Natural Mimics



Introduction

The following letters were written at the BSHS Annual Conference 2009 in Leicester by participants in a pilot study for 'Natural Mimics', a creative-writing activity based around the life, travels, letters, and works of Henry Walter Bates (1825-92).

Son of a local hosier, Bates met Alfred Russel Wallace – co-discoverer of the principle of natural selection – in the 1840s, whilst the latter was teaching in Leicester at the Collegiate School, just off London Road. The two travelled on an expedition to Peru and Brazil a few years later, hoping to make their scientific reputations. They collected thousands of specimens on river-banks, in jungle clearings, and up mountains, some of which were sold to museums and collectors back home to finance the trip; others were kept and used for their own research. In 1863 Bates was to describe his experiences in South America in *The Naturalist on the River Amazons* (available to download or view online). He became most famous for describing how non-poisonous species of insects had developed bright predator-warning colouration, known as Batesian mimicry. This arguably supported the theory of natural selection proposed by Wallace and Darwin.

Learning more about Bates introduces students to key issues in the history of nineteenth century science, as well as providing ways of critical thinking about science today. These include:

- the central role of natural historical voyages and travel-writing in studying nature
- the practices of specimen collection and display
- the importance of biodiversity, and its ecological significance
- the piecemeal career of the man of science in the mid-19th century, when there were few paid professional positions
- the wider scientific community within which Darwin was working, including the importance of global correspondence networks, and global travel and encounters
- the mechanisms of Batesian mimicry and how to provide evidence for evolutionary theories

Working in small groups, participants were asked to write a letter as Bates from the Amazon to a scientific colleague back home in Britain. They were given a resource pack of materials which included details of Bates' life; examples from Bates' letters; pictures of him in the Amazon; images of contemporary specimens, and illustrations of Batesian mimicry. They were asked to pick between two examples – hummingbirds and butterflies – when writing their letters.

They were asked to use this historical evidence to imagine what it would have been like encountering these creatures and landscapes. How would you analyse what you're looking at? How would you fit it together with what you already know? How would you report on your findings to friends and colleagues back home? How would you propose new ways of looking at nature, based on your findings?

This project will be further developed for use with GCSE Biology students in Leicester schools.

Developed by Melanie Keene and Iris Montero for the BSHS Outreach and Education Committee.

14th September 1855

The Amazon!

My Dear Rosamond ~

Please excuse the absence of recent correspondence. You have been much in my thoughts. I find myself with a rare moment of leisure, and imagine you reading this in your garden, watching the butterflies and perhaps thinking for a moment of me.

My time recently has been devoted to a detailed study of the butterflies. By close observation of the subtle variations in the butterflies to be found in different regions, I have arrived at some novel conclusions.

These concern two species of butterfly: the Heliconius Melpomene and the Heliconius Thelxiope. The Melpomene, a black butterfly with a large crimson spot, is to be found on the South side of the river in the dry forests behind Santarena. The Thelxiope, a more beautiful butterfly, has rays of black and crimson, and adorned with bright yellow spots.

Prior to my close observations, people had assumed there were distinct species. However, I am beginning to suspect that the Thelxiope has in fact derived from the Melpomene. Both types float lazily in great numbers and if one traverses the 8- miles between Serpa and Averyrus, one encounters butterflies whose appearance lies somewhere between the two types.

This makes for long and exhausting work and, in your absence, my only consolation is my pet Toucan, "Toucano".

I wish you could be here to see these wonders with me, but this is no place for a lady.

With warmest affection,

Henry Bates

Amazonia

Oct 1860

Dear Sir,

I thank you most sincerely for the receipt of your last letter and the materials you sent for the packaging of our latest specimens. I must tell you about my latest observation in relation to the hummingbird and their habits.

These birds are active early in the mornings and in the evenings, moving from flower to flower in a most capricious manner. I have observed them for many days but collecting specimens have proved very problematic due to their speed. It is difficult to distinguish between the species on the wing and I must be careful to observe them at rest as the brilliant colours cannot be seen in flight.

Further confusion has arisen from the frequent presence of the hummingbird hawk moth which I have seen and several times shot by mistake, we must find a better method of collecting such specimens, of which I have but a few good examples. I shall send you one for further consultation. On close inspection it becomes clear that the resemblances between these species are merely superficial, for example in the shape of the head and the tail. The natives are firmly convinced that these are related, one being a transmutational form of the other. Obviously this is an absurdity but is there perhaps a deeper truth hidden in this simple superstition?

I have some questions which I wish to put to you in relation to theory but in the meantime I look forward to receiving a copy of Mr Darwin's latest work which will help.

Yours sincerely

HWBates

Dear Sir

You perhaps imagine that I am entirely lost in the Amazon, from my silence of the last six months. I wish to emphasise how much I appreciated your last letter, and it has only been my shattered health that has prevented me from replying sooner. Six months of eating anteater has driven me nearly to distraction, and added to that, the fate which one of those poor hunting dogs met with has quite overshadowed things and made me most unpopular with my housekeeper. But to the point, and you asked me for entomological news, so I will endeavour to supply some. I collected abundant specimens of the following:

Hipparthia semele

Heliconius Melpomene

Heliconious Thelxime

The latter species afford much material for though on the relations between varieties and species. It gives me mental strain to be collecting while always having in mind such higher philosophical questions. But I can offer more information of an entomological character on the hummingbird hawkmoth, which I was not even trying to collect. This species, however, resembles so closely its namesake the hummingbird that it was not without considerable effort and many hours of tiring work that I finally learned to distinguish between the two. Indeed, many times I thought I had a specimen of the bird, only to discover that it was one of the moth. But this seeming inconvenience was the happy occasion for some philosophical speculation on the possible convergences of analogies between different species, for it seems that both these species have as their aim the pollination of flowers, and whether by design or otherwise they have both been equipped with a similar shape and powers.

The possible mechanisms by which so remarkable resemblance between such distant species could came about would bear much examination. I read the Vestiges, which you so kindly forwarded to me, but I am not impressed by the arguments developed there, and can only hope that in the not too distant future some of your speculations may lead us further in that matter.

I remain, etc.

Henry Walter Bates

Para

July 4. 1854

Dear Sir

Your two letters of March & June reached me together yesterday. Many thanks for yr observations on the beetles – I believe you are correct on the variation question. Yr communications are the most important since the departure of Wallace, the loss of whose specimens has I fear cast much of our discovery into darkness as far as London's men of science are concerned.

My work must for this reason, & in view of speculation of the own proceed apace. On a successful day, I may identify perhaps 5 or 6 distinct species (chiefly Insectae) the greater part of which will, I trust, be affirmed as hitherto unknown.

In regard to yr qtion regarding the hummingbird hawk-moth, I must report that the circumstances are indeed curious. So great is the resemblance betw bird & moth that I have myself, though apprised of the danger of so doing, on more than one occasion shot the one in place of the other. It is hardly to be wondered that the natives, to a man, accept without reservation that the one is merely in the other in transmuted form, of caterpillar to moth. In asserting the absurdity of this doctrine, I am yet struck by the necessity of forming some exption compatible wth the tenets of our own age.

Wd be interested to hear yr views on the prospect that we see here a case of mimicry in nature.

Wd indeed be grateful if you would favour me with a copy of yr paper & that of Mr Darwin as discussed. I hope you will excuse absence of a return supply of materials, but conditions here are you will appreciate are not as they might be.

Yours sincerely,

H.W. Bates

Caripi, Jan 1853

My Dear Sir,

I have just received – after a twelve-month gap – your letter, along with the rest of my long anticipated correspondence. What a trial it often is to travel in such distant climes! I was distraught to hear of the fate of your vessel, and the loss of so many hard-won specimens! What a blow to your future prospects.

I enclose with this communication a new Trochiliadae – many a morning has been devoted to its pursuit as often I mistook the hawk-moth (Macroglossia Titan) for the hummingbird.

Only yesterday could I examine these in the hand, and was struck again by their curious resemblance. Others in the group crowded round under the orange blossoms. "Look at their feathers," they said; "their eyes are the same and so are their tails" – they are insects, not birds. Had I only observed their flight, I could have shared their opinion. But this deceptive morphology does not trick the naturalist's eye.

We shall discuss these matters on my return; how these curious creatures relate to the ideas about transmutation in "Vestiges".

Until then, I remain,

Yours,

Henry Walter Bates