

# First Snapshot of How Sperm Binds the Egg at the Molecular Level



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Egg–sperm interaction at fertilization marks the beginning of a new individual and allows the transmission of the genetic information to the next generation. Studied by scientists since the seventeenth century, this fundamental process has also long captured the attention of the public because of its direct relevance to reproductive medicine. However, how the female and male gametes recognize each other at the molecular level has until recently remained unknown. Using structural biology, we have found that—despite insignificant sequence identity—a common egg coat protein architecture mediates the initial interaction with sperm in mollusk and human, two organisms separated by 600 million years of evolution. Building upon this discovery, which revealed an expected link between invertebrate and vertebrate fertilization, we have determined the first three-dimensional structure of an egg coat–sperm protein complex. By visualizing the molecular details of the initial contact between gametes, this has both revealed how this interaction has made species-restricted and suggested a mechanism for sperm penetration through the egg coat (Raj et al. 2017). Together with recent data on a subsequent recognition step that ultimately triggers gamete plasma membrane fusion (Han et al. 2016; Ohto et al. 2016; Aydin et al. 2016; Nishimura et al. 2016), these studies started to unveil one of the most crucial moments of life at unprecedented detail.

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