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Stable isotopes of bone collagen and the subsistence strategies of European hunter-gatherers, from Neanderthals to Mesolithics

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Bone collagen records the carbon and nitrogen isotopic signatures of the average food consumed during the last years of life of a given individual. Moreover, collagen can be preserved in fossil bone as old as 120,000 years in Europe, and carbon and nitrogen signatures are different in food resources such as terrestrial plants, herbivorous animals and marine items. Therefore, fossil collagen carbon and nitrogen isotopic signatures have been used to reconstruct the subsistence strategies of ancient European hunter-gatherers since about 20 years. This approach has already yielded valuable information on the diet of Neanderthals from temperature and glacial context, on the possible role of dietary shifts at the transition between Middle and Upper Palaeolithic, and on the geographical variations of subsistence strategies of Mesolithic people, especially between coastal and inland populations. A review of the main breakthroughs will be made in the course of this presentation.

However, this approach is not routine yet and three major requirements have to be met for isotopic signatures of fossil collagen to be usable for palaeodietary reconstruction: (1) to test the chemical reliability of the organic extract; (2) to evaluate the period of life-time reflected in the extracted collagen with respect to nursing and weaning especially in the case of infants; and (3) to establish a reasonably good trophic structure of the human food web based on collagen isotopic data of contemporaneous herbivorous and carnivorous mammals. Examples will be given about the possible biases generated by not following these requirements.

A further methodological improvement is the use of mathematical models to make quantitative estimates of the consumption of different food items, even in purely ter-

restrial context. An example of this new approach will be presented in the case of the Neanderthal from Saint-Césaire (Charentes-Maritimes, France).