

CAMBRIAN EXPLOSION AND PERMIAN QUIESCENCE: IMPLICATIONS OF RUGGED FITNESS LANDSCAPES

KAUFFMAN, Stuart A., Santa Fe Institute, Suite A, 1660 Old Pecos Trail, Santa Fe, NM 87501 U.S.A.

The Cambrian explosion witnessed the formation of a large number of the higher taxa extant today. The higher taxa are said to have "filled in" from the top down, with species that found phyla giving rise to daughter species which found classes, then orders, and so on. During the Permian extinction, in contrast, 96% of all species go extinct. During the rebound, a large number of new families are created, a few new orders are created, but no new phyla are created. The higher taxa are said to have "filled in" from the bottom up. The profound asymmetry between the Cambrian and Permian has been a deep puzzle. I shall suggest that this asymmetry is a nearly inevitable consequence of adaptive evolution on rugged, multi-peaked fitness landscapes.