A New Radiocarbon Hypothesis

John P. Jackson, Ph.D.
Turin Shroud Center of Colorado
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There exist today multiple arguments of a historical/archaeological nature which conclude that the Shroud of Turin is older than the medieval date ascribed to it by radiocarbon dating in 1988. This has led to the proposal of various hypotheses to explain this apparent discrepancy. One hypothesis is that the linen sample used in the radiocarbon dating actually came from a medieval "re-weave". While this hypothesis has been argued on the basis of indirect chemistry, it can be discounted on the basis of evident bandings in the 1978 radiographs and transmitted light images of STURP. These data photographs show clearly that the banding structures (which are in the Shroud) propagate in an uninterrupted fashion through the region that would, ten years later, be where the sample was taken for radiocarbon dating.

Another hypothesis to explain the medieval radiocarbon date is that the Shroud sample has been contaminated by intrinsically younger (in a radiocarbon sense) material that is alien to the cloth such as bioplastic residues from microbial action. The problem here is that the amount of carbon mass in such a contamination needed to skew the radiocarbon date of the Shroud from the first to the fourteenth century would be in excess of twice that present in the Shroud sample itself, assuming that the intrinsic radiocarbon date of the contamination is of modern age or older.

These considerations have led our research team to consider a new contamination-enrichment hypothesis that does not suffer from these limitations. It has been observed that carbon monoxide in the sea-level atmosphere is significantly enriched in radiocarbon well above that found in normal biogenic quantities derived from carbon dioxide. The reason for this is that carbon-14 produced by cosmic ray interactions with the atmosphere first interacts with oxygen to form 14CO with relatively high efficiency. Only later, on the order of one to two months, does 14CO interact with OH radicals in the atmosphere to form carbon dioxide which subsequently mixes into the atmosphere at a lower radiocarbon ratio than that which exists in carbon monoxide.

This raises the possibility of enrichment if carbon monoxide were to slowly interact with a sample so as to deposit its enriched carbon into the sample. We presume that textiles could be particularly vulnerable to such enrichment by gaseous contamination, since the gas molecules would easily diffuse around and interpenetrate into the 15 micron diameter fibrils that are loosely spun and woven together to make up the cloth. It turns out that, given the degree of natural radiocarbon enrichment that has been measured in atmospheric carbon monoxide at sea-level, only about a 2% carbon contamination relative to the overall carbon in the sample would be required to move a first century date of the Shroud textile to the fourteenth century.

The problem, therefore, is to test if there exist a chemical or physical pathway by which atmospheric carbon monoxide can contaminate a linen sample to the 2% level AND in a way that is consistent with the chemical and physical nature of the Shroud. It must also be shown why such contamination has evidently not occurred in some other linen samples for which a reasonable radiocarbon date is believed to have been rendered. For example, the linen wrap for the Dead Sea Scrolls apparently yielded a radiocarbon date consistent with it historical context; however, it is understood that this wrap had been sealed in a jar for two thousand years, which arguably might have protected (or retarded) it from atmospheric-based carbon monoxide contamination.

We at Turin Shroud Center of Colorado are studying the radiocarbon monoxide enrichment hypothesis, taking into account its concentration in the atmosphere, and expect that these studies will take many months to complete. While we, of course, cannot guarantee the outcome of these experiments, we intend, at the completion of these studies, to present our work in an appropriate manner. We do not intend to release interim progress reports or premature information about our experiments until our work is completed.