scintillators, respectively. We have used the maximum figure of merit and the figure of merit corresponding to the balance point as parameters for the evaluation of the quality of counting for each composition studied.

THE IMPACT OF ACCELERATOR DATING AT THE EARLY AGRICULTURAL SITE OF ABU HUREYRA ON THE EUPHRATES

A M T MOORE

Woodbridge, Connecticut 06525 USA

The early village of Abu Hureyra is significant because of its great size (ca 11.5 ha) and long sequence of occupation (ca 11,500–7000 BP) that spans the transition from late Pleistocene hunting and gathering to early Holocene farming, and the cultural change from Epipaleolithic to Neolithic. The 40 accelerator dates obtained for Abu Hureyra have produced three important results.

1. They have demonstrated that the site was inhabited for much longer than the few conventional radiocarbon dates for the site had suggested. The gap between the Epipaleolithic and Neolithic villages seems to have been brief.
2. They have dated a change in climate and vegetation during the life of the Epipaleolithic village. That change precipitated a shift in the foraging way of life of the early inhabitants just before the inception of agriculture.
3. Dating of individual bones and seeds has documented that the wild progenitors of sheep and several cereals were present near Abu Hureyra in the late Pleistocene, outside their present areas of distribution. This has implications for where those species may have been domesticated.

THE EFFECT OF MICROBIAL RESPIRATION ON REACTION-PATH MODELING OF GROUNDWATER AGES[1]

E M MURPHY

Geosciences Department, Pacific Northwest Laboratory, Richland, Washington 99352 USA

The respiration of heterotrophic microorganisms provides a source of dissolved inorganic carbon (DIC) that complicates groundwater age dating by ^{14}C. Although fractionation of carbon isotopes during dissolution/precipitation reactions is well understood and can be modeled, the carbon fractionation during microbial respiration is largely undefined. Reaction-path modeling of DIC sources associated with microbial respiration of lignite in the Middendorf aquifer in South Carolina is demonstrated. Tritium, ^{14}C and groundwater chemistry were analyzed along three flow paths. The ^{14}C ranged from 89 pMC in the recharge zone to 9.9 pMC in the distal borehole; the $\delta^{13}C$ remained relatively constant at ~ −22‰. To account for increasing inorganic carbon and to calculate the groundwater ages, two geochemical reaction paths were modeled: lignite oxidation with calcite dissolution and lignite oxidation with carbon isotope fractionation. Carbon isotope analysis of particulate organic carbon from the core sediments was used to model the carbon isotope fractionation, and the groundwater ages obtained ranged from modern to ~ 13,000 BP.

[1]Research supported by the US DOE/OHER Subsurface Science Program