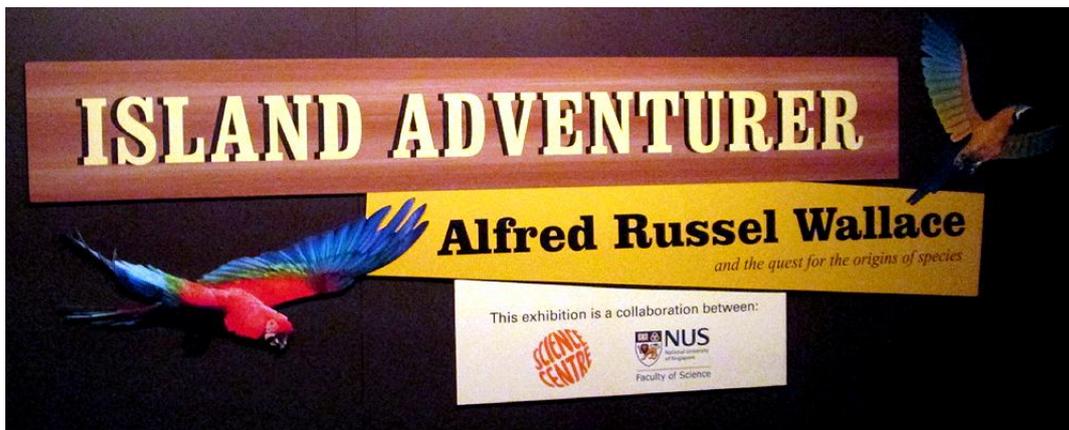


## Trouble With Tiger Beetles: Singapore Science Centre's Wallace Exhibition Spreads Tiger Beetle Myth

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*"Every substantive claim in the popular narrative about Alfred Russel Wallace and evolution turns out to be incorrect... Wallace deserves more attention but much of what you will have heard about him in the last few months is factually incorrect..." John van Wyhe, 2013*

In early December 2013 I gave an invited talk about Wallace at the Science Centre in Singapore. Whilst there I had a look at "[Island Adventurer](#)", the Centre's new exhibition about the great man, which runs from 30 November 2013 until 30 November 2014. I had really been looking forward to seeing this display as I had been involved in the early discussions about it some years ago.

My reactions to the exhibition were mixed. First the positive points: It is very nicely put together, especially considering that there are no actual Wallace-owned items (specimens, documents or other objects) on display. The videos, dioramas and 'hands-on' elements are excellent technically and visually, and the Science Centre staff who produced them should be praised for doing such a brilliant job. Overall I thought the exhibition was good, and whilst I would certainly recommend going to see it, visitors should be aware that it contains a number of serious historical inaccuracies. I am concerned that some of the tens of thousands of people who have seen/will see this exhibition will spread these errors, and that they will end up becoming accepted 'facts' in the literature... It is in a probably futile attempt to try to combat this that I am writing this article.

The person responsible for the historical content of the exhibition is Darwin historian John van Wyhe, so it is on his shoulders that responsibility for these mistakes must rest. The Science Centre staff are not Wallace specialists, so would naturally have accepted the

information that van Wyhe provided. Van Wyhe, who is a lecturer at the National University of Singapore, has recently 'branched out' from his often controversial work on Darwin, to publish even more controversial work on Wallace - a notorious example being his 2013 book *Dispelling the Darkness: Voyage in the Malay Archipelago and the Discovery of Evolution by Wallace and Darwin*, from which most of the information in the Science Centre's exhibition is drawn. Van Wyhe is a revisionist, who specialises in 'debunking' supposed historical myths. Unfortunately in his eagerness to revise established historical narratives built up by the labours of scholars over many decades, he often makes mistakes, as we will see. Although I spotted a number of problems with the story that van Wyhe presents in the exhibition I will restrict myself to discussing his biggest blunder plus two more minor ones.

### **Malthusian Moment or Tiger Beetle Delirium?**

Wallace famously discovered natural selection during a fit of fever (probably malaria) whilst on a remote Indonesian island in February 1858. He had by this point in time been trying to understand how transmutation (as evolution was then called) works for about 10 years, so what (if anything) triggered his great discovery? Wallace himself states several times in his published writings that it was his recollection of the argument in Thomas Malthus' book *Principle of Population* (which he read in Leicester in 1844/45) that led to his epiphany. Here, for example, is what Wallace wrote in his book *Natural Selection and Tropical Nature* in 1891:

"...the question of how changes of species could have been brought about was rarely out of my mind, but no satisfactory conclusion was reached till February 1858. At that time I was suffering from a rather severe attack of intermittent fever at Ternate in the Moluccas, and one day while lying on my bed during the cold fit, wrapped in blankets, though the thermometer was at 88° F., the problem again presented itself to me, and something led me to think of the "positive checks" described by Malthus in his "Essay on Population," a work I had read several years before, and which had made a deep and permanent impression on my mind. These checks—war, disease, famine and the like—must, it occurred to me, act on animals as well as on man. Then I thought of the enormously rapid multiplication of animals, causing these checks to be much more effective in them than in the case of man; and while pondering vaguely on this fact there suddenly flashed upon me the idea of the survival of the fittest—that the individuals removed by these checks must be on the whole inferior to those that survived. In the two hours that elapsed before my ague fit was over I had thought out almost the whole of the theory, and the same evening I sketched the draft of my paper, and in the two succeeding evenings wrote it out in full, and sent it by the next post to Mr. Darwin." [for an account of how the theory came to be jointly published with Darwin see my essay here: <http://downloads.bbc.co.uk/tv/junglehero/alfred-wallace-biography.pdf>]

Without justification, van Wyhe rejects the account that Wallace gave of his own discovery and instead invents a dramatic (and flawed) alternative story which is prominently featured in van Wyhe's book and in the Science Centre's exhibition. Van Wyhe's tale is that Wallace was so enamoured by the wonderful crypsis (background colour matching/camouflage) of different species of tiger beetles (white species on white sand, dark species on grey sand, and an olive green species on greenish mud) that this led to his "[Eureka moment](#)". Although Wallace did mention crypsis in tiger beetles in an obscure private letter and in some of his later published writings as being a nice example of an adaptation which had evolved by natural selection, he never said **anywhere** that these insects and their camouflage inspired

him to devise his revolutionary theory. In fact he very clearly says multiple times that Malthus inspired him...

In his book van Wyhe enthuses:

"These tiger beetles would become the unsung inspiration for Wallace's evolutionary breakthrough." - p. 135

"Their exact match with the mud would make these tiger beetles his equivalent of Darwin's legendary finches. They could be called Wallace's tiger beetles. They would spark the greatest breakthrough of his life." - p. 186

"For Darwin, the spark was Galápagos mockingbirds and South American fossils; for Wallace, the tiger beetles." - p. 318

van Wyhe's claim for the hallowed status of these beetles rests almost entirely on a very brief remark that Wallace made in [a letter to beetle collector Frederick Bates](#) (Henry Walter Bates brother) in March 1858, very soon after he discovered natural selection. The letter is largely about the tiger beetles (then classified as part of the group Geodephaga) that Wallace had found and that Frederick Bates was interested in acquiring for his collection. After mentioning the impressive crypsis of some species Wallace remarks "Such facts as these puzzled me for a long time, but I have lately worked out a theory which accounts for them naturally." (the theory he refers to is of course natural selection which he had just discovered). Notice that he does *\*not\** say that such facts inspired him to discover the theory, and also note that by "Such facts as these..." he clearly means that 'these' facts (i.e. crypsis in tiger beetles, which is what he was referring to) were just **one of a number of facts** that puzzled him and that are now explained by his theory. What he does *\*not\** say is "These facts puzzled me for a long time and led me to devise a theory to account for them naturally" – which is how van Wyhe misreads Wallace's remark.

To back up his story about the beetles, van Wyhe tells us on page 215 of his book that the following passage in [Wallace's 1858 essay on natural selection](#) was "...inspired in part by the tiger beetles." Wallace remarks "Even the peculiar colours of many animals, especially insects, so closely resembling the soil or the leaves or the trunks on which they habitually reside, are explained on the same principle..." However, there is absolutely no evidence that Wallace had tiger beetles in mind when he wrote this, or indeed that camouflage in animals is what 'sparked' his great discovery. As a seasoned collector and naturalist Wallace would have encountered literally thousands of different animal species, insects in particular, which exhibited remarkable camouflage. Camouflage as a form of protection is extremely common in animals as any biologist will know, and there are countless species which resemble soil, leaves and the bark of trees. And note that camouflage in animals was just one of a several different examples of adaptations of organisms to their environment which Wallace discusses in his landmark essay. It was certainly not the lynchpin of his argument.

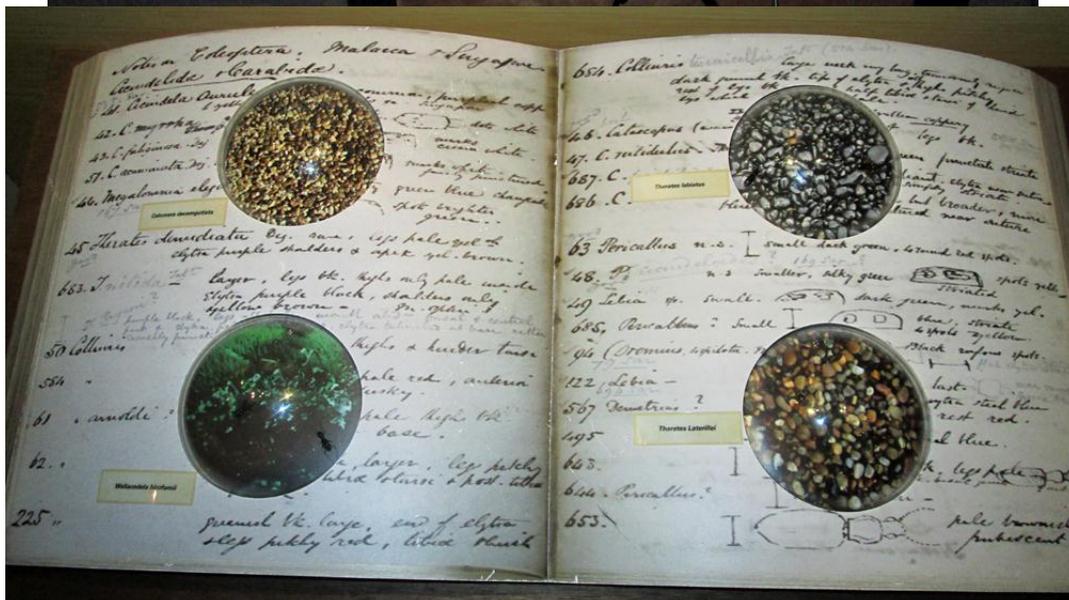
Interestingly, in the first overview Wallace wrote about the subject of animal colouration ([Wallace, 1867](#)) he remarks "The whole order of Orthoptera, grasshoppers, locusts, crickets, &c., are protected by their colours harmonizing with that of the vegetation or the soil on which they live, and *in no other group have we such striking examples of special resemblance.* [my emphasis]" So perhaps camouflage in orthopteroid insects has a greater claim to being the trigger of Wallace's 'Eureka moment'! Note too that camouflage in tiger

beetles isn't even mentioned in Wallace's important 1889 book *Darwinism*, in which the subject of animal colouration is extensively reviewed.

van Wyhe's tiger beetle '[just-so story](#)' is featured prominently in an animated video at the beginning of the Science Centre's exhibition, and it even has an entire display dedicated to it. Below are some photos I took.



Note that the display features four species of tiger beetles carefully placed on different backgrounds (under the plastic domes shown in the photos below) in order to demonstrate their fantastic camouflage (see below). However, the species shown against the background of black gravel (i.e. *Therates labiatus*) is known to live and hunt on the low foliage of rainforest plants \*not\* gravel (see <http://hbs.bishopmuseum.org/pubs-online/pdf/iom15-1.pdf>), as too does "*Therates Laterillei*", the species shown to be supposedly camouflaged against variegated gravel. Both of these species are (ironically) probably warningly coloured - the antithesis of being camouflaged.



## Oversized Insect Labels

Wallace (or sometimes Charles Allen) put a label on every insect specimen he or his assistants collected. These labels were pinned beneath the specimen and consist of a circular disk of usually white, sometimes pale blue, paper with the name of the locality where the specimen was collected written on it in ink. The locality names are often abbreviated *e.g.* "Sing." for Singapore - see example to the right.



A display in the Science Centre exhibition explains how these labels were produced. It reads:

### "On the uses of a wadding punch

Wallace could easily make labels in the field using his *Wadding Punch* – a standard bit of kit that came with his gun. Normally, the punch would be placed on a few layers of linen and hit smartly with a hammer to produce a series of neatly cut linen circles. These were then used as gun wadding for proper gun firing. When applied to paper, the punch would make an infinite supply of circular labels about half an inch [12.7mm] across – a perfect size for labelling insects!"

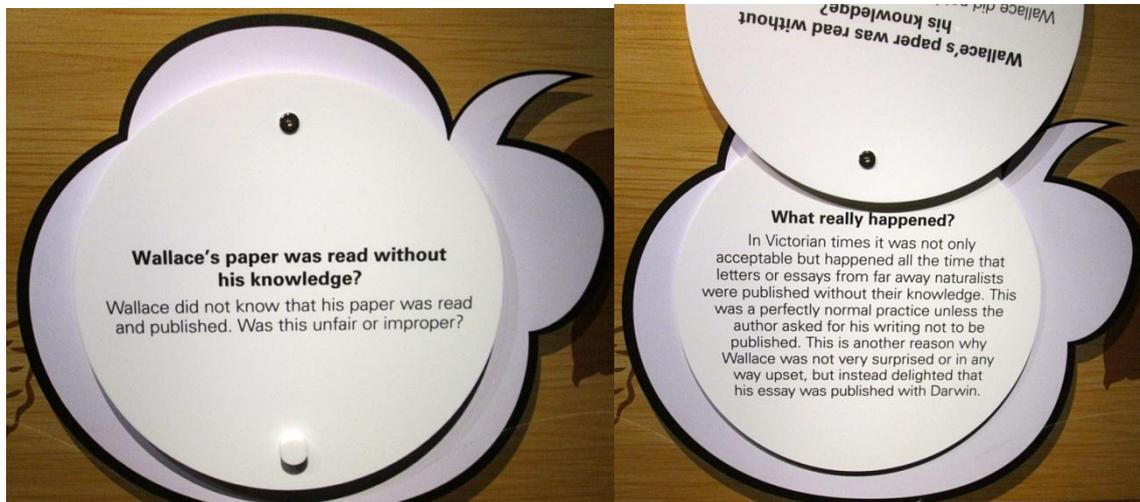


However, to paraphrase Thomas Huxley: This is a nice theory is killed by one small ugly fact - which is that Wallace's insect labels are all *c.* 8mm in diameter, not 12.7mm! [I have examined hundreds of them] It would seem that van Wyhe only ever saw photographs of Wallace's labels, never an actual example; otherwise he would have realised that the ones he describes were far too big. Presumably he thought they should be 0.5 inches in diameter since that was the bore of the double barrelled shotguns that Wallace took with him to the 'Malay Archipelago'. But there is no actual evidence that Wallace used a gun wadding punch to produce them – it was an assumption van Wyhe made probably based on the following reasoning: Wallace's labels were circular; Wallace would have had a gun wadding punch which could have been used to produce circular paper disks; Wallace's shotgun was .5 bore; therefore he 'must' have produced his labels using his gun wadding punch and they therefore 'must' have been .5 inches in diameter...



### The Dishonourable Arrangement

Towards the end of the exhibition there is a display entitled "A CONSPIRACY?" with question and answers on flip panels. One of these is shown below.



But is this indeed “What really happened?” I suggest **not**. van Wyhe’s assertion (also in his book) that it would have been ‘normal practice’ in the 19<sup>th</sup> century to publish a scholarly article containing a revolutionary new theory **without the author’s expressed permission** is absurd and completely unsubstantiated. In fact I have been unable to find a comparable case in the entire history of science! Publishing another person’s work without their agreement was as socially unacceptable then as it is today, not only that but it almost certainly broke the copyright laws of the time (as it would today). Publishing someone’s novel theory without their consent, prefixed by material designed to give priority of the idea to someone else [*i.e.* Charles Darwin] is ethically highly questionable<sup>2</sup>: Wallace should have been consulted first! The onus is on van Wyhe to provide some comparable examples (and note that publishing excerpts from the ‘everyday’ letters of overseas collectors is an entirely different matter)...

What really happened is as follows: Wallace having discovered natural selection in February 1858, wrote a scholarly essay explaining his theory, and sent this together with a covering letter to Charles Darwin. Wallace asked Darwin to pass the essay on to the great geologist Charles Lyell (a friend of Darwin's who Wallace did not know), because the argument in Wallace's essay was directed at what Lyell had written about evolution in his book *Principles of Geology* (he was strongly opposed to the idea at that time). Wallace said nothing in his letter about the publication of his essay<sup>3</sup>.

Darwin, having formulated natural selection years earlier, was understandably horrified when he received Wallace's essay and immediately wrote an anguished letter to Lyell asking for advice on what he should do. "I never saw a more striking coincidence. If Wallace had my M.S. sketch written out in 1842 he could not have made a better short abstract! ... So all my originality, whatever it may amount to, will be smashed." he exclaimed<sup>4</sup>.

Lyell teamed up with another of Darwin's close friends, Joseph Hooker, and rather than attempting to seek Wallace's permission, they decided instead to present his essay plus two excerpts from Darwin's writings on the subject (which had not been written for publication<sup>5</sup>) to a meeting of the Linnean Society of London on July 1<sup>st</sup> 1858. This public presentation of Wallace's essay took place a mere 14 days after its arrival in England.

Darwin and Wallace's musings on natural selection were published in the Society's journal in August that year under the title "On the Tendency of Species to Form Varieties; And On the Perpetuation of Varieties and Species by Natural Means of Selection". Darwin's contributions were placed before Wallace's essay, in order to assert his priority of the theory. Hooker had sent Darwin the proofs to correct and had told him to make any alterations he wanted<sup>6</sup>, and although he made a large number of changes to the text he had written, he chose not to alter Lyell and Hooker's arrangement of his and Wallace's contributions.

Lyell and Hooker stated in their introduction to the Darwin-Wallace paper that "...both authors...[have]...unreservedly placed their papers in our hands...", but this is patently untrue since Wallace had said nothing about publication in the covering letter he had sent to Darwin.

Wallace later grumbled that his essay "...was printed without my knowledge, and of course without any correction of proofs."<sup>7</sup> adding "I should, of course, like this act to be stated."

## Endnotes

1. This is actually *Therates latreillei*, which is now a **synonym** of *Therates laotiensis*.
2. See Rachels, J. 1986. Darwin's moral lapse. *National Forum*: 22-24 (pdf available at <http://www.jamesrachels.org/DML.pdf>)
3. In a letter from Darwin to Charles Lyell dated 18th [June 1858] (Darwin Correspondence Database, <http://www.darwinproject.ac.uk/entry-2285> accessed 23/04/2014), Darwin, who was referring to Wallace's essay, says "Please return me the M.S. [manuscript] which he does not say he wishes me to publish..." and in a letter from Darwin to Charles Lyell dated [25<sup>th</sup> June 1858] (Darwin Correspondence Database, <http://www.darwinproject.ac.uk/entry-2294> accessed 23/04/2014), Darwin states that "Wallace says nothing about publication..."

4. Letter from Darwin to Charles Lyell dated 18<sup>th</sup> [June 1858] (Darwin Correspondence Database, <http://www.darwinproject.ac.uk/entry-2285> accessed 23/04/2014).

5. These were an extract from Darwin's unpublished essay on evolution of 1844, plus the enclosure from a letter dated 5th September 1857, which Darwin had written to the American botanist Asa Gray.

6. In a letter from Joseph Hooker to Darwin dated 13<sup>th</sup> and 15<sup>th</sup> July 1858 (Darwin Correspondence Database, <http://www.darwinproject.ac.uk/entry-2307> accessed 23/04/2014), Hooker stated " I send the proofs from Linnæan Soc<sup>y</sup>— Make any alterations you please..."

7. Letter from Wallace to A. B. Meyer dated 22<sup>nd</sup> November 1869 cited in Meyer, A. B. 1895. How was Wallace led to the discovery of natural selection? *Nature*, **52**(1348): 415 (see <http://people.wku.edu/charles.smith/wallace/S516.htm>). Note that van Wyhe attempts to argue that in the 19<sup>th</sup> century the phrase "printed without my knowledge" actually meant "...that a piece of writing was considered so worthy that it was printed even without the author having to put it forward himself.", rather than the "modern English" meaning "printed without my consent" (see <http://blog.oup.com/2013/11/alfred-russel-wallace-centenary/>). However, a quick search for the phrase "printed without my knowledge" in the 19<sup>th</sup> century literature on [Google Books](#) reveals that van Wyhe is incorrect and that the phrase was frequently/usually used to mean "printed without my consent". If we examine the context that Wallace used the phrase *i.e.* "It [his 'Ternate essay'] was printed without my knowledge, and **of course without** [my emphasis] any correction of proofs." it is clear that he was complaining both that it was printed without his consent and without allowing him to correct the proofs before the paper was published. That he was upset that he was not given the opportunity to correct the proofs is evident from the corrections he made to his personal copy of the published paper (see Beccaloni, 2008).

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