

# A proposal to radiocarbon-date the *pollen* of the Shroud of Turin

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## Introduction

A major area of Shroud of Turin studies over the past half-century has been radiocarbon-dating the Shroud's *linen*,<sup>1</sup> and then responding to its 14th century dating.<sup>2</sup> Another important area of research has been identifying the Shroud's *pollen* and its geographical distribution.<sup>3</sup> A potentially major new line of research, which does not seem to have been publicly proposed in Shroud studies,<sup>4</sup> and has apparently only been briefly suggested in the scientific literature,<sup>5</sup> is *radiocarbon-dating the pollen* of the Shroud of Turin.

Yet radiocarbon-dating of pollen is an important part of a branch of science, palynology.<sup>6</sup> Moreover, while they are not mutually exclusive, there are significant advantages to radiocarbon-dating the *pollen* of the Shroud of Turin, compared to its *linen*. This paper proposes the case for radiocarbon-dating the pollen of the Shroud of Turin, with suggested guidelines and a strategy for how this should be done.

## Advantages of radiocarbon-dating the Shroud's *pollen*

There are a number of advantages of radiocarbon-dating the Shroud's pollen, compared to its linen.

*Pollen is less subject to contamination than linen.* A basic assumption of radiocarbon-dating is that the sample has not been contaminated with any extraneous carbon.<sup>7</sup> This appears to be a problem with linen, which has yielded some significant radiocarbon-dating anomalies.<sup>8</sup> A likely cause of these anomalies is that linen's flax fibres are porous and comprised of many fibrils which total a vast surface area available for contamination by microorganisms containing younger carbon-14.<sup>9</sup> By contrast, pollen has a non-porous external shell or *exine* comprised of a tough organic polymer, sporopollenin, which does not exchange carbon with its environment and is one of the most decay- and chemical-resistant substances known.<sup>10</sup> This makes pollen extremely resistant to degradation by microorganisms, which is evident in that the oldest fossils of flowering plants are 130-million-year-old pollen grains.<sup>11</sup>

*Pollen is richer in carbon than linen.* The carbon content of pollen's sporopollenin-rich *exine* is about 90% compared to about 50% in the cellulose of plant cell walls, which includes flax.<sup>12</sup> The accelerator mass spectrometry (AMS) method of radiocarbon (the same method used to date the Shroud's linen) can accurately

date samples containing less than 500 micrograms (millionths of a gram) of carbon, allowing dating of single pollen grains.<sup>13</sup>

*Pollen contains geographic information.* Pollen grains vary in size, shape and surface features which together can be unique to the genus or species of its parent plant.<sup>14</sup> Therefore, those genera or species of Shroud pollen which are native to a particular region can indicate where the Shroud has been.<sup>15</sup> The late Swiss botanist and criminologist Dr. Max Frei identified 57 different kinds of plants from pollen samples he had collected from the Shroud in 1973, and these included plants native to Palestine, Turkey, as well Europe.<sup>16</sup> Israeli palynologist Dr. Uri Baruch reviewed the 34 pollens that Frei had identified as species, and although Baruch was able to confirm only 3 correct at the species level, he verified that all Frei's identifications were accurate at the genus level.<sup>17</sup> Some palynologists and botanists dispute even this, claiming that pollen in general, and the Frei pollens in particular, could not be reliably identified down to the species level.<sup>18</sup> Yet identification of pollen grains to the species level by forensic palynologists has been accepted by courts as sufficient evidence to secure criminal convictions.<sup>19</sup>

It is here assumed that only Shroud pollen grains in the Max Frei collection will be radiocarbon-dated, at least initially. Frei collected his pollen from the Shroud while it was the property of King Umberto II, who upon his death in 1983 bequeathed ownership of the Shroud to the Pope.<sup>20</sup> Subsequent to Frei's death in the same year, his pollen collection was in 1988 given by his widow to the American pro-authenticity group Association of Scientists and Scholars International for the Shroud of Turin (ASSIST), which in turn gave custody of the collection in 1993 to another USA pro-authenticity group, the Council for the Study of the Shroud of Turin (CSST).<sup>21</sup> It is therefore here assumed that permission of the Pope or the Archbishop of Turin is not required for the destructive testing, as is necessary in radiocarbon-dating, of the Shroud pollen in the Frei collection.<sup>22</sup>

*Less objection to destructive testing of the Shroud's pollen.* Since the pollen is not part of the Shroud itself, there should be less objection to a small percentage of it being destroyed. Moreover, there seems to be abundant pollen grains on the Shroud. Counts of between 44 and 137 pollen grains per square centimetre have been made, and even at an average rate of only 1-2 pollen grains per square centimetre, as cited by Frei, there potentially could be between 47,000 and 94,000 pollen grains over the entire Shroud.<sup>23</sup>

*Pollen from different parts of the Shroud can be tested.* A major criticism of the radiocarbon-dating of the Shroud's linen is that, instead of the original protocols' seven different samples from seven different locations of the cloth, only one sample was removed from a single location, therefore it would be unlikely to be representative of the entire Shroud.<sup>24</sup> By contrast, Frei took pollen samples from a total 39 different sites on the Shroud,<sup>25</sup> and therefore carbon-dating of those pollens should be more representative of the entire Shroud.

## **Testing of theories of the Shroud's age and image formation**

A major advantage of radiocarbon-dating the Shroud's pollen is that it will enable testing of various theories of the Shroud's age and how its image was formed.

*Pollen fraud theory.* Some Shroud anti-authenticity proponents have claimed that Frei had fraudulently "spiked" or "salted" his tapes with living Turkish and Palestinian pollen to agree with historian Ian Wilson's theory of the Shroud's journey from Israel through Turkey to France (see below).<sup>26</sup> So if the Shroud's non-European pollen does not return a 20th century radiocarbon-date, then the pollen fraud theory would be falsified.

*Leonardo da Vinci substitution theory.* If the Shroud's non-European pollen returned a radiocarbon-date of 15th-16th century that would confirm the theory that the Shroud we have today was forged by Leonardo da Vinci (1452-1519), or some other Renaissance artist, and substituted for the original Shroud.<sup>27</sup>

*Medieval forgery theory.* This maintains that the image on the Shroud was forged immediately before its first documented European appearance at Lirey in France in the 1350s.<sup>28</sup> This theory takes as its confirmation the radiocarbon-dating of the Shroud's linen between AD 1260-1390, i.e.  $1325 \pm 65$ .<sup>29</sup> Therefore, if the Shroud's non-European pollen dates well before the 13-14th century, that would disconfirm both the medieval forgery theory and the 13-14th century radiocarbon-date of the Shroud's linen.

*Edessa Cloth/Mandyion-Shroud theory.* Ian Wilson proposed the theory that the Edessa Cloth, the Mandyion and the Shroud of Turin are one and the same.<sup>30</sup> He reconstructed a chronology of the Shroud, as the face only visible Edessa Cloth, having been taken from Jerusalem to Edessa, now Urfa in south-eastern Turkey (c. 30-944), from Edessa to Constantinople, now Istanbul in western Turkey (944-1204), where it was also called the Mandyion, and then as the full-length Shroud from Constantinople to Lirey, France (1204-1357).<sup>31</sup> Therefore,

if the Shroud's pollens which are native to Israel, Turkey and Europe do not return radiocarbon-dates which form a chronological progression from Israel (1st century), Turkey (2nd-12th century) and Europe (13th-20th century) respectively, that would disconfirm Wilson's theory.

*Burial sheet of Jesus theory.* If the Shroud's pollens from plants native to Israel in general, and the Jerusalem region in particular,<sup>32</sup> return a first-century radiocarbon-date, that would confirm the theory that the Shroud of Turin is in fact the very burial sheet of Jesus Christ. However see also next.

*Nuclear radiation scorch theory.* If the pollens from plants native to Israel have a younger radiocarbon age than the pollen from plants native to Turkey, then that would still be consistent with the Shroud having been the burial sheet of Christ. Because in that case it would be consistent with the theory that the Shroud's image was formed by an emission of nuclear radiation as Christ's body was resurrected through it, increasing the C-14 levels of the Shroud's linen and giving it a younger radiocarbon age.<sup>33</sup> The same could also apply to pollen grains which were on the Shroud at that moment, such that they could have a younger radiocarbon-age than chronologically younger Turkish pollen grains which were deposited on the Shroud later, according to Wilson's theory.

## **Suggested guidelines for radiocarbon-dating the Shroud's pollen**

*Mistakes of the radiocarbon-dating of the Shroud's linen must not be repeated.* This should be the primary guiding principle in radiocarbon-dating the Shroud's pollen. The following are suggested guidelines to that end.

*Protocols be adhered to.* The original protocols for radiocarbon-dating the Shroud's linen were largely ignored, which has undermined its credibility.<sup>34</sup> This must not be allowed in radiocarbon-dating the Shroud's pollen. The existing protocols for testing the pollen in the Frei collection may need to be modified to allow for destructive testing as required for radiocarbon dating.<sup>35</sup> Since the results could be disputed, the protocols must attempt to build into the process adequate answers to every reasonable objection. The revised protocols would then need to be legally binding on all who agreed to participate in this process.

*A coordinating committee be established to direct the process.* It is assumed this committee will be established under the auspices of ASSIST and/or CSST. Ideally the committee should be open to representatives of pro-

non- and anti-authenticity groups who are willing to give an unequivocal, legally-binding, commitment to the protocols. By "non-authenticity" is here meant groups that neither affirm nor deny that the Shroud of Turin is the burial sheet of Jesus.

*Thorough planning.* Inadequate planning was evident in the 1988 radiocarbon-dating in that the decision where on the Shroud the sample was to be taken was made immediately prior to the cutting ceremony, and this resulted in it being one of the worst possible places on the Shroud for carbon-dating.<sup>36</sup> It is imperative therefore that radiocarbon-dating the Shroud's pollen not fail due to poor planning. Nevertheless, the need to avoid undue haste should be balanced against the symbolic significance of 13 October 2008 being the 20th anniversary of the announcement that the radiocarbon-dating of the Shroud's linen had shown that the Shroud was medieval!<sup>37</sup>

*Blind testing.* Contrary to the original protocol, the radiocarbon-dating of the Shroud's linen was not "blind" in that the laboratories knew which sample was the Shroud and which were the controls and their ages.<sup>38</sup> This meant that the laboratories *could* have, unconsciously or consciously, skewed the results so that a desired date was obtained.<sup>39</sup> Radiocarbon-dating of the Shroud's pollen must be blind, such that the laboratories not be able to know whether they are testing pollen from the Shroud or a control of the same species. Since the Shroud's pollen, being ancient, may be able to be recognised under a microscope, one laboratory could reduce the pollen to carbon and then a different laboratory do the actual dating of that carbon, with only the coordinating committee knowing which carbon sample was from the Shroud.<sup>40</sup>

*Selection of laboratories.* To avoid a potential conflict of interest, the three laboratories who conducted the 1988 dating, namely Arizona, Zurich and Oxford, should be excluded. The laboratories selected to radiocarbon-date the shroud's pollen should ideally be commercial facilities, experienced in pollen dating, and would look upon it as just another job.

*Publication in a peer-reviewed scientific journal.* In keeping with the best practice of Shroud pro-authenticity research, the results should be published in an appropriate peer-reviewed scientific journal.<sup>41</sup> Ideally the first the public should find out about the testing is when the result is published in the journal. However, realistically, given the likely public interest in the radiocarbon-dating of the Shroud of Turin's pollen, which may involve many different tests over many years, it should be assumed that leaks will occur. Therefore, the committee

should preempt that by issuing media releases at key stages in the process, specifying a contact person who alone is authorised to make public comments on behalf of the committee.

## **Suggested strategy for carbon dating the Shroud's pollen**

*Not be seduced by the fallacy of the experimentum crucis.* Contrary to "a heroically simplified version of scientific progress .... single 'crucial' experiments rarely decide major issues in science."<sup>42</sup> The 1988 radiocarbon-dating of the Shroud was a prime example of that fallacy. While even *one* grain of pollen from the Shroud dating much earlier than the 14th century would be a major blow to the credibility of the radiocarbon-dating of the Shroud's linen, the result would then almost certainly be challenged. The pro-authenticity community must therefore be prepared for a long drawn out process, over many years, involving many experiments, with possible setbacks along the way.

*Start with one confirmed, abundant, non-European pollen species.* Radiocarbon-dating can be expensive and a trying to date many species of pollen simultaneously could spiral out of control. It is therefore suggested that only one species of pollen be dated at a time, at least in the first instance. The logical species of pollen to radiocarbon-date first would seem to be *Gundelia tournefortii*, as it comprises the majority (29%) of pollen in the Frei collection.<sup>43</sup> Also, its identification in the Frei collection has been confirmed by both palynologist Baruch and Israeli botanist Avinoam Danin.<sup>44</sup> *G. tournefortii* is moreover the only species in its genus,<sup>45</sup> therefore issues about whether its pollen is from another species in the same genus do not apply. The range of *G. tournefortii* covers from Israel to Turkey,<sup>46</sup> so dating its pollen should help test Wilson's Edessa Cloth/Mandyion-Shroud theory. An additional reason for starting with *G. tournefortii* pollen is that pollen of that same species has been found on the Sudarium of Oviedo,<sup>47</sup> so it may be possible in the future to indirectly compare the radiocarbon-dates of these two claimed graveclothes of Christ.

## **Conclusion**

Radiocarbon-dating the Shroud's pollen could potentially have *enormous* implications. As with the Shroud's linen, a first-century carbon-date of its pollen would not *prove* that the Shroud was the very burial sheet of Jesus.<sup>48</sup> But then "the probability will be overwhelming that what we have on the Shroud is the *vera imago* of Jesus" and it "would, no doubt, be so accepted by nearly everyone."<sup>49</sup>

But what if the radiocarbon-dating of the Shroud's pollen returns a 14th century date? First and foremost, if the Shroud really was medieval, then it would be better to know that. However, a 14th century radiocarbon-date of the Shroud's pollen, while it would further *support* the medieval forgery theory, it would not *prove* that theory. There is still the strong, albeit circumstantial, evidence that the Shroud was in existence back to the 6th century, and even to the 1st century,<sup>50</sup> and no plausible alternative theory around which an anti-authenticity consensus has converged.<sup>51</sup>

Since most who consider the Shroud to be a fake presumably do so because of the 14th century carbon-dating of the Shroud's linen,<sup>52</sup> we in the Shroud pro-authenticity community have little to lose, but *much* to gain, in a similar test of the Shroud's pollen. Perhaps through radiocarbon-dating its pollen, "the shroud, even now, frail and discredited as it might seem, is part of a cosmic drama not yet played out"<sup>53</sup>

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