Introduction

- Elegant Scops Owl (Otus elegans) is distributed on some western Pacific islands.
- Some of these islands were connected in the past as the fall of sea level in the glacial period, but some are not.
- The contemporary population structure should be shaped by both isolation and dispersal.

Study aims

Using molecular markers to reveal the genetic diversity, population structure, gene flow and demographic history of Elegant Scops Owls on Ryuku and Lanyu islands.

Genetic marker

I. Mitochondrial DNA: 1,665 bp complete Cytochrome b (1,142 bp) and NADH dehydrogenase subunit 6 (ND6) gene (522 bp)

II. Microsatellite: 13 loci

Result

I. Genetic diversity

<table>
<thead>
<tr>
<th>Island</th>
<th>Total</th>
<th>Lanyu</th>
<th>Yaeyama</th>
<th>Okinawa</th>
<th>O. e. botelensis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nt</td>
<td>0.290</td>
<td>0.678</td>
<td>1.0</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>θ</td>
<td>0.006</td>
<td>0.002</td>
<td>0.007</td>
<td>0.004</td>
<td>0.004</td>
</tr>
<tr>
<td>Haplotype</td>
<td>0.922</td>
<td>0.666</td>
<td>0.954</td>
<td>0.863</td>
<td>0.863</td>
</tr>
</tbody>
</table>

Microsatellite

- Genetic diversities are higher in northern island populations.
- No mtDNA variation was found in Lanyu and Daito populations than other island populations.

II. Phylogenetics and population differentiation

A. Minimum Spanning Network (mDNA)

- Deep divergence exists between northern and southern island populations.
- Some southern haplotypes can be found in northern populations.

B. Fst

- Significant population differentiation are present among most island populations.

III. Gene flow

A. Bayesian estimation of divergence vs. migration over historical time

- Different divergent history and migration rate among islands.
- Amamioshima and Okinawa populations were separated relatively recently, with frequent gene flow after separation.
- Long-term divergence with little migration between Okinawa and Yaeyama.
- Lanyu population was diverged from Yaeyama recently, but few gene flow after separation.
- Daito population might originated from Amamioshima, instead of Okinawa.

B. mDNA haplotype distribution

- The two haplotype groups were roughly separated by Kerama Gap.
- Four southern haplotypes were found in Okinawa and one found in Amamioshima.
- Kumejima owls was from southern population.

C. Maximum likelihood estimation of migration rates (MIGRATE 1.6.8Baeiri 2002)

- Asymmetric migration between populations
- More northward than southward migration
- The direction of asymmetric migration coincide with the direction of typhoon.

IV. Demographic history

Maximum likelihood estimation of population growth rates based on the coalescent (Futuaste 1.4, Kuhner et al. 1998)

- No significant population decline was detected since last glacier period.

Summary

I. The population of O. elegans had experienced a long period of north-south isolation.
II. Different degrees of genetic differentiation exist among some populations.
III. Cross-ocean dispersal exists.
IV. The direction of gene flow is asymmetric, more individuals move northwards than southwards.
V. The reduction of land mass due the rise of sea level after glacier period did not result in significant population decline.

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