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UV LIGHT EXPOSURE IN AMPHIBIAN GENOMES: CC:GG>TT:AA

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Abstract

In this work, we show that the nuclear and mitochondrial genomes of amphibians exhibit increased frequencies of CC:GG>TT:AA dinucleotide mutations compared to other groups of vertebrates. We suggest that this may be due to exposure to ultraviolet radiation during the sensitive period of embryonic development.

External exposure to mutagens is one of the factors driving the molecular evolution of species and classes. For example, one of the strong mutagens influencing the occurrence of DNA damage and, as a consequence, substitutions and rearrangements, is ultraviolet light.

It has been shown that the signature of UV light has a known pattern, doublet base substitution CC>TT (DBS1 COSMIC sign [1]). We hypothesize that since amphibians may inhabit solar environments and have transparent eggs [2] they may have increased UV light explosion and the following increase in rates of CC:GG>TT:AA, observed in neutral sites (4-fold positions). Analysing whole nuclear genomes of dozens of amphibian species we have shown that indeed genomes accumulate TT- and AA-rich codons following the increased frequencies of CC:GG>TT:AA. It leads to an amino acid shift toward an increase in Asn, Lys and Leu, Phe, while Pro and Gly become losers.

References

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