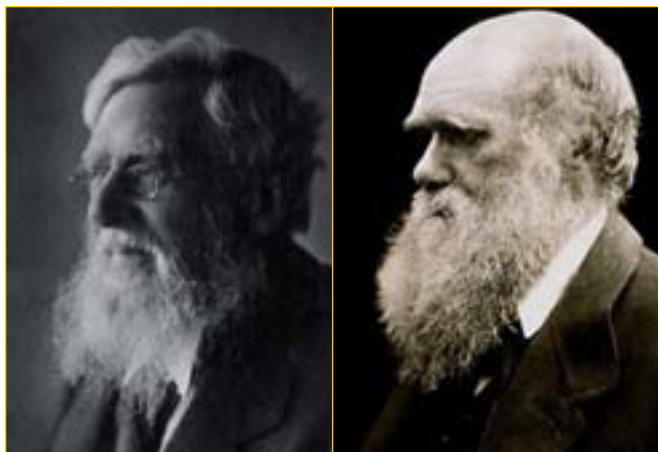
It was not until April 1856 that Darwin, for the very first time, divulged the essence

tious collecting expedition in Malaysia and Indonesia when, as he reported later, during an attack of fever, the idea of natural selection suddenly occurred to him. He wrote a detailed essay explaining the theory and sent it to Darwin, whom he already knew from correspondence. In the covering letter Wallace asked for Darwin’s opinion on whether the essay was sufficiently interesting. If so, he asked him to pass it on to Charles Lyell, hoping that Lyell would ensure publication of the essay.

Darwin appealed to his friends Lyell and Joseph Hooker for advice on what to do. They decided first to present Wallace’s essay along with Darwin’s two excerpts from his writings at the upcoming meeting of the Linnean society and then to publish them. In the publication, Darwin’s pieces were placed before Wallace’s essay, thus emphasising Darwin’s priority to the idea. Wallace later complained that his essay “... was printed without my knowledge, and of course without any correc-

tions or proofs”.

Nevertheless, Darwin and Wallace developed a mutual admiration and respect for one another. And although Wallace himself always stressed that Darwin had more claim to the idea, both were regarded as co-discoverers of the theory, at least until Wallace’s death in 1913. As documented, for example, by the *laudatio* on the occasion of the presentation of the Linnean Gold Medal to Wallace when the president said: ►►



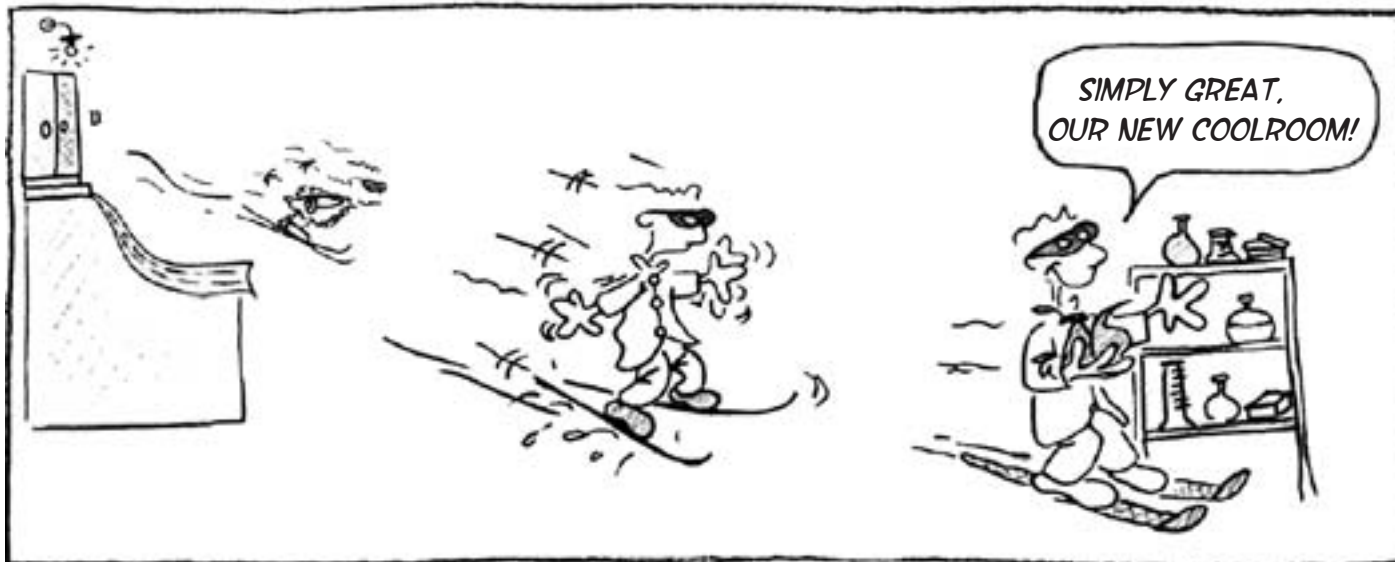
ZZ Top members? No, Alfred Russel Wallace (l.) and Charles Darwin – ‘co-fathers’ of the Theory of Evolution by Natural Selection.

of his theory of natural selection to the famous geologist Charles Lyell, a fellow of the Royal Society. Upon Lyell’s advice he began to write a sketch of his ideas for publication, which, however, he soon abandoned as unsatisfactory. Instead, he began to write an extensive book on the subject.

The shock came two years later when Darwin received a letter from the British naturalist Alfred Russel Wallace. Wallace had already spent four years on an ambi-

BY RAFAEL FLORÉS

PAUL THE POSTDOC



Recently Awarded

Summer is usually “award time” at the European Molecular Biology Organization (EMBO). Accordingly, three researchers have recently been honoured by EMBO:

► **James Briscoe** of the Medical Research Council’s National Institute for Medical Research (NIMR) in London received the **2008 EMBO Gold Medal**, worth €10,000. Briscoe, who had already been selected for the highly competitive EMBO Young Investigator Programme in 2000, was able to establish how, in the developing nervous system, the explicit spacio-temporal expression pattern of the morphogen Sonic Hedgehog (Shh) organises which cells develop into which types of nerve cells. On hearing the news of the award Briscoe didn’t forget to emphasise that the success certainly was the result of effective teamwork: “I have been very fortunate working with very talented and smart people. They taught me a lot, supported me fantastically and made many significant contributions.”

► **Axel Meyer**, Chair of Zoology and Evolutionary Biology at the University of Konstanz, Germany, received the **2008 EMBO Award for Communication in the Life Sciences**. Meyer regularly publishes in leading German newspapers. In his weekly column for the largest German business newspaper *Handelsblatt* he writes concise and opinion-strong articles, where he tackles current dilemmas in research, the policy of science or the problems of the university systems. His first 100 columns were recently published as a book entitled *Evolution ist überall* (Evolution is everywhere).

► **Jürgen Tautz**, zoologist at the University of Würzburg, Germany, was honoured by a special discretionary prize, as part of the **2008 EMBO Award for Communication in the Life Sciences**, for his long-term public communication activity on bees using all available media. His 2007 published book *Phänomen Honigbiene* (The Buzz about Bees – Biology of a Superorganism) has been published in almost all European languages. -RNE-

► “... Your brilliant work [...] as one of the founders of the Theory of Evolution by Natural Selection, is universally honoured and has often received public recognition, as in the awards of the Darwin and Royal Medals of the Royal Society, and of our own Medal in 1892.” Wallace might have started work on the theory later than Darwin but it was recognised that he developed the theory independently and “published” it at the same time.

So it’s incomprehensible that only Darwin’s name remained linked to natural selection when the theory re-emerged – after three decades of unpopularity – with the modern synthesis of the 1930s and 1940s. Why Wallace disappeared so dramatically from public awareness is one of the greatest mysteries of science history.

(For more information on Alfred Russell Wallace: <http://wallacefund.info/>) -RNE-

Taxonomy

Unusual Complaint

Usually, original research articles are not a forum to express complaints about the science system. Antonio Valdecasas from the National Museum of Natural Sciences (CSIC) in Madrid, however, did exactly that when, by strictly adhering to the rules of his field, he turned a new water mite species into a living criticism of evaluating science by citation numbers.

Valdecasas is a taxonomist and, by applying Confocal Laser Scanning Microscopy, has recently described a new genus and species of water mite, belonging to the subfamily Axonopsinae. In taxonomy, the discoverer has to give a name to a new species and explain why he selected it. A rule that has occasionally led researchers to express a special sense of humour as documented in examples like *Aha ha*, a wasp, or *Ochisme* (“Oh, kiss me!”), a beetle genus.

Valdecasas, however, didn’t just want to be funny when he chose *Vagabundia sci.* for his mite. What he really wanted to express, as he wrote in his paper (*Zootaxa* 1820: 41–48): “*Vagabundia* comes from the Spanish word ‘vagabundo’ that means ‘wanderer’ [...]; sci refers to Science Citation Index. We pointed out some time ago [...] that the popularity of the Science Citation Index (SCI) as a measure of ‘good’ science has been damaging to basic taxonomic work. Despite statements to the contrary that SCI is not adequate to evaluate taxonomic production [...], it is used routinely to evaluate taxonomists and prioritise re-

search grant proposals. As with everything in life, SCI had a beginning and will have an end. Before it becomes history, I dedicate this species to this sociological tool that has done more harm than good to taxonomic work and the basic study of biodiversity. Young biologists avoid the ‘taxonomic trap’ or becoming taxonomic specialists [...] due to the low citation rate of strictly discovery-oriented and interpretative taxonomic publications. Lack of recognition of the value of these publications, makes it difficult for authors to obtain grants or stable professional positions.”



Why exactly citation numbers are completely inadequate to evaluate taxonomy in comparison to other research disciplines had already been summarised in a short essay by Vince Smith from the National History Museum in London earlier this year (see his blog at <http://vsmith.info/REF>). “In taxonomy”, he stated, “research communities are small and results only develop their full impact in decades. Therefore, a taxonomist might require a lifetime’s work to generate enough citations amongst their immediate peers before they become visible through their citations”. In the face of the growing popularity to base ever more funding decisions mainly on quantitative citation data, Smith therefore concluded: “Any institution would have to be mad to hire a taxonomist.” -RNE-

The cause of Chopin’s death

An Affair of the Heart

Was Frederic Chopin no victim of tuberculosis, as was stated in his post mortem report, but did he instead suffer and die from cystic fibrosis? A couple of Polish scientists would like to resolve that issue by testing Chopin’s heart, which, since his death in 1849, has been kept in a jar sealed inside a pillar at Warsaw’s Holy Cross Church. Polish authorities, however, have recently rebuffed their request. ►►

▶▶ Actually, Chopin is not the only great European composer who has recently fuelled new speculation about their real causes of death. In 2000, for example, chemists found 100 times higher than normal levels of lead in eight strands of Ludwig van Beethoven's hair, indicating that permanent lead poisoning might have caused some of Beethoven's reported chronic illnesses and his strange behaviour.

Another theory claims that Wolfgang Amadeus Mozart fell victim to roundworm-caused trichinosis, which he had caught by eating uncooked pork. The evidence for this lies primarily in a letter to his wife, mentioning an impending pork dinner and written in chronological coincidence with the gestation period of trichinosis. On the other hand, descriptions of his symptoms apparently tally with those of trichinosis, while other theories leave some symptoms unexplained.



Similar arguments were put forward for the "Chopin case" in 2003. In a *Journal of Applied Genetics* paper (vol. 44: 77-84), lead author, Michal Witt, of Warsaw's Institute of Molecular and Cell Biology, claimed that Chopin's reported symptoms were really those of cystic fibrosis, an inherited genetic disorder that affects the mucous glands of the lungs, liver, pancreas and intestines. Furthermore, two of Chopin's three sisters had similar complaints, including multiple organ failure, and – as their brother – died prematurely. According to Witt, these symptoms strongly suggest that the Chopin family was afflicted by cystic fibrosis.

By extracting DNA from Chopin's preserved heart the Polish scientists were hoping to detect a mutation in the gene coding for the cystic fibrosis transmembrane conductance regulator (CFTR), which is typical

for the hereditary disease. CFTR is an ABC transporter-class protein that transports chloride ions across epithelial cell membranes. In mutations giving rise to cystic fibrosis, the blockage in ion transport occurs in epithelial cells that line the passageways of the lungs, pancreas and other organs, finally leading to chronic dysfunction, disability and a reduced life expectancy.

The Polish Culture Ministry, however, was not convinced. End of July, after consultation with experts, it decided that "this was neither the time to give approval, nor was it justified by the potential knowledge to be gained". According to a ministry spokesman, the view of the experts was that the proposed research is going to serve first and foremost to satisfy the curiosity of the project's authors, while offering no new knowledge that would have a meaningful impact on the assessment of the figure and work of Chopin.

Clear words. Nevertheless, Witt and his team stated that they would continue to press for access to Chopin's heart. -RNE-

A Virus in a Virus

French virologists discover the first 'virophage' and thus fuel the debate about whether viruses are alive.

In 2003, Didier Raoult and colleagues at the Université de la Méditerranée in Marseille described the giant mimivirus, by far the largest virus known to science. It is larger than numerous bacteria (400nm in diameter), harbours more protein-coding genes than them (more than 900) and infects certain amoeba.

Recently, the same team discovered a new mimivirus strain that was even larger and named it mamavirus. However, the French researchers were much more stunned by something else: inside the giant virus was another virus (*Nature* 2008 Aug 6., Epub ahead of print). This small 'parasite', named Sputnik by the authors, was certainly much smaller than its 'mama' and comprised only 21 genes.

These, however, are sufficient to make its viral host, well, ill. When mamavirus infects an amoeba, it uses its large array of genes to build up a replication machine to produce new viral particles.

Sputnik infects and hijacks this viral factory in order to replicate itself, thereby causing the infected cells to produce fewer and often deformed mamavirus particles. In other words, Sputnik behaves like a viral parasite that effectively weakens its viral host.

Such behaviour hasn't been observed before and, because it so closely resembles what bacteriophage do to bacteria, Raoult and Co. have called the new type of virus a virophage.

This 'Sputnik surprise', however, instantly fuelled a more far-reaching debate: whether viruses should be regarded as living organisms.



In April, Raoult and his colleague Patrick Forterre of the Université Paris Sud, who also co-authored the 'Sputnik paper', published an opinion piece in *Nature Reviews Microbiology* (vol. 6: 315-9) titled "Redefining viruses: lessons from Mimivirus". In the abstract they wrote: "Viruses are the most abundant living entities and probably

had a major role in the evolution of life, but are still defined using negative criteria." Therefore, they proposed a division of biological entities into two groups of organisms: ribosome-encoding organisms, which include eukaryotic, archaeal and bacterial organisms, and capsid-encoding organisms, which include viruses. "Based on this suggested classification system," they continued, "we propose a new definition for a virus – a capsid-encoding organism that is composed of proteins and nucleic acids, self-assembles in a nucleocapsid and uses a ribosome-encoding organism for the completion of its life cycle."

In the article, Raoult and Forterre do not explicitly propose to redefine viruses as *living* organisms. But others did when they learned about the Sputnik paper. Jean-Michel Claverie, for example, a viral genomics expert at the Université de la Méditerranée in Marseille, was quoted by *Nature* as saying: "There's no doubt that this is a living organism. The fact that it can get sick makes it more alive."

So it's all still open to discussion.

-RNE-

(More research results from European labs on pp. 28-33)