The production of gametes and the reproduction is an energy-consuming process. A female cannot afford the risk of not having her eggs fertilized due to the poor quality of the male's semen or of the investment in bringing up of the progeny of a weak male. According to the sexual selection concept, the female must evaluate the quality of a male in order to choose the best possible. The traits that indicate high quality males are manifested as elaborate sexual ornamentation. The secondary sex characters are reliable because they are costly. Therefore, only individuals that possess high biological fitness can survive despite the costs of producing extravagant signals. But the issue of sexual selection and reproductive success are much more complicated than that. It is often found that highly ornamented males, possessing high-quality ejaculate, are more susceptible to infections and more infected with parasites during mating season than males that are less externally attractive. Some authors attribute the phenomenon to androgens, in particular testosterone which not only stimulates the development of sexual ornamentation but also adversely affects the immune system. Thus, only the high-quality males are able to produce flamboyant, testosterone-mediated ornamentation and simultaneously bear the cost of immunosuppression. However, the theories mentioned above seem to be of limited use in species that do not exhibit distinct secondary sexual ornamentation and/or are group spawners (polyandrous spawning species). One of these species is common carp (*Cyprinus carpio* L.). Carp males do not develop any spawning coloration or other secondary sexual characteristics aimed at making males more attractive to females. In those species the direct influence of the female on the choice of the best male for reproduction is limited. For rival males the reproductive success depends much on production of high-quality ejaculate. In the theory, females getting their eggs fertilized under sperm competition can increase the probability of inheriting high quality genes by their offspring. Males with high genetic resistance against parasites may be at advantage during spermatogenesis and consequently have high-quality ejaculates. Therefore, one can suppose that the trade-off between immunity and reproduction can be an avenue for post-copulatory sexual selection. In the present experiments, we want to find out if the differences in the innate immunity are correlated with the specific parameters of the semen enhancing its competitiveness and thus the fertilization ability. The aim of our project is to gain knowledge of the relationship between the immune system and the reproductive success by the example of *Cyprinus carpio* L. As the result of this study we will answer the hypothesis: more parasite-resistant carp males are able to control the immune system more efficiently and, subsequently, can produce higher-quality ejaculate, which increases the chance to sire progeny and pass on their genes.

To achieve our goals we will carry out a three-step experiment. At first we will challenge one group of carp males with blood parasite *Trypanoplasma borelli* and another with *T.borreli* lysate in order to activate the immune system of the fish. This will enable to evaluate the efficiency of the immune system of individual males and to define levels of testosterone in relation to infection. In the second step, we will evaluate the ejaculate of the immune challenged males and examine their reproduction efficiency in comparison to healthy males and in relation to immunocompetence and testosterone level. Also we will compare protein profile of semen plasma of control and immunologically challenged fish in order to learn which (if any) plasma proteins undergo changes under immune system activation. Last experiment will provide information on the competitive abilities of the immune stimulated individuals against healthy males.

The project aims to clarify the relationship between reproductive success of carp males and the efficiency of their immune system. We will find out whether the infection will tip the scale at fighting the pathogen and survival of the individual or rather at reproductive success and survival of the species. In this proposal, we for the first time will take attempt to utilize common carp males which are precisely evaluated in terms of their immune efficiency to explain the interactions between the hormonal control of spermatogenesis and the immunity. Explanation of the issues described above is essential for clarification of the role of post-copulatory sex selection in various evolutionary processes, such as speciation, environmental adaptation, maintenance of genetic diversity as well as pathogen-host co-evolution. Learning how co-evolving infectious organisms affect the reproductive success of the host will help to explore intricate immunological aspects of organisms adaptation. The study will contribute to a better understanding of the impact of the immune system on the basic vitals of all vertebrates, including the human, extending our knowledge on the theory of sexual selection. Impact of the study will be important for a much broader field than only aquaculture as Common carp serves as a model of organism that show certain behavioral and physiological features.