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PROJECT TITLE: Trade-off between species recognition and individual discrimination in tropical Turtur doves

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Research project objectives/Research hypothesis

Song is a fundamental signal associated with sexual selection in birds. The processes that allow for species recognition as well as for individual recognition are inextricably linked and prerequisite for subsequent decisions about strategy of territory defence and mate choice. The two mentioned functions are somewhat contradictory, as species recognition needs the uniform feature of a song within a species, whereas individual recognition is only possible if individuals within a species are somehow acoustically different. This may lead to conflicting selection pressures that are dependent on the chance of mistaken species recognition and the importance of individual recognition. The problem that we want to deal with in this project is the evolutionary compromise between species specific uniformity and individual-specificity of acoustic signals produced in a sexual selection context. Our model system, the dove species from the Turtur genus inhabit forest-woodland-savanna habitats in Sub-Saharan Africa. Firstly, we want to describe the advertisement song variation among and within all Turtur species, in order to identify species and individually specific song features. Second, we want to experimentally test how birds respond to songs of the same species and different species in populations occurring allopatrically and sympatrically; and if birds can discriminate between neighbours and strangers and how similar, co-existing species affect this process. We plan to use molecular methods to confirm phylogenetic relatedness among the five species and analyse the genetic structure of same- and different-species populations living in sympatry and allopatry.

Research project methodology

We have planned research in at least nine macro-locations in which we want to catch and test birds in 21-24 micro-locations differing in habitat type (from deep, moist forest to wooded dry savanna) across Sub-Saharan Africa. At each location we plan to record birds' song and conduct playback experiments allowing for the precise testing of hypotheses about song functions. Recordings will be analysed with bioacoustics software allowing for repeatable measurements of song parameters. In places where recordings will be taken we will also describe the habitat in a standardised way to determine the preferences of the vegetation structure of a particular species (background for interspecific competition). We plan to experimentally test the response to the playback of songs of their own species from local populations, distant populations, and different congeneric species songs. We plan to test response to neighbours and strangers from local population as well as to artificially synthetized song containing manipulated mixture of individual- and species-specific characters. All experiments will include a control. Birds will also be caught in order to obtain blood samples for molecular analyses. Population genetic and phylogenetic analyses will be performed using RAD-seq method. We plan to obtain a considerable part of all data from individually marked individuals thanks to the use of modern telemetry technologies. In each site we would like to catch 20-30 birds which should give an overall total of about 500-600 sampled individuals. In the case of playback experiments we plan to test no less than 15-20 birds per treatment within each experiment.

Expected impact of the research project on the development of science

The results of this project are important in many ways. As recognition of own species and individuals underlies almost any social behaviour, detail understanding of species and identity signalling will help us better understand the mechanisms recognition processes but social behaviours in general as well. The study system, closely related bird species with very simple and inherited song, seems to be perfect for attempt of understanding how animals resolve species-identity recognition conflict in practice, when occur with congeneric, potentially signal-confounding species in different spatial combinations. Results of this study will also improve methods for species and individual bird recognition for nature conservation and long-term monitoring purposes. Only few publications report on the phylogenetic position of four (among five) of the Turtur spp. among other pigeons and doves Therefore, our analysis on the respective positions of Turtur spp. on the phylogenetic tree of Columbidae will result in a better understanding of phylogenetic relations within this little studied group of species and among Turtur spp. and other pigeons. There are no reports on the genetic structure within and among populations of the five species. Also, nothing is known about the diversification among the species in different localities, where they occur sympatrically or allopatrically. The present project will fill this gap. The results of the molecular analysis will provide a demographic background for the analysis of song diversification among Turtur species. We will be able to compare ranges of diverse acoustic signals with the genetic structure of populations to search for potentially similar patterns of diversification. There is no published data on song behaviour of Turtur doves.