

## Invitation to the Keynote Lecture Faculty of Biology

**Prof. Dr. Noah Whiteman**

University of California, Berkeley, USA

### **Title: Retracing the horizontal transfer of an immune module from bacteria to animals: A tale of two toxins**

#### **Abstract:**

The innate immune systems of vertebrates and invertebrates deploy robust responses against pathogenic microbes. However, like vertebrates, invertebrates also face attack by diverse, long-lived metazoan parasites. In humans, metazoan parasites play an even more important role than microbial pathogens in shaping genome-wide signatures of local adaptation. Similarly, parasitoid wasps are among the most important agents of natural selection in insects. Insects deploy diverse strategies to defend against parasitoids that include cell- and humoral-mediated innate immune responses resulting in encapsulation of wasp eggs, defensive symbioses with toxin-expressing bacteria, and the use of dietary toxins. Here, we used genome editing in *Drosophila melanogaster* flies to retrace the origin of the first known toxic humoral immune factor against parasitoids. This factor is encoded by parasitoid-protective genes acquired by insects through horizontal gene transfer from bacteria. This fusion of cytolethal distending toxin B (*cdtB*) with a partial apoptosis inducing protein of 56kDa (*aip56*) gene (*fusionB*), strongly enhanced fly survival and suppressed parasitoid development when expressed only in fly immune tissues, recapitulating resistance phenotypes observed in the native hosts. However, the FusionB protein, a DNase I enzyme, was lethal to flies when expressed ubiquitously, pointing to the salience of regulatory constraint. FusionB was secreted into the hemolymph of flies and specifically targeted the parasitoid embryo's serosal cells as it did in the native hosts. In the right regulatory context, horizontal gene transfer can instantaneously endow animals with novel innate immune modules tailored to particular parasites.

**Monday, 08 April 2024, 12:15 noon**

Host: Prof. Dr. Shuqing Xu

The keynote lecture will be presented at the  
Biozentrum 1, HS BZ1, 00.187, Hanns-Dieter-Hüsch-Weg 15, Ground Floor

