Article: Dating Photographic Materials Based Upon Atomic Bomb-Derived Radiocarbon Content (Abstract)
Author(s): Gregory W. L. Hodgins and Dana Drake Rosenstein
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DATING PHOTOGRAPHIC MATERIALS BASED UPON ATOMIC BOMB-DERIVED RADIOCARBON CONTENT

GREGORY W. L. HODGINS AND DANA DRAKE ROSENSTEIN

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Since 1955, the earth's atmosphere has contained elevated levels of radiocarbon as a consequence of above-ground nuclear testing. The extra radiocarbon has circulated through the atmosphere, oceans and biosphere, and when detected in plant or animal tissues, the elevated radiocarbon levels provide a time-stamp for when an organism lived within the last 60 years. Because paper and photographic materials are produced from tree and animal tissues, those manufactured after 1955 should also contain elevated levels of radiocarbon. In other words, radiocarbon measurements from documents and photographs manufactured after 1955 should indicate roughly when these media were produced. This would provide important evidence for determining when particular negatives were exposed or images were printed. This approach differs from conventional radiocarbon dating in that measurement uncertainties are of the order of plus or minus a couple of years rather than the plus or minus 35 years typical in conventional radiocarbon dating.

Our hypothesis was that the radiocarbon content of gelatin from the photographic emulsion would be a more sensitive indicator of manufacturing date than the radiocarbon content of the paper support. This is because as gelatin is manufactured from short-lived animals, whereas paper is manufactured from long-lived trees. Pulping would mix pre-1955 wood fibers with post-1955 fibers and thus attenuate the rising radiocarbon levels in paper. We have measured radiocarbon levels in the paper and emulsion of several samples of known-age silver gelatin photopapers. Preliminary measurements support our hypotheses.

The approach has potential for dating all photographic materials that contain gelatin: negatives, black and white papers, color papers, film stock and other materials. However it is destructive, and at this stage, requires relatively large samples, so it would be useful only in specific circumstances.

GREGORY W. L. HODGINS, D. PHIL. AND DANA DRAKE ROSENSTEIN, M.SC.,
NSF-Arizona AMS Laboratory, Department of Physics, University of Arizona