ORAL PRESENTATION – SESSION C5 CLIMATE CHANGE: FROM GENES TO ECOSYSTEM

THERMAL EFFECTS ON CEPHALOPOD ENERGY METABOLISM – A CASE STUDY FOR *SEPIA OFFICINALIS*

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Cephalopods are the largest, most active invertebrates and there is considerable evidence for their convergent evolution with fishes. However, most active cephalopods display standard and active metabolic rates that are several-fold higher than comparably sized fishes. Shifting habitat temperatures due to climate change will therefore affect a cephalopod's energy metabolism much more than that of a fish. Prediction of the probable outcome of cephalopod-fish competition thus requires quantitative information concerning whole animal energetics and corresponding efficiencies. Migrating cephalopods such as squid and cuttlefish grow rapidly to maturity, carry few food reserves and have little overlap of generations. This "live fast, die young" life history strategy means that they require niches capable of sustaining high power requirements and rapid growth.
This presentation aims to draw a bottom-up picture of the cellular basis of energy metabolism of the cuttlefish *Sepia officinalis*, from its molecular basis to whole animal energetics based on laboratory experiments and field data. We assessed the proportionality of standard vs active metabolic rate and the daily energetic requirements using field tracking data in combination with lab based respirometry and video analysis. Effects of environmental temperature on mitochondrial energy coupling were investigated in whole animals using *in vivo* ^{31}P-NMR spectroscopy. As efficient energy turnover needs sufficient oxygen supply, also thermal effects on the blood oxygen-binding capacities of the respiratory pigment haemocyanin and the differential expression of its isoforms were investigated.

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