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# Population Structure of the Luminescent Deep-Sea Shark *Etmopterus granulosus* (Squaliformes: Etmopteridae)

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## Introduction - Etmopteridae

- inhabit subphotic zone
- most speciose family of Squaliformes (approx. > 45 species)
- cosmopolitical distribution
- slow growth and low reproduction rate
- many species are bycatch of increasing commercial deep-sea fisheries
- bioluminescent organs

# Introduction - *Etmopterus granulosus*

IUCN Red List of Threatened Species:

- common name: Southern Lanternshark
- endemic to South America
- morphologic congener *Etmopterus baxteri* is a junior synonym of *E. granulosus* according to morphological analyses (Tachikawa et al. 1989)
- doubts remain on taxonomic status and distribution ranges of both species
- recordings of large lantern sharks as *E. baxteri* or *E. granulosus*

 inconsistent usage of both species' names

## Introduction - *Etmopterus granulosus* (Günther 1880)

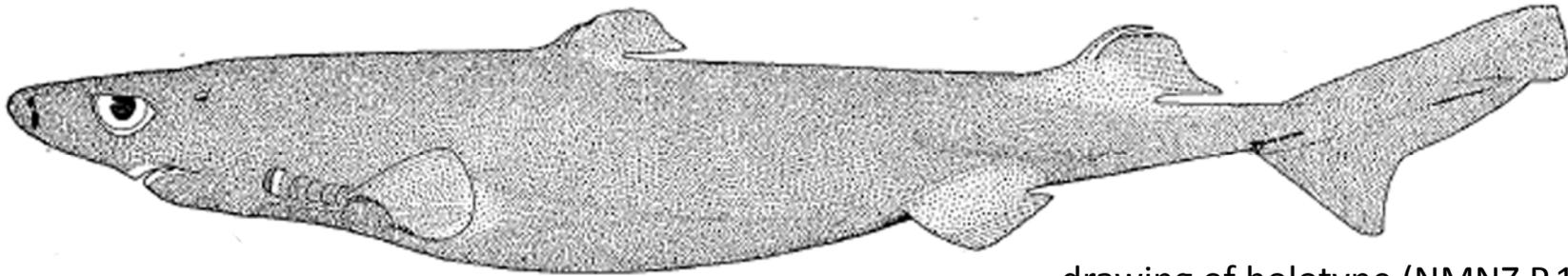


holotype (BMNH-1879.5.14.460)



fresh specimen (Chile)

## Introduction - *Etmopterus baxteri* (Garrick 1957)

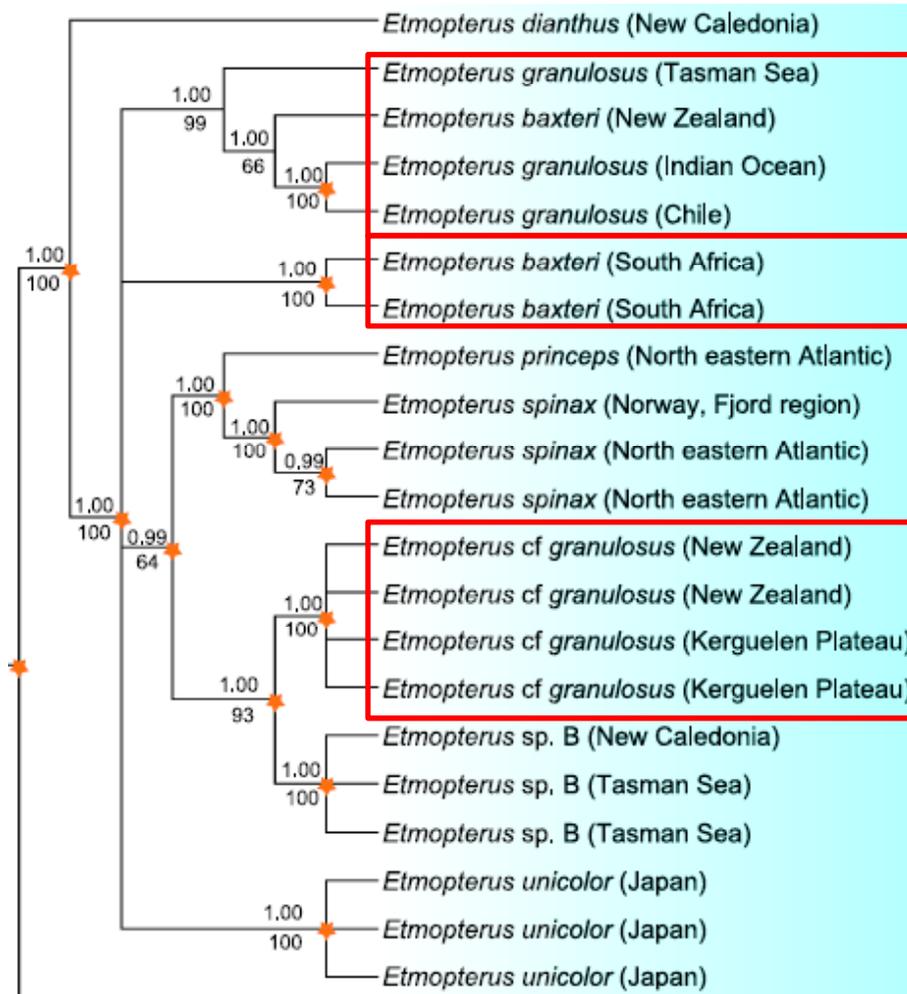


drawing of holotype (NMNZ P.1950)



fresh specimen (New Zealand)

# Molecular Phylogeny – *Etmopterus spinax* clade



Please have a look at our poster!

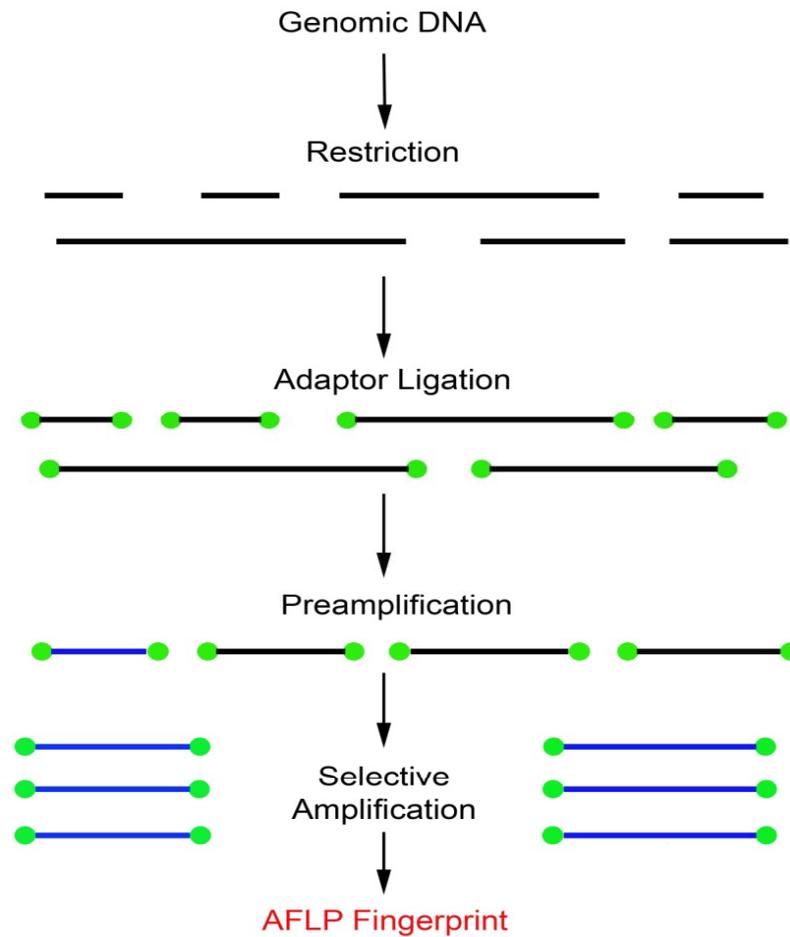
## Open Questions

- synonymy of *E. baxteri* and *E. granulosis* reflected in molecular analyses?
- cryptic diversity among specimens recorded as „*Etmopterus granulosis*“ and „*Etmopterus baxteri*“, respectively:
  - species status of *E. baxteri* from South Africa
  - species status of *E. cf granulosis* from the Kerguelen Plateau
- biogeography of *E. granulosis*: distributed in the whole southern Hemisphere or endemic to South America?

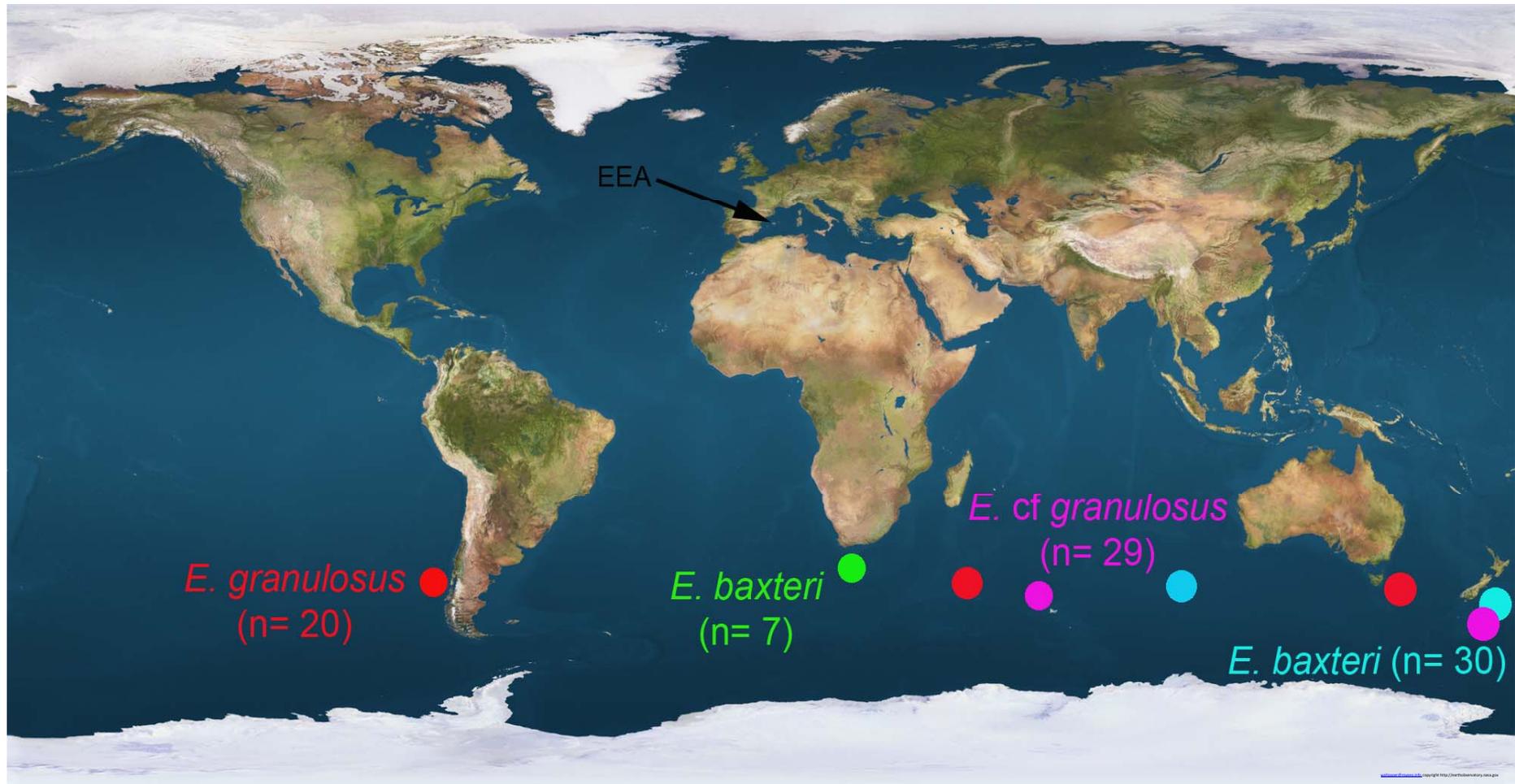
# Approach

- population genetics incl. samples of *E. granulosus*, *E. baxteri*, and *E. cf granulosus* from different locations
- mtDNA (COI) barcoding (655 bp)
- multilocus AFLP genotyping (3359 characters)

# Approach – AFLP Genotyping



## Approach – sampling sites



Introduction

Molecular Phylogeny

Open Questions

**Approach**

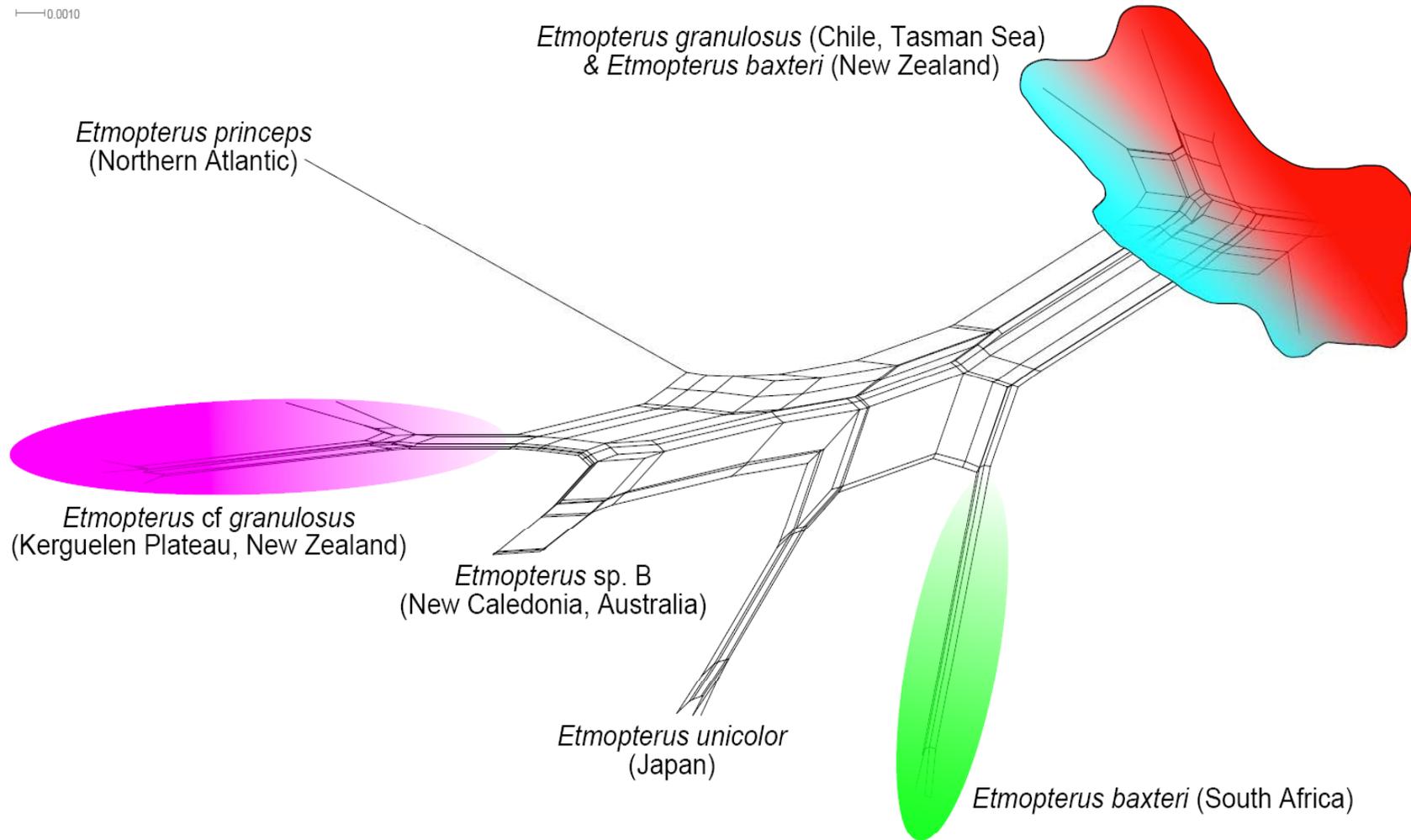
Results

Discussion

Perspectives

# Results – COI Network

0.0010



Introduction

Molecular Phylogeny

Open Questions

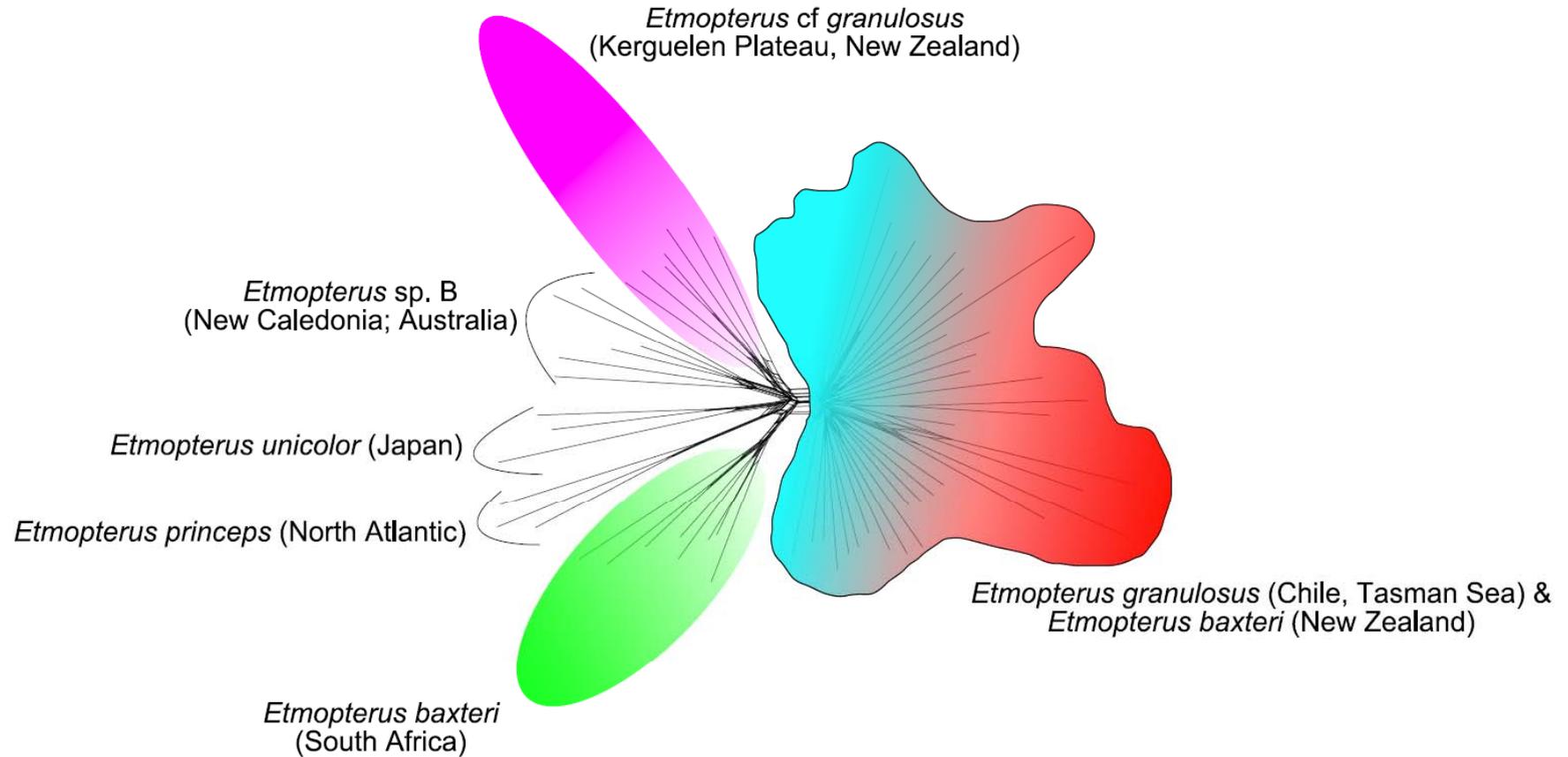
Approach

**Results**

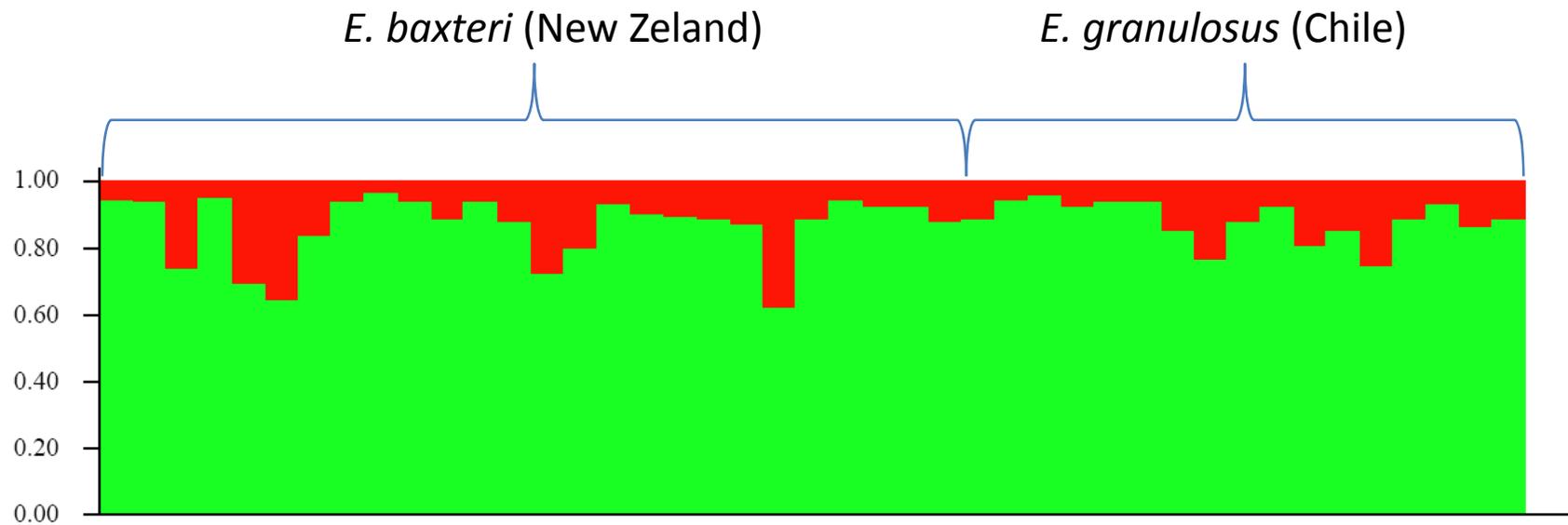
Discussion

Perspectives

# Results – AFLP Network



# Results – Bayesian Cluster Analysis (Structure v2.3.2)



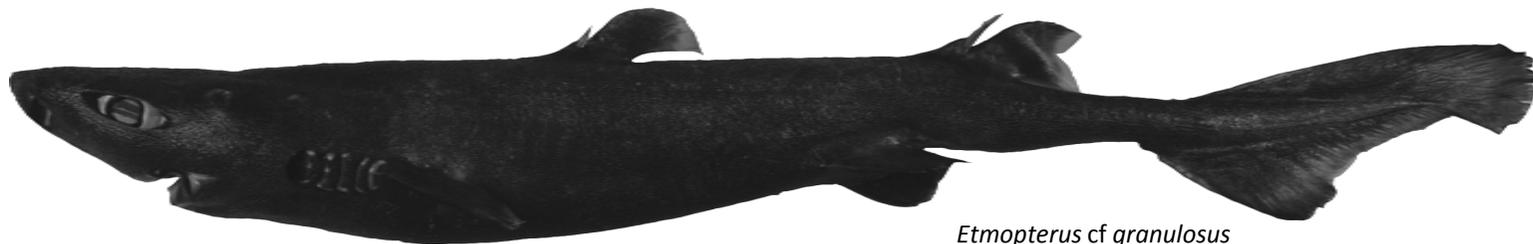
## Results – Summary

- no genetic differentiation between *E. granulosus* and *E. baxteri*

➔ **Synonymy confirmed**

- specimens of *E. baxteri* from South Africa form a distinct cryptic species from *E. granulosus* from New Zealand and Chile

- specimens of *E. cf granulosus* from the Kerguelen Plateau represent a still undescribed species



## Discussion

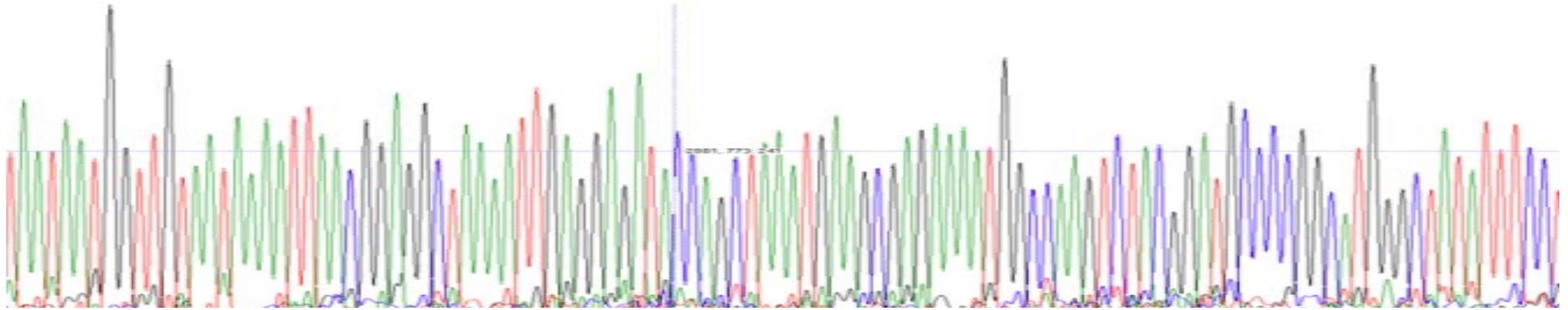
- one single population of *E. granulosus* spread in the Southern Hemisphere?
- not endemic to South America
- results suggest regular genetic exchange between locations

 Is *E. granulosus* migratory?

## Perspectives

- phylogeographic differentiation of deepwater sharks needs to be accounted for in stock assessments and fisheries
- endemic vs widespread species need differentiated conservation and management strategies
- cryptic diversity in etmopterids is high

 similar situation for *Etmopterus unicolor*

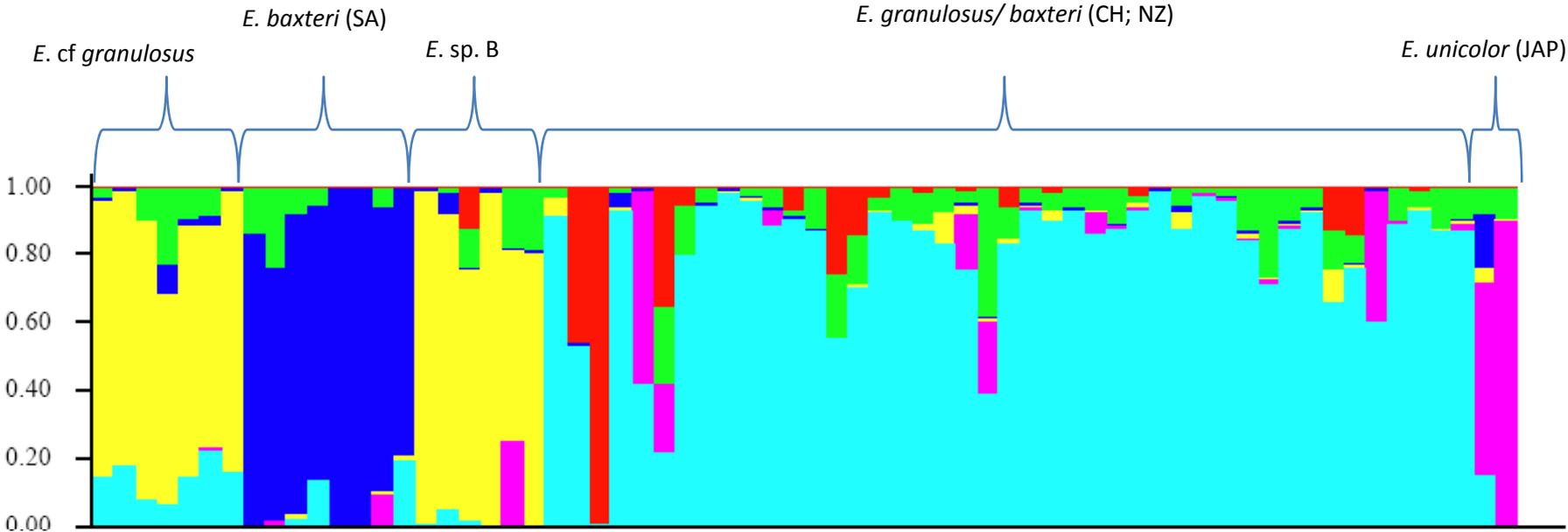


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- Sho Tanaka (Tokai University, Japan)
- Samuel Iglésias (MNHN, France)



# Bayesian Cluster Analysis (Structure v2.3.3)



# Principal Component Analysis from Morphometric Data (PAST v1.0.3)

