

Biogeography of the Indo-West Pacific freshwater sardines

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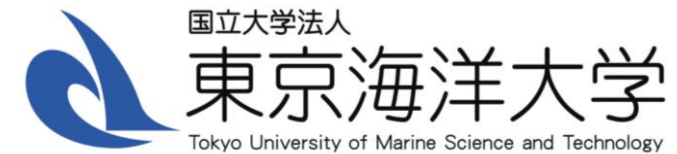
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Date: 2018.03.15



海外探検隊



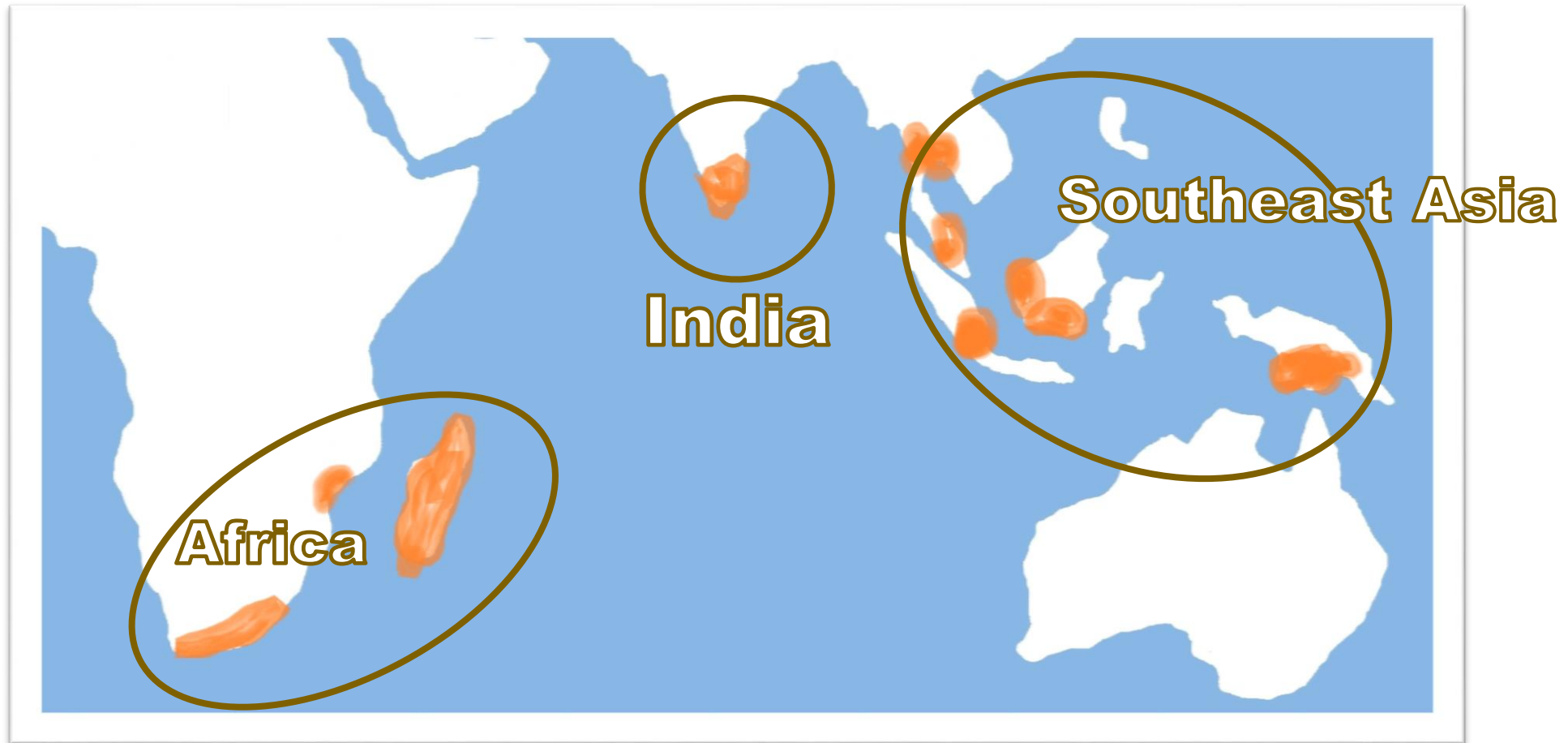
Indo-West Pacific freshwater sardines

Subfamily Ehiravinae:

- Comprises **20 species**
- Lives in **Africa**(5 species), **India**(2 species), **Southeast Asia**(13 species)
- They **cannot** live in ocean



The distribution of these fish



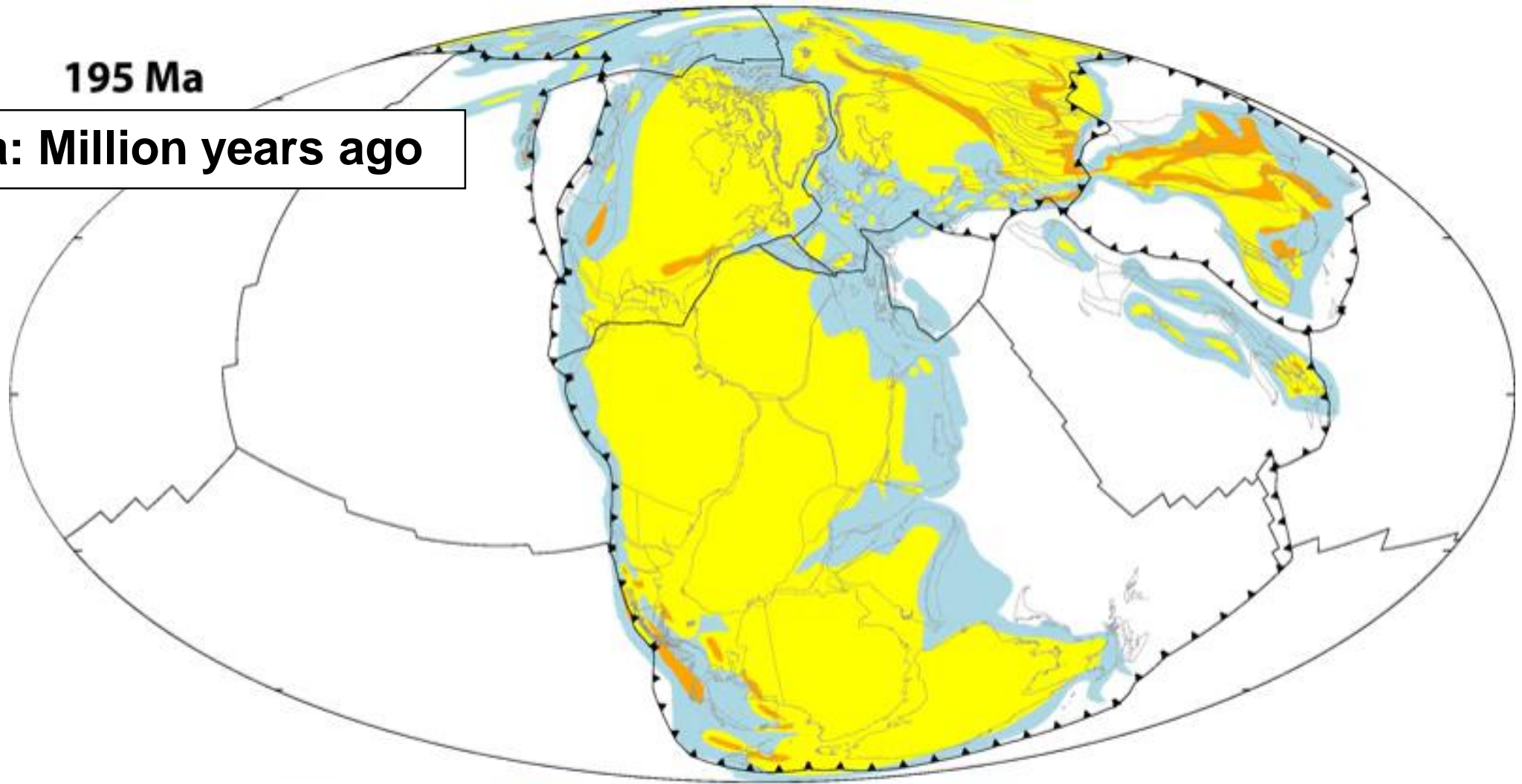
Map of the Indo-West Pacific region on which is shown the distribution of freshwater sardines (subfamily Ehiravinae)

3 Hypotheses explaining the distribution of the freshwater sardines

- 1: Pangean Dispersal
- 2: Gondwana Vicariance
- 3: Post Drift Dispersal

195 Ma

Ma: Million years ago



Ice sheet



Mountain



Landmass



Shallow marine



Deep ocean

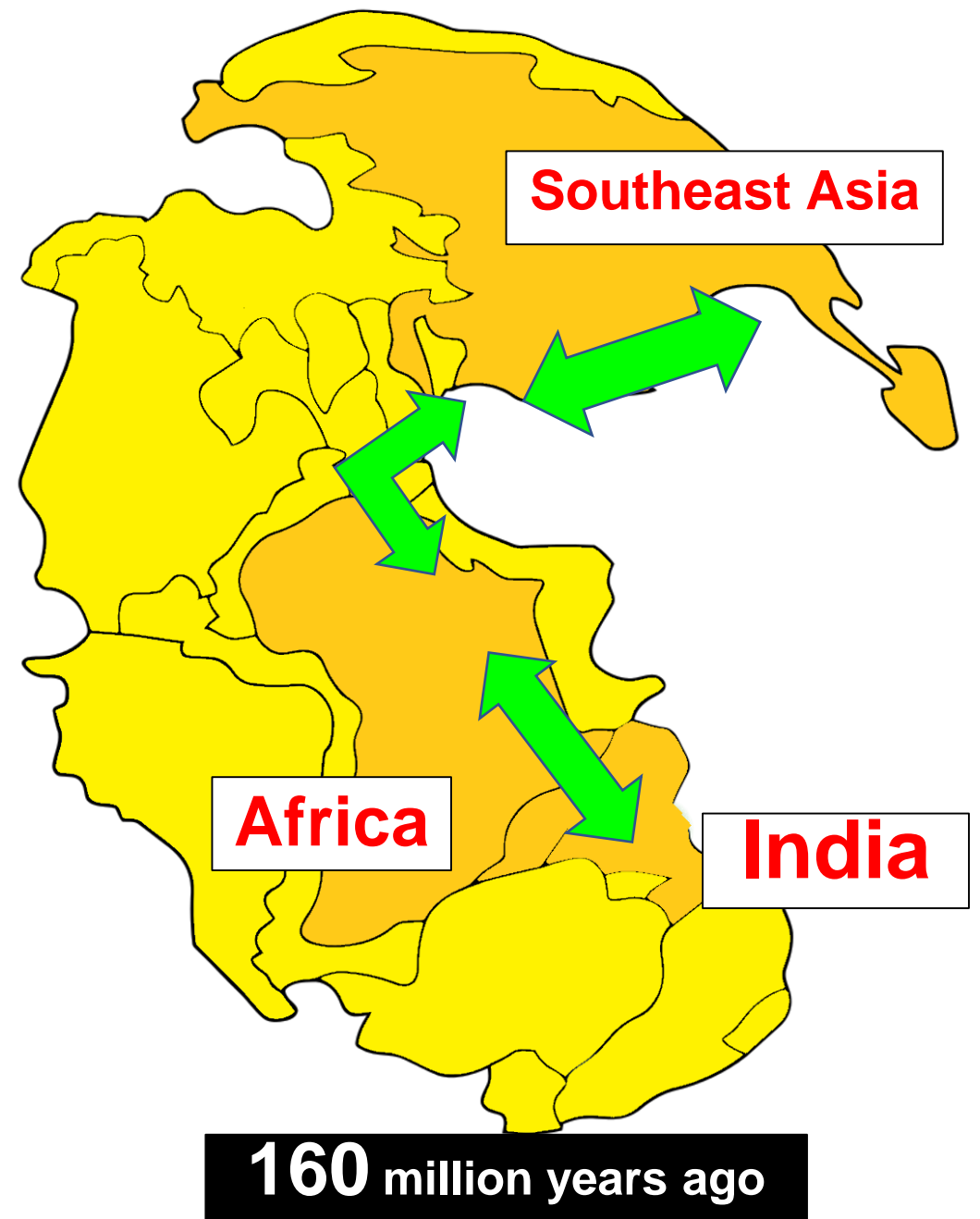
Hypothesis 1

Pangean Dispersal

Prediction (If correct...)

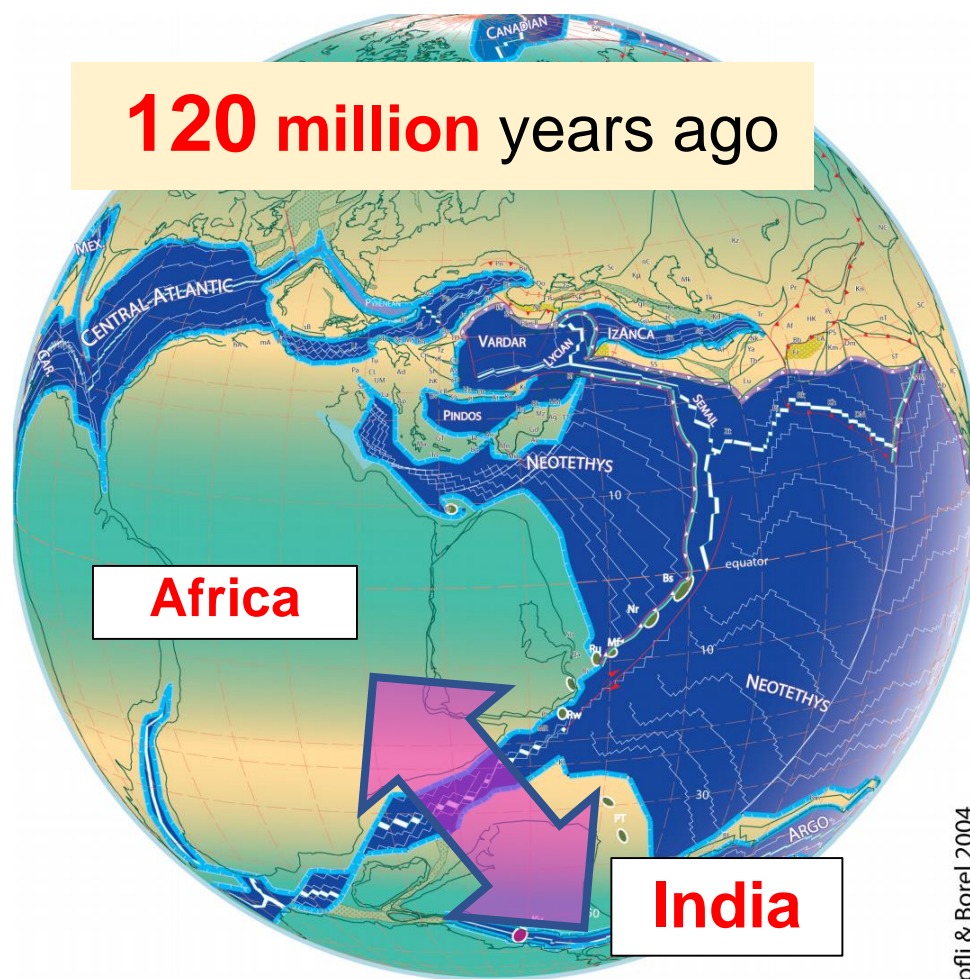
The divergence time :

Older than **160 million** years ago.



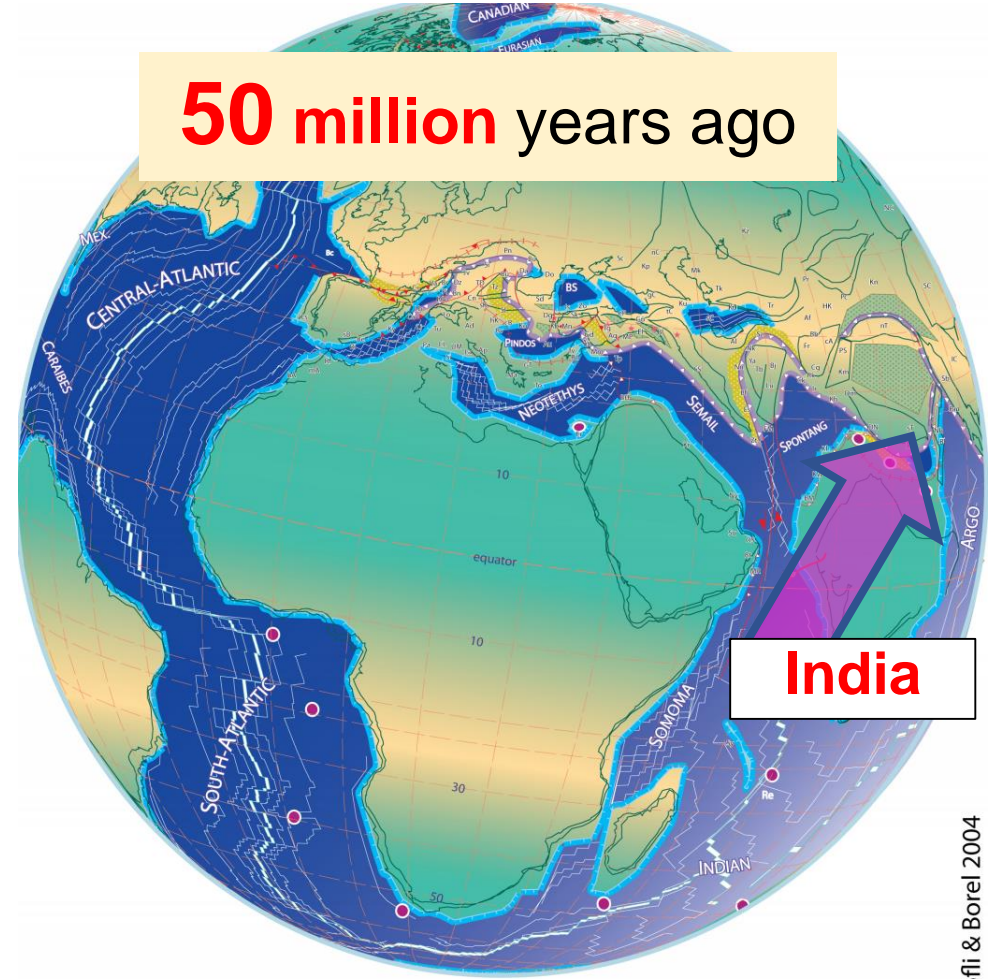
Hypothesis 2

Gondwana Vicariance



121Ma - Barremian-Aptian (an. M0)

Stampfli & Borel 2004



46 Ma - Lutetian (an. 21)

Stampfli & Borel 2004

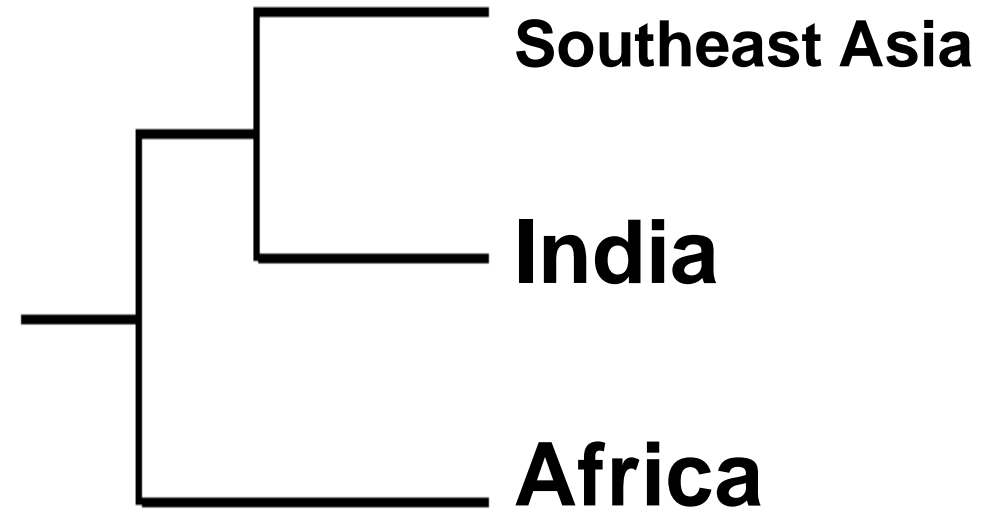
Hypothesis 2

Gondwana Vicariance

Prediction (If correct...)

The divergence time
(between **African** and **Indian sardines**) :
About **120 million** years ago.

The divergence time
(between **Indian** and **Southeast Asian sardines**) :
Younger than **50 million** years ago.



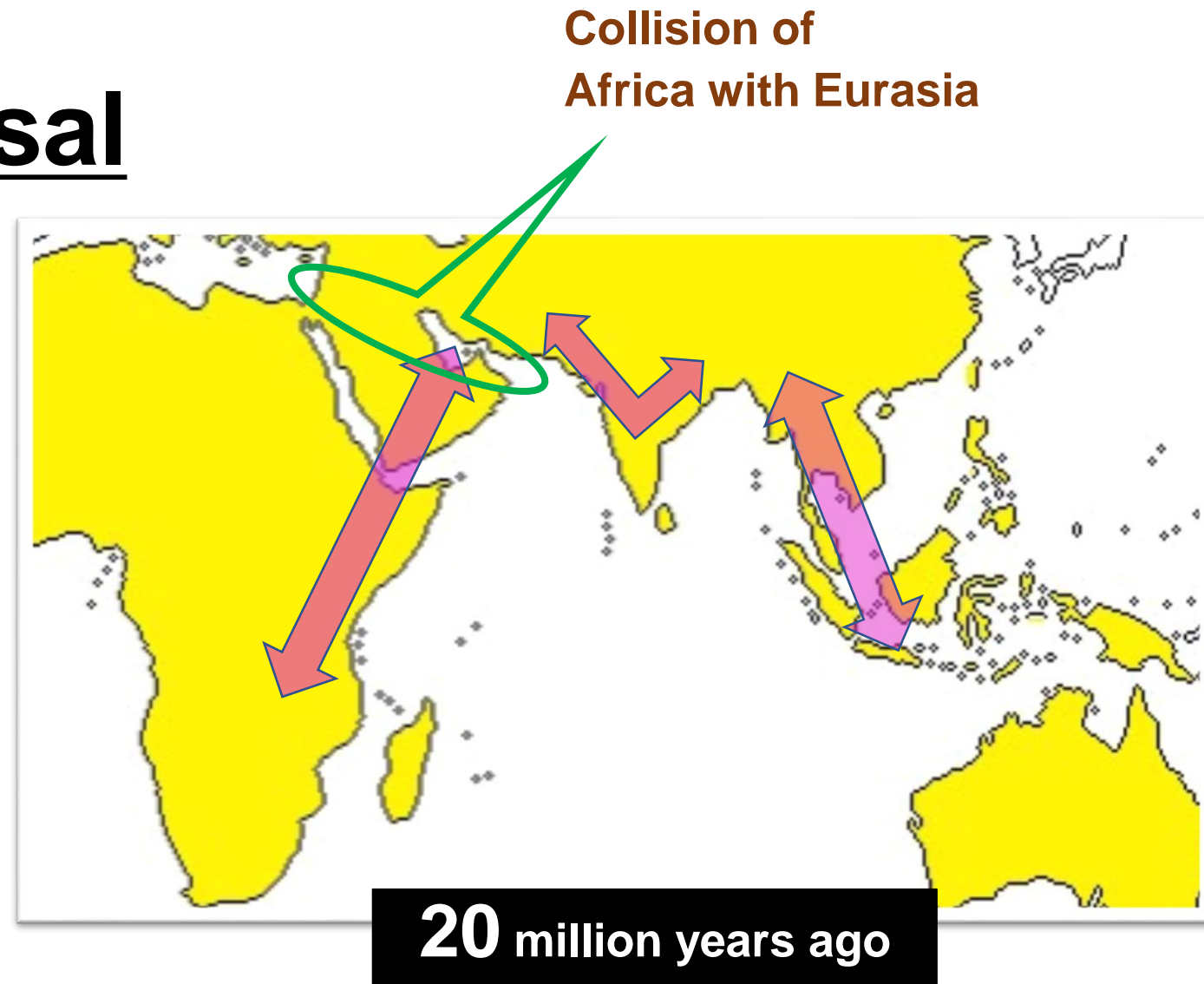
Hypothesis 3

Post Drift Dispersal

Prediction (If correct...)

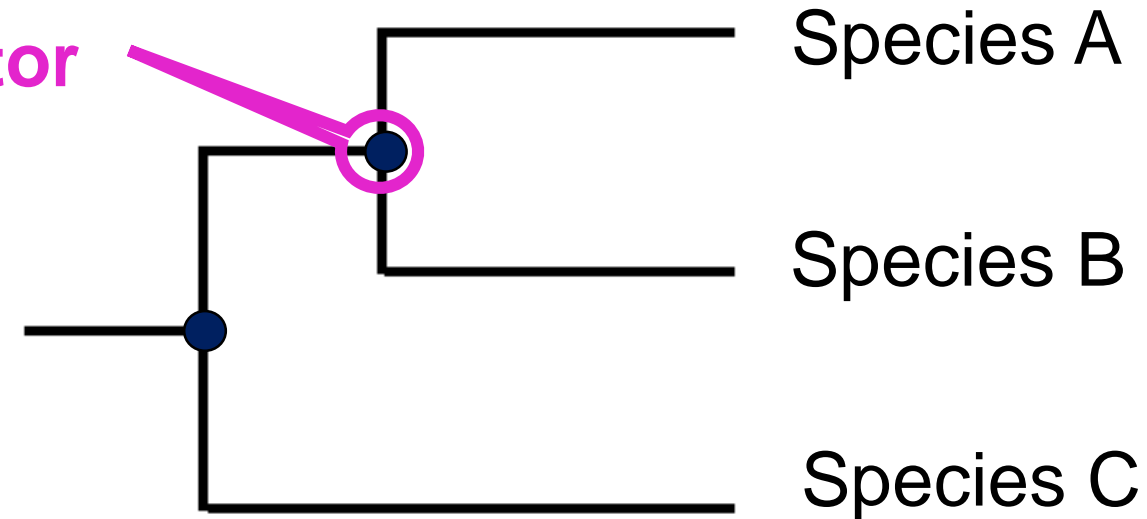
The divergence time :

Younger than **20 million** years ago

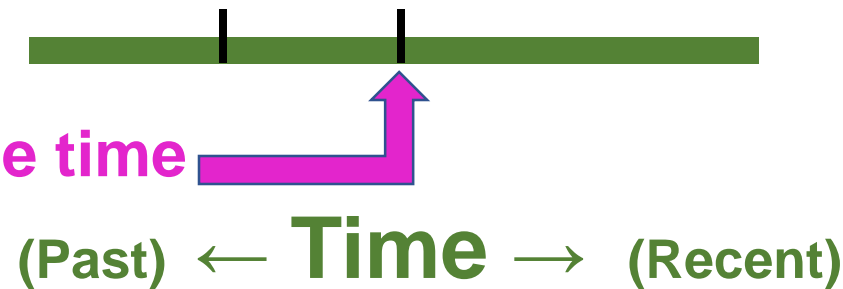


Phylogenetic tree

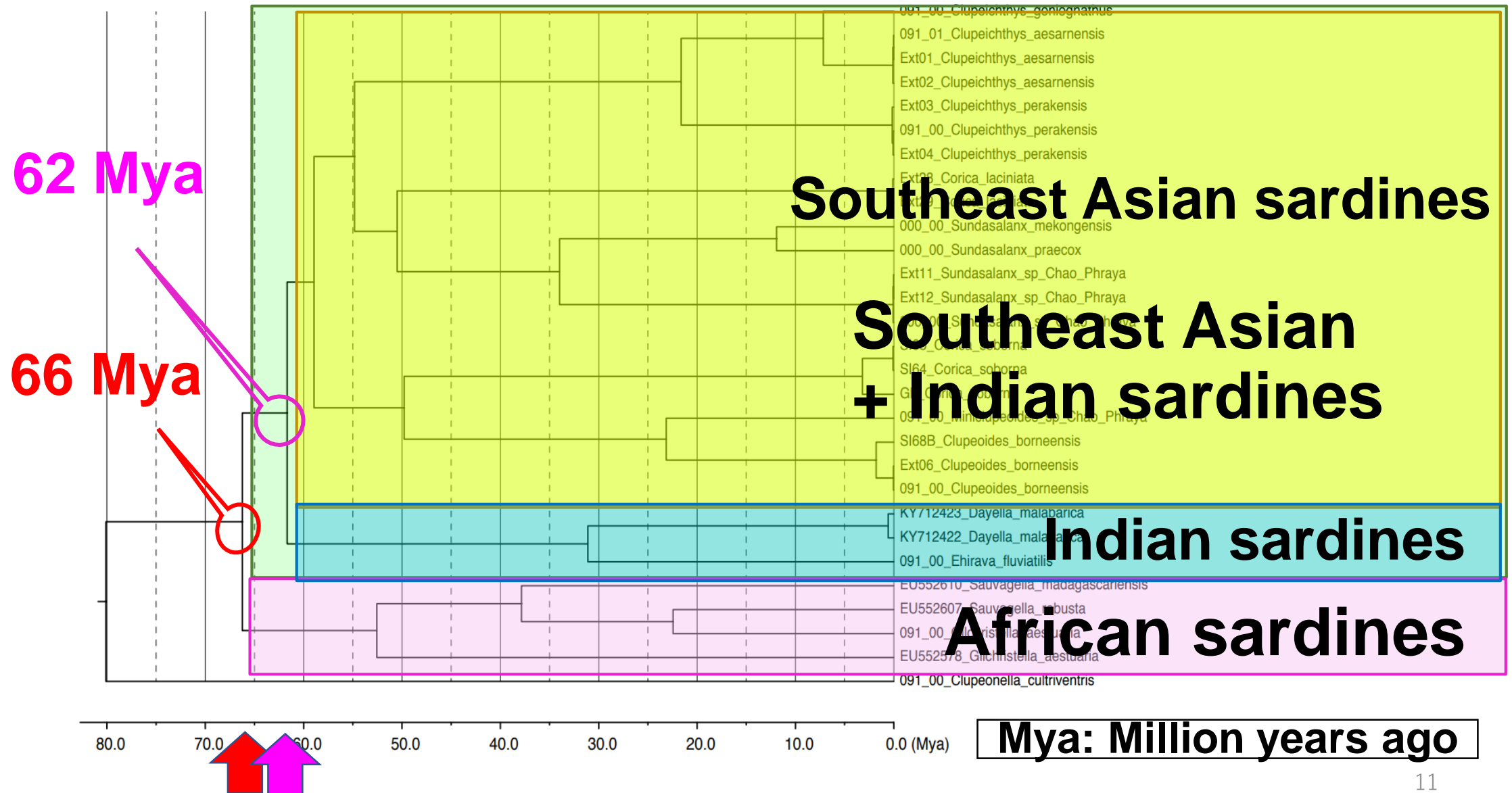
Most recent
common ancestor
of A and B



The estimated divergence time



Result: Phylogenetic tree



Predictions of 3 Hypotheses

1: “Pangean Dispersal ”

The estimated divergence time between African sardines ,Indian ones and Southeast Asian ones would be older than 160 million years ago.



2: “Gondwana Vicariance”

The estimated divergence time between African and Indian sardines would be about 120 million years ago.

the estimated divergence time between Indian and Southeast Asian sardines would be about 30 million years ago.

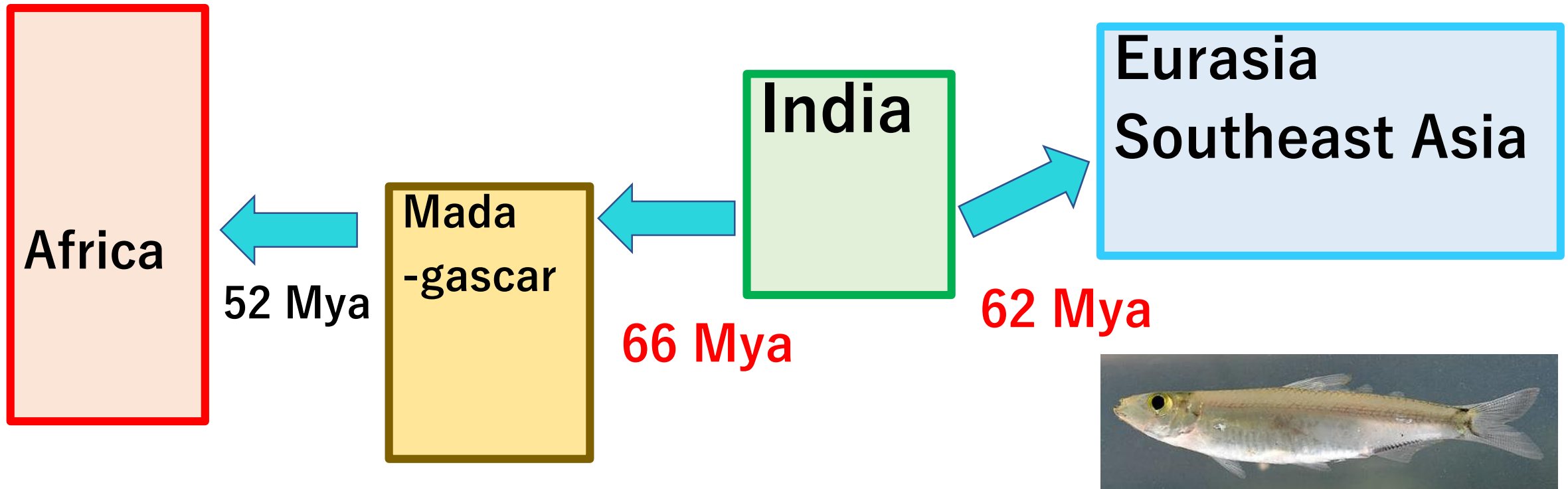


3: “Post Drift Dispersal”

The estimated divergence time of these fish would be younger than 20 million years ago.



New Hypothesis “Marine Dispersal”



Freshwater sardines dispersed through marine environment (?)

Acknowledgement

I warmly thank Prof. Miki, Prof. Denis Prof. Lavoué,
Prof. Komatsu.

Thank you for your attention.