

## **MENDEL'S SIGNIFICANCE**

**Greg Radick, Wednesday 18 May 2017**

Good afternoon, everyone, and many thanks to Rector Havel and Director Dostál for inviting me to say a few words about Gregor Mendel and his significance from the perspective of the historian of science. Truly I am delighted to join you today, both as a historian specializing not just in biology but in Mendelian biology, and as someone who, like Mendel, had the good fortune to spend time teaching secondary school in the Czech lands. Also like Mendel, my Czech is not very good, so thank you for putting up with me reading my text, and in my thick New Jersey accent.

At his death in 1884, Gregor Mendel was little known outside this city. Today, of course, he is famous all over the world. He is “the father of genetics,” regularly ranked with Newton, Darwin and Einstein. Even today, students at every level who are beginning their studies in genetics start with Mendel. What they learn about his ideas derives from a single scientific paper. Entitled “Experiments on Plant Hybrids,” it summed up work with hybrid pea and bean plants that Mendel had completed over the course of ten years in the garden of the Abbey of St Thomas, where he lived. He first delivered this paper as two lectures to the Brünn Natural Sciences Society in 1865, then prepared it for publication the next year in the Society’s annual proceedings. Admirers of Mendel need to come to Brno – and they should! – in order to see the grounds where Mendel did his experiments. The city’s first statue of Mendel, which was unveiled in 1910, ten years after the biological world became excited about Mendel’s paper, now sits there. But anyone, anywhere, can read Mendel’s paper, in the original German or in the many translations that have been made. And again: they should! For in Mendel’s text they will encounter science at its very best. With clarity and grace,

Mendel unfolds a beautifully reasoned, richly quantitative argument on how to interpret the results of what, the reader soon appreciates, were ingenious experiments, performed with meticulous care and dogged persistence, and on a dauntingly large scale. Unquestionably the paper deserves its status as a scientific classic.

Mendel's enduring fame as a founder, and the extraordinary quality of the paper on which that fame rests, are reasons enough for Brno colleagues, students and citizens to cherish Mendel and his connection to their city. But I want to suggest that there are even better reasons to cherish that connection – reasons that, furthermore, have nothing to do with the role of the paper in the creation of genetics in the early twentieth century. If we step back from that particular role and ask, in a more general way, about what makes for science at its best – about what ingredients must be in place for successful science of the highest order to emerge – I think Mendel's paper vividly illustrates three of the most important ones.

First of all, there has to be a dialogue – creative and critical – with the scientific past. Mendel did not invent his experimental program out of nothing; on the contrary, he saw himself as building on the work of previous investigators whom he studied with care. From his botany teacher at the University of Vienna, Franz Unger, Mendel took the idea of looking for mathematically regular patterns in the changes that biological forms go through over time – a program of inquiry that itself brought together themes from two of the great shapers of Central European biological science in the mid-nineteenth century, Johann Wolfgang von Goethe and Alexander von Humboldt. And from the great German-language experts on plant hybrids in previous generations, especially Carl Friedrich von Gärtner, Mendel took the idea that experiment might throw light on why, with some hybrid plants, the hybrid form does not persist uniformly, but instead the parental forms come back. Understanding that return of the parental forms, not laying the foundations for genetics, was the mission Mendel undertook in

his paper. He sought to go beyond his predecessors. But their work set the direction of his own.

The second ingredient I want to mention is the existence of a community of people who are prepared to join in creative, critical dialogue with each other. Brünn in Mendel's day was a kind of permanent scientific seminar, with St Thomas' monastery as one of its hubs, and the wider science of Europe flowing through via journals, books and visitors. When Mendel returned from his studies in Vienna, he found himself surrounded by scientifically inclined people keen to discuss the latest advances in natural science and its practical applications. It was a very encouraging environment. Although a persistent legend portrays Mendel's audience at his 1865 lectures as bored or confused, the evidence suggests otherwise. They were serious people, and they recognized and appreciated his achievement. His paper itself, moreover, shows that Mendel had kept up to date with the latest progress in biology beyond Brünn, notably in cell theory and Darwinian evolutionary theory. He never saw himself as isolated, and no one in isolation would ever have produced that amazing paper.

So far I have stressed the importance of dialogue with the past and present. But there also needs to be dialogue with the future. This is the third ingredient for science at its best. There has to be ambition, a sense of mission about making one's mark. In relating this theme to Mendel, we need to take a little care. I have already referred to the tempting but anachronistic view which sees Mendel as trying unsuccessfully to found genetics before the world was ready. Outstanding historical research, by Vitězslav Orel among others, has helped us instead to understand Mendel more accurately as someone who sought to make a major, lasting contribution to the science of plant hybrids in his own time. Within that more limited horizon, however, Mendel aimed very high indeed. He remade the science of plant hybrids as a quantitative science, showing by example how a previously unimagined exactness in the collection of data permitted previously unimagined boldness in the framing of hypotheses.

To conclude: in our day as much as Mendel's, science at its best grows from a three-way conversation, simultaneously with past, present and future. May Nikos Armutidis' splendid new statue serve as a daily reminder of how good science at its best can be, and of the multiple, open-minded, and open-ended conversations that make science at its best possible. Thank you.