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Amino acid racemization dating of Upper Pleistocene - Holocene terrestrial gastropods from a Mediterranean region (Murcia, SE Spain)

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The amino acid racemization method has become a widely used geochronological tool for dating Quaternary deposits. The method is based on the fact that living organisms contain only L-amino acids which gradually racemize into D-amino acids after death. Thus, the D/L ratio increases with time after death until it is equal to 1, that is, when equilibrium is reached. Gastropod shells are particularly useful for amino acid racemization dating. Because the amino acid racemization method is not a numerical dating method in isolation, it needs to be calibrated, mainly with radiometric dating methods. The racemization process is genus- and temperature-dependent. In this work we present a preliminary analysis that compares the radiometric age estimated from different dating methods of a number of gastropods recovered in localities from Murcia (Southeastern Spain), with the age obtained through the amino acid racemization method. Taking advantage of recent paleoseismological research in the Murcia region (SE Spain), 28 gastropods specimens were collected from different trenches dug in young Quaternary alluvial deposits. The specimens were subsequently classified and then analyzed according to the standards protocols of the Biomolecular Stratigraphy Laboratory (UPM, Madrid School of Mines). The species found were Otala lactea, Iberus gualterianus, Sphincterochila candidissima and Theba pisana. The D/L ratios of aspartic acid, leucine, phenylalanine and glutamic acid were determined, and the corresponding average age of each specimen was calculated introducing the D/L values in the age calculation algorithm of Torres et al. (1997) for gastropods of central and southern Spain. The racemization age for each locality was then compared to the radiometric age of the deposit where the specimens were collected. To this respect, the samples were classified in different groups considering the reliability on the age control method. The most reliable sample consists only on dates obtained by the radiocarbon method applied to pieces of charcoal found in the same sedimentary unit as the gastropod. The other subsets consider dates, or bracketed dates, obtained from other dating techniques (TL, OSL, Uranium series) or even stratigraphic criteria. Preliminary results show that Torres et al. (1997) calibration algorithm estimates ages as much as ten times older than the most likely one. We think that this result is due to a strong bias on the way the algorithm was obtained, based mostly in Lower Pleistocene/Pliocene samples. Hence, the new data presented here could be used to constraint better the Torres et al. (1997) function towards Upper Pleistocene and Holocene dates. This type of calibration model would be very valuable in determining ages of recent deposits in the Murcia Region, a matter that is critical in paleoseismological research.