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Radiocarbon dating of late Quaternary sediments using fossil gastropod shells

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ages from the same stratigraphic intervals. Thus, we conclude that fossil Succineidae shells, and shells of a few other small gastropods, can be used for ^{14}C dating regardless of the local lithology, past climate, or environmental conditions.

RADIOCARBON DATING OF LATE QUATERNARY SEDIMENTS USING FOSSIL GASTROPOD SHELLS

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Terrestrial gastropods are one of the most successful groups of organisms on Earth. Their distribution includes all continents except Antarctica, and they occupy exceptionally diverse habitats, from marshes and wet meadows to alpine forests and Arctic tundra. Their shells are also commonly preserved in Quaternary deposits and potentially could be used for ^{14}C dating. However, terrestrial gastropods are known to ingest limestone and incorporate the old carbon in their shells, resulting in apparent ages that are often too old. Recent studies have shown that many small (<1 cm diameter) terrestrial gastropods avoid this “limestone problem” even when living in areas in which carbonate rocks are readily available. However, the shells must also behave as closed systems with respect to carbon if their ages are to be considered reliable. Our latest work has been aimed at testing if small gastropod shells do, in fact, remain closed systems in late Quaternary deposits over a wide array of climate conditions across North America. Our results demonstrate that ages derived from Succineidae shells are identical to wood and charcoal ages in loess in Alaska, glacial deposits in the upper Midwest, loess in the Great Plains, and paleowetlands in the desert southwest. Moreover, Succineidae shell ages routinely fall within permitted limits set by stratigraphic boundaries, require less interpretation than humic acid ages that are commonly used in loess studies, can provide additional stratigraphic coverage to previous dating efforts, and maintain stratigraphic order more often than luminescence