Andrea Margarete Wirmer

Involvement of nitric oxide in the reproductive behavior of female *Chorthippus biguttulus*

Nitric oxide (NO) is a gaseous transmitter that diffuses freely across membranes and acts as a modulator in many systems. In both, vertebrate and invertebrate nervous systems, it is generated by a conserved isoform of nitric oxide synthase (NOS) which is activated by Ca\(^{2+}\)/calmodulin and produces NO from L-arginine under consumption of NADPH and O\(_2\) and the development of L-citrulline. In its target cells NO activates the production of cGMP by a soluble guanylate cyclase (sGC).

In the human nervous system, NO is involved in multiple physiological pathways and plays an important role in neurodegenerative diseases due to its actions as a free radical. Insects are worthwhile experimental animals to explore mechanisms that activate NO generation and to reveal effects of NO on cellular targets.

In insects, NO is involved amongst other systems in vision, olfaction, and locomotion where it increases the cGMP levels of its target cells.

The audible stridulation that grasshoppers perform with their hindlegs serves to find mating partners. It is controlled by the central body, situated in the midbrain. Injections of NO-donors into the central body can suppress stridulatory behavior.

This master thesis dealt with the question in how far NO is involved in the reproductive behavior of female *Ch. biguttulus*. For this purpose I performed immunostainings against L-citrulline in the brain, pharmacological and behavioral experiments with female *Ch. biguttulus*, and compared the amount of NOS expression in the brain between males and females of the species. The findings provide evidence, for NO production in the same neuronal networks that control stridulation and that the stridulatory behavior of female *Ch. biguttulus* can be altered by injections of NOS inhibitors.