

FACETS of FAITH and  
Science, Vol. 3, The Role of  
Beliefs in The Natural Sciences  
Sous la dir. de Jitse M. Vander Meer  
U. Press of America, 1996  
8

---

## The Shroud of Turin: Resetting the Carbon-14 Clock

Thaddeus Tremm

### HISTORICAL INTRODUCTION

#### *Shroud of Turin*

This case study deals with the complex and highly contentious linkage between the biblically established event of the resurrection of Jesus and the extant artifact known as the Shroud of Turin. Tradition maintained that this linen cloth was actually the burial shroud of Jesus Christ. The linen cloth, when extended, is 14' 3" long and 3' 7" wide, quite sufficient to cover both sides of the body from head to toe. The cloth's weave, material and pattern match products in common use in the Middle East during the first century. The linkage is reinforced by the presence of pollen samples from plant material characteristic of Palestine found in sediment layers from the Lake of Galilee belonging to the time of Jesus.

The most striking feature of the Shroud of Turin is the image as to both style and character. A photograph taken in 1898 by Secondo Pia revealed it to be the nature of a photographic negative, yet one with an exceptionally high degree of resolution permitting very detailed analysis. To this day, no one has been able to adequately ascertain just how this image was formed—an image that just will not go away.

This cloth was frequently subjected to candle smoke and other sources of carbon contamination during periodic public expositions over the centuries. A severe fire in 1532 in the Savoy family chapel, where it was housed at Turin, engulfed the folded cloth, causing molten silver from the casing to drip onto the linen, searing holes right through the cloth and leaving extensive damage quite visible today.

### *Edessa Connection*

Normally, the Shroud is kept rolled up today, as is done with yardage goods. Early on, it had been folded, doubled in four, in the manner of a flag, with the countenance uppermost. Tradition and modern research traces the original folded cloth to Edessa, Turkey (modern Urfa, Turkey), where the apostle Jude Thaddeus was actively preaching and healing. After Jesus' death and resurrection, this Hebrew from Edessa was entrusted with the burial shroud, which he took as requested on a mission to heal King Abgar V of Edessa. Historically, the Abgar dynasty at the east Syrian kingdom of Osroene is considered a landmark, being at the head of a long line of converted kings bringing Christianity to all their subjects. The cloth itself was rediscovered about AD 525 sealed for protection in the city walls of Edessa.

The Mandyllion, as it was later named, was brought to Constantine VII in AD 944. The French Crusader Knights stole it during the sack of Constantinople in 1204, and brought it home where it turned up in Lirey as a spoil of war. Eventually it was transported to the ruling House of Savoy, based in Turin, where it was housed initially in the family chapel. From 1694 it was housed in a new chapel built specifically for this purpose. The Mandyllion was long known to be more than merely the evident facial image visible atop the packet. Examination of the full image reveals the front and dorsal aspects of a crucified man, brutally lashed and crowned with thorns. The location of the wounds, including the unexpected position of nail holes—in the wrists, not palms—as well as the open gash at mid-body conform with astonishing precision to biblical reports. The mummy wrap tradition, long used to depict Christ's burial, had already begun to change by 1025 in Constantinople to correspond with a full-length draped cloth. This reflects full awareness of the meaning and physical characteristics of the Shroud.<sup>1</sup>

### *A Problem for Authenticity*

Ancient tradition venerated the cloth's image as *Acheiropoietos*, "made without hands." During the fourteenth century a controversy erupted

suggesting that this only looked like a burial garment but was in fact merely a work of art cunningly produced. This infamous D'Arcis affair has been diffused historically as being a manifestation of acrimonious interpapal rivalry ongoing at the time.<sup>2</sup> Modern science has confirmed that it is manifestly not a work of art of any type. The image is confined to the surface and appears as yellow discolorations of the cellulose—there is no penetration of the fibres as would be expected from any artistic medium.<sup>3</sup> Yet microscopic photographs verify the presence of bloodstains which have seeped into the crevices of the fibres in the image areas. Most baffling, the image has a very definite three-dimensional character.

But if it is a burial garment, as scientific evidence now seems to guarantee, how did the image form on the cloth? One might wish to conclude that this was somehow an effect of the resurrection event, but two problems intervene at this juncture. First, there is no known process readily available to make the connection scientifically. Second, radiocarbon dating purportedly breaking the link with Jesus altogether. Unless the fibres forming the cloth existed at least 1960 years before the present, this clearly could not have been the burial garment of Jesus Christ. Carbon dating in 1988 claims an age less than 700 years! The claim was immediately accepted, albeit uncritically, by the public and most scientists alike. Perhaps the cloth was the burial garment of a fourteenth-century Crusader Knight captured by the Saracens and crucified exactly in the manner of Jesus in deliberate mockery of the latter's death.

### RESETTING THE CARBON-14 CLOCK

#### *Carbon Dating*

Assuming the carbon reservoir to be in a state of equilibrium, carbon taken up by metabolic processes will remain in the same ratio until the time of death. At that point, the decay of carbon-14, radiocarbon, makes the ratio it has with stable carbon-12 decrease slowly with time, inexorably like clockwork.<sup>4</sup> The date of death can then be deduced, accordingly, in a comparative fashion, with some considerable degree of accuracy. Carbon-14 is produced mainly in the upper atmosphere. Neutrons of moderate energy, released by cosmic radiation, are captured by nitrogen, the most abundant gas. Nitrogen-14 loses a proton in the exchange, effectively reducing its atomic number one unit. The resulting carbon-14 leaves its tracks in the form of electron emission, as it undergoes weak beta decay, transforming itself back into nitrogen-14, taking about 5,700 years for half of it to change.

Now, to determine the carbon ratios, it is far more efficient to count carbon atoms directly instead of waiting for radiocarbon to decay. Greater resolution is achieved by initially accelerating the isotope ions to high energy. The advantage of using this so-called *accelerator mass spectrometer* (AMS), besides the higher resolution that is achieved, is that very small specimens are required for destructive testing in comparison with what is needed for radioactive techniques. A *sine qua non* for accurate carbon dating is that no secondary radiocarbon be present to skew the ratio, which is particularly sensitive to this carbon-14 component, normally present at less than one part in a billion! With some materials, it is often difficult to distinguish carbon contaminants, which include carbon-containing compounds that are not indigenous to the original sample matrix, but which have become physically or chemically fixed as part of the specimen.

### Carbon Contaminants

Researchers dealing with the Shroud of Turin were keenly aware of potential sources of carbon contamination and tried their utmost to eliminate these anticipated contaminants during pretreatment cleaning. It is well known that the cloth in question came into contact with smoke periodically over the centuries.<sup>5</sup> Such surface contamination might well have become etched, as it were, into the fibres during the serious fire of 1532. If not eliminated or calibrated out, excess radiocarbon as contaminant would have the effect of shortening the calculated age. According to one estimate, it would take only eighteen percent excess of carbon-14, whether as a contaminant or produced *in situ*, to shift the date from 2,000 years to 650 years before the present.<sup>6</sup>

The AMS technique is particularly troublesome with regard to accuracy, as is well known, normally requiring the control of more traditional procedures except for estimates. Anomalous results obtained have been duly noted, and traced in many cases to the pretreatment of samples tested. So clearly there were serious potential costs accompanying the benefits expected when only three AMS-oriented laboratories were selected to test the Shroud of Turin: namely, Zurich, Arizona and Oxford.

These three laboratories each treated their shroud sample as a whole piece of cloth, rather than shredding or unravelling the fibres, because otherwise pretreatment cleaning would be more difficult. Such treatment was crucial, since the shroud had been exposed to a wide range of potential sources of contamination; dirt, smoke and other contaminants to an unknown degree. The laboratories each subdivided their own sample and then used several mechanical and chemical

cleaning procedures. Each laboratory was provided with a sample of three control specimens of known origin and date, none of which was fixed with such an indeterminate background of contamination.

### Radiocarbon Dating Moot

Their findings were published in *Nature*.<sup>7</sup> "The results provide conclusive evidence that the linen of the Shroud of Turin is medieval." [sic] "The age of the shroud is obtained as AD 1260-1390, with at least 95% confidence." As it stands, the evidence appears unassailable. Yet the interpretation of the results, upon closer scrutiny, is clearly subject to doubt.

Each laboratory reported "no significant differences between the results obtained with the different cleaning procedures that each used," and, taken together, each result was in the same range. But this implies that the elaborate chemical procedures applied by each of the laboratories were no more effective in the removal of contaminants than were simple physical procedures. The Zurich subsample, designated Z1.1u, "received no further treatment" beyond the precleaning ultrasonic bath. Yet, without the benefit of any chemical treatment this subsample actually yielded the *older* datum of the several runs! Arizona utilized various *chemical* pretreatment procedures exclusively.

It strains scientific credibility to suppose that simple *physical* procedures and complex *chemical* procedures, each applied independently, could just be interchangeable in their effectiveness. At the very least, this would render the elaborate chemical pretreatment procedures superfluous. Logic dictates that the procedures actually utilized in this case were simply not differentially effective in removing carbon contaminants. Either there were no such contaminants in the first instance or else the results obtained require revision. Yet the researchers involved acknowledged the checkered history of this linen cloth, exposed as it was to smoky environments over time. The intense fire of 1532 alone dictates the need for pretreatment cleaning. The procedures selected, unfortunately, cannot be deemed successful.

### FURTHER RESETTING THE CARBON-14 CLOCK

#### In Situ Production of Radiocarbon

Besides contamination there is another way by which excess radiocarbon might well have become fixed in the fibres, immune from pretreatment cleaning. If the atmosphere did not attenuate the range of

cosmic radiation, the conversion of nitrogen-14 to carbon-14 could easily occur on earth, *in situ*, as it were, affecting samples both living and deceased. The same result would occur in the presence of neutron flux from some other origin. Nitrogen-14 fixed in the fibres in the presence of a neutron flux, could undergo transformation to carbon-14 just as in the upper atmosphere. The AMS team at Oxford actually anticipated this theoretical possibility.<sup>8</sup> Higher yields of radiocarbon would be expected from this standard *nitrogen* process compared with the equally plausible neutron activation of carbon-13. Now, it is doubtful that the Oxford team truly believed such a neutron flux actually constituted part of the historical environment of the Shroud of Turin. The point to be made here is simply that *if* one were to have occurred, then the *in situ* effect upon nitrogen-14 fixed in the fibres would require attention.

The source of this idea can be traced to the suggestion by several individuals that a burst of radiation accompanying the resurrection event might be one way to account for the formation of the image on the linen cloth. One variation of this proposal includes a neutron flux to produce excess radiocarbon. While this may yield a result helpful for elucidating anomalies regarding the Shroud of Turin, there is a fundamental reason for excluding any such neutron event. If it were introduced as a singleton event, unique in all history, then it would be considered unresolvable in principle and would elude scientific scrutiny altogether. This is why it was considered so important that pretreatment procedures should have been adequate to eliminate any possible excess radiocarbon produced *in situ*. Although radiocarbon is radiocarbon however it is produced, the precleaning techniques employed were considered quite adequate to *selectively* remove any hypothetical excess carbon-14 in virtue of the chemical location of the fixed nitrogen which would have been involved. Since similar results were obtained for both chemical and physical techniques, it was presumed that no such hypothetical excess carbon-14 was even present in the first place.<sup>9</sup>

Although the carbon dating investigators presumed that any excess carbon-14 would be selectively removed by pretreatment cleaning, there is good reason to doubt that such secondary radiocarbon would be separable. As contamination from smoky environments, excess radiocarbon *might* be separable, but not easily if it were etched into the fibres by excessive heat. The lack of any difference obtained, using physical methods or chemical pretreatment cleaning, suggests that any such extra carbon-14 was merely added to the total carbon-14 content *a fortiori* foreshortening the date obtained.

Radiocarbon could also be induced from neutron irradiation of *in situ* nitrogen-14. The Shroud investigators considered that such nitrogen-14

would be in a chemically different environment. If so, any carbon-14 removed from this nitrogen-14 would be in a chemically different environment. Such carbon-14 was presumed to be susceptible to selective removal by the chemical cleaning techniques. Yet they must still account for the lack of any advantage for such *chemical* procedures over the simple physical ultrasonic bath as discussed above. But the chemical environment may *not* be different! Jitse van der Meer has suggested that any nitrogen-14 would be found only in the proteins, namely the same chemical location as for photosynthetic carbon-14 of original endowment: "So the two carbon-14's are in the same chemical environment within the protein molecule."<sup>10</sup> If true, this would undermine their presumption of selective removability of any excess carbon-14 and would strengthen the central argument of this paper, namely, that excess carbon-14 was inevitably co-present throughout the carbon dating investigations.

Both alternatives lead to the same basic conclusion, namely that pretreatment cleaning was ineffective at removing induced radiocarbon, as if indeed any had been induced. Whereas excess radiocarbon (as contaminants or from neutron flux) could not be easily removed, selectively vis-à-vis radiocarbon of original endowment, it is of course, entirely possible to test the overall density distribution of the *total* carbon-14 content. Assuming the distribution of photosynthetic radiocarbon to be uniform throughout the cloth, any lack of uniformity overall would strongly indicate the presence of excess carbon-14. Induced excess radiocarbon would be commingled and superimposed upon this background of photosynthetic radiocarbon. But unless the neutron-induced radiocarbon was quite random and uniform in distribution, the *total* count, when scanned across the width, would not be uniform. It is this possible discrimination regarding the total carbon-14 content, by means of counting differentials, that is our concern. For this would provide a *direct* indication of nonuniformity in the overall radiocarbon distribution. The implications of this startling result should be obvious even to the skeptic.

### Effect of Additional Radiocarbon

While the uniformity of results obtained by the three laboratories was interpreted as evidence for lack of any residual excess radiocarbon, another conclusion is possible. If some excess radiocarbon were fixed in the fibres in such a manner as to be indistinguishable from the original endowment—a well known source of other dating errors in the past—then the absence of detectable difference might be turned around to suggest that the pretreatment techniques used were simply

inadequate. Perhaps some secondary radiocarbon merely eluded the procedures. The argument against the presence of secondary radiocarbon formed by "neutron capture by nitrogen in the cloth" was based upon the "equivalent results" obtained by the three dating laboratories using "different types of chemical pretreatments."<sup>11</sup> But it is now clear that these elaborate chemical procedures could have been replaced altogether with a simple physical process (ultrasonic bath) *vis-à-vis* their alleged effectiveness at removal of carbon contaminants. So it is questionable whether these same chemical procedures could have been any more effective at discriminating the separation of secondary radiocarbon from the original endowment, notwithstanding the claim that "the original nitrogen is in a chemically quite different environment." Where detectable difference is absent, prudence would suggest that it would be wise to begin by questioning the effectiveness of the procedures selected.

The problem for the radiocarbon dating results is evident. Any significant excess radiocarbon, normally present in the isotopic mix known as carbon at less than one part in a billion, would quite radically skew the ratio between carbon-14 and stable carbon-12. Accordingly, as the relative amount of radiocarbon increases, the age of the specimen will appear younger than it ought to be if given the original endowment. The presence of radiocarbon produced *in situ* would scramble the carbon dating clock more seriously than carbon contaminants.

### Implications of Excess Radiocarbon

Normally, only a negligible amount of radiocarbon would be produced in any given specimen due to cosmic radiation reaching the earth. The enhanced amount envisioned here as the result of a neutron flux has wider implications beyond modifying the carbon ratio, perforce foreshortening the measured age of the cloth. Such a neutron flux would undoubtedly be an accompaniment of some physical process as yet to be determined. Parsimoniously, such a process would also involve the cause of the image formed on the cloth. It ought as well to deal directly with the resurrection event itself, to the extent that this is at least in part also a manifestation of some physical process.

The problem here is that while it might be possible to explain the dating anomaly through the introduction of excess radiocarbon caused by a neutron flux accompanying a resurrection event that also produced an image on the cloth, the very nature of the event, however plausible it may be scientifically, tends to elude scientific methodology. Science is indeed at its best dealing with reproducible events, although it is

making headway on possibly the most glaring exception, with ever increasing theoretical understanding of events associated with the Big Bang.

Irreproducible events do occur. Science cannot assert that a given process or event did *not* occur simply in virtue of poverty in probability. In order even to begin to approach the mystery of the Shroud of Turin, I believe that we must adequately take into consideration the complex constellation of events associated with it—however rare or unique—events which, while distinct, are nevertheless collectively as unique as the Shroud of Turin itself. For if Jesus Christ was indeed buried in this linen cloth and then resurrected while wearing it, this is surely of great consequence.

### RESURRECTION MODEL

#### *Dematerialization*

I should like to introduce *dematerialization* as perhaps a key feature of the resurrection event associated with the Shroud of Turin. This is essentially different from the case of Lazarus.<sup>12</sup> Let us take the example of boiling water whereby molecular bonds are overcome, freeing the gaseous products in a vapor we call steam. By analogy, at the nuclear level, the strong force bonding the main units—neutrons and protons—is expressed in terms of exchanging a particle known as pion-meson, or pion. If this pion *glue* were overcome by energy supplied to the system, we could speak of a sort of phase change, as when water turns to steam. One striking feature of pion bonding is the missing mass. The slight mass differential between paired and unpaired nucleons, neutrons as well as protons, is termed *mass defect* in the language of mass. Energy-wise it is known as *binding energy*.<sup>13</sup> So, energy would be required to violate those unions—energy pumped into the system, as it were, to replace the *binding energy*.

Each nucleus is *missing* about one percent of its mass. For an object weighing, say, eighty kilograms, the missing energy would be the equivalent of nearly thirty-six grams of matter converted by  $E=mc^2$ . Put graphically, to resurrect a body this way would require the energy nominally equivalent to about twenty-nine atomic bombs. Here it is crucial to realize that we are dealing *not* with energy released but with energy to be *replaced*—the extra energy to break those pion bonds. By analogy, an exothermal chemical reaction liberates heat, whereas an endothermal one absorbs heat. Clearly then, a resurrection event accompanied by *weak* dematerialization would not devastate the tomb. Robinson has suggested "transmaterialization" as an alternative in order

to capture the traditional glorified-body aspect without depending upon any physical explanation.<sup>14</sup>

### Singleton Event Complex

Once normal pion bonding were overcome, the nucleons of matter would have been set free. These would subsequently behave according to normal physical laws. Almost instantaneously the nuclei would begin to lose their orbital electrons. Electron orbit-jumping is normally accompanied by soft x-rays characteristic of the shift. These would be sent speedily from every element of the body surface. The electrons, now unbound, would tend to fly to ground—literally and electrically. The dry cloth would act in the first instance as earth potential. As with the x-rays, these electrons would also emanate from every atom of the body, streaming away as if collimated, which is normal to the body surface in the manner of coronal discharge. Aside from the obvious advantage to image resolution if each atom contributed to the process, recent scientific research supports the position that soft x-rays and coronal discharge could yield the sort of image effect produced by the Shroud of Turin.<sup>15</sup>

The unbound neutrons would yield a dense flux throughout the length and width of the cloth impacting upon nitrogen-14 atoms fixed in the fibres with energy sufficiently moderate to convert many nuclei into radiocarbon. These neutrons would no longer be "forbidden" to transform themselves into protons, so the proton plasma would continually grow and disperse itself throughout the atmosphere within the tomb. The burial cave hewn out of rock is suddenly filled with hydrogen mixed with oxygen. The slightest additional spark would have set off a most violent explosion within the confined space, generating water, and forcing aside by concussion any object in the way. The linen cloth would have been violently blown aside, and the stone would have been dislodged from the entrance. Anyone subsequently entering the empty tomb would have found the linen cloth tossed aside, but bearing signs of an image. Those witnesses, though, could not have known about the excess radiocarbon fixed in the rock—kept secret until our day.

### Nonuniform Density of Radiocarbon

The original endowment of radiocarbon gained through metabolic processes would be present uniformly throughout the entire cloth. Any secondary radiocarbon produced *in situ* would tend to vary in density as a function of the neutron flux distribution. Various attempts have

been made to account for the cloth's image in virtue of a burst of radiation. Some have included a neutron flux as an accompaniment of this burst, perhaps in the manner of a neutron bomb yielding high velocity neutrons.<sup>16</sup> The suggestion here of weak dematerialization, achieved through overcoming pion bonding of the nucleons of matter, is very different. The neutrons would simply be freed to stream through the cloth with only moderate energy. Accordingly, we would expect a variation in the density distribution, highest in the center of the cloth along its entire length, namely, where the body lay. It would be simple to test this prediction of an axial maximum.

Recall that radiocarbon transforms itself back into nitrogen-14 through a process of weak beta decay, taking about 5,700 years for half to change. Less than twenty-five percent of this secondary radiocarbon, produced *in situ* by this alleged neutron flux, would have undergone weak beta decay to date. Beta rays are electrons from the nucleus, and are exceptionally weak in the case of radiocarbon. But if this nuclear electron emission were initially accelerated by means of a positively charged fine mesh grid especially placed against the spread-out Shroud for testing purposes, the impact distribution could be coherently registered by any number of available detection processes. Alternatively, a matrix of photographic plates with lead sheets sandwiched in between could be enfolded within the Shroud in total darkness for a period of time to clearly differentiate the frontal and dorsal aspects of the variation in density distribution, obtaining a visual record for detailed optical scanning. So, although the Shroud of Turin may elude the grasp of scientific methodology in virtue of the irreproducibility of the event complex that led to the evidence to hand, it may nevertheless yet have something to teach science.

### CONCLUDING POSTSCRIPT

#### Uncritical Rejection

I have long been intrigued by the strong tendency to dismiss the Shroud of Turin as a forgery or fake of some type. Typical reactions are neither neutral nor objective as to the question of its authenticity, but tend to be negative and sceptical, not infrequently virulently so. What is it about this supposedly simple linen cloth that evokes such hostility? Could it perhaps be a vaguely felt fear of the unknown? A common sense intuition that there is far more to this particular linen cloth than meets the eye? An escape to the dungeon of unbelief to avoid the blinding light? That the Shroud of Turin is an extant artifact is an unassailable fact that has long attracted world attention. Why, though,

is the public so inclined to be more comfortable with claims that it is not what it purports to be? True, many people were no doubt disappointed in 1988 to learn that radiocarbon dating had placed it in the fourteenth century. Scientifically, though, the conclusions went far beyond what the evidence would bear. The presence of radiocarbon was actually found to be in quantity inconsistent with the date of 2,000 years before present and consistent with the fourteenth century *provided* no secondary radiocarbon had been introduced during the intervening years. This latter proviso was not even specifically stated, much less considered, although given the tradition associated with this linen cloth, it is historically questionable to dismiss it, even though this move conforms with sound scientific methodology. Beyond the exaggerated claims of science came the public media with unsupported implications that "fake," "forgery" and "fraud" are somehow appropriate words to describe this artifact. It is just this "jumping to conclusions" and uncritical rejection that seems to me the litmus test of authenticity. For *science* has already confirmed that this cannot be a work of art of any sort, and *science* stands perplexed, without as yet an explanation for how the three-dimensional image was formed. Some fake!

### *Blinded by a Parable*

Throughout his earthly life, Jesus often spoke in a parable which in Aramaic may be translated as "riddle." How apropos that he should have left such a magnificent conundrum for posterity—an enigma tantalizing for science, but just beyond its grasp—a playful yet powerful parable to the sceptics of our day who examine closely with eyes enhanced by science, though still fail to see. For if Jesus Christ was buried in that linen cloth, and was resurrected while wearing this underdeveloped film, then these events *must* perforce be taken into consideration when scrutinizing the Shroud of Turin. To construe it as merely another piece of cloth is to fall victim to this ultimate parable. Yet science, in virtue of its mentality and method, can forever see only a cloth, not the Shroud of Turin—*a fortiori*—neither can it adjudicate its authenticity.

Yet irreproducibility aside, a considerable amount of scientific evidence and data has been accumulated over the years concerning the Shroud of Turin. And the linkage between image formation, excess radiocarbon and a resurrection event involving weak dematerialization accompanied by a neutron flux does lead to a testable prediction as regards the expected axial maximum in the density distribution of secondary radiocarbon. Still, such an alternative account, however plausible scientifically, takes us into the realm of belief and unbelief at

a very deep level, exposing hidden motivations and attitudes which in turn condition the operation of presuppositions and theory formation including the acceptance or dismissal of "evidence." In the absence of a dispositional attitude of belief, there will be no way to "prove" that this might be the case. The mocking assertion by one of the principal scientists involved with the radiocarbon dating is but one indicator of such atridinal unbelief: "Someone just got a bit of linen, faked it up and flogged it."<sup>17</sup>

### *Authenticity Reconsidered*

The immediate issue of authenticity concerns whether this is indeed a burial cloth of the first century. Of course, if it is authentic, it would not "prove" the Resurrection. Belief in the Resurrection must not depend upon this burial garment or anything else. Nevertheless, unconditional belief in the Resurrection event, *whatever* may actually have taken place, may well dispose the heart and mind to at least accept the possibility of alternative processes and hypotheses which may well be ancillary towards an understanding of the Turin Shroud. Without such an attitude of openness, in catch-22 fashion, we may exclude even from consideration the very sort of event-complex that could substantiate the authenticity of the Shroud as a first century garment.

The answer to the question of the Turin Shroud's authenticity is written on the heart, and quite eludes the scope of science to definitely affirm or refute. Scientism is our modern ideology. Much like Thomas the doubter, we refuse to believe what eludes sense and reason. Following Adam, we have pridefully succumbed to the lure of our modern tree of knowledge only to find its fruit bitter to the taste. How pretentious to expect that scientific evidence could provide the easy way—a *firm* foundation for belief. The Shroud of Turin is a mystery. Merely dating its fibres at 2,000 years will not guarantee its authenticity. Nor will a sound theory of image formation resolve the conundrum. Even the results of future tests on its wake. But neither of secondary radiocarbon will leave sceptics in its wake. But neither can the recent radiocarbon dating results be accepted as a verdict of dismissal. The resurrection event is probably the key to this enigmatic bequest. To interpose our science as an adjudicator of belief is pride of the rankest sort. The essential act of faith in Jesus Christ must not be mediated or made contingent upon scientific findings or anything else for that matter.

Without such unconditional belief, the Shroud of Turin remains quite inaccessible. But believing in the Shroud for its own sake could turn it into just another golden calf.<sup>18</sup> Faith in Christ must not be dependent

on any sort of idol, sacred or profane. Whatever function it might have, the Shroud must not become the object of our faith. Nor may we allow it to be construed as a condition or test for faith. It cannot be a crutch or substitute for the essential act of faith. Yet, if rightly understood, it may for some who already believe unconditionally, even reinforce and further validate the earthly claims of Jesus Christ, no less than his many miracles, performed in the presence of faith.

## NOTES

1. K.E. Stevenson and G.R. Habermas, *The Shroud and the Controversy* (Nashville: Thomas Nelson, 1990), chap. 4 and passim; I. Wilson, *Holy Faces, Secret Places* (New York: Doubleday, 1991), chaps. 10-14 and passim; F.T. Zugibe, *The Cross and the Shroud* (New York: Paragon Press, 1988), chap. 12 and passim.
2. Wilson, chap. 2; Stevenson and Habermas, 155.
3. Stevenson and Habermas, 31, 121, passim.
4. R.E. Taylor and R.A. Müller, "Radiocarbon Dating," in *McGraw-Hill Encyclopedia of Science and Technology*, vol. 15, 6th ed. 1987, 121-28.
5. P.E. Damon, D.J. Donahue, B.H. Gore, A.L. Hatheway, A.J.T. Jull, T.W. Kinick, P.J. Serecel, L.J. Toolin, C.R. Bronk, E.T. Hall, R.E.M. Hedges, R. Housley, I.A. Law, C. Perry, G. Bonani, S. Trumbore, W. Woelfli, J.C. Ambers, S.G.E. Bowman, M.N. Leese, and M.S. Tite. "Radiocarbon Dating of the Shroud of Turin," *Nature* 337 (1989): 611-15, 612; Wilson, 176ff.
6. B. Kelly, "Turin Shroud," *New Scientist* 119 (1988): 94; dates are indicated backwards from present.
7. Damon, et al.
8. R.E.M. Hedges, "Reply," *Nature* 337 (1989): 594.
9. "The three laboratories used different types of chemical pretreatments...yet obtained equivalent results. This shows that any C<sup>14</sup> formed by neutron irradiation behaves chemically in the same way as the original C<sup>14</sup>. This is inherently unlikely because the original nitrogen is in a chemically quite different environment." (Hedges, 594).
10. J.M. van der Meer, personal communication.
11. Hedges, 594.
12. J.A.T. Robinson, "The Shroud and the New Testament," in *Face to Face with the Turin Shroud*, edited by P. Jennings (Oxford: Mowbray, 1978), 79.

13. K.W. Ford, *The World of Elementary Particles* (New York: Blaisdell, 1965), 174 and passim. One way to envision the energy influx is via very high energy gamma rays focused on the nuclei. A far simpler way would involve premature and spontaneous pion decay, whereby "leashed" virtual pions escape as real pions which then automatically decay in a fraction of a second. Compare Ford, 195, 207-9, passim. Weak dematerialization is like "Lego" blocks which are being disassembled but do not disappear.

14. Robinson, 79.
15. Stevenson and Habermas, 40-41 and passim; Zugibe, 178. As for hypothetical carbon-14 fixed in the fibres, compare quote at note 9. One referee noted that the suggested process might have also left some traces in the rock of the tomb, and that in principle one could make relevant measurements at the Holy Sepulchre in Jerusalem.
16. T.J. Phillips, "Shroud Irradiated with Neutrons?" *Nature* 337 (1989): 594; Stevenson and Habermas, 167, 198-99, 204; Zugibe, 173-78.
17. Wilson, 5, quoting Professor Edward Hall.
18. Stevenson and Habermas, 146-47, 169.