



MOTH AND RUST
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“Lay not up for yourselves treasures upon earth, where moth and rust doth corrupt, and where thieves break through and steal.” As a bored child, who was also an amateur lepidopterist, listening to the Bible reading in compulsory school chapel, I was particularly fond of Jesus’ injunction in the Sermon on the Mount: my favourite insects were agents of decay and degradation.

The Wissenschaftskolleg lies in a Grunewald neighbourhood of ritzy refurbished villas, as well as flashy new blocks of flats, with a high titre of Ferrari and Porsche owners. Yet there is a prevalent, and to me, attractive atmosphere of gloomy decay and turnover. The trees are old and vast, and some have clearly been growing among the houses and streets since the forest was cleared for the villas in the late 19th century; some perhaps were left by the builders of the villas, and they are certainly much older than the newer luxury houses over which they tower threateningly. The trees make the streets and gardens dark and shady, especially during the grey weather we had almost continuously this academic year, but the upside is that their branches and leaves provide a highly complex environment for a thriving fauna of insects, birds and mammals, and especially insects such as moths. On the pavements in front of many villas are small brass plates commemorating Jews who lost their lives in the 1940s, and of course there is also Platform 17 in Grunewald station, Deutsche Bahn's Denkmal to its own complicity as official transporter for the Holocaust.

From 1859 till today, similar signs of building, decay, revolution and rebuilding are also evident in evolutionary biology. I was lucky to become one of an international team of evolutionary biologists discussing and working on the controversial topic of "sympatric speciation", the evolution of new species from within the geographic range of their parents. I joined Jeff Feder, Patrick Nosil and Francisco Úbeda de Torres, under the friendly but disciplined leadership of Axel Meyer. I took the opportunity to investigate the history of ideas about species, from Darwin's 1859 *Origin of Species* to the present.

Around the time Stalin was consolidating his power in Russia, and Hitler's mob were planning to murder Jews in Germany, a kind of revolution in the understanding of species also occurred. Perhaps coincidentally (although perhaps not), the chief architects of this second wave of a movement we evolutionary biologists call "The Modern Synthesis" were also a Russian and a German, Theodosius Dobzhansky and Ernst Mayr. Both were emigrés living in the USA.

Mayr and Dobzhansky agreed that Darwin was right about evolution in general, but claimed he was wrong about the origin of new species, or speciation. Mayr in 1963 wrote: "Darwin failed to solve the problem indicated by the title of his work ... I have examined the reasons for this failure and found that among them Darwin's lack of understanding of the nature of species was foremost." Dobzhansky and Mayr felt that Darwin had overemphasised the continuity between "varieties" and species, and proposed what they considered a better definition: species were "reproductively isolated" from one another. Darwin

had underemphasised the reality of species, and so, according to Mayr and Dobzhansky, he couldn't begin to understand how species evolved. This view that Darwin was "muddled or wrong" about species is still generally held, although we biologists are now much more Darwinian in our view of species and speciation than at any time for the last 70 years. We now have examples of many "varieties" that are almost species and that are partly reproductively isolated. We also know that many species occasionally hybridize, and that genes sometimes flow between them: reproductive isolation does not have to be complete when species first form. The transition from varieties (today called morphs, or geographic races) to species appears to be relatively continuous in nature. Indeed, many of the great branches of the Tree of Life seem to have originated as a result of fusion or gene exchange between other branches, so much so that many now claim that "Web of Life" is a better descriptor. It is not a simple tree.

Whether Mayr or Darwin were correct is not so much what I want to describe here – this is just the background. The topic with which I became fascinated while at the Wissenschaftskolleg, and which diverted me from my stated goal of writing a book on the evolution of biodiversity in general, was the social science of science. Mayr, in particular, was an extremely influential summarizer of earlier literature. By the 1960s, Mayr was universally regarded as one of the great authorities on Darwin. The advantage of this for the rest of us biologists is that we could read Mayr's clear prose rather than having to read long-winded and understated Victorian English sentences to understand Darwin. Yet now when I read Darwin, I have no doubt that he was misinterpreted by Mayr and that his quotations were grossly distorted by selective abbreviation. Furthermore Mayr's criticisms of Darwin's view of species simply don't hold water anymore. It's not just my own view: there are many others, particularly historians of science, who had already made similar criticisms of Mayr's portrayal of Darwin, such as Michael Ghiselin (himself a former Wiko Fellow).

So why, for about 50 years, were most biologists convinced by Mayr? All they had to do was read the Darwin's *Origin* with an open mind and find out for themselves. Curiously, I don't think that Mayr deliberately misrepresented Darwin, I think he duped himself in exactly the same way he duped everyone else – by being convinced that his own views on species were correct, so that Darwin's had to be wrong. But not only is it extraordinary that almost all biologists agreed with Mayr from the 1940s until approximately the 1980s or 1990s, I find it even more odd that we have now largely switched back to a more Darwinian stance. This has been slow and subtle, and because biologists are not histori-

ans, we haven't really noticed the changes. Mayr is still revered and quoted for his views on Darwin, but the accumulated changes in our outlook should negate our respect.

What is going on? How is it that the entire herd of us from the 1940s to the 1980s held a very different view about species than Darwin, and then from the 1980s to the present day again returned to an increasingly Darwinian viewpoint? It is the worst nightmare of the natural scientist, and a delight to many social scientists – that the “truth” depends on culture, not facts. This year I have therefore striven to understand why scientists believed for so long that Darwin was wrong about species, and why it is that we, in the 150th year after the publication of *The Origin*, again have more respect. I have found this historical research demanding and realize that I am not cut out to be a historian or philosopher of science – I hope to get back to biology soon. Yet after this year I can more fully appreciate the work of historians (such as my neighbour at the Wiko, Sheila Fitzpatrick) and of some extraordinary historians of science – A. O. Lovejoy*, for example.

Ideas, it seems, are like buildings, subject to decay and corruption. They depend, as do the Grunewald villas, on assiduous interest by those who can afford time and attention to their care. Sometimes they become neglected, fall into ruin, and crumble to nothing or are demolished and replaced with newer ideas. Or they are modified or rebuilt, and the changes made can be for the better or, and this is often the case, in rather poor taste.

* Lovejoy, A. O. “The argument for organic evolution before ‘The Origin of Species’, 1830–1858.” In *Forerunners of Darwin: 1745–1859*, edited by B. Glass, O. Temkin, and W. L. Straus, 356–414. Baltimore: Johns Hopkins Press, 1968.