

# SFB 960-/BZR – Kolloquium

26. September 2019, 14.00 Uhr  
H53



## Dr. Andrea Pauli

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***“Small proteins with big roles – from coordinating cell migration to mediating species-specific fertilization”***

Life of any sexually reproducing organism starts with the fusion of two specialized cells, the egg and the sperm, to form a single cell, the zygote. This totipotent cell gives rise to all cells of the future organism.

Despite the importance of sperm-egg fusion in initiating embryogenesis and decades of research devoted to its understanding, fertilization still belongs to one of the most mysterious processes. What are the underlying molecular players and mechanisms that mediate sperm-egg binding and fusion? And related to this question, what other essential factors might we still be missing that function in much better understood processes?



Using zebrafish as main model organism, we have discovered two previously unannotated short proteins, Toddler/Apela and Bouncer, which are both essential yet serve very different functions: While Toddler is a secreted peptide that promotes cell migration during gastrulation, Bouncer is bound to the egg membrane and is required for sperm entry into the egg. Remarkably, by replacing zebrafish Bouncer with medaka Bouncer in the zebrafish egg, we found that changing this single factor allowed cross-fertilization between these two evolutionarily distant fish species. Thus, Bouncer acts as the gate-keeper of the egg, enabling conspecific sperm to enter while keeping heterospecific sperm out. While fish express Bouncer exclusively in the egg, the mammalian homolog of Bouncer, Spaca4, is restricted to the male germline.

Our discoveries of Toddler and Bouncer highlight not only the exciting possibility that further new important developmental regulators remain to be identified, but also provide an entry point for studying the molecular basis of species-specific fertilization.

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