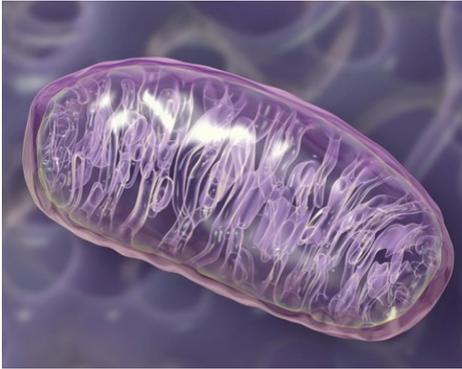




*Master Thesis projects available*

## Effects of mitochondrial-nuclear interactions



Nucleus and mitochondria in a cell communicate. The communication can be haplotype-specific and cause health and fitness effects. Particularly strong effects are predicted for male fertility and mitochondria-mediated sperm function. Master projects in this field are available in the Applied Zoology group at TU Dresden. The candidate will not be given a ready-made topic but will be involved in the development of a powerful experimental design to test these effects. We mainly use fruit fly *Drosophila melanogaster* lines that either have the same nuclear genotype and differ in mitochondrial haplotype, or where the same haplotype is placed alongside various genotypes. Potential projects include, but

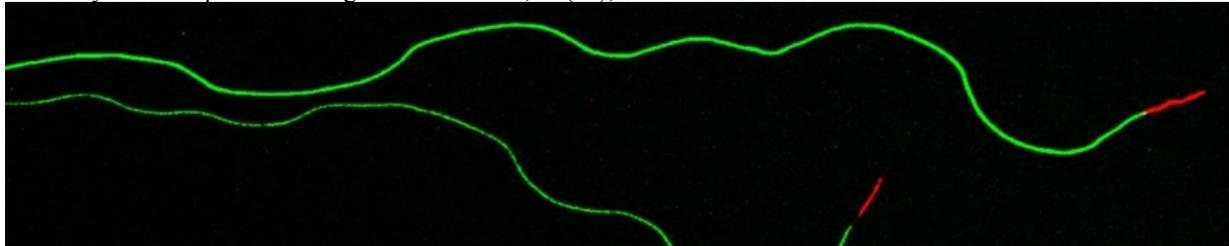
are not restricted to:

### 1) Effects of mito-nuclear interactions on male fertility: when mum's mitochondria cause infertility

Reading:

Yee *et al.* (2013). *In vivo* male fertility is affected by naturally occurring mitochondrial haplotypes. *Current Biology* 23, R55-R56.

Yee *et al.* (2015). Intergenomic interactions between mitochondrial and Y-linked genes shape male mating patterns and fertility in *Drosophila melanogaster*. *Evolution*, 69(11), 2876-2890.



### 2) Differences of mito-nuclear effects between the sexes

Mitochondria are maternally inherited. Co-evolution between mtDNA and nDNA is therefore only possible in the female lineage while deleterious mutations can accumulate in the male genome (mother's curse). Is it true, then, that males fare worse than females? Reports in the literature are ambiguous. Further reading:

Gemmell *et al.* (2004). Mother's curse: the effect of mtDNA on individual fitness and population viability. *Trends in Ecology & Evolution*, 19(5), 238-244.

Innocenti *et al.* Experimental evidence supports a sex-specific selective sieve in mitochondrial genome evolution. *Science*, 2011, 332, 845-848.

### 3) Population dynamics

How are population dynamics affected by genotype and haplotype?

Reading:

Dobler, R. *et al.* (2014). A meta-analysis of the strength and nature of cytoplasmic genetic effects. *Journal of Evolutionary Biology*, 27(10), 2021-2034.

Gemmell *et al.* (2004). Mother's curse: the effect of mtDNA on individual fitness and population viability. *Trends in Ecology & Evolution*, 19(5), 238-244.



Any other project related to the topic or fitting into the Applied Zoology ([www.tudaz.net](http://www.tudaz.net)) objectives can also be proposed. For further information, please contact me ([ralph.dobler@tu-dresden.de](mailto:ralph.dobler@tu-dresden.de)) or visit [ralphdobler.wordpress.com](http://ralphdobler.wordpress.com).