

The stated purpose of the volume is “to examine critically... sweeping claims — to attempt to clarify the rational status of various distinctive facets of the paranormal in terms of recent studies and developments” (p. 4).

“Paranormal” is a wastebasket classification in the sense that “exceptional children” is: It includes quite a variety of phenomena that are not considered “normal.” Some of these putative occurrences and states seem to require a mind-body dualism for explanation, some do not; some seem to presuppose a supernatural order, some do not; some are amenable to scientific attack as usually understood, others are not. Mostly, the contributors sort out these and related issues more than they try to prove or disprove the existence of *psi* phenomena. They do not always agree with one another as to which kinds of events require which kinds of world-view and/or methodology, which is all to the good. The reader can decide. There is also that impassable divide between those who find a good case-history the best kind of evidence and those who want statistics.

The book requires minimal background in its subject. When technical terms are used, they are always explained. Bibliographies are carefully prepared and appropriate.

This is probably not a book for those who have thought long and hard about philosophical issues and scientific methodology. Advanced scholars may wish for some distinctions that are not made. This book achieves its purpose, however, and the purpose was worth achieving. Those who want to survey the whole area of the paranormal (or parts of it) with a fresh and informed perspective should find this a useful preparation.

Robert B. Nordberg
Professor Emeritus of Education
Marquette University
Milwaukee, WI 53233

Relic, Icon or Hoax. Carbon Dating the Shroud of Turin by Harry E. Gove. Bristol and Philadelphia, Institute of Physics Publishing, 1996, ISBN 0-7503-0398-0.

The Shroud of Turin made its first recorded appearance in the 1350’s in the town of Lirey, France. This cloth, bearing the remarkable image of a man, was said to be brought there by a crusading knight, and has no previous provenance. Since then, many people have believed that the Shroud is the burial cloth of Jesus Christ and the image is that of Jesus.

Of course, this claim has not gone unchallenged. In fact, the Church launched an investigation which resulted, in 1389, in the confession of a hoaxer. However, his identity is not known, and some people prefer to believe that the confession is the hoax. In any case, critical inquiry into the Shroud through the centuries has had little impact on peoples’ belief in its authenticity.

When radiocarbon dating was invented in the 1940’s, it was realized almost

immediately that this was a test that had the potential to settle the issue definitively. A sample of the cloth could be taken, and if the age was significantly less than 2000 years, then the Shroud must be a fake, for it's hard to see how even God could contrive to wrap a man in a cloth that didn't yet exist. If the age should prove to be around 600 years, then it would be reasonable to conclude that the original investigation conducted in the fourteenth century had in fact uncovered the truth about the Shroud. However, the test required damaging the cloth, and the Church was understandably reluctant to submit the Shroud for testing.

In 1978 an unprecedented opportunity arose to study the Shroud scientifically. For five days a team of scientists known as STURP (Shroud of Turin Research Project) subjected the Shroud to a variety of tests. Unfortunately, almost nothing was learned from this, and the project was seriously marred by the team's lack of objectivity: most of the members were already devout believers in the Shroud's authenticity. One member even estimated the odds against its authenticity to be one in 83 million! An objective appraisal of the STURP investigation is inconclusive in the extreme.

A breakthrough occurred in 1977 when physicists Harry Gove, Ted Litherland, and Ken Purser developed accelerator mass spectrometry, an alternative to conventional carbon dating. The idea behind carbon dating is to determine the ratio of the number of carbon 14 atoms to carbon 12 atoms in an artifact. Since C14 is radioactive while C12 is not, this ratio changes as the object ages. Thus carbon dating is essentially counting; however, counting atoms is not trivial. Conventional carbon dating takes advantage of the instability of the C14 atoms, detecting the decay of individual atoms into nitrogen. Since the atoms decay slowly, with a half-life of 5730 years, only a tiny fraction of the atoms will decay in any interval of time and thus large samples are required.

Accelerator mass spectrometry (AMS) proceeds by counting essentially all the atoms in a sample, and therefore only small samples are needed. The sample is vaporized, and the resulting atoms ionized and accelerated with an electric field. The slight mass difference between C12 and C14 causes a slight difference in their flights, and so they can be separated and counted. This was the technique that ultimately was used to establish the age of the Shroud.

Relic, Icon or Hoax? Carbon Dating the Turin Shroud by Harry Gove, is a documentary of the testing. It is not simply an account of the actual dating of the Shroud, which was a technically routine event; rather it is a blow-by-blow account of the wheeling and dealing and politicking that took place in order to convince the Church to allow the testing. It is definitely not literature; the writing is austere, with most of the sentences formed in a very direct, simple declarative structure. The lack of style is very noticeable, and if you are reading for pleasure this is detrimental; on the other hand, if your purpose is to gather information, say, for debating, then the simplicity of the writing may be to your liking. Either way, the book contains a bewildering amount of detail, covering the ten years from the invention of AMS to its eventual use on the

Shroud. Even the number of people involved is overwhelming; the book has a “cast of characters” appendix which I found helpful.

The book does have entertainment value, however. The intrigue is astonishing, and involves more than the Catholic Church. The STURP team worked hard to block the dating test, and when that failed, tried to get themselves invited as participants, even though they had no expertise in carbon dating. Gove’s animosity toward STURP grew so intense that his attorney advised him to soften his tone in “Relic” for fear of libel. Gove succeeded in preventing STURP from participating in the carbon dating, fearing their lack of objectivity would compromise the results. On the other hand, his efforts didn’t go unpunished. The original experimental protocol called for seven independent labs to date the Shroud, but the Church unilaterally decided on three and Gove’s was not one of the chosen. STURP’s influence here is insinuated but not proved.

The decision to use only three labs was ostensibly made to reduce the amount of material needed for the test, and hence minimize the damage to the Shroud. Gove easily refutes this justification and suggests the Church wanted to weaken the test results. This provides Gove with the opportunity to explain the difference between statistical errors and nonstatistical (systematic) errors, an important distinction the Church either didn’t understand or ignored.

Also mentioned is the fear of collusion among the labs. This is ridiculous, of course, since the entire testing process can be witnessed and recorded by any number of observers. However, it raises an interesting question: in which direction did they fear the labs would skew the date? Gove expresses strong opinions throughout the book, but he doesn’t address this issue explicitly.

I shouldn’t give the impression that Gove paints everyone in the Church as a villain. The dating could never have been arranged without influential clergymen (in particular the president of the Pontifical Academy of Science) supporting the idea, and Gove gives due credit to these men. Also getting high marks for integrity is the National Science Foundation, which funded part of Gove’s expenses in helping to arrange the testing.

The book’s flaws are of two kinds: those deriving from the author’s writing and those due to his particular background. Examples of the former are his sketchy descriptions of technical matters. He never fully explains how AMS works. This is probably deliberate, in order not to put off the non-technical reader. But as the inventor of the technique, he is entitled (I feel) to the luxury of describing it fully. Secondly, Gove discusses the precision available from carbon dating, and points out that if 90% accuracy were the best that could be achieved, the date of the Shroud would be uncertain by 830 years. After some thought, I believe I understand where this number comes from, but it would have been nice if Gove had explained it. Thirdly, Gove makes an error in his discussion of the role of contamination in the dating. He states that if the Shroud were authentic, the contamination necessary to skew the date to the observed medieval value would be one third of the sample; in fact, the correct value is two thirds, an overwhelming proportion.

Flaws due to the author's background are easier to forgive. An example is Gove's ignorance of much of the Shroud's history. For instance, he plainly is unaware that there is a confession from the forger, and says that in his opinion the Shroud is not a hoax. But my biggest complaint is his attitude toward the Shroud. On several occasions he claims his interest in dating the Shroud is only to establish his AMS process as the definitive carbon dating technique. I think anyone who reads the book will conclude, as I did, that his ulterior motive was to have his name linked to the Shroud dating. To bolster his claim of detachment, he labels himself a religious agnostic, but then proceeds to observe that it might be better if the truth about the Shroud were not known, a statement that is totally unacceptable to me. As a rationalist and a skeptic, I find such an attitude objectionable, for, regardless of their religious beliefs, people are better off ignorant only if they can't handle the truth, and there is no reason why the Shroud's being a hoax should threaten anyone's faith. No one should apologize for trying to discover the truth; ignorance is not a virtue.

On the positive side, there is much factual information in the book, and many points that good skeptics will appreciate. For instance, Gove ridicules the suggestion that the testing should be "blind": a dummy sample being included with the three Shroud samples given to each lab. Now, as a practical matter he has a point, since the weave of the Shroud cloth is very difficult to mimic, but I got the impression his opposition to blind testing went deeper. At any rate, this shows that Gove is a novice in dealing with the paranormal.

Surrounding any paranormal topic one can find people who exercise a make-believe open mindedness. That is, they support objective investigation as long as the results agree with their personal conclusions, long ago decided by other means. The Shroud of Turin is no exception, and skeptics should enjoy comparing the various attitudes of the people appearing in the book. Particularly interesting is a paragraph on page 246 in which Ian Wilson tips his hand about what it would take to persuade him that the Shroud is a fake. (Wilson is the author of several books on the Shroud.)

As a third point for skeptics, I return to the decision to reduce the number of independent tests from seven to three. The custodians of the Shroud never seemed to appreciate the difference in the two protocols. Or maybe they did. It is suggested in the book that the purpose of the reduction was to weaken the results; that Turin feared a medieval age would be established. The rationale for this suggestion is that if only two of the three labs agreed, then there would be a serious question about the reliability of the test, a question that would not arise if one or two labs out of seven disagreed. The interesting point is that this would apply no matter what age the testing produced; it seems to me that if the labs were in disagreement, with one of them producing a 2000 year age, Turin would suddenly find itself wishing it had included more labs. Fortunately, the error bars from all three labs overlapped (all indicating an age of about 600 years), so in hindsight three labs were enough. However, it was a gamble (un-

less Turin expected this result — but then why all the complications arranging the tests?), and Gove rightly fought to keep all seven labs involved.

A book like this one, that documents actual events from beginning to end, contains numerous factoids that catch the readers' attention. For instance:

1. Did you know that Paul Dirac, Nobel laureate in physics and an adamant atheist, was a member of the Pontifical Academy of Science?
2. Gove mentions a rumor that the Shroud had been secretly carbon dated prior to the documented tests, an astonishing possibility that I don't believe (and neither does Gove).
3. The security for STURP's testing was incredibly lax. At one point during the five days in 1978 that STURP had the Shroud, fanatics ran in from the street and placed their bodies up against it!
4. Page 283 contains a mysterious and tantalizing statement implying that Umberto, last king of Italy, exiled to Portugal, had known for a long time the Shroud was a forgery. Gove doesn't know how Umberto knew this. Is it simply the 14th century confession, of which Gove is ignorant, or is there more?

By far the most important aspect of this book, and I can recommend it for inclusion in a skeptic's library on this basis, is that it lays bare the steps taken to achieve the dating of the Shroud. Putting the rhetoric aside, the book describes the details of the testing: the taking of samples from the cloth, their identification and transportation to the labs, the dating of the samples, and the handling of the results. As such it serves as ammunition for those who wish to defend reason and science against the Faithful who would discredit the dating.

Thomas J. Pickett
Assistant Prof. of Physics
School of Science and Technology
University of Southern Indiana
Evansville, Indiana 47712

Life at the Edge of Science by Beverly Rubik. Pennsylvania: The Institute for Frontier Science, 1996, 185 pp., \$16.00 (p), ISBN: 0-9652401-0-X, brubik@compuserve.com, <http://www.healthy.net/frontierscience>

The Truth Is Out There

An *X-Files* episode this past summer took place among an orthodox Jewish community in Brooklyn, NY. They had animated a Golem (a monster formed from soil) to revenge a death in their community. In the following week's show, we learned that investigator Scully had cancer, undoubtedly contracted during her abduction experience. (It was left inconclusive as to whether the