Question

All individual fishes in a population are not identical. Phenotypic diversity within a population may modulate a resilient population response to changing conditions.

Allezymes, which relate to gene expression, characterize phenotypic diversity and may serve to identify the adaptation to specific conditions in habitats.

Diversity vector

12 loci with different allezymes implicated in glycolysis, Krebs cycle, lipid generation and catalysis of proteins (\(\ast\) - m \(\ast\): in the muscle; \(\ast\) - f \(\ast\): in the liver)

- PGI-m
- LDH2-m
- ME2-m
- MDH1-m
- PGD-m
- aGPD-m
- IDH-f
- AAT-f
- LGG-f
- PP-f
- IDH-m

Sampling

On board R/V Thalassa during PELGAS acoustic surveys, a dedicated protecole for genetics:

- 50 anchovies at trawl station are frozen (-70°C)
- 5 to 16 opportunistic stations per year, 5 years: 3356 individual fishes covering all habitats

In the Laboratory:

- Extraction of muscle and liver
- Preparation of proteic material
- Separation of allezymes by Electrophoresis on a polyacrylamide gel

Data

The allezyme data matrix:

- It contains the results of the electrophoresis
- Lines are individual fishes, columns are the loci. Each matrix cell \([i,j]\) has a value ‘codeA codeB’ characterizing the two alleles for individual \(i\) at locus \(j\).
- Allelic diversity is based on the values of codeA and codeB.

Other associated data:

- Individual fish biometry (Length, weight, Age), trawl location, bottom depth at trawl location
- Acoustically derived anchovy biomass (tonnes/n.mi.\(^2\)) averaged in the vicinity of the trawl locations (4 n.mi.)

Results

Three Loci only are polymorphic (5% level): PP-f, PGI-m, IDH-f

IDH-f: Significant antagonistic gradient with bottom depth of allele 100 and 120 frequencies

Discussion

Similar result for Steelhead Trout: Redding et al. (1979), who also demonstrate that the combination 120xxx is favored in case of higher temperature and/or less oxygen.

Are individuals with the allele 120 favored in coastal habitats?

Allelic frequencies do not correlate with biometric parameters unlike in Bembo et al. (1996)