

# Phytogeography and zoogeography—rafting vs continental drift

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Evolutionists have great difficulties explaining the global distributions of plants and animals. Accepted models of continental drift are inadequate to explain both trans-Atlantic and trans-Pacific disjunctions. At the same time, evolutionary biogeographers are unable to provide an adequate mechanism by which these distribution patterns could have arisen by dispersal. In contrast, the data fit well within a creationist model where plants and animals were rafted to the places they now inhabit on log mats left over from the Genesis Flood. The more raftable animals tend to have the most numerous transoceanic disjunctions and areas of high endemism/biodiversity tend to be concentrated in coastal regions where ocean currents intersect with land masses. Areas of high plant endemism/biodiversity often coincide with areas of high animal endemism/biodiversity, suggesting that the plants and animals were transported to these places by the same means.

“The pattern of geographical distribution [of plants and animals] is just what you would expect if evolution had happened.” (Richard Dawkins, Oxford University<sup>1</sup>)

“Biogeography (or geographical distribution of organisms) has not been shown to be evidence for or against [macro] evolution in any sense.” (Gareth Nelson and Norman Platnick, American Museum of Natural History<sup>2</sup>)

Disjunct distributions, where similar plants and animals are found in widely separated areas, are numerous. Moreover, many patterns of disjunction are seen, giving rise to the concept of ‘tracks of dispersal’ (figure 1). In the preface to their *Cladistic Biogeography*, Humphries and Parenti argue that “These ‘generalised tracks’ of distribution are so consistent in disjunct, transoceanic terrestrial taxa ... that they imply historical connections between the biotas.”<sup>3</sup> Many of these ‘historical connections’, it is argued, can be explained by continental drift and the associated fragmentation of widespread ancestral species.

Among geologists, the generally accepted model has the supercontinent Gondwana rifting to form the Atlantic Ocean, with Africa splitting off from South America about 120 Ma ago. This, however, is poorly supported by biogeographic data. Of about 200 seed plant families native to eastern South America, only 156 are common to eastern South America and West Africa, whereas 174 are common to eastern South America and eastern Asia.<sup>5</sup> This hardly fits the view that, prior to the rifting of Gondwana, South America and Africa were joined for millions of years. Moreover, hundreds of plants found in both South America and Africa are classified as being the same species. How, then, can they have been separated for over a hundred million years? Given the alleged power of evolution, it would seem remarkable that they

haven’t changed significantly over such a long period of time. Furthermore, according to evolution theory, many plants and animals with transoceanic disjunct distributions originated millions of years *after* the continents are said to have drifted apart.<sup>6–11</sup>

In order to explain the hundreds of trans-Pacific disjunctions, some biogeographers have rejected the geologists’ model of Gondwana rifting to form the Atlantic Ocean, in favour of an alternative supercontinent, *Pacifica*, rifting to form the Pacific Ocean.<sup>12</sup> Another scenario proposed to explain transoceanic disjunctions is the ‘Expanding Earth’ hypothesis. This postulates that, prior to the Jurassic period, the Earth was smaller with all its present oceans closed and that an increase in Earth’s radius gave rise to both the Pacific and Atlantic Oceans.<sup>13,14</sup>

Further confusion about Earth’s geological history arises from the many anti-tropical distributions where plants and animals are disjunct across the tropics, i.e. they are found in the northern and southern regions but not in between.<sup>15</sup> This has led some evolutionists to postulate a pre-Pangaea configuration whereby the present northern and southern regions were once adjacent to one another.<sup>16</sup> As admitted by Van Damme and Sinev: “None of the theories can reconcile the current geological and biogeographical data.”<sup>17</sup>

The difficulties evolutionists have in explaining biogeographic patterns have led to the most remarkable admissions. Nelson and Platnick wrote of how biogeography lends itself “to ever more complicated treatment in the abstract, which is apt to border even on the miraculous, but which is apt to crumble in confrontation with concrete facts of life”. Similarly, Croizat opined:

“... contemporary zoogeographers founder in a self-created morass of chance hops; great capacities for, or mysterious means of, dispersal; rare accidents

of over-sea transportation; small probabilities that with time become certainties; and other pseudo-explanations.”<sup>18</sup>

The 1998 biogeography symposium of the Willi Hennig Society argued that “historical biogeography was in a mess, a subject looking for a method”.<sup>19</sup> Writing prior to the general acceptance of plate tectonics, Darlington commented: “I have tried ... to see if I can find any real signs of [continental] drift in the present distribution of animals. I can find none.”<sup>20</sup>

### The logical alternative—dispersal

Despite their inability to correlate biogeographic data with their beliefs about Earth history, evolutionists often reject the alternative of dispersal across oceans. This is because it “is thought to be a random process, and hence it could not have given rise to the type of congruent or concordant patterns found in so many different groups.”<sup>21</sup> Had these biogeographers believed what the Bible teaches about Earth history, however, they might have been more open-minded. The Genesis Flood would have uprooted billions of trees, many of which would have been left floating upon the oceans. These massive islands of vegetation could have easily dispersed both plants and animals around and across oceans, especially given the high levels of rainfall arising from the warm post-Flood oceans.<sup>22</sup> Moreover, their being propelled by ocean currents would explain the consistency of the many clear patterns of disjunction (figure 1) and the general correspondence between areas of high biodiversity and the intersection of ocean currents with land masses (figure 15).<sup>23</sup> Ironically, in discussing Croizat’s tracks of dispersal, Humphries and Parenti remark:

“Characteristically, many disjunct patterns spanned ocean bottoms, to the point that the oceans have been characterized as the natural biogeographic regions and the continents represent the land areas around the periphery.”<sup>24</sup>

### Rafting of animals?

In discussing the plausibility of reptiles and mammals traversing significant stretches of water, it should be remembered that the safe arrival of just one pregnant female would be sufficient to establish a new colony. Moreover, there are numerous examples of sizeable islands of vegetation being seen adrift at sea.<sup>25,26</sup> Charles Lyell reported that rafts had been seen floating on the Amazon carrying snakes, alligators, monkeys, and squirrels and that, on one occasion, four pumas had rafted down the Parana River to Montevideo where they were discovered prowling the streets!<sup>27</sup> Alfred Wallace records that a large boa constrictor floated 320 km

(200 miles) from the island of Trinidad to the island of St Vincent, wrapped around the trunk of a cedar tree.<sup>28</sup> Another account involved a pirate who, having been marooned on a riverbank in hostile territory, swam to a floating nipa palm island and remained adrift for several days subsisting on the palm fruits.<sup>29</sup> Following the Indian Ocean tsunami of 2004, a man survived being swept out to sea for eight days, clinging to a floating tree and drinking rainwater. He was picked by a passing ship 160 km (100 miles) offshore.<sup>30</sup> One raft was spotted in the Atlantic, intact with trees 9 m (30 feet) high, despite having rafted along the coast of North America for over 1,600 km (1,000 miles).<sup>31</sup> Schuchert records how one such raft was seen carrying live lizards, snakes, and small mammals as far as 1,600 km (1,000 miles) out to sea.<sup>32</sup> Moreover, rafts left over from the Genesis Flood would surely have dwarfed such as these.

Woodmorappe<sup>33</sup> has documented how rough waters tend to concentrate rather than disperse natural rafts, with vegetation debris tending to be rolled into tight clumps. He also discusses another major source of flotsam, i.e. pumice. This is known to cover large areas—with a thickness sufficient for a man to walk on<sup>34</sup>—and can float in the ocean for years. The considerable volcanic activity occurring during the Flood may have produced islands of pumice thousands of square metres in area.

Zoogeography provides an opportunity to test the hypothesis that rafting played a significant role in dispersing plants and animals to their present habitats. Particularly, we would expect to see a correlation between raftability and frequency of transoceanic disjunction, with more raftable animals having a higher incidence of disjunction.

### Small animals

Samples of flotsam have been found to be remarkably rich in insects and other small animals including snails, spiders, mites, millipedes, isopods, worms, and pseudoscorpions.<sup>35,36</sup> Numerous insect disjunctions are known across both the Pacific and Atlantic Oceans.<sup>37–39</sup> Although it might be argued that flying species could have been dispersed by wind, examples are also known in flightless insects such as the cricket subfamily Macropathinae<sup>40</sup> and the flea subfamily Stephanocircinae.<sup>41</sup> In addition, many transoceanic disjunctions are known among arachnids, (e.g. Micropholcommatidae (figure 2), Pettalidae (figure 3), Neogoveidae, *Mecysmaucheniidae*, Palpimanidae, Archaeidae, Chthoniidae, Tridenchthoniidae, Garypidae, Zalmoxidae and Olpiidae), millipedes (e.g. Heterochordeumatoidea, Spirostreptidae, Iulomorphidae, Cambalidae, Spirobolellidae, Rhinocricidae, Stemmiulidae, Siphoniulidae, Siphonotidae, Pygrodesmidae, Platyrrhacidae,

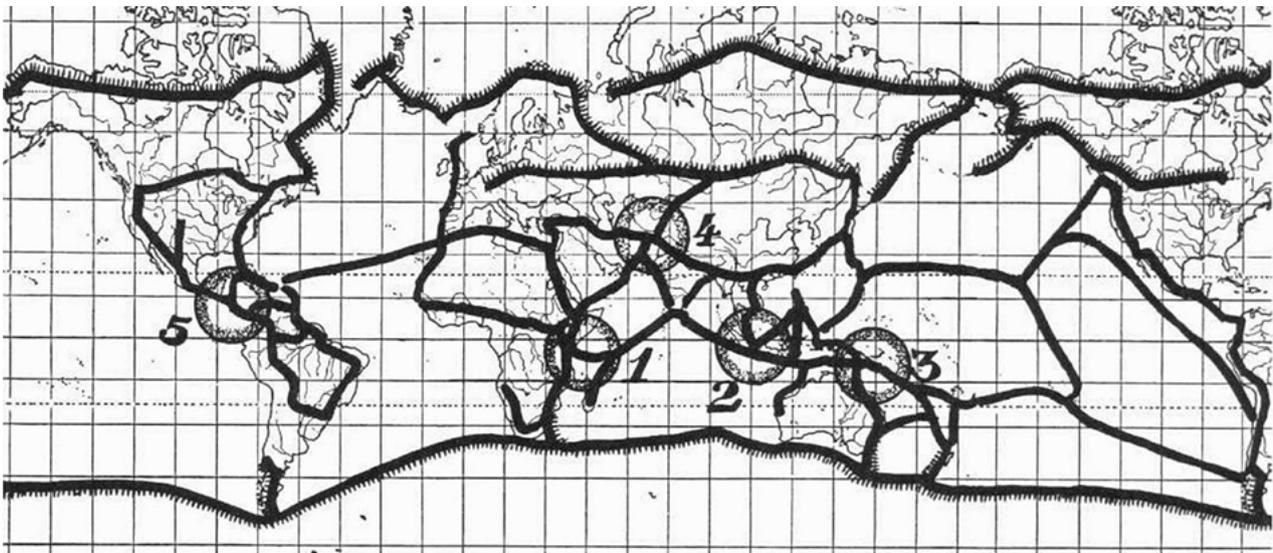


Figure 1. Léon Croizat's generalised tracks of plant dispersal. Numbered circles refer to 'nodes' of dispersal.<sup>4</sup>



Figure 2. Distribution of micropholcommatid spiders (family Micropholcommatidae).<sup>43</sup>

Fuhrmannodesmidae and Cryptodesmidae),<sup>42</sup> planarians, earthworms and snails.<sup>17</sup>

### Reptiles

Reptiles are among the most raftable animals due to their tolerance of salt water and their ability to subsist for long periods without eating or drinking.<sup>45</sup> The ability of reptiles to traverse wide stretches of ocean is illustrated by the presence of Scincidae on many islands in the western Pacific and by the gecko species, *Nactus pelagicus* and *Gehyra vorax*, both of which are distributed throughout many islands in the southern Pacific.<sup>46</sup>

Reptiles, generally, are widely distributed with many transoceanic disjunctions. Examples include side-necked turtles of the family Chelidae (figure 4), turtles of the family Geoemydidae (figure 5), skinks of the family Scincidae (figure 6), lizards of the family Iguanidae (figure 7), turtles of the family Podocnemididae (figure 8), and boine snakes of the family Colubridae (figure 9). Other transoceanic reptile disjunctions include Pelomedusidae, Geoemydidae,

Emydidae, Testudinidae, Crocodylinae, Amphisbaenidae, Aniliidae, Anguidae, Alligatoridae, Dibamidae, Mabuyinae, Testudinidae, Typhlopidae, Trionychidae, Leptotyphlopidae, Crotalinae, and Gekkonidae. The lizard genus *Sphenodon* is found in New Zealand and the gecko *Tarentola* made its way 6,000 km from North Africa to Cuba.<sup>47</sup>

### Amphibians

Amphibians are less raftable than reptiles due to their lower tolerance of salt water. However there is little doubt that rafting of some amphibian groups is possible due to the presence of frogs on a significant number of oceanic islands. (It would seem that rafting provides the only viable explanation for their distribution).<sup>56</sup> There are fewer transoceanic disjunctions involving amphibians than reptiles but there are some, including Microhylinae (figure 10), Pipidae (figure 11), Leptodactylidae and Leiopelmatidae, all of which are anurans.<sup>57</sup> The pelodyadine hylids of Australia and New Guinea are closely related to a group of hylids that exists only in South America. Even evolutionists have concluded that these must have crossed the Pacific as, in their thinking, pelodyadine hylids evolved tens of millions of

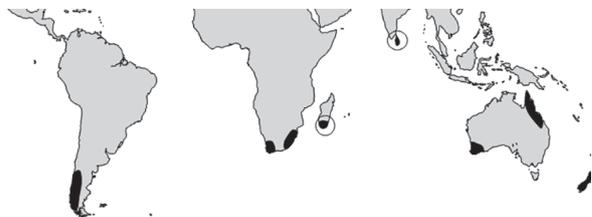


Figure 3. Distribution of the harvestmen family Pettalidae.<sup>44</sup>



**Figure 4.** Distribution of Austro-South American side-necked turtles (family Chelidae).<sup>48</sup>

years after the alleged Antarctic land bridge between South America and Australia disappeared.<sup>58</sup>

There are fewer transoceanic disjunctions involving caecilians (figure 12) and they are conspicuous by their absence in Australasia. Arguably, there are none involving urodeles (figure 13) as these may have dispersed across a warm Bering land bridge.<sup>59,60</sup> Giant salamanders (Cryobranchidae), for example, are found in eastern Asia and eastern North America and may have been part of a continuous plant and animal distribution linking these two regions.<sup>61</sup> Whereas there are numerous reptiles found on Madagascar (geckos, chameleons, skinks, iguanids, snakes, turtles and tortoises, and crocodiles) the amphibians comprise just four frog families.

The ability of relatively salt-intolerant amphibians to raft significant distances can be explained by the likely size of the post-Flood vegetation mats and high levels of post-Flood rainfall.<sup>22</sup> There are a number of possible explanations for the greater raftability of anurans compared with urodeles. Anuran larvae are usually omnivorous and many will eat the eggs of their own species; urodele larvae are only carnivorous.<sup>62</sup> Also, fewer urodeles exhibit salt tolerance than anurans.<sup>63</sup> One anuran species, *Fejervarya cancrivora*, is particularly salt tolerant and is known to live in brackish environments such as mangrove swamps. It also swims happily in full-strength sea water.<sup>64</sup> Platymantine frogs, which are widely distributed from the Philippines to Fiji, lay terrestrial eggs and forego the tadpole stage, giving them a greater chance of rafting across salt water. Arboreal anurans do not require large amounts of water and could have sheltered in upright trees, well away from sea water. The fossorial nature of caecilians would make them less likely to be found on rafts than anurans.

### Mammals

Mammals are among the least raftable of terrestrial animals as they require substantial amounts of water to survive even for short periods. However, some can obtain the water they need from vegetation. Rodents are a well-known



**Figure 5.** Distribution of the turtle family Geoemydidae.<sup>49</sup>



**Figure 6.** Distribution of skinks (family Scincidae).<sup>50</sup> Some of the most closely related species are found in South America and Africa, indicating that the trans-Atlantic disjunction did not arise due to migration across a Bering land bridge.<sup>51</sup> The data are also poorly explained by the rifting of Gondwana as it would seem most unlikely that species would change so little over the 120 Ma since South America allegedly split from Africa.<sup>52</sup>



**Figure 7.** Distribution of the lizard family Iguanidae.<sup>53</sup>



**Figure 8.** Distribution of the turtle family Podocnemididae.<sup>54</sup>



Figure 9. Distribution of boa snakes of the subfamily Boinae.<sup>55</sup>



Figure 11. Distribution of pipid frogs (family Pipidae).<sup>66</sup>



Figure 10. Distribution of microhylid frogs of the subfamily Microhylinae.<sup>65</sup>

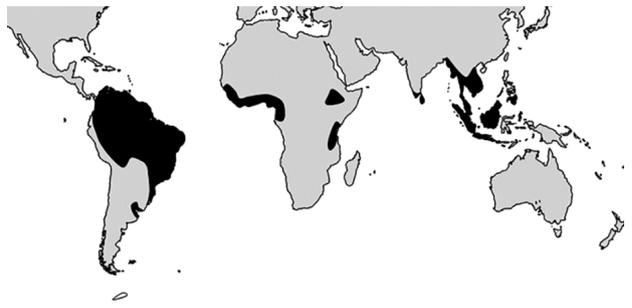


Figure 12. Distribution of caecilians.<sup>67,68</sup>

example of this and are found on many isolated oceanic islands.<sup>71</sup> The few transoceanic mammal disjunctions include monkeys,<sup>72</sup> rodents,<sup>73</sup> the bat families Molossidae and Emballonuridae (all of which are disjunct across the Atlantic) and the bat superfamily Noctilionoidea which is disjunct across the Pacific.<sup>74</sup> Another interesting example is the marsupial *Dromiciops* found in Chile but which is more closely related to Australian marsupials than other South American marsupials.<sup>75</sup> The other South American marsupials probably arrived by migration from Asia across a Bering land bridge.<sup>23,59</sup>

### More evidence of rafting from the Madagascan fauna

Evolutionists' models of continental drift show Madagascar becoming separated from the mainland in the Late Cretaceous. However, its Cretaceous vertebrate fossil record bears little resemblance to its living species. According to Angelica Crottini *et al.*:

“The Cretaceous fauna included lungfishes, gars, nonranoid giant frogs, dinosaurs and marsupial and gondwanatherian mammals whereas the extant vertebrate fauna is composed of mainly percomorph freshwater fishes, ranoid frogs, modern squamate reptiles, lemurs, rodents, carnivores, afrotherian mammals, bats, and numerous families of birds.”<sup>76</sup>

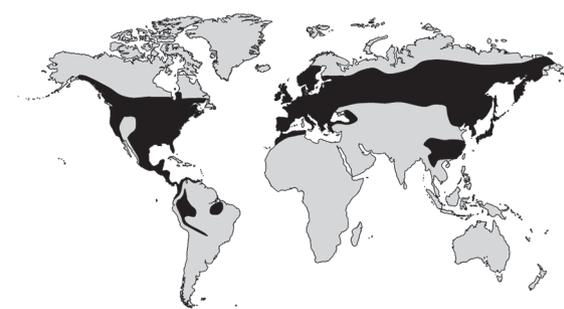
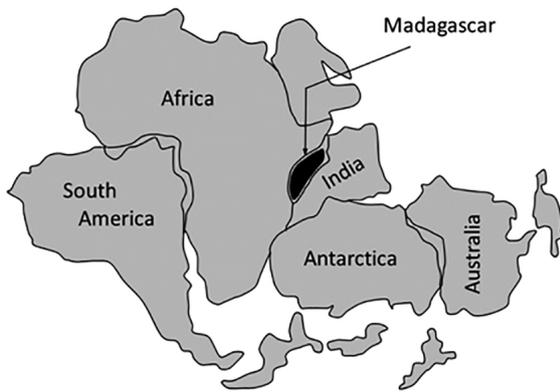


Figure 13. Distribution of urodeles (salamanders and newts).<sup>69,70</sup>

Prior to the breakup of Gondwana, Madagascar was supposedly sandwiched between India and Africa, allowing faunal interchange between South America, Africa, Madagascar and India (figure 14). This is said to explain why the lizard family Iguanidae (figure 7), the turtle family Podocnemidae (figure 8) and the boa subfamily Boinae (figure 9) are found in both South America and Madagascar. However, there are no living representatives of these groups in either Africa or India. Moreover, evolutionists' DNA analyses are said to show that their ancestors became separated about 80 Ma ago; but this is over 20 Ma *after* continental drift allegedly broke the land connection between Madagascar and South America. In an attempt to solve this problem, some have suggested that land bridges existed between Madagascar and Antarctica up until the Late Cretaceous, enabling faunal interchange between



**Figure 14.** Madagascar's position in the hypothetical supercontinent Gondwana.

Madagascar and South America via Antarctica.<sup>77</sup> Others, however, are adamant that such land bridges did not exist!<sup>78,79</sup> Similarly, Madagascan net-winged midges of the subfamily Edwardsiniinae are absent in both Africa and India, but are found in South America and Australia.

Madagascar supposedly remained in contact with India for 50 Ma after it was separated from Africa but the Madagascan termite fauna is more closely related to that of Africa than India.<sup>80</sup> Darlington observes:

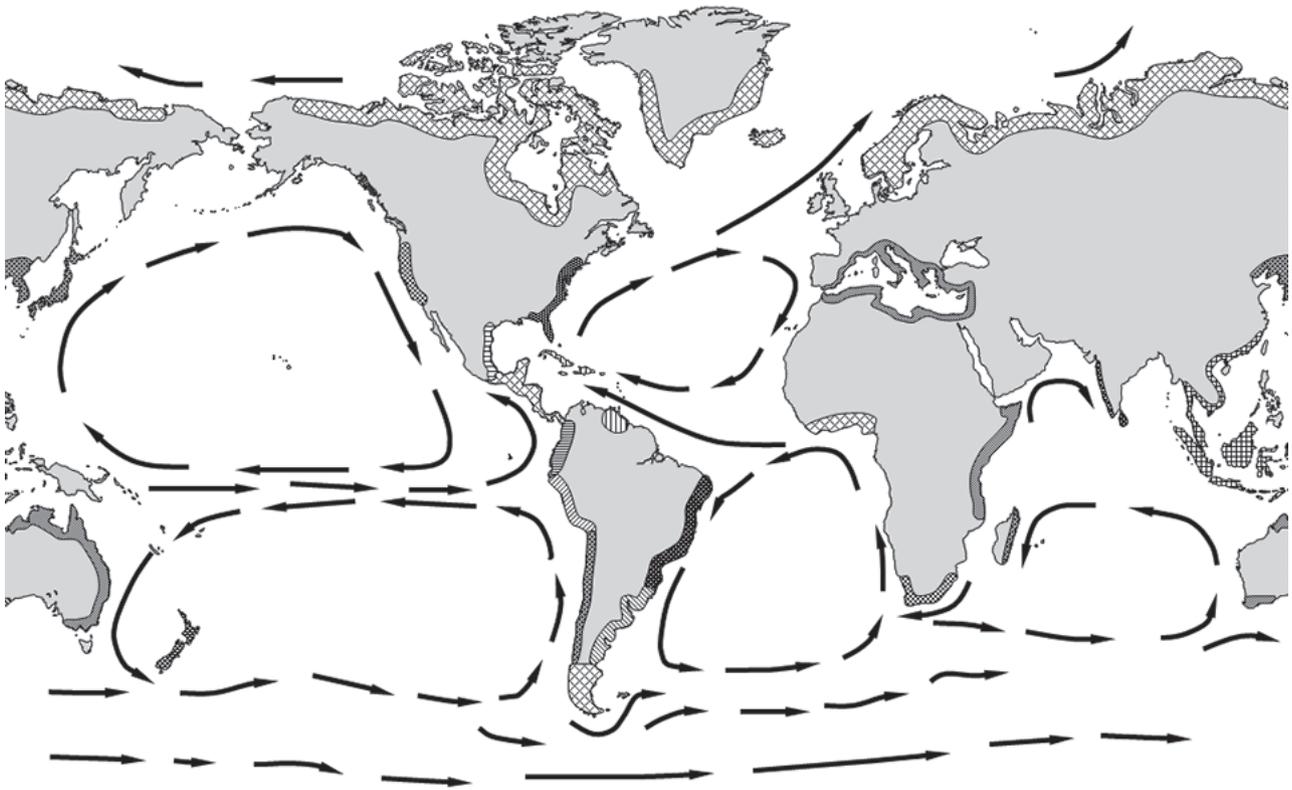
“The Madagascan fauna ... seems to be an accumulation of animals received from two directions [Africa and the Orient] ... rather than part of a fauna exchanged by Africa and India across Madagascar.”<sup>81</sup>

Unsurprisingly, some evolutionists concede that much of Madagascar's extant terrestrial fauna probably colonised the island by rafting.<sup>82,83</sup>

### Areas of endemism/high biodiversity

Plants and animals are not distributed randomly. Instead they tend to be clustered in ‘areas of high endemism’ (regions where there are a high number of endemic species) or ‘areas of high biodiversity’ (regions where there are many different species but which may not necessarily be endemic). Significantly, areas of high endemism tend to coincide with areas of high biodiversity and these are often coastal areas or islands where land masses intersect with ocean currents (figure 15).

Generally, areas of high plant endemism correspond to areas of high animal endemism.<sup>84</sup> For example, the Yucatan peninsula of Central America is an area of endemism for amphibians, reptiles and birds. It is also one of Croizat's nodes of plant dispersal (figure 1). Madagascar is an area of endemism for reptiles, birds and mammals. This is also



**Figure 15.** Areas of high endemism/high biodiversity and ocean currents.<sup>91,92</sup>

another of Croizat's nodes. The southern tip of South Africa is an area of endemism for amphibians, mammals and birds. It is also a point on Croizat's southern track. Another area of high plant endemism is southern West Africa (Ghana and the Ivory Coast). This is also an area of endemism for amphibians, birds and mammals.<sup>85</sup> As with areas of endemism generally, all these are regions where ocean currents might deposit rafts (figure 15).

Evolutionists, of course, will argue that high endemism would arise on islands and in coastal areas where there are many different ecological niches and therefore ideal conditions for evolutionary diversification. Moreover, these tend to be associated with areas of high rainfall, which might be argued to provide an environment where plants can thrive and many different plants and animals could evolve. However, this does not explain the many *patterns of disjunction* where the same plants and animals are found in the same widely separated areas of endemism.<sup>86</sup> This is better explained by rafting and the creationists' model of rapid post-Flood speciation.<sup>87,88</sup> Rafting on ocean currents would transport the same plants and animals to the same widely separated regions. These would then diversify into many different species as they adapted to their new environments, giving rise to areas of high endemism. Hence, the creation model would also predict that coastal regions and islands such as Madagascar would have many endemic species.

### Conclusion

Evolutionists often present an allegedly unifying theory of Earth history, claiming that the distributions of plants and animals fit well with the geologists' model of slow continental drift and the rifting of Gondwana to form the Atlantic Ocean. The reality, however, is that the distributions of many plants and animals fit very poorly within this framework. At the same time, they support the rafting model well. There appears to be a clear association between raftability and frequency of transoceanic disjunction. Areas of high biodiversity/high endemism, generally, are found where ocean currents intersect with land masses and, most significantly, these areas often overlap for plants and animals, supporting the view that they were transported to these places by the same means. The creationist rafting model appears much superior to the evolutionist model of continental drift.

Rafting is just one of a number of means by which plants and animals could have dispersed following the Genesis Flood, other possibilities being land bridges that have subsequently fallen below sea level and transport by man.<sup>89,90</sup> Catastrophic plate tectonics, however, is not considered as the movement of the continents would have taken place beneath the Flood waters. The study of biogeography together with the rafting model—if deemed valid—may have implications

for the ongoing debate regarding the placement of the Flood/post-Flood boundary.

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