



ESF - Short Visit Grant - Final Report

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APPLICATION DATA

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SHORT VISIT GRANT

Reference Number : 1865
Report submitted : 23/07/2007 16:36:53

ESF ACTIVITY

Unit(s) : LESC
Activity Title : Integrating population genetics and conservation biology: Merging theoretical, experimental and applied approaches
Activity Acronym : CONGEN

PROJECT

Title of the proposed research project : Tracing the initial stages of genetic and ecological divergence in a highly mobile marine mammal
Date of visit (starting date) : 09/07/2007
Duration : 5 day(s)
Travel Granted : 400 €
Applicant's Name : Dr. Jochen B. W. Wolf, Bielefeld, Germany

MAXIMUM AMOUNT GRANTED

TOTAL ESF Grant FUNDING : 825 €

HOST INSTITUTE(s)

Professor Oscar Gaggiotti, Grenoble, France

ACTUAL EXPENDITURE

Travel Cost : 400 €

Scientific Report Jochen B. W. Wolf

Purpose of the visit

Recent advances in speciation research promote the idea that ecological differences may be crucial drivers for genetic differentiation. We study the Galapagos sea lion to determine the extent to which ecological parameters can trigger genetic divergence in sympatry. As such large marine top predators are not amenable to experimental approaches, mathematical techniques constitute an attractive alternative to contrast competing hypotheses. It was the aim of the visit to use mathematical modelling techniques to address this question in more detail.

Description of the work carried out during the visit

A Bayesian inference framework recently developed in the group of Oscar Gaggiotti was used to model the influence of ecological variance on genetic structure. As this method is yet to be published, this was also an important step in testing and validating the functionality of the method. Further, a variety of other Bayesian and likelihood based methods were used to estimate population genetic parameters of interest. Using a large data set of nuclear and mitochondrial markers, we aimed at obtaining estimates of gene flow and the demographic history of the species. Large part of the conducted work consisted in finding the right settings for the MCMC chains to converge in order to obtain reliable parameter estimates.

Description of the main results obtained

Structure of the environmental variables and the degree of genetic differentiation did unfortunately not allow to directly assess the relative importance of various environmental variables. We could, however, infer recent migration rates with good confidence. Against our expectation, recent migration proved to be highly asymmetric, a finding that will certainly be of importance for conservation management of this vulnerable species.

We proceeded to estimate historical migration rates and population growth. Preliminary results suggest that the Galapagos population expanded and, interestingly, the direction of gene flow changed through evolutionary times. If that result can be consolidated, this would lend further support to “ecological hypothesis of differentiation”.

Future collaboration with host institution and projected publications

We plan to finish the started analysis and in addition obtain a time estimate of the splitting event for the two ecologically and genetically distinct populations. Once all relevant estimates are obtained we project to combine them in the most likely scenario of population genetic history of the species. We foresee a publication that uses the Galapagos sea lion as a model that will help to understand evolutionary processes in sympatry.