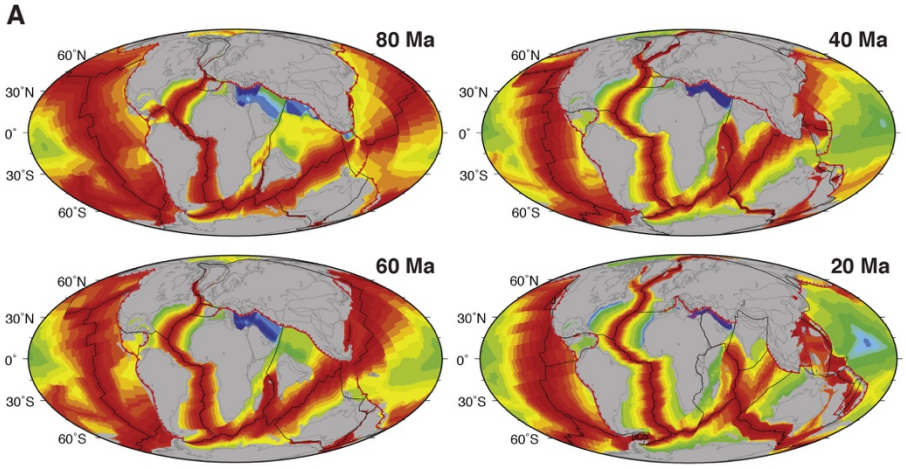
Tectonic summary and spatiotemporal constraints on transoceanic biological dispersal events in: "Global-scale episodes of transoceanic biological dispersal during the Cenozoic"

Cenozoic closure of the Neotethys was associated with northward movement of Africa, India and Australia, with the Indian and Southern Oceans opening behind the advancing landmasses. The southern and central segments of the Atlantic Ocean widened (at the expense of the east Pacific) throughout the Cenozoic, with seafloor spreading in the northern segment (separating Europe from North America and Greenland) starting c. 55 Ma [8]. Seafloor spreading between Australia and Antarctica began c. 45 Ma [9], and connection between Australia and South America (through the South Tasman Rise and Antarctica) was severed c. 32 Ma [10], about the same time as the Drake Passage fully opened and the Antarctic circum-polar circulation was established [11]. Collision of Asia with Arabia provided a land connection through to Africa after c. 27 Ma [12]. Following full separation from Antarctica c. 32 Ma [10], Australia may have seen connections to mainland Asia through the island arc systems of Southeast Asia. North America–Asia, North America–South America and Africa–Europe were each potentially connected throughout the Cenozoic, through the Bering Strait and island arc systems of the Caribbean and Mediterranean Seas, respectively. Madagascar and New Zealand have each been isolated since seafloor spreading began in the Mozambique Channel (before the Cretaceous: >145 Ma) and the Tasman Sea (c. 80 Ma), respectively [13]. Figure. S1A provides reference tectonic reconstructions at 80, 60, 40 and 20 Ma. Figure S1B summarizes spatiotemporal constraints on transoceanic dispersal events considered 'allowable'.

A



B

Departure region ↓ / Colonization region →	Afr	Aus	Mad	Eur	NZ	N Am	S Am	Asia
Africa (Afr)		84–32 [12]	84–5 [39]		84–5 [-]	84–5 [7]	84–5 [31]	84–32 [7]
Australia, New Caledonia (Aus)	84–32 [11]		84–5 [6]	84–32 [1]	84–5 [18]	27–5 [2]	27–5 [5]	84–32 [3]
Madagascar, Mascarenes, Seychelles (Mad)	84–5 [4]	84–5 [3]		84–5 [-]	84–5 [-]	84–5 [-]	84–5 [1]	84–5 [2]
Mediterranean, Europe (Eur)		84–32 [-]	84–5 [-]		84–5 [-]	50–5 [-]	84–5 [4]	
New Zealand (NZ)	84–5 [-]	80–5 [1]	84–5 [-]	84–5 [-]		84–5 [-]	80–5 [4]	84–5 [1]
North America, Central America (N Am)	84–5 [6]	27–5 [-]	84–5 [-]	50–5 [3]	84–5 [-]			84–5 [1]
South America, Caribbean, Easter Is (S Am)	84–5 [31]	27–5 [4]	84–5 [8]	84–5 [1]	84–5 [8]			84–5 [10]
South Asia, Southeast Asia, Hawaii (Asia)	84–32 [13]	84–32 [2]	84–5 [9]		84–5 [-]	84–5 [3]	84–5 [10]	

Figure S1. (A) Tectonic reconstructions at 80, 60, 40 and 20 Ma, after Seton et al. [13]. (B) Matrix summarizing oceanic dispersal timings (in Ma) that were allowed into the compilation: rows and columns represent 'departure' and 'colonization' regions, respectively; number of events for each dispersal pathway in square brackets; migrations without need for a long-distance oceanic route are blackened.

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