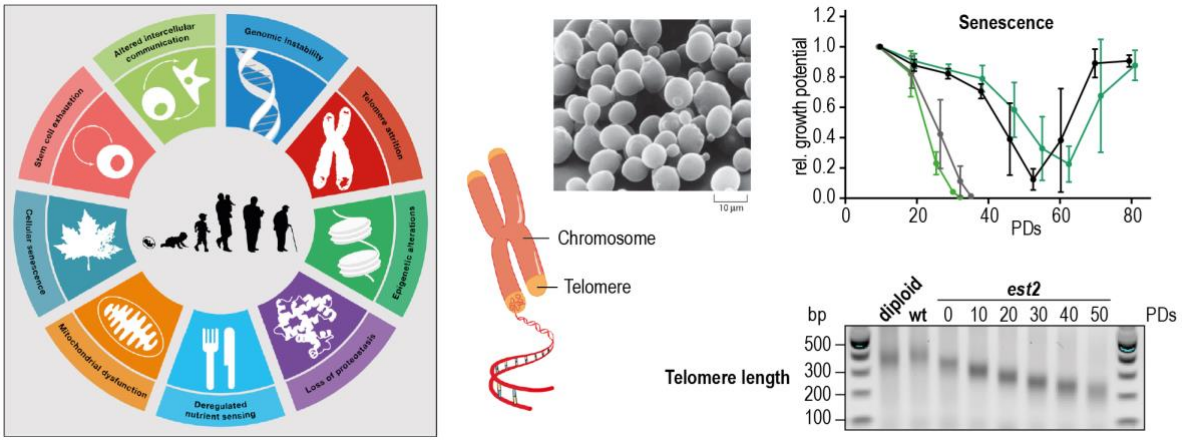
Molecular Biology of Ageing

Contents and aims of the module:

The students will acquire profound knowledge of the different aspects and hallmarks of the molecular biology of ageing. The **lectures** will cover the molecular and cellular mechanisms behind ageing and will address ageing in a disease-related and medically relevant context. Additionally, the students will learn about the fundamental techniques and model organisms in ageing research. In the literature **seminar**, recent and important papers in the field of ageing biology will be discussed.



The lectures on the molecular biology of ageing will cover the hallmarks of aging (left), from López-Otín et al., 2013, Cell. The practical course (module 16a) will focus on studying telomere shortening and replicative senescence in the model organism S. cerevisiae (from http://book.bionumbers.org/; Electron micrograph of budding yeast cells; courtesy of Ira Herskowitz and E. Schabtach). The students will address the replicative potential of telomerase negative budding yeast cells (top right) and analyze their telomere length by Telo-PCR (bottom right).

In the **practical course** (module 16a) the students will be introduced to basic methods in molecular biology and use budding yeast as a model organism for ageing research. In addition to methods of yeast genetics (yeast transformation; *in silico* planning and conducting the deletion of a yeast gene, genomic DNA extraction and quantification, confirmation of gene deletion by (Colony-)PCR), the students will perform replicative senescence assays of different yeast mutants and analyze telomere length by Telo-PCR and Southern blot.

The methods acquired in the first part of this module will be the basis for the smaller scientific projects (module 16b) in one of the research groups participating in this module. The students will be introduced to a broad variety of molecular biology methods with which they will be able to independently solve scientific problems. The students will learn to plan, conduct and evaluate research experiments largely independently. While being introduced to research activities, the students will be trained to develop strategies for solving scientific or technical problems. In the accompanying seminar, they will present their research projects, the underlying questions and the data acquired.

Credit point requirements:

- Successful module examination: Module 16a: written exam (60 min)
  Module 16b: oral exam (poster/presentation)
- Regular and active participation in courses
- Literature presentation

Frequency: Winter semester (max. 6 students)

Responsible persons: Prof. Dr. Brian Luke, Dr. Tina Wagner