

# COLLOQUIA IN PHYSIOLOGY AND VASCULAR BIOLOGY

Venue: Medical University Vienna, Center for Physiology and Pharmacology,  
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"Gr. Hörsaal Physiologie"

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Wednesday 03.12.2014 12:00 s.t. **Jozef Vanden Broeck** (host:  
Chr. Gruber)

Animal Physiology and Neurobiology Section  
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***"Peptide-receptor couples implicated in the control of feeding and digestion in insects"***

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Despite their huge biodiversity, some fundamental characteristics are shared by all animals. Metazoans are heterotrophs, implicating the basic need for the intake and digestion of food, as well as for the intestinal absorption of nutrients. Therefore, it is crucial that animals can rely on physiological mechanisms for the control of these essential processes. Nutrient-sensing, hormonal and neuronal signaling systems are playing an important role in this complex regulation.

In this lecture, we will consider a few neuropeptide-mediated pathways that are implicated in the physiological regulation of feeding and digestion in insects<sup>1</sup>. In particular, we will discuss recent data obtained in the locusts, *Schistocerca gregaria* and *Locusta migratoria*, which are swarm-forming pest species that irregularly devastate the agricultural production in large areas of the world. In a physiological and neurobiological research context, they have proven to be interesting experimental model organisms. Moreover, RNA interference constitutes a highly efficient and robust method to silence the expression of peptide precursors and/or receptors in several insect species, including locusts. We have identified several insect neuropeptide precursors and receptors and will report on our recent physiological and molecular biological studies that further illustrate the role of neuropeptides, such as DH<sup>2</sup>, NPF<sup>3</sup>, sNPF<sup>4</sup> and SK<sup>5</sup>, in the regulation of food intake, digestive enzyme secretion and gut motility in locusts. The general aim of our work is to contribute to a better understanding of the regulation of these complex processes, as well as of the possible functional interactions between different regulatory pathways in an integrative physiological context.

### *Acknowledgements*

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### *References*

1. Spit, J., Badisco, L., Verlinden, H., Van Wielendaele, P., Zels, S., Dillen, S., Vanden Broeck, J. (2012). Peptidergic control of food intake and digestion in insects. *Can. J. Zool.*, 90, 489–506.
2. Van Wielendaele, P., Dillen, S., Marchal, E., Badisco, L., Vanden Broeck, J.

- (2012). CRF-like diuretic hormone negatively affects both feeding and reproduction in the desert locust, *Schistocerca gregaria*. *PLoS One*, 7(2), e31425.
3. Van Wielendaele, P., Dillen, S., Zels, S., Badisco, L., Vanden Broeck, J. (2013). Regulation of feeding by Neuropeptide F in the desert locust, *Schistocerca gregaria*. *Insect Biochem. Mol. Biol.* 43, 102-114.
  4. Dillen, S., Zels, S., Verlinden, H., Spit, J., Van Wielendaele, P., Vanden Broeck, J. (2013). Functional characterization of the short Neuropeptide F receptor in the desert locust, *Schistocerca gregaria*. *PLoS ONE* 8(1), e53604.
  5. Zels, S., Verlinden, H., Dillen, S., Vleugels, R., Nachman, R.J., Vanden Broeck, J. (2014). Signaling Properties and Pharmacological Analysis of two sulfakinin receptors from the red flour beetle, *Tribolium castaneum*. *PLOS One* 9(4), e94502.