



# Einladung

zu dem am Donnerstag, dem 8. November 2018, ab 14 Uhr  
im Geo-Bio-Hörsaal,  
Zülpicher Straße 49, 50674 Köln

stattfindenden öffentlichen

**wissenschaftlichen Umhabilitationsvortrag**  
Zoologisches Institut / Max-Planck-Institut für Biologie des Alterns  
von

**Dr. Gabriella Lundkvist**

über das Thema

## **Ticking away biological time: how internal time is set by our body clock**

Biological time-keeping is evolutionary probably one of the oldest features in living organisms. Biological clocks exist in humans, animals, plants and even cyanobacteria ("blue-green algae"), which indicates how important it is for all living organisms to adjust their activities to the earth's rotation around the sun and to optimize physiological and cellular functions to a certain time of the day. The daily (circadian = 24 hr) rhythms in physiology and behaviour, such as hormonal fluctuations, sleep-wakefulness and immune system activity, are coordinated by an internal "body clock", the hypothalamic suprachiasmatic nuclei (SCN). Rhythms may become disturbed and are common in certain psychiatric disorders, neurodegenerative diseases, African sleeping sickness and aging. The principle in plants and animals is the same: the clock consists of a self-regulatory molecular loop including specific "clock genes" and their protein products. When the clock genes are activated, they produce clock proteins that accumulate in concentration. Once the clock proteins reach a certain concentration, they inhibit the clock gene transcription. Later the proteins are degraded, the inhibition is lost and the gene transcription and loop can start all over again. This cycle takes around 24 hr.

The mammalian circadian system has been described as an orchestra with a conductor, where other body clocks represent the different instruments in the "orchestra" and the SCN represents the head "conductor". When the body clocks come out of synchrony with each other the individual experiences physiological malaise and discomfort. One such example is jet lag, which occurs after traveling rapidly across time zones, and causes the body clocks to react with different speeds to the new environment, resulting in a disturbed phase-relationship among the body clocks. If similar conditions occur during a very long period of time and disturbed rhythmicity becomes chronic, such as regular shift work, there is an increased risk for obtaining diseases such as cancer, diabetes, cardiovascular disease and depression. Stable internal time-keeping is in other words essential for our health.

In this talk the cellular and physiological basis of circadian time-keeping will be explained. The importance of biological rhythmicity for health, and physiological consequences of disturbed rhythmicity, will briefly be discussed.

G. Schwarz  
Dekan