



Explorations & Recreations in the Sciences (ERIS), 13th to 17th May 2023

Niche Evolvability & Adaptability beget Habitat Diversity & Excellence (Featuring The Floating Fungi)

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The fungus floating over the pond water creating a dry surface with its fungal forest indicates how an unexpected habitat & unmatched form adapted to it could be exploited by the life. Moreover, the fungus did not have many ponds available for it to be a specialist of water surface; so, it must have a breadth of habitats it could employ for living & dispersion. So, the quasi-species of the habitat & niche would exist & be achieved ultimately.



Image 4.1 Floating fungal forest over the source pond.

The unexpected hydro-terrain offers motility of, nutrition to the dry floating fungal forest- the advantages unavailable to the stationary supports of the fungal forests on land. Wonder if you see a completely air-floating phyto-fungal organism - photosynthetic humidity fed mainly aerial species, maybe taking halts on organic supports for rest, nutrients, concentration & protection. This majorly aerial niche shall help the fungus conquer the limits of stationary habitats & niches to great extent.

The locus of the phyto-fungus on unusuality axis would lead it interact more with its majorly unusual neighborhood & create still more unusual phenotypes in addition to its own propagating unusuality. Moreover, for the water floating fungus in the image, the complex cross interaction between the regular terrain traits with hydro-terrain exceptional traits would be possible & generating even more unexpected phenotypes.



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The convergence of multiple distant lineages to exploit the hydro-terrain would inform how evolutionary distance could be overcome by the life to converge. The re-convergence of conquest of land by insects, animals, plants would be simpler as it follows a likely classical evolutionary path. The re-convergent conquest of unusual niches (as done by dolphins, whales of waters with the other aquatic life & maybe, bats of air with birds, insects & some dinosaurs) would be more unusual, however, having diversity limited in amount by unusuality but a little exalted in type by unusual rarity. Trade-offs between the standard habitat-niche heritage & unusuality would limit the latter.

The developmental, growth phenotypes & traits from the life history could be employed or edited to attain varied distant habitats & niches. *De novo* traits would likely bring in some of the neutral, normal & sporadic diversity into the habitat-niche quasi-species. The water floating fungus doesn't show any uncommon trait, possibly being a recombining of the phenotypes from development & life history. This may reduce the need of the multiple phenotype generating systems. There seems a similarity in the duck feather, lily leaf fibers, insect 'skins' from water insects & possibly their vestiges in terrestrial-aerial ones, & likely the floating fungal base & forest: light, waxy, dry, fibrous planar bases. They seem to still maintain the terrestrial form once they adapt to the waters. The insects are another example of re-use of their waterproof skins on land habitat also imparting generalist adaptation to mainly water, & also, air & land. This conservation shall impart evolvability & adaptability to the species. The first spore of fungus that accidentally landed on water surface must have been at an advantage due to the conserved light, dry nature. The fungi then likely met their at least density-wise ideal habitat match bound to its ultimate ideal match by lack of excessive exception.

There however is necessity of *de novo* traits in the complete story of any evolution- as recombining system phenotypes or pure new traits. When the evolutionary question boils down to pure novelty, only *de novo* traits match more & better than the less parsimonious but hopefully represented recombining &



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editing of conserved traits. Classical answer to novelty is *de novo*; but fungi are not a 'normal' representative taxon & it must thus have a skewed version of the evolvability-adaptability system. Classically they are light, a little sappy, weak & dark/dead-loving group. From their accessible neighborhood, they might thus excel in using the niches mainly & ultimately unusable, unusual & rare. They seem thus evolutionarily unusual taxon in the Tree of Life.

Thus, as indicated by the fungi & their habitat-niche choice, there must be variation in evolvability-adaptability & evolutionary profile among evolutionary kingdoms & other taxa, leading to the biodiversity.