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Room: Seminar Room

Impact of urbanization on abundance and phenology of caterpillars and consequences for breeding in an insectivorous bird

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Urbanization can have marked effects on plant and animal populations' phenology, population size, predator-prey interactions and reproductive success. These aspects are rarely studied simultaneously in a single system, and some are rarely investigated, e.g. how insect phenology responds to urban development. Here, we study a tri-trophic system of trees – phytophagous insects (caterpillars) – insectivorous birds (great tits) to assess how urbanization influences i) the phenology of each component of this system, ii) insect abundance and iii) avian reproductive success. We use data from two urban and two forest sites in Hungary, central Europe, collected over four consecutive years. Despite a trend of earlier leaf emergence in urban sites there is no evidence for an earlier peak in caterpillar abundance. Thus, contrary to the frequently stated prediction in the literature, the earlier breeding of urban bird populations is not associated with an earlier peak in food availability. Despite this the seasonal dynamics of caterpillar biomass exhibited striking differences between habitat types with a clear peak in forests, and several much smaller peaks in urban sites. Caterpillar biomass was 8.5 to 24 times higher in forests than urban sites during the period when great tits were raising their first broods. This higher biomass was not associated with taller trees in forest sites, or with tree species identity, and occurred despite most of our focal trees being native to the study area. Urban great tits laid smaller clutches, experienced more frequent nestling mortality from starvation, and reared fewer offspring (of lower body mass) to fledging age. Our study strongly indicates that food limitation is responsible for reduced avian reproductive success in cities, which is driven by reduced availability of the preferred nestling diet, i.e. caterpillars, rather than phenological shifts in the timing of peak food availability.