PhD position

Shared between the University of Groningen, Netherlands, and Lomonosov Moscow State University, Russia

Ancient timers in dynamic environments

Our world is constantly cycling, with seasons passing by, the day coming after the night, the moon turning around the Earth and driving tidal rhythms. All living organisms have to align their lives with these cycles. It has long been studied how the ancient time-keeping programs regulate animal physiological and behavioural cycles at annual, daily or tidal or lunar scales. In avian chronobiology, experiments by Ebo Gwinner and Viktor Dolnik have become a classic. Recently, our supervisory team and others have been breathing new life in studies of nature's enigmatic rhythms.

Many birds are born with internal time-keepers that help them anticipate rhythmic changes in the environment, such as the coming of spring and autumn. Birds then prepare to migrate, to breed, and to moult, just in time for the change of seasons. However, in our times environments are changing rapidly. Therefore, we need a better understanding of time-keeping programs. This PhD project seeks to dissect biological time-keeping and look at it from the ecological perspective.

Nowadays, novel technologies, state-of-the-art analytical methods and the tools for remote observation open up new opportunities to look at biological clocks at a different level and, importantly, to answer acute questions, such as:

- How migratory birds change their routines to the diverse environmental cycling along the flyway.
- How do they adjust when environmental cycles get disrupted.
- How the ability, the pace and the pathways of adjustment depend on species' life history.

We offer a fascinating and flexible PhD project, with a focus on avian time-keeping, but also with several options that a student can shape according to his/her interests. It will consist of the following 3 work packages:

1) Analysis of already collected data on time-keeping in captive birds. Using existing unique long-term data from captive waders and songbirds, the student will look at birds' ability to shift from internal time-keeping program to the rhythmic environment. We will examine whether the birds' shifts depend on life-cycle stage.

2) Analysis of data on behavioural routines of individuals from wearable trackers. Using GPS and accelerometry data from free-flying birds of various species, the student will study the birds' time-keeping in the wild and detect changes in their synchronization with their environments. With our help, the PhD student will (1) reveal behavioural cycles using machine learning to classify behaviour from accelerometery data and (2) match the behavioural cycles with animals' locations from GPS data and with environmental cycles from numerical model predictions and/or Earth Observation datasets..

3) Experimental work in captivity. Using captive facilities, in Groningen and possibly also in Russia, the student will be able to learn about, and carry out, studies of seasonal biology.

There is also scope for more in-depth quantitative approaches, for example modelling of annual-cycle activities or effects of climate change.

The PhD project will take 4 years, of which 3 will be spent in Russia with interspersed visits to the Netherlands. The final year, and the initial PhD defence, will take place in the Netherlands.

The project will be supervised by Eldar Rakhimberdiev (Moscow State University), Julia Karagicheva (Royal Netherlands Institute for Sea Research) and Barbara Helm (University of Groningen).

Interested? Please contact Eldar Rakhimberdiev eldarrak@gmail.com

References:

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