Environmental quality and intensity of sexual conflict

Despite reproduction being a common goal of both sexes, the evolutionary interests of males and females rarely overlap. With the exception of strict monogamy, males reproductive success depends only on access to mates and successful copulations, whereas female reproductive success is limited by the number of offspring she can physically produce (e.g. number of eggs). Therefore, males compete with other males for access to mating partner and for access to females' eggs. Male adaptations to sexual competition can be maintained in a population even if they have negative effects on sexual partner fitness. On the other hand, females may then evolve counter-adaptations to decrease harm from males. The implication of such sexual conflict is coevolution of sexually antagonistic traits. One of the classic examples is from *Drosophila melanogaster*. During copulation, male *D. melanogaster* transfers non-sperm components that increase male reproductive fitness but which are harmful to females in the same time.

Arms-races between males and females seem to be directionless, and their effects seem to be limited by coevolving sexual traits. Nevertheless, ecological factors, such as availability and quality of environmental resources and density of population, affect individual condition, and thus may drive variability in investment in the reproductive traits involved in sexual conflict. If local environmental factors differ between populations, males from populations with low-quality food (low-condition males) may be less competitive than males from populations with high-quality food (high-condition males). This situation may lead to limitation of gene flow. Meanwhile, females from low-quality food population (low-condition females) may be less selective and more sensitive to males' harmful effects, which might also result in reproductive isolation forming. However, there are no complete studies indicating conditionally-dependent mechanisms affecting male competitiveness, the effect of mating on females fitness, or female resistance to the harmful effects of males.

The aim of this project is to test the assumption that the low-quality food during development should result the condition of the interacting individuals, which should in turn reduce intensity of sexual conflict. The project will be conducted on the mite *Sancassania berlesei* (Michael 1903) species (Acari: Astigmata). Individuals will be exposed to low-quality food known to affect the conditions of both sexes, which should in turn affect investment in reproduction. The design of the study will include a control treatment (with high-quality food during development) and experimental treatment (low-quality food during development). I predict that low-condition males will have lower mating success, low-condition males will be less harmful to females, low-condition males will be less competitive. Females will be treated with a poor diet during development in the same way as males and female resistance will be investigated. I anticipate that the experimental females' resistance to male harm will be lower than the control females, which will result in decreased female fitness.

This study will fill an important gap in knowledge about ecological factors that affect sexually antagonistic coevolution. Such factors have important implications for life history evolution, evolution and diversification of sexual systems, and, potentially, speciation. The output of this study will be of interest to a broad range of evolutionary biologists, as well as taxonomists, population geneticists and others. It may also attract attention from popular science.