Public Abstract

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Title:The evolutionary significance of developmental plasticity in the communication system of Neoconocephalus triops (Orthoptera: Tettigoniidae)

One of the most fundamental questions in biology is, how did the diversity of traits and species that we observe today evolve? In recent years, a body of research emerged, showing that organisms can change in response to changes in the environment they live in. This phenomenon was termed 'developmental plasticity' and has been identified as a potent initiator of new traits and species. Thus, studying developmental plasticity contributes to the understanding of evolutionary processes.

Acoustic communication plays for many organisms (e.g. katydids, frogs) an important role in the context of reproduction: the male produces a call to attract females for mating. Male call and female preference for these calls have to match for the communication system to function. Each species only produces one specific call to attract females of its own kind. We investigated acoustic communication in the katydid Neoconocephalus triops. This species is exceptional because it changes its calls with the seasons: the summer call is substantially faster than the winter call and the different calls are the product of different environmental conditions (= developmental plasticity). Our research focused on the consequences of male call plasticity for female preference and whether call plasticity caused the communication system to evolve. We conducted behavioral experiments to test female attraction to acoustic stimuli at different temperatures.

We found that females were attracted only by a specific speed of the call and this preference changed with temperature. Warm females preferred much faster calls than cold females, so that the fast summer call attracted females only at high temperatures and the slow winter call only at lower temperatures. We found that this match between female preference and each call type at different temperatures was due to an evolved change in female preference. Thus, female preference evolved to compensate for the seasonal change in male calls. Our experiments highlighted the role of the environment in the evolutionary change of a trait (female preference).