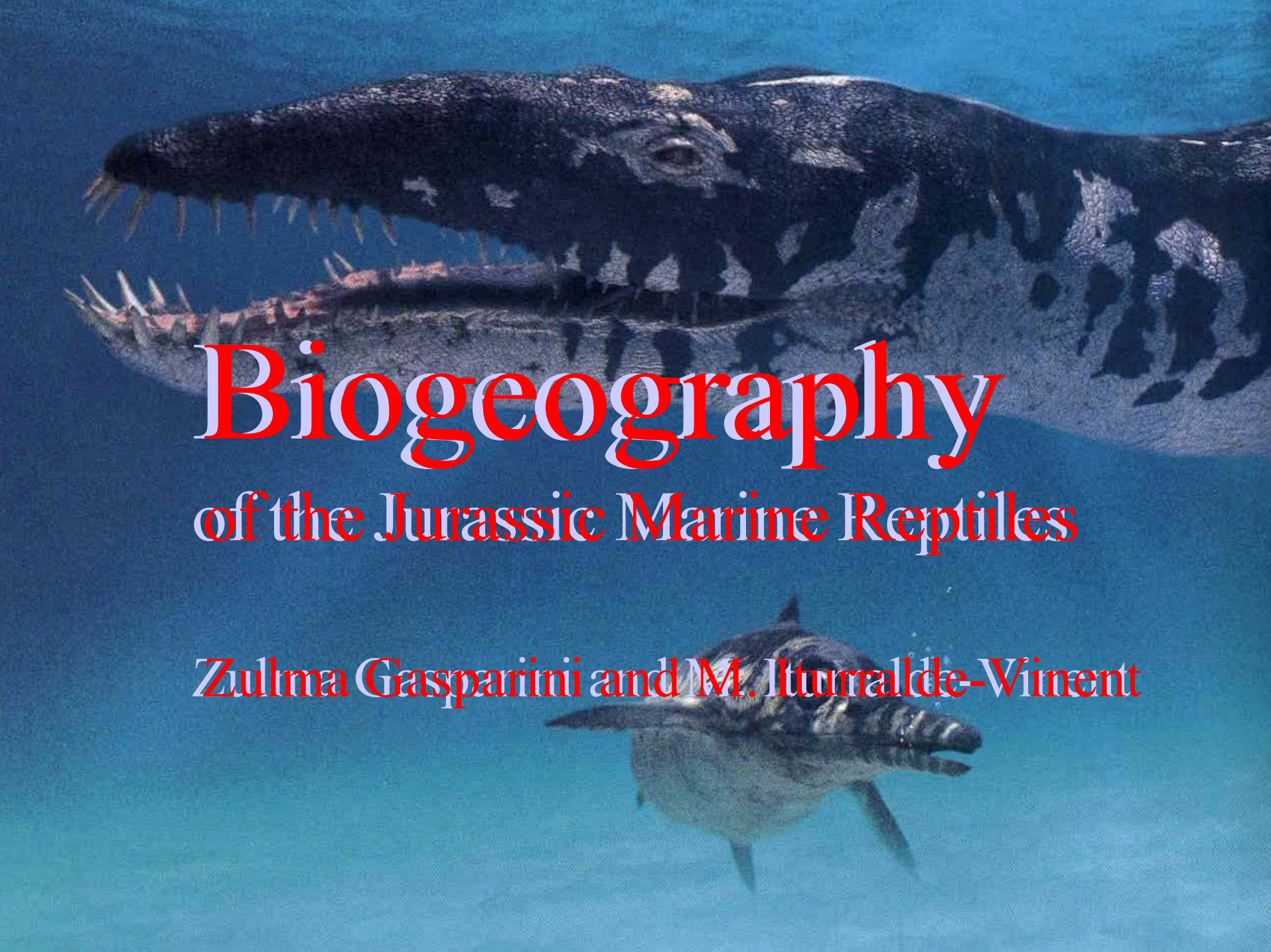
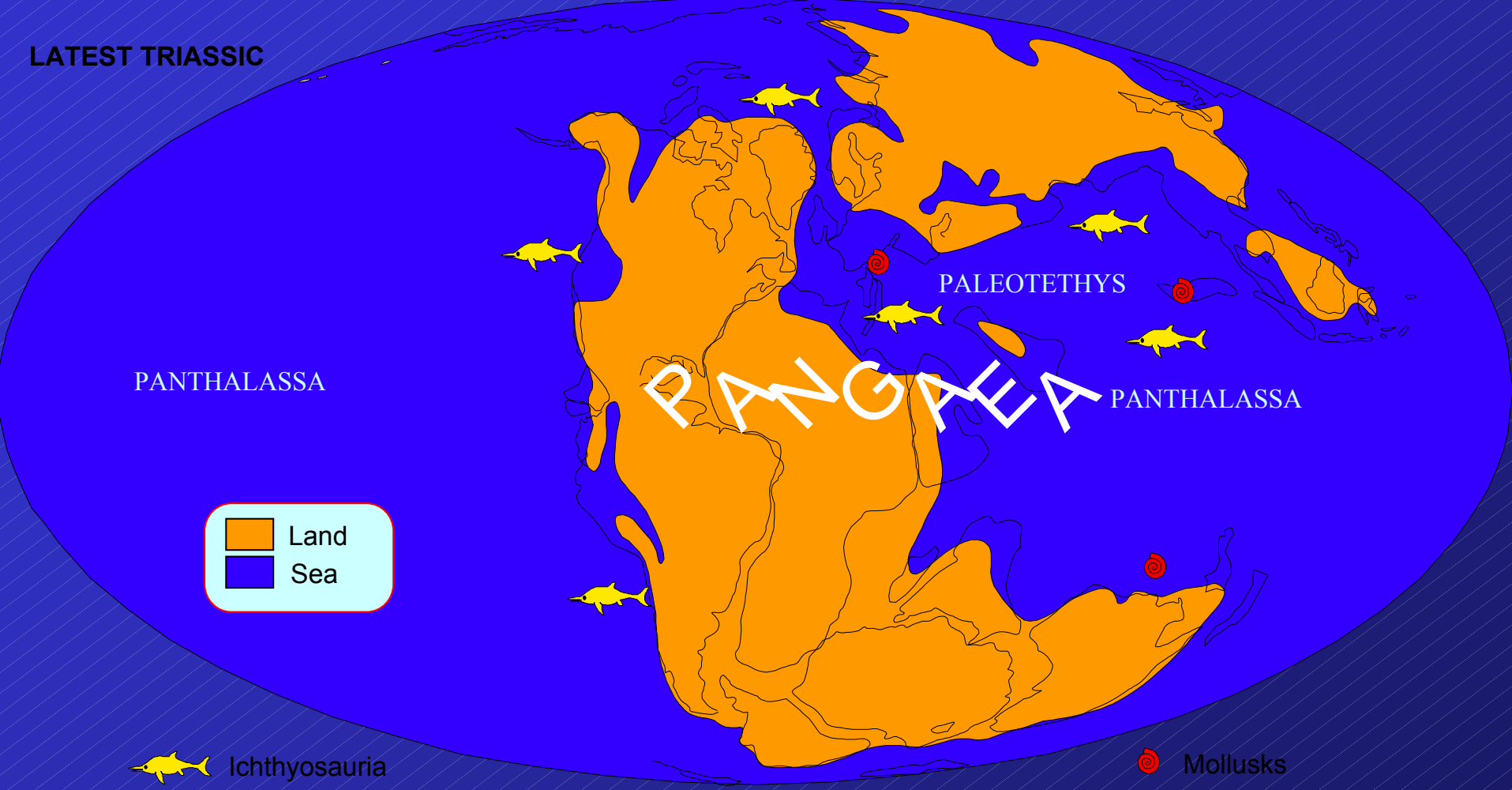


Biogeography

of the Jurassic Marine Reptiles

Zulma Gasparini and M. Iturralde-Vinent

Latest Triassic



The occurrence of some ichthyosaurian remains in Panthalassa as in the Tethys, is because these animals were able to disperse across the open sea. During the latest Triassic there was not any possible marine seaway within west-central Pangaea.

Lower Jurassic

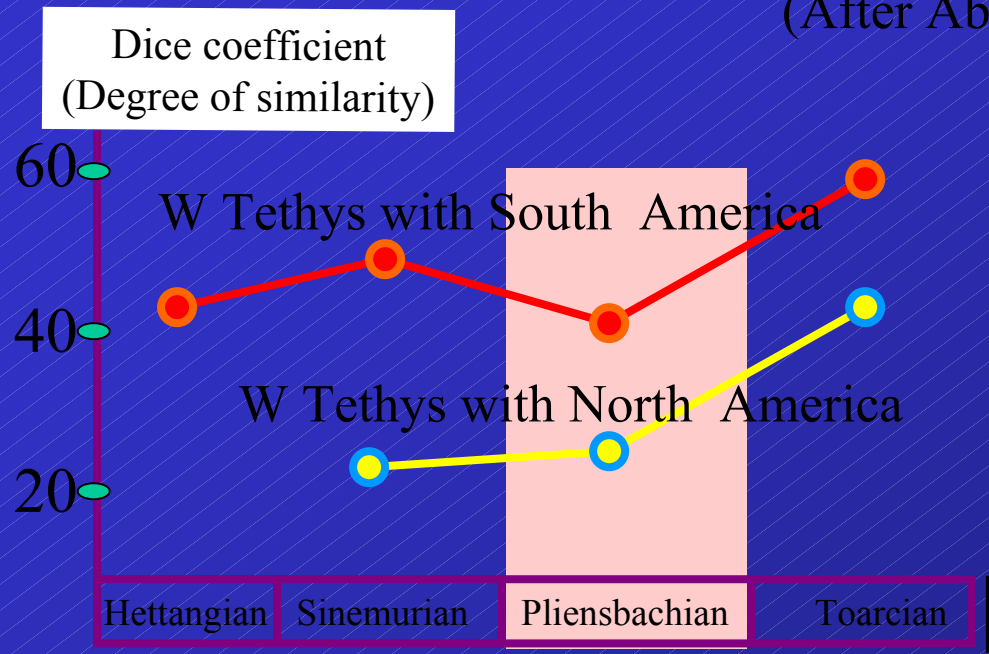
Paleontologic evidence

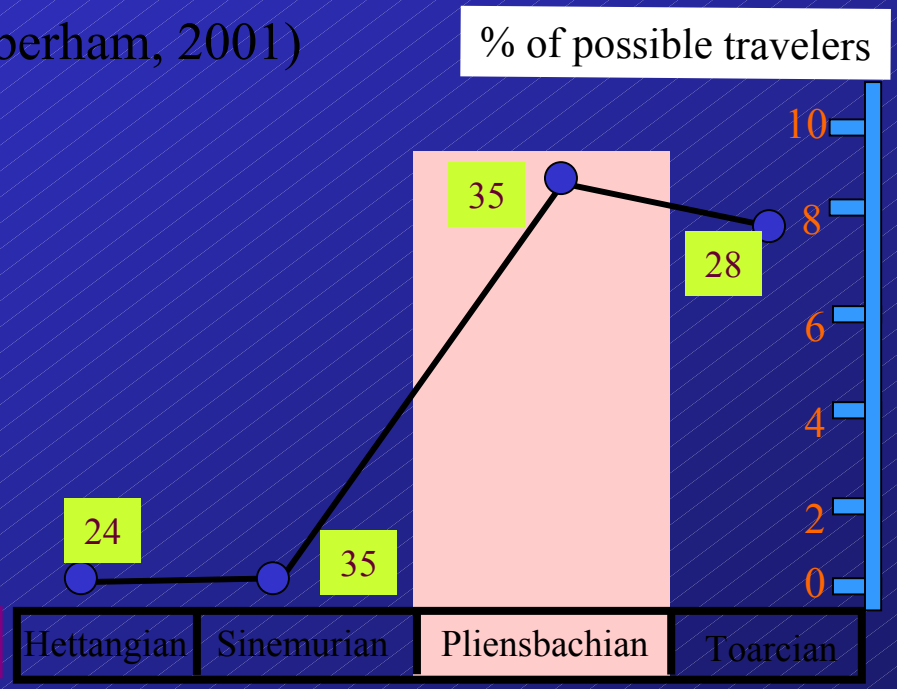
Early Jurassic ichthyosaurian remains are known in western South America (SA), but they are cosmopolitan. Western Tethyan marine crocodile (Thalattosuchia) was reported from the Sinemurian of SA.

Abundant evidences from invertebrate fossils suggest a western Tethys - western SA biotic interchange since the Toarcian (Riccardi, 1991; Jakobs, 1995; Rubilar, 1998; Ballent & Whatley, 2000; Damborenea, 2000). This is illustrated by the next slide.

Comparison between Lower Jurassic western Tethyan and eastern Pacific pectinoid bivalves

(After Aberham, 2001)





This diagram illustrates the degree of similarity between the western Tethys biotas and those of the eastern Pacific margins of North and South America, according to the coefficient of Dice.

This diagram illustrates the number of species-morphotypes known to occur in each stage of the Lower Jurassic [35], and the percentage of these morphotypes which are supposed to have dispersed along the marine seaway named "Hispanic Corridor"

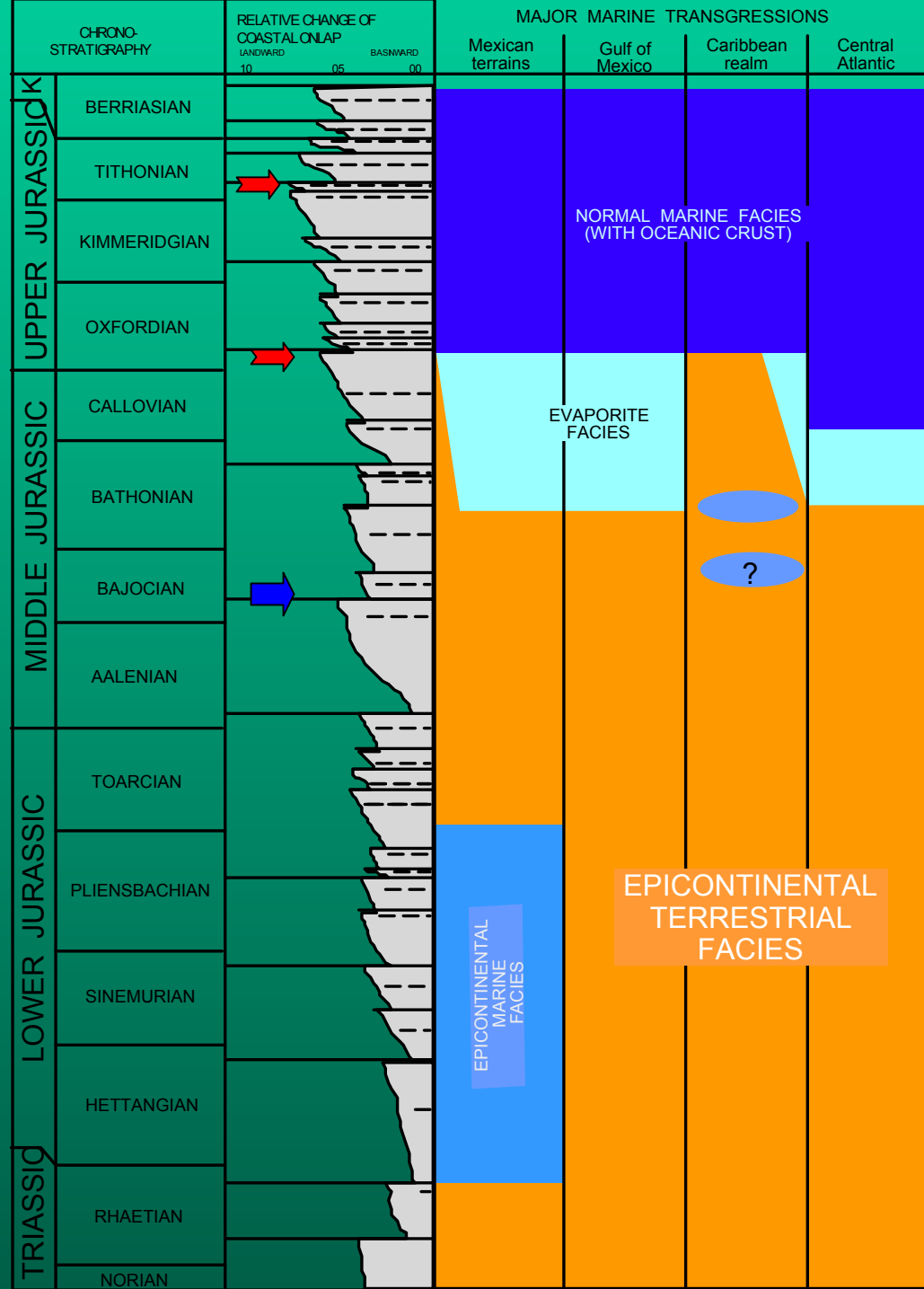
Aberham (2001) concluded that the Hispanic corridor was active since the Pliensbachian

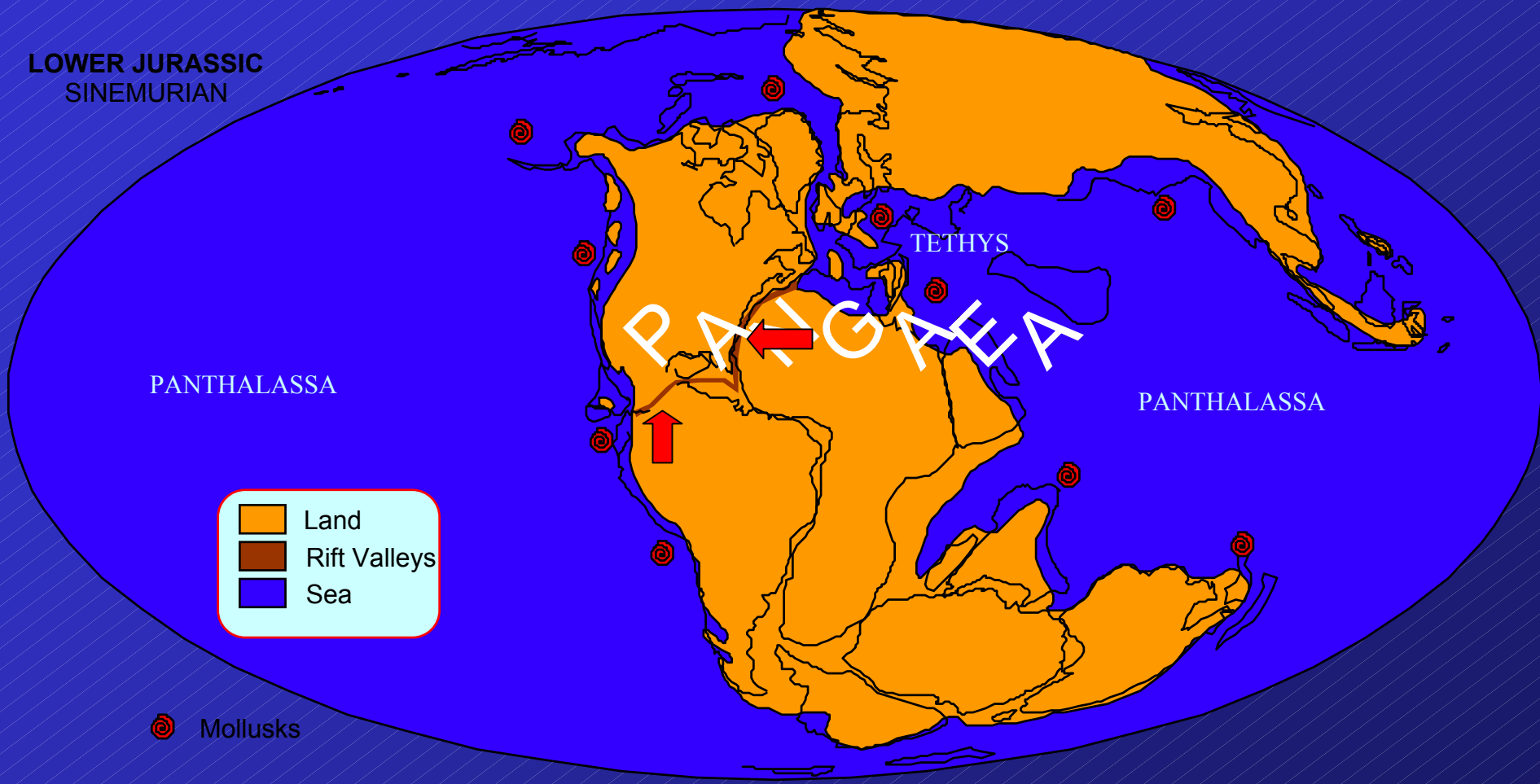
Biogeographic Hypothesis

Early Jurassic biogeographic interpretations suggest the existence of a intermittent shallow marine connection between western Tethys and the eastern Pacific. The first marine connection was probably established by Sinemurian or Pliensbachian (if not even Hettangian) times. The supposed shallow connection acted as a filter, being an effective barrier for off-shore species, while allowing the passage of on-shore benthonic species.

Evolution of the marine environments

This graphic illustrate the fact that, during the Jurassic, the sea level curve clearly suggest growing possibilities of incursions of marine environments into the continental landmasses. Since Bajocian times the possibilities of extensive transgressions are large, and this had a clear reflect in the sedimentary facies of the Caribbean realm and its surroundings. Major marine transgression are recorded in the Oxfordian and Tithonian.





The only possible route for western Tethyan taxa to disperse into the eastern Pacific was a system of rift valleys probably located along the suture between Laurasia and Gondwana, but there is not stratigraphic data which support any marine environment before Bajocian within the Caribbean realm

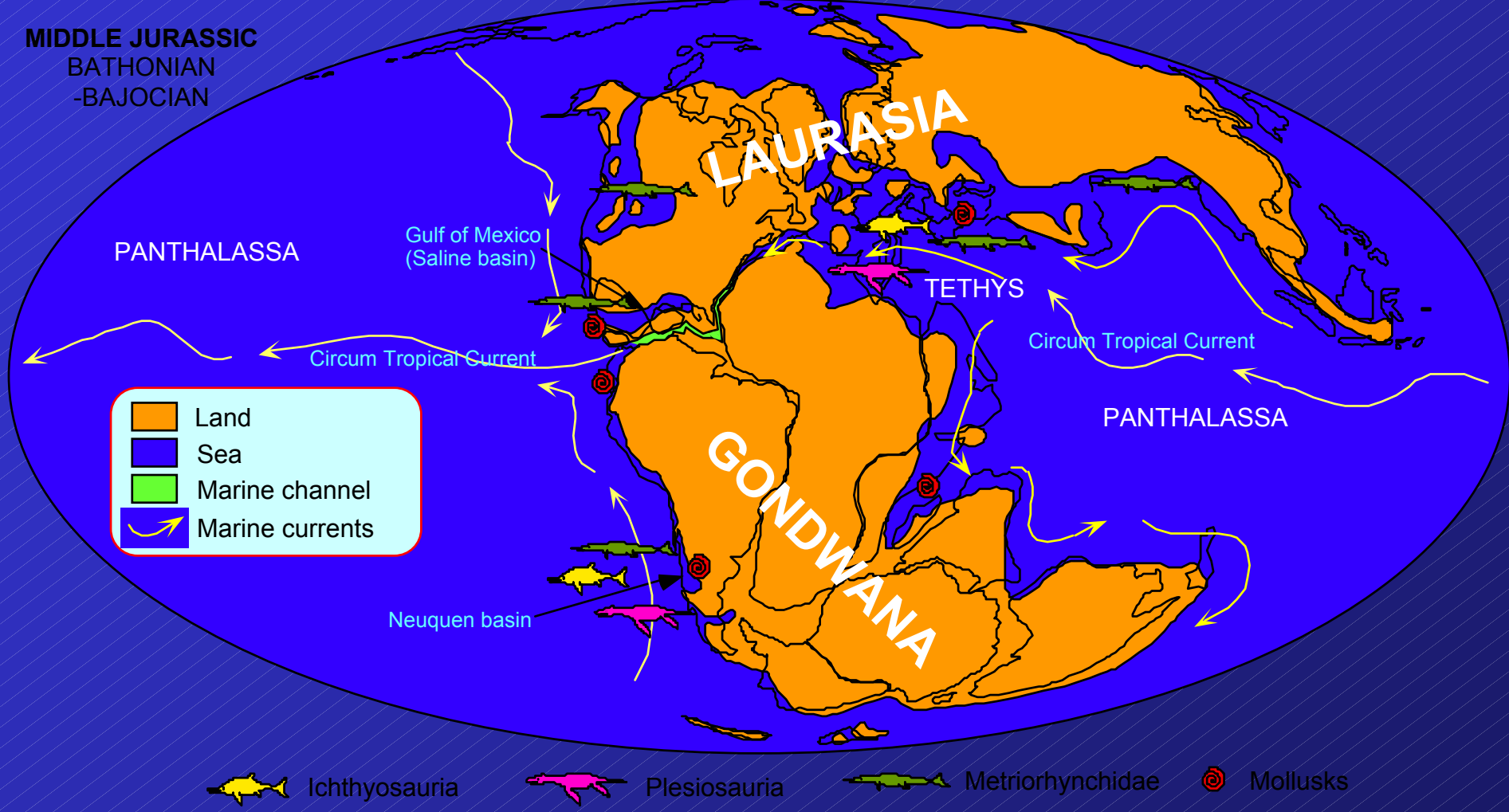
Middle Jurassic

Paleontological evidence

European Middle Jurassic herpetofauna yield close paleobiogeographic relationships with that of the Bajocian-Callovian of the Eastern Pacific. Evidences from invertebrates corroborate this observation (Imlay, 1984; Ricardii, 1991; Manceñido & Dagys, 1992; Bartock, 1993; Damborenea, 2000; Ballent & Whatley, 2000).

Biogeographic Hipothesis

During the Middle Jurassic, mainly since Bajocian, there was an extensive exchange of marine biota between western Tethys and the eastern Pacific across an intracontinental seaway within west-central Pangaea. Stratigraphic evidences and sea level curves both agree with this conclusion



Increasing stratigraphic data, as well as sea level curves, demonstrate the occurrence of marine environments within the Caribbean realm (Cuban Southwestern Terrains) since the Bajocian, corroborating the biogeographic hypothesis of an intra-Pangaean marine connection of the western Tethys and the eastern Pacific Ocean.

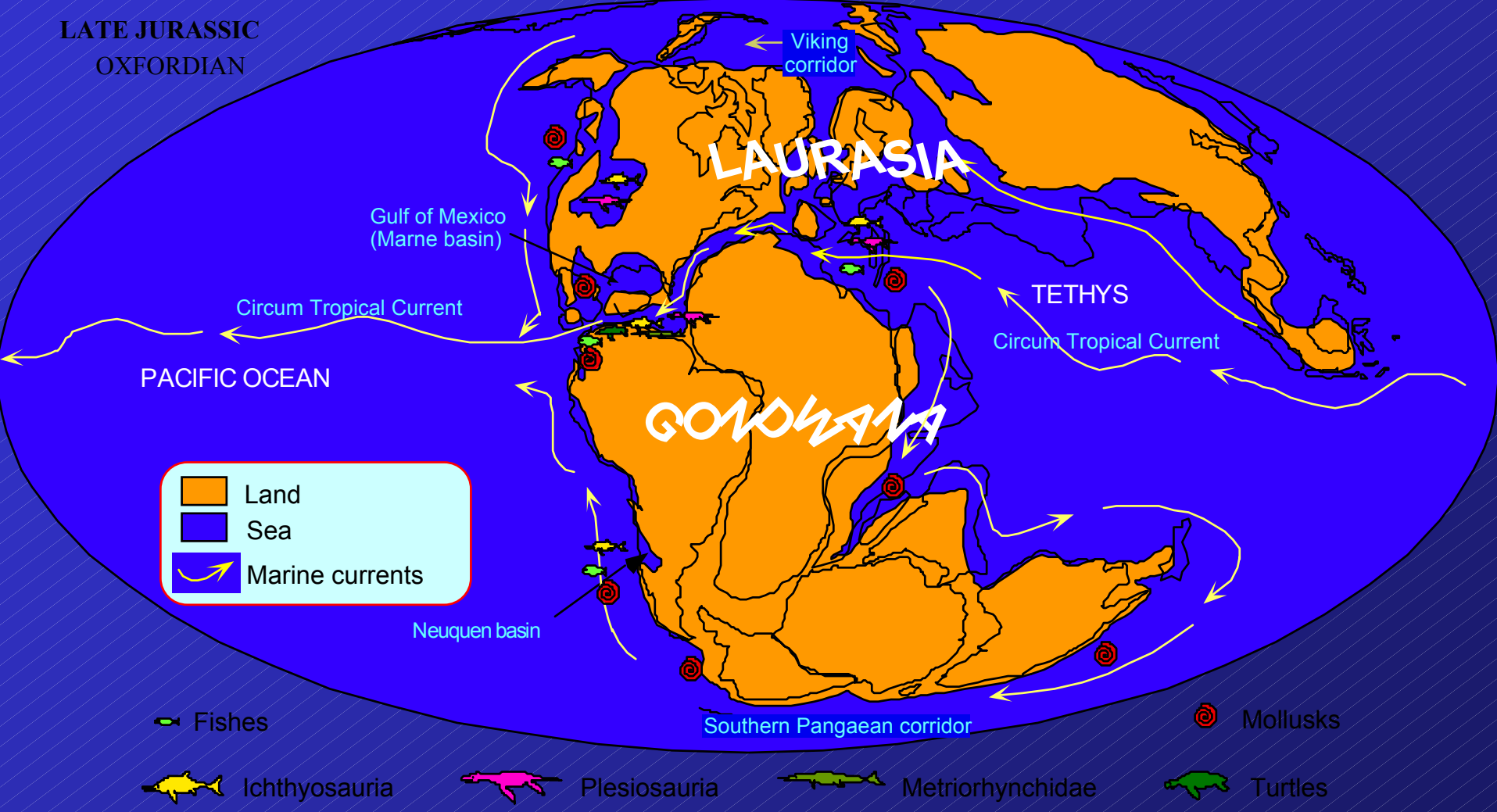
Late Jurassic
Oxfordian

Paleontologic evidence

An important mid-late Oxfordian marine herpetofauna of western Tethys and eastern Pacific affinities occur in the Guaniguanico Terrain of western Cuba (Iturralde-Vinent & Norell, 1996). The Cuban assemblage yield both near-shore and off-shore animals (Fernández & Iturralde-Vinent, 2000; de la Fuente & Iturralde-Vinent, in press; Gasparini, Bardet & Iturralde-Vinent, in press).

Biogeographic hypothesis

The occurrence of off-shore and near-shore marine reptiles in the Caribbean during the Oxfordian (Guaniguanico Terrain of Cuba) suggest the existence of a wide seaway in the area. The similarities among west Tethys, Caribbean and eastern Pacific paleobiotas point toward an extensive exchange across the Caribbean Seaway.



A variety of stratigraphic, geologic and plate tectonic data strongly suggest that a widening marine Caribbean Seaway with ocean crust was under development during the Late Jurassic, reaching an important width already in the Oxfordian.


CONCLUSIONS

1. The Caribbean and Gulf of Mexico areas evolved almost simultaneously, but they were structurally isolated from each other until the Late Jurassic

2. The crust of the Caribbean and the Gulf are of Callovian-Oxfordian in age, but the Gulf crust may be slightly older.

3. The Louan salts may be slightly older than Punta Alegre salts of northern Cuba-Bahamas.

4. The oldest marine rocks of the Caribbean area and surroundings are of Bajocian-Bathonian age, but indirect paleontologic evidence suggest that there may be older marine rocks in the area.

5. The Caribbean opened as a seaway probably in the Bathonian, but certainly in the Oxfordian, when was populated by deep marine animals.

This is a contribution to
IGCP Project 433
Caribbean Plate Tectonics

Web Site:

www.ig.utexas.edu/CaribPlate/CaribPlate.html

Thanks / Gracias