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RADIOCARBON DATING: A DIDACTIC VIDEOTAPE

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In recent years, audiovisual techniques have evolved to the extent that videotape is now a very useful didactic tool in any scientific field. Audiovisual presentation of radiocarbon techniques allows us to communicate with radiocarbon users at a highly scientific level. To familiarize archaeologists and other users of radiocarbon dates with the basics and experimental procedures of radiocarbon dating, we prepared a videotape that explains radiocarbon dating and liquid scintillation counting. The presentation consists of the following sections:

- Geochemistry of radiocarbon dating, involving the distribution of carbon among the different carbon reservoirs and its incorporation into plants and animals; the different carbon isotopes and the formation, distribution and decay of ^{14}C.
- Measurement of ^{14}C activity by liquid scintillation, introducing the concept of activity and explaining the conversion of beta energy into light and its measurement with a liquid scintillation counter.
- Treatment of samples, showing materials suitable for ^{14}C dating and the procedure of pretreatment to eliminate non-contemporary carbon.
- Synthesis of benzene, in three steps: production of CO_2, reduction to C_2H_2 and trimerization to C_6H_6, as well as the preparation of the counting solution. The complete process is explained with images of an actual synthesis and counting preparation.
- Necessity of using a contemporary standard because of the fossil-fuel effect and ^{14}C-producing nuclear reactions in the atmosphere.
- Age calculation and its range. We show that radioactive decay is a random phenomenon, and that the measured activity recorded has a somewhat variable value, which later becomes the origin of the uncertainty.
- Calibration of radiocarbon ages. We point out that the ^{14}C calendar does not show true ages owing to fluctuations of the ^{14}C concentration in the atmosphere. Finally, we illustrate the calibration procedure.

Level: University
Duration: 17 min.
Languages: English, French, Spanish and Catalan
Systems: PAL-NTSC/VHS-Beta
Script and scientific direction: Gemma Rauret, J. S. Mestres and J. F. García
Directed by: Antonio R. Bartalomé
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