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A mechanism for Snowball Earth triggering animal evolution

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It is hypothesized that a demographic and ecological consequence of the Neoproterozoic 'snowball Earth' glaciations was to increase the relative fitness of group-level traits, thus directly trigger the evolution of costly macroscopic form. Extreme and repeated founder effects associated with glaciations increased average genetic relatedness between individuals, making evolutionary dynamics driven by kin selection more important than at any other time during earth history - and permitting the evolution of costly altruistic traits such as terminal cellular differentiation. Macroscopic physiology may also have aided survival via resource storage and accentuating disequilibrium with the physical environment. This lead to group viability selection - whereby demes containing non-cooperative individuals did not survive the extreme conditions, a process made more effective by extreme restrictions on dispersal. Snowball Earth caused these (normally transient and ecological) conditions to apply over millenial and planetary scales in time and space respectively, creating selection for altruism between the cells of ancestral heterotrophic eukaryotes of unprecedented effectiveness. It is noted that the extreme restrictions on cell fate associated with animal terminal differentiation is consistent with the emergence of the ediacara after the final neoproterozoic 'snowball'.