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THEME IA3: EVOLUTION
SERIE: S

DNA Duplication: A Mechanism For 'Survival Of The Fittest'

5 Some 65 million years ago, the earth's most recent 'mass extinction' took place. One or more catastrophic events produced widespread fires and clouds of dust and smoke that obstructed sunlight for a long period of time. These adverse conditions killed off about 60% of the plant species and numerous animals, including the dinosaurs. Only the most well-adapted plants and animals were able to survive this mass extinction - but what is 'most well-adapted'?

10 Jeffrey Fawcett, Steven Maere and Yves Van de Peer have been working as bioinformatics specialists to decode various plant genomes (...). Time and again, they have been confronted with the fact that, over the course of the history of these plants, their entire DNA was duplicated one or more times. By means of sophisticated research techniques, they have dated these duplications as closely as possible.

15 They noticed that the most recent duplications occurred at approximately the same time in all of the plants. But, in terms of evolution, 'the same time' is relative: the DNA duplications occurred between 40 and 80 million years ago. So, the bio-informaticians worked to refine the dating. (...) They were able to make a very precise dating of the duplications on the basis of standard evolution trees. This indicated that, in all of the plants under study, the most recent genome duplication occurred some 65 million years ago - thus, at the time of the last mass extinction.

20 From these results, the researchers concluded that plants with a duplicated genome were apparently the 'most well-adapted' for survival in the dramatically changed environment. Normally, in unaltered circumstances, duplications of DNA are disadvantageous because they lead to an over expression of the duplicated genes that can be costly for the organism. (...) However, in radically changed circumstances, these very properties can make the organism better adapted to the new climate.

25 In previous research, Yves Van de Peer had discovered very old genome duplications in early ancestors of vertebrates and fish. At that time, he showed that these duplications were probably crucial for the development of vertebrates and thus of human beings as well.

Adapted from ScienceDaily (Mar. 23th, 2009)

Sum up this article and explain the main ideas using your scientific knowledge.