

MA 28: Bio-Magnetism (Magnetoreception)

Time: Wednesday 11:30–12:15

Location: H 0110

Invited Talk

MA 28.1 Wed 11:30 H 0110

The Future of Magnetoreception Research in Animals —

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Magnetoreception, the ability to sense the Earth's magnetic field, is widespread within the animal kingdom. Even though the sense is behaviourally proven to exist in birds, amphibians and mammals, the transduction mechanism remains a mystery. Two basic mechanisms have been proposed: A magnetic particle based mechanism (MPM) and a chemical mechanism based on radical pairs (RPM). In birds, both mechanisms seem to exist, perhaps complementing each other, while mammals seem to have either one or the other type. This has been concluded from a variety of straight forward behavioural experiments specifically addressed to narrow down the mode of magnetoreception. On the other side, histological evidence is ambiguous and often key findings are challenged several years later. Therefore, unravelling the magnetic sense is still a highly motivating field of research. In this talk, I will give an overview of the methods and findings regarding the mechanisms of magnetoreception in animals. I will discuss current problems, show up to date techniques and upcoming research directions.

MA 28.2 Wed 12:00 H 0110

Cattle under power lines - ELF MFs disturb magnetic

alignment — •SABINE BEGALL¹, PAVEL NĚMEC², ERICH PASCAL MALKEMPER¹, and HYNEK BURDA¹ — ¹University of Duisburg-Essen, Dept. General Zoology, Essen, Germany — ²Charles University in Prague, Faculty of Science, Prague, Czech Republic

Resting and grazing cattle tend to align their body axes in the geomagnetic North-South (NS) direction when being on flat pastures with no high-voltage power lines. In a follow-up study, we used aerial images provided by Google Earth to show that extremely low-frequency magnetic fields (ELFMFs) generated by high-voltage power lines disrupt alignment of the bodies of these animals with the geomagnetic field. Body orientation of cattle was random on pastures under or near power lines. Cattle exposed to alternating magnetic fields (AMF) directly under East-West trending power lines, exhibited a preference to orient their body axes parallel to the power lines and perpendicular to the resultant magnetic field, that oscillates between two intensity values (and two inclination values) but without changes in azimuth. In contrast, the alternating magnetic field vector of NS-oriented power lines is perpendicular to the horizontal component of the Earth's magnetic field lines, so that mainly the azimuth of the EMF is affected by the AMF, while intensity and inclination remain nearly constant. Under NS power lines, cattle tended to align their body axes along the NS axis, showing much higher scatter than controls (cattle on pastures without power lines). The disturbing effect of ELFMFs on body alignment attenuated with the distance from conductors.