# A short story about preservation – from living organisms to fossils

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Fossil plants and animals are preserved in a number of different ways. These include impressions, per-mineralizations, and organically preserved structures. Most modern plants lacks biomineralized tissues, hence their survival in the fossil record relies on the preservation of organic remains. The fossil fauna is often biomineralized, however their cuticles can retain an organic signature.

Plant structures composed of both lignin and aliphatic macromolecules are the most likely to be preserved in the fossil record. However, the preservation potential of the aliphatic component itself is higher than that of lignin. Animal bodies are composed of biopolymers such as proteins, DNA, chitin and lipids, of which DNA and proteins are most susceptible to biodegradation and are thus rarely found in the fossil record. Despite degradation processes, chemosystematic information can often be obtained.

In both plants and animals, the physical and chemical properties of cuticles are responsible for their potential for preservation in the fossil record. However, the following factors also determine the extent of chemical and structural preservation, and subsequent survival into the fossil record:

1) type of the organism (terrestrial vs marine; degree of sclerotization or initial mineralization)

2) nature of the depositional environment (climate; oxic vs anoxic basin; terrestrial vs marine basin; pH of the environment; organic productivity; rate of sedimentation)

3) inhibition of initial biodegradation (microbial activity) and further diagenetic alterations

The role of temperature is not precisely known but time appears to be less important, but it can not be ignored completely. The preservation potential of major biopolymers (from DNA to lignin), in a variety of environments will be reviewed and discussed.

## References

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# Diagenesis effects on specific carbon isotope composition of plant *n*-alkanes

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The stable carbon isotope composition of individual biomarkers in general, and of *n*-alkanes in particular, is often used to reconstruct palaeoenvironments. However, little is known about the evolution of such an isotopic signal through diagenesis. We have investigated the effect of diagenesis on the isotope composition of bulk leaves and individual *n*-alkanes from higher plant lipids. The effects of very early diagenesis were investigated by studying the evolution of the isotope signal in modern leaves degrading in soils. These results were compared with those obtained from related fossil plants originating from Mesozoic and Cenozoic deposits.

In agreement with literature, all the analyzed *n*-alkanes appeared $^{13}$C-depleted when compared with bulk leaves. Within a given extract, they exhibit variations in specific isotope composition, depending on carbon number. The $^{13}$C-depletion of *n*-alkanes when compared with bulk leaves and the distribution of their individual $^{13}$C-content with respect to chain length appeared variable among species, degradation stages and fossil vs modern plants. Such variabilities of specific alkane isotope composition reflect the multiplicity of factors influencing the isotope signal in plants and derived organic matter. In soil samples, the results tend to indicate that the isotope composition of individual *n*-alkanes may be more affected by degradation than that of bulk leaves.