Condition-dependent mechanisms in gamete-level mate choice (postmating sexual selection) in humans

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Charles Darwin proposed sexual selection theory as a special form of natural selection where individuals of one sex compete with each other for mating opportunities (intrasexual competition) or choose among individuals of the opposite sex the one to mate with (intersexual competition). Since that, we know that sexual selection may act not only before copulation but also after it in a form of sperm competition and cryptic female choice. Both mechanisms of post-mating sexual selection are documented in many species, and what is more interesting, cryptic female choice (CFC) was recently presented also in humans.

By using female reproductive tract fluids and semen samples, researchers demonstrated that the sperms of individual men behave differently depending on cervical mucus or follicular fluid from different women. That suggested that CFC in humans may select for a more genetically compatible mate and subsequent research focused on finding a gene, “the Holy Grail” of compatibility, under that type of selection. However, females in many other species choose their mating partners based on the elaborated traits which are often an honest signal of male quality and condition. It is very likely that females are able to asses male condition also after copulation by detecting particular molecules on the sperm membrane and based on that selectively suppress or enhance the performance of the sperm cells. Despite that mechanism related to the male condition seems to be the most straightforward explanation of CFC, the causal relationship between the male condition and post-mating female choices has never been tested, yet.

In this project, I aim to investigate how men's condition affects sperm performance, in the post-mating context in humans, i.e. in female reproductive tract fluids from different women. That will provide knowledge of another, next to the “genetic compatibility”, mechanisms of CFC in humans. Investigating such relationships is crucial for future studies aiming for finding genes or genotypes under selection against incompatible variants. Moreover, given the increasing fertility problems, the results of this project will help to understand why around 30% of couples struggle with not explained fertility problems, and thus drive the attention of medical science to the evolutionary perspective of that issue. Moreover, investigating condition-dependence in post-mating decisions and better understanding such multiway interactions will shed light on human genetic diversity, e.g. huge allele variation of some genes (e.g. major histocompatibility complex, an important part of our immune system). Since CFC can affect gene flow between populations, CFC for male condition might have played an important role also in macroevolutionary processes in Homo.