Evolutionary morphology of the male genital system and spermatozoa of spiders

Evolutionary morphology not only aims at describing but explaining morphological diversity. Sperm in general, and spider sperm in particular, are well known for their enormous morphological diversity. Moreover, in spiders sperm are not only transferred as individual sperm but as sperm conjugates, e.g., the so called synspermia. However, the analysis of these sperm conjugates, which is usually based on two dimensional (2D) microscopy alone, is often challenging. Thus, three dimensional (3D) reconstructions on an ultrastructural level, are especially helpful in understanding, and visualizing the (ultra)structural complexity of sperm conjugates. This, however, inevitably requires serial images that can be obtained by diverse approaches. Traditionally, these images are obtained by serial ultrathin sectioning, consequently followed by Transmission Electron Microscopy (ssTEM). However, ssTEM is highly challenging, time consuming, and prone to artifacts, as e.g., section loss, or image distortion. Alternative approaches, such as Serial Block-Face Scanning Electron Microscopy (SBFSEM) overcome these limitations, but image quality, and signal-to-noise ratio are highly dependent on previous staining procedures.

The talk will highlight the morphological diversity of spider sperm in an evolutionary context and especially focus on a variety of methods that are feasible to analyze the morphological diversity of the male genital system and spermatozoa of spiders.