

# Chapter I.7

## Summary of Part I

The sheer number of applications of stable isotope analytical techniques presented in the preceding chapters as well as their wide spectrum clearly demonstrates that this technique is a very powerful tool, providing quantitative and qualitative information that cannot be obtained by any other means. Government agencies such as the British FSA whose remit is authenticity of food and food ingredients, BEVABS at the European Commission JRC's IHCP that aims to ensure correct implementation of EU wine quality legislation and was set up to combat major frauds in this area or sports bodies such as the World Anti-Doping Agency have already declared stable isotope analysis a method of choice and an indispensable tool in combating counterfeit or mislabelled food stuffs or combating doping in sports.

However, no matter what the application, one underlying principle of stable isotope forensics is already emerging. Similar to the tenet that meaningful forensic interpretation of evidence and analytical data has to be contextual and should be supported by corroborating information obtained from independent techniques, stable isotope forensic examination of evidence should also be based on a multivariate approach examining information based on independent variables. This may already be achieved through multi-isotope profiling where single isotopic signatures are independent variables, which when combined will work like a multitumbler combination lock with only one solution in  $X^Y$  of possible combinations with  $X$  being the number of positions per tumbler and  $Y$  being the number of tumblers. However, given what we have learned about the drivers that account for the differences in isotopic composition of two otherwise chemically indistinguishable compounds it is clear that even multivariate stable isotope profiles should be combined with analytical data from independent analytical techniques to yield the maximum possible level of discrimination. That being said, based on what we have learned thus far it seems clear that multivariate stable isotope profiles of natural compounds and materials hold the potential to serve as a powerful screening tool and to provide real-time forensic information so as to help directing resources in criminal investigations.