

DISCUSSANT'S CONTRIBUTION

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In accepting to participate in this Symposium I had asked to present a paper on the the basic protocol under which the Shroud tests were carried out, that seems to have been forgotten. This request was not granted, without any explanation, so I shall now try and expound it in the brief time allotted to Round Table discussants, time that the courtesy of the Symposium Chairman, Prof. Scannerini, allowed me to be somewhat extended – but I am obviously compelled to a telegraphic style, skipping many important details.

The Church does not know what the Holy Shroud is, and therefore welcomes any serious scientific enquiry on it. When in 1978 direct tests on the Holy Shroud were proposed, the Archbishop of Turin asked (informally) the Polytechnic of Turin for somebody to examine the test proposals and supervise their execution, in order to ensure on one hand the technical safety of the Holy Shroud and on the other hand the freedom of research, that he did not want to be conditioned in any aspect by Church related bodies. My colleagues indicated my name and thus in the spring 1978 I got involved in the Shroud research – among so many volunteers the one man drafted to supply a service. Of course this arrangement gained us the undying hostility of those Shroud groups who aim to control the Shroud research. Attempts to limit the tests were blocked and STURP could carry out their full measuring pro-

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gram, obtaining the results to which the first two days of this Symposium were devoted. Let it be pointed out that the tests were not aimed at proving the "authenticity" of the Shroud: the issue of course was present to all the involved scientists, but STURP noticed that it was not a valid scientific question, as there was no scientific means to give it a positive answer, but only, if the case, a negative one. The research was aimed at finding out the physico-chemical nature of the various stains and images on the Shroud and the mechanism of their formation: the first issue was solved while the second is still unanswered.

When the technique for radiocarbon dating small samples became available we expected that this test would be soon proposed and Card. Ballestrero, well conscious of its relevance to the eye of the great public, spoke of it to the Pope and sought the advice of the competent Vatican Departments, receiving preventive approval from all sides. As the carbon dating of the Holy Shroud has been presented as a rash initiative of Card. Ballestrero in contrast with the Pope, I want to make it clear that Turin always acted under precise instructions from the Holy See or within limits clearly defined by the Holy See.

The proposal for carbon dating the Holy Shroud was made by STURP on Aug. 15th 1984, one of a package of 26 examinations aimed to extend and verify the 1978 study: STURP was to act as the submitter of the Shroud samples to six laboratories that had agreed to date them. Meanwhile the Holy Shroud had become a property of the Holy See, with the Bishop of Turin its official Custodian. Card. Ballestrero therefore dutifully asked the Vatican for the advice of the Pontifical Academy of Science, the obvious Vatican scientific consultant, to supplement the advice he was receiving in Turin.

Unfortunately the President of the Academy, the Brazilian biologist Prof. Chagas, took the matter in his own hands without applying to any member of the Academy, but relying only on a personal friend of his. Without consulting with Turin they dismissed the research program as "unscientific" [without discussing it], stating that the only test to be made was the carbon dating, to be managed by the six laboratories as

STURP was labelled as "biased". The situation developed into a covert struggle on who was controlling the Shroud, and became strictly politics when the labs began sending protest telegrams to the Vatican Secretary of State. We succeeded, however, in holding a three-day Workshop in Turin (autumn 1986) with representatives of all the radiocarbon labs (that had grown to seven), of STURP as proposing body, and a couple of experts chosen by Turin, to set out an operative proposal. The labs and Chagas were adamant in asking Shroud samples for each of the labs, without any scientific motivation for such a quite unusual request, notwithstanding they were warned that the responsible authorities would hardly accept the notion that samples should be given to whomever asked. After more manoeuvres aimed at blocking any other test, the Vatican decided to proceed with the dating by no more than three labs, and we chose the ones that had the higher experience in archaeological dating and required less material.

The samples were taken under supervision by two textile experts, and were officially certified by Card. Ballestrero, who delivered them personally into the hands of the directors of the three radiocarbon labs, who came to Turin in order to avoid any possible doubt on their handling. The measurements were staggered through several months and were marred by systematic leaks of news, which put the Church authorities in the embarrassing position of being the last to know the results. Due protest was made for this behaviour, taking care of not confusing the deprecation of the unseemly behaviour of some people of the labs with a negative judgment on the result itself. The Vatican accepted the proposal of the labs that the results were communicated to the public by the Church authorities themselves, in order to be able to set the result into the proper pastoral frame since the beginning, whatever it would be. As the communiqué of Oct. 13th 1988 was often represented as expressing views of Card. Ballestrero in contrast with the Pope, I want to point out that it was read in a press conference chaired by the director of the Vatican's Press Room, who came from Rome for this purpose fetching its final text in order to stress that it was an official Vatican document. A few

months later Card. Ballestrero resigned from the Turin See having reached the age limit, but the Pope, in order to show His appreciation for the work done for the Holy Shroud, took the exceptional decision to maintain him as Pontifical Custodian of the Shroud. In August 1990 Card. Ballestrero, considering his failing health and the difficulties in carrying out this task from outside Turin, asked to pass the responsibility of the Shroud to his successor, who told me he did not need my services.

The medieval dating of the Holy Shroud was contested since the beginning by the several Shroud groups, which in the past twelve years raised such a wealth of objections to discredit it that many people were persuaded it had been disproved. It must be pointed out, however, that none of the objections were raised before the test: in the long years spent in discussing it not one of the people that later were so lavish in criticism cared to warn us of the methodological pitfalls they afterwards denounced. Actually, none of the objections is scientifically valid, and they were mostly raised by incompetent people. These objections come under three main headings: (a) refusal to accept the validity of the radiocarbon dating method itself; (b) substitution of the samples; (c) "rejuvenation" of the Shroud fabric by one or more of several processes.

The scientific community has no doubts on the validity of the method: a couple of hundred laboratories support themselves by radiocarbon dating. Of course one may list wrong dates, but wrong measurements or wrong assessments happen in all natural and human sciences. A variant of the refusal of the radiocarbon technique is the statement that a radiocarbon date is accepted only when corroborated by historical or archaeological evidence, which is untrue, as the radiocarbon has been instrumental in reshaping the archaeological timetable. Measurements are not a sort of ceremonial seal to be put on historical evidence: they are made to gather information that we do not have – when we know a date without doubts we do not waste time and money on a radiocarbon test. When a radiocarbon date contradicts assessments made by other evidence, further research is due on both sides to

understand what went wrong: sometimes faults are found in the radiocarbon result, sometimes the archaeologists have to revise their estimate. Anyhow, this is not the case for the Shroud of Turin, on which we have no real evidence before the 14th century (only hints liable to different interpretations): the radiocarbon date does not contradict any of the other physical evidence gathered on the object. Probably at the bottom of the refusal of the radiocarbon method lies the humanistic distaste for 'mechanical' devices, but measurement is the basis of physical sciences since Galileo: no physical scientist can accept to throw out a physical datum before a theory, and one cannot speak of multidisciplinary research on the Holy Shroud while rejecting a priori one of the competent disciplines.

As for the second heading, I can only deny it for the record as gross slander. I shall not offer any proof to people who appointed themselves as prosecutor, judge and jury in a calumnious charge, but I shall repeat what I wrote to those who first published it, without receiving any answer: if anybody has the slightest doubt on the correctness of the Shroud sampling, it is his duty to ask the Vatican to appoint a Commission of Inquiry on it. The very fact that this was not done speaks by itself. A matter of thought is that the Shroud groups that launched such injurious suspicion choose to accuse of sample substitution the Turin equipe rather than the labs, and the other Shroud groups never saw it fit to spend a word in defense of the Custodian of the Holy Shroud.

As for the several effects called for to claim that the radiocarbon gave the Holy Shroud a younger age than its actual one, one must first remember that physics is a quantitative science: in order to bring out a 1300 date out of first-century cellulose by introduction of 20th-century carbon one ought to substitute about 25% of the original carbon or add about 180% of modern one to it (in first approximation). This rules out the idea often suggested that the cloth appears younger because of pollution left over in the cleaning process (this point anyhow had been addressed at the 1986 Turin Workshop without anyone raising exceptions). Three more sophisticated 'rejuvenation' effects have been proposed: (1) carboxylation by

atmospheric carbon owing to the 1532 fire; (2) bioplastic coating of the fibers by microbiological action; (3) increase of the ^{14}C ratio by neutron bombardment connected with the Resurrection. In all three cases the effect would be accompanied by huge amounts of non-cellulosic material easily measurable by non-destructive routine physico-chemical tests on the extra sample, contiguous to the ones delivered to the labs, that was conserved in Turin just for the purpose of future checks if their need arose, and is now in the hands of the Custodian of the Holy Shroud. Such tests might be carried out as well-defined expertises commissioned by the Custodian of the Shroud to reputable independent laboratories (of course with expenses covered by the people who ask for the tests). The fact that those who advanced these theories did not ask for such obvious checks speaks by itself.

Anyhow, these effects would have involved the whole Shroud, not only the corner from where the samples were taken, and it would be very strange indeed that such conspicuous enclosures had not been detected in the thorough 1978 tests. The fire-induced carbon substitution theory was checked by a couple of radiocarbon labs [on the general principle of checking any phenomenon that might affect the radiocarbon technique], and no rejuvenation was found. With 16th-century carbon the rejuvenation would need a substitution of about 85% or addition of about 520%. Besides, chemical and textile experts of the Turin Polytechnic repeated the original experiment and found that carboxylation occurs also in nitrogen atmosphere, which shows that the carboxylated carbon comes from the cloth itself, hence the effect cannot produce rejuvenation (F. Ferrero, F. Testore *et al.*, *J. Textile Inst.* 89, 1998, 562). Also the bioplastic coating, if any, should be shown to be produced by atmospheric carbon to cause rejuvenation, and no such coating, nor the swarming microbiological life necessary to produce it in the required amount, was detected in the 1978 tests. In 1989 I sent to Prof. Adler a couple of threads from the extra sample to check for pollution, and he told me that no pollution had been detected. As for the neutron bombardment, skipping any comment on the weird idea of a nuclear

physics of the Resurrection, as a nuclear physicist I can assure you that the exposure of cellulose to a fast neutron fluence big enough to cause the required enrichment in ^{14}C would play such a havoc with the hydrogen atoms to cause chemical changes visible to the naked eye (and this too can be easily checked).

For the past 12 years the Shroud research has been stopped in a fruitless attempt to falsify the medieval date, impacted into the false dichotomy "burial cloth of Christ or medieval artifact meant as a fake", without any attention to other possibilities. This cast a dark shadow on the whole Shroud research. On one hand the free, objective spirit of research of 15-20 years ago seems to have disappeared: what is being done now is not looking for facts, but defending a thesis. On the other hand the accumulation of any kind of argument, even weird or slanderous ones, to disprove a measurement datum in the abused name of religion (or, worse, of a personal theory) gives the impression that the only value ascribed to the Shroud is of being a relic – in contrast, by the way, with the officially stated position of the Church. It is time to get out of this deadlock.