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Student evaluation:

Sander Visser (2021)

Evolution of the sex determination pathway in the Mediterranean flour moth, *Ephestia kuehniella*

[PhD Thesis]

Sander had been working in our lab since the end of August 2015 as a PhD student in the Horizon H2020-MSCA-ITN project with the acronym BINGO (**B**reeding **I**nvertebrates for **N**ext **G**eneration BioContr**o**l). For this position we selected him from 29 foreign applicants from different countries and it was a very lucky choice. From the beginning, Sander proved to be an exceptional PhD student, very intelligent, highly motivated, precise and independent, with excellent knowledge in molecular genetics and experience with similar research in insects, especially houseflies. He also fitted in very well with the team in our lab.

In his PhD programme, Sander began research to fulfil my big dream of understanding the molecular mechanism of sex determination in moths and butterflies (Lepidoptera). It was good timing, because just a year ago Japanese researchers discovered two pillars of the sex-determining pathway in the silkworm, *Bombyx mori*, a primary trigger of female development, the *Fem* piRNA, and the *Masculinizer* (*Masc*) gene, which is essential for male development. Sander's task was to investigate sex determination in our model species, *Ephestia kuehniella*, and to see if this pathway is conserved in distant lepidopteran species. As can be seen from his dissertation, Sander accomplished this task very well and the results obtained exceeded my expectations. He found a duplication of the *EkMasc* gene in *E. kuehniella*, proved the masculinizing function of the duplicated gene, and discovered a putative *Fem* piRNA in *E. kuehniella* and in a related moth *Plodia interpunctella*: Apart from the silkworm, *Fem* piRNAs have not been found in any Lepidoptera so far.

To achieve the above results, Sander has mastered a wide range of methods in molecular genetics and cytogenetics, including the necessary bioinformatics tools. In our lab, he successfully introduced the RNA interference method to study gene function, which is not an easy-to-use tool for Lepidoptera. He also completed a demanding training programme that was part of the BINGO project. Sander also participated in other projects and co-authored four other publications not included in his PhD thesis. His professional skills are best evidenced by the fact that he was hired for a research position at the University of Groningen in June 2020, shortly after completing his regular PhD studies.

In summary, Sander has been very successfully in opening up a new research direction for our lab and his results have made an important contribution to our understanding of the evolution of sex determination in Lepidoptera. It gives me great pleasure to recommend his dissertation for defence. Sander, THANK YOU for all your work and friendship and wish you good luck and success in your life!

In České Budějovice, 2 December 2021

František Marec
(tutor)