

The relation between hairpin formation by mitochondrial WANCY tRNAs and the occurrence of the light strand replication origin in Lepidosauria

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Mitochondrial light strand DNA replication is initiated at light strand replication origins (OLs), short stem-loop hairpins formed by the heavy strand DNA. OL-like secondary structures are also formed by heavy strand DNA templating for the five tRNAs adjacent to OLs, the WANCY tRNA cluster. We tested whether natural OL absence associates with greater capacities for formation of OL-like structures by WANCY tRNA genes. Using lepidosaurian taxa (Sphenodon, lizards and amphisbaenids), we compared WANCY tRNA capacities to form OL-like structures between 248 taxa possessing an OL with 131 taxa without OL (from different families). On average, WANCY tRNA genes form more OL-like structures in the absence of a regular OL than in its presence. Formation of OL-like structures by WANCY tRNAs follows hierarchical patterns that may reduce competition between the tRNA's translational function and its secondary OL function: the rarer the tRNA's cognate amino acid, the greater the capacity to form OL-l