

## Scientific Report

### Keeping Track of the Seasons

#### The ecology and physiology of annual cycles in mammals and birds

##### Scientific background and motivation

Seasonal change in behavior and physiology is of growing interest to both the general public and scientists in diverse fields, including ecology and physiology. Associated with global change, many animals modify seasonal behavior, and ecologists are investigating associated fitness consequences. Simultaneously, evidence is mounting for far-reaching seasonal changes in diverse aspects of an animal's phenotype, and physiologists are beginning to reveal these processes at a molecular level. Although both approaches are driven by interest in annual cycles, they have not been well integrated in the past. Ecologists and physiologists often don't meet and if they do, use different conceptual approaches and technical terms. Further, much of the physiological advance has been achieved in research of mammals whereas ecologists have focused on avian studies. Thus, the workshop was aimed at bringing together ecologists and physiologists who work on seasonality in mammals and birds.

##### The workshop

The Lorentz workshop was attended by 40 researchers from six countries, representing a good mix of disciplines as well as of "old wisdom" and "young and plastic brains". Over its five days of duration, we aimed to transect our overall grounds in several steps. The first day was dedicated to getting to know each other and to introducing fundamentals of each discipline. The second day explored the role of the environment in shaping seasonality and attempts of quantifying it. This theme led up to a first intense exchange between ecologists and physiologists over the way annual cycles and environments are conceptualized. The third day was dedicated to the mechanistic basis of time-keeping in the two taxa. The overall impression was that there are relatively few clearly identifiable differences between mammals and birds. Some of the perceived differences may have related to particular approaches and conceptual emphasis in the two taxa. On the fourth day, research on mammals and birds was addressed in parallel, integrating over the disciplines and attempting to identify sorely needed research. On the last day we exchanged visions for the "Road ahead" in the study of animal seasonality.

The format of a Lorentz workshop proved to be ideal for the inter-disciplinary goal of our workshop. The unique mix of people, created by the integrative theme, facilitated first direct interactions between many researchers working in parallel in different fields. The idea of being "a department" for a week and flexible schedules allowed for a wealth of one-on-one interactions, leading to much more fundamental discussions than would be possible at international meetings. In addition, during six sessions we broke up the attendance into small groups so that each participant, junior or senior, led a discussion on a topic of her or his own choice. This turned out to be a powerful stimulant of cross-disciplinary exchange. As a consequence, there was general consensus that the meeting has been exceptionally stimulating. Research progress, which had been hampered because of lacking integration between various approaches, may now advance at a faster pace. First steps into this direction were already initiated at the end of the workshop. Participants are currently discussing several possible funding schemes to

continue fruitful interactions. As a direct first step, delegates are being asked to submit relevant electronic material that can be used as a resource based on the Lorentz Center website. Overall, we hope to have gained major impulses for the understanding of animal ecology, physiology, and also conservation, and for future research in this field.

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