# Problems related to the unreliability of the radiocarbon dating method

# Application to the $^{14}C$ dating of the Turin Shroud

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## SUMMARY

The world famous announcement of the mediaeval age of the Turin Shroud in 1988 (Damon *et al*., 1989) presented the $^{14}C$ dating method as an infallible chronometer, point admitted beyond doubt by most people.

It is based on the following assumptions :

1. The method, derived from nuclear desintegration, is insensitive to external factors such as solutions, temperature, microbial attacks, etc. The amount of $^{14}C$ is therefore an absolute measure of the age.

2. It is also assumed that the $^{14}C$ is produced at constant rate in the high atmosphere, then spreads at uniform rate in the air, the waters and finally in the living beings.

3. Although it has been recognized that some materials produced anomalous dates, it was certified that this was not the case for the Shroud, the cellulose being a very reliable material.

4. With all those claims certifying the production of absolute dates, one wonders why Damon *et al.* were obliged to derive their results from a very complicated statistical calculation, criticized by all statistiticans. Let us only point, among the many faults found in this strange calculation, that the data were obtained by three labs only, from unknown basic data...

The author shows then that the points 1, 2 and 3 being false and point 4 devoid of any scientific reliability, the labs only obtained their « correct » dates, even for the other samples studied with the Shroud because they knew them in advance. In fact, the radiocarbon specialists have been unable to obtain correct dates from the blind tests performed on textile samples in the intercomparison preliminary to the dating of the Shroud by Burleigh, Leese and Tite (1986).

In conclusion, the « mediaeval age » for the Shroud was obtained artificially and the true result of this famous radiocarbon dating is the collapse of the radiocarbon as an absolute dating method.

## *1. The radiocarbon dating questioned*

I will comment briefly the main conclusion of my book entitled « Le radiocarbone face au Linceul de Turin » (*The radiocarbon facing the Turin Shroud*) issued last year at the Editions F.X. de Guibert, Paris :

The world famous « mediaeval age » obtained for the Shroud by $^{14}C$ is irrelevant, essentialy because the $^{14}C$ « chronometer » is not a true measure of time[1]. Such a statement may appear quite foolish after the triumphal announcement of the « Science verdict » all over the world by a team of 21 high level scientists who, basing themselves on a very technical statistical calculation, concluded authoritalively (Damon *et al*., 1989) :

« *The results of radiocarbon measurements at Arizona, Oxford and Zurich yield a calibrated calendar age range with at least 95 % confidence for the linen of the Shroud of Turin of A.D. 1260-1390 (rounded down/up to nearest 10 years). These results provide conclusive evidence that the linen of the Shroud of Turin is mediaeval* ».

The « verdict » approved by all the radiocarbon specialists echoed everywhere. They explained that the $^{14}C$ method, set up by W.F. Libby - Nobel price - in *ca* 1950 and based on very solid physical grounds, delivered absolute dates in every case. They still observed that if the method had given some very few false dates in the past, the present one could not be doubted, since it had been performed by the best known labs, utilizing a new device issued from the highest technology - the Accelerator Mass Spectometer or A.M.S. - They had still operated in blind testing and finally validated their data through a very elaborate statistics which had unambigously garanteed the result at the 95 % confidence level. Although the method delivered absolute dates in all cases, the importance of the A.M.S. device in obtaining this peculiar date was stressed by Prof. Harry Gove, from Rochester, one of the most famous carbonists. After quoting mockingly the other scientific tests all in favor of the authenticity, Gove claimed authoritatively :

« *Accelerator Mass Spectroscopy (A.M.S.), first developed at the University of Rochester's Nuclear Structure Research in 1977...* ***has achieved its greatest public success to date that the Shroud is of mediaeval origin and certainly not the burial cloth of Jesus Christ****. Although few would rejoice in this peculiar result, it is an impressive example of the power of the accelerator - based carbon dating technique* » (Gove, 1990).

## *2. Points which disprove the mediaeval date*

The result was presented by the media as a new victory of Science over Religion[1] since the Turin Shroud bears a highly venerated image, printed by Christ himself at the very moment of his Resurrection from the death, according to a very old, almost bi-millenary tradition.

Should this tradition be false ? Should the $^{14}C$ dating have proved that the Gospel's records were irrelevant ?

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[1] I am glad to tell that I submitted my book to the appraisal of the French Academy of Science which agreed with my conclusions. You will find it in the Annex (fig. 1 and 2). By comparison, I gave also the last opinion of two well known radiocarbon specialists, Prof. Gove and Evin (text 3 and fig. 4).

The radiocarbon date was not only in contradiction with the Gospels and the Tradition, it contradicted also the observations of many scientists who had studied this linen by high-level techniques, observing its extraordinary characteristics, and above all, the curious printing of the image by a mysterious radiation. All results being in close agreement with the Gospel's records, they had concluded to its authenticity, and therefore for a first century age.

### *3. An unexpected epistemologic problem*

The logical conclusion of the announcement of the « Science verdict » compared to the results of the other tests all proving the authenticity of the relic was that the radiocarbon date was necessary false, since science could not contradict itself.

However, the carbonists concluded in a different way. They argued that since the radiocarbon result had been delivered by an absolute science « superior to all the others put together » (Evin, 1989), the conclusion in favor of the authenticity was therefore irrelevant.

The carbonists presented themselves as superior scientists, mastering the nuclear phenomena unknown to the others. Being in addition paragons of rationality they had logically, cooly concluded in favor of the mediaeval age.

If the second level scientists did wrong interpretations - explained the carbonists - it was because they were still impregnated by the creeds imposed by the Church which made them falsely recognize the image of Christ on a curious feature printed on a mediaeval linen, as objectively determined by the $^{14}C$ chronometer.

The most curious is that the position of the carbonists was accepted by almost everyone, comprising the Church representatives. The « verdict » announced all around the world made therefore consider the image as an « aenigma » although the Church, recognizing still in it the « icon of Christ » recommended to venerate it as in the past. The confusion about the identity of the relic had began.

### *4. Was the « verdict » true after all ?*

As the time passed, serious criticisms arose about the « verdict ». It is important to stress that they were never taken in account by the carbonists, who simply ignored them. The first, fundamental criticism was tremendous for the verdict : **it was simply false !**

Of interest is to read the analysis of the statistical calculation of Damon *et al*. by Dr. Jouvenvoux in my book. It shows that the $^{14}C$ age deduced at 95 % confidence level for the Shroud extends within a range of [30,1820] A.D., *i.e. ca* 2000 years. In conclusion, there has never been any mediaeval date at all measured on the Shroud...

The reaction of the carbonists was simple : they avoided to refer any more to this calculation. Tite, after recognizing to be incompetent in statistics, obstinately refused to publish the « basic

[1] One of the other most impressive being the victory of the Evolution theory over the Genesis records.

data » requested by the other scientists. The author of this calculation, Mrs Leese, first agreed with the criticisms, then refused to answer. Hedges'confuse explanations only prove he has no answer (Hedges, 1998). Gove found easier to forget all about the statistics and even transformed the result, which became more precise (« 1325 A.D. with a 33 years standard deviation ») when the 95 % confidence level corresponds to **two** standard deviations and the official age was 1260-1390 A.D. (Gove, 1990).

Other problems arose when it was proven by several tests that the $^{14}C$ contents were not at all insensitive to the external attacks contrary to stated by Libby. Therefore his « chronometer » was not an absolute measure of the time.

The following phenomena altered the $^{14}C$ content :

a) high temperatures in presence of water vapor (as in « hydrothermal processes »). One knows that the Shroud had been submitted to similar conditions during the 1532 fire at Chambery (France).

b) neutron irradiation

c) neutron irradiation followed by heating.

d) alteration of the linen by microbial attacks.

The reaction of the carbonists was the same : they refused to credit such tests performed, they said, by low-level scientists, which deductions had been biased by their obsolete creeds.

Had the carbonists any right to reject the testimony of experimental facts ? Was radiocarbon a superior science after all ? On which basis did the radiocarbon scientists could state that the biblical documents were myths based on obsolete creeds ?

I began my enquire and looked for the proofs for the credibility of the radiocarbon science. After a long path, I hit the target and saw the $^{14}C$ idol collapse.

## *5. Is radiocarbon science a truly superior science ? The origin of my book*

My adventures began in 1989. I had been invited to speak at the « radiocarbon round table » in company of Prof. Evin and Tite, at the first International Scientific Symposium in Paris, and criticised the radiocarbon method during one hour, requesting for thermal tests. The only result of my talk was that not only the carbonists refused to perform them but they did not pay the least attention to my conclusions. If they agreed with the presence of anomalous dates, such as those presented in my conference, they claimed energetically (and falsely) I had collected all the false dates, all the others being excellent, peculiarly those on textiles. The most extraordinary is that the so-called « friends » of the Shroud who had invited me behaved exactly the same.

If the leading thread of my book - a kind of polar - is this peculiar test which has never been performed the way I had required, the quite unexpected events which happened during the long period which occured since the day I entered the carbonists'den until the one I finished my book made me understand many things, some scientific, some extra-scientific. These last, on account of the peculiar nature of the Shroud which behaves like a bridge between earthly and heavenly truths has the curious property - just like Christ it certainly wrapped - to reveal the secret thoughts of men.

In consequence, it helped me to understand that the seven capital sins existed and still inhabited the souls of men in spite of the Progress of the humanity, and more peculiarly the one of some high level scientists.

But the most important scientific thing I learned, after years of vain attempts to discuss with the carbonists, was that radiocarbon is not a science, but something quite different : a kind of disease which erodes science as I will explain later on.

And the other very important thing I learned, just at the boarder of Science of Religion, has been to understand why they refused the scientific debate with those who had brought proofs of the unreliability of the radiocarbon chronometer and the authenticity of the relic.

For the carbonists, the image could not be the one left by Christ, essentially because they could not accept the idea that a son of God had ever existed since God didnot exist. Therefore, he had never taken the human nature, neither suffered passion for our sins, since there were no sins, nor resurrected from the death indeed.

The obsoleteness of those creeds had been evidenced by the new scientific finds which, by bringing the proof of the slow and continuous evolution of Life, from the Bacteria to the Man, had relegated the Genesis records into the myth and transformed the « unhappy sons of Eva » into the « glorious sons of Lucy ». Such optimistic prospects had evidently rendered useless the existence of any Creator or Saviour.

Of peculiar interest in order to test the value of such assessements is to investigate how the last stages of the evolution of man from ape descent have been dated by radiocarbon during the last 40.000 years. Those dates are, as everyone knows, presented as the very proof of such an evolution, based otherwise on pure hypothesis.

## *6. Did the $^{14}C$ chronometer date the evolution process ?*

The advent of his absolute chronometer, in *ca* 1950, was presented by Libby as the « radiocarbon revolution ». He inaugurated a new calendar, able to date unambiguously the events during the 40.000 last years, the historical ones of course, but the main interest of his chronometer was to date the prehistoric ones which ages were still unknown.

His calendar, expressed in years B.P. (Before Present, *i.e.* 1950, date of the first experiments from Libby), had still been divided in years A.D. (Anno Domini, those of our era) and B.C. (Before Christ, before our era). Since the very beginning, the accuracy of the $^{14}C$, results obtained for the historical materials, which ages could be controlled by the historical chronologies, appeared very poor. The only reliable results were obtained in dry countries. In the others, mainly in peat-rich sites, the influence of the soil solutions in the alteration of the $^{14}C$ ages was evidenced.

But even in dry climates, where the dates had given some good results, many had been rejected by the archaelogists as « anomalous ».

The collaboration of a well known egyptologist, Prof. Säve Söderbergh, and a reputed carbonist, Ingrid Olsson (Söderbergh and Olsson, 1970), gave remarkable results. From the investigation of the well dated pharaonic remains by Söderbergh, Olsson concluded that the $^{14}C$ results were deceptieve. Both scientists summarized the common attitude of the archaeologists towards radiocarbon quoting another famous archaeologist, Prof. Brew : « *If a $^{14}C$ date supports our*

*theories, we put it in the main text. If it does not entirely contradict them, we put it in a foot-note. And if it is completely ' out of date', we just drop it*. »

Unfortunately for Libby's chronometer, this is exactly the case, as everybody can control by the results found in the specialized reviews such as Radiocarbon, Archaeometry, several Proceedings, etc.

The number of anomalous dates is astonishing. The results are sorted according the simple and non-scientific procedure indicated by Prof. Brew : the true reference is another chronology, supposed to give the true date. Some very few examples are found in Table II (see Annex). The worse is that, as evidenced by Libby himself, the prehistoric chronologies could not be referenced, since they were not known. He wrote in 1956, recalling the events related to his discovery :

« *The first shock Dr. Arnold and I had was that our advisers informed us that history extended back only 5000 years. We had thought initially that we would be able to get samples all along the curve back to 30.000 years, put the points in, and then our work should be finished. You read books and find statements that such and such a society or archaeological site is 20.000 years old.* ***We learned rather abruptly that these numbers, these ancient ages, are not known*** *; in fact, it is about the time of the first dynasty in Egypt that the last historical date of any real certainty has been established* ». (W.F. Libby, « Radiocarbon dating », American Scientist **44**, p. 107 -1956- quoted by Whitcomb and Morris, 1980, p. 372).

In consequence, Libby and his followers simply sorted the radiocarbon dates which were in fact quite discrepant : either older, or younger or even in the future, retaining only what they had called the « best values », *i.e.* those that corroborated the age expected by the prehistorians using a non-scientific circular reasoning. Here, we reach to a very important conclusion :

**In fact, those chronologies have never been dated by $^{14}C$ : to the contrary, the $^{14}C$ dates were utilized, after convenient sorting, to confirm the dates established by the prehistorians on the subjective and speculative basis we all know : the slow and continuous evolution of man from ape descent...**

Looking for the roots of the Libby's chronometer in my book, I first evidenced that, in spite of its impressive mathematical formulations, his method derived from a series of hypothetical premises, such for instance the constancy of the desintegration rate process, the production of the cosmic radiation, or the uniform distribution of $^{14}C$ etc. (Libby, 1965) which appeared to be false later on. **Finally, since the $^{14}C$ results varied for the same prehistoric event, in the same prehistoric site, the only reference for their sorting was the evolution theory, supposed to deliver the ultimate truth.**

In addition, my background of physico-chemist - like Libby - but unlike him specialized in soil science and peculiarly in the soil solutions in their role of edification or destruction of the soil minerals (silicates, oxides, carbonates, etc.) made me realize that Libby had built his chronometer on obsolete theories, not only about the role of the soil and the one of the soil solutions, but about the structure of the matter, either organic or inorganic.

At the time Libby built his clock - in the 50ies - others were building other techniques based also on radiations which allow nowadays to understand the structure of the matter, either organic or inorganic.

As a specialist of those new techniques and more specifically in their application to the identification of the soil minerals and the understanding of their genesis, synthesis and alteration, having also been charged to create a new cursus at Louvain University entitled « Colloidal Mineralogy », I can tell that the new finds brought by the new techniques provoked a revolution in Soil Science which obliged to reconsider Natural Science in a whole and would logically have led to a new interpretation of the radiocarbon one.

Since the years 50, new techniques utilizing also radiations, such as, to quote the more important in the case of the Shroud , the X-ray and the I-R spectroscopy, allowed to understand that the materials, either inorganic or organic, were not simple mixtures of oxides, as still believed by Libby, but were formed by oxigen ions held together in very complex structures either by silicon, in mineral ones, or by carbon, in organic ones. The size and the disposition of their components were disclosed, and their radicals identified by I-R. It is known since long that there is a close relation ship between silicon and carbon derivatives. The new finds showed that they formed in water, through the slight changes induced it its structure either by the inorganic ions or the organic complexes. I marked with great interest that Michael Denton (1997) recognized to the structure of the water the same role in the building of the organic structures.

It is incredible that the radiocarbon specialists continue to live on old fashioned theories, obsolete since *ca* half a century.

Let us recall that in the 50ies, the complex structure of the A.D.N. had been already discovered thanks to the X-rays by Cricks and Watson and that, at the same time, with the same technique, Bragg and Brindley established the structure of sillicates, and more specifically the very complex structure of clays, the main component of soils.

If it is understandable that Libby, specialized in the narrow field of nuclear physics, still ignored those finds, it is however unacceptable that he built his « radioactive clock » without proper time standards, those relying on the subjective theories developed during the XIX$^{th}$ century and on a quite unscientific circular reasoning, specific to the radiocarbon specialists.

It is still more unacceptable to see them follow the same path, in spite of the large amount of false radiocarbon dates obtained. All the radiocarbon science seems to be based on circular reasoning and vain attempts to prove the dates assumed for the evolution of man in the XIX$^{th}$ century.

It is impossible to tell everything. I will only mark that Libby ignored the decisive role of water in the transport of carbon, and of course radiocarbon. The tiny amounts ($10^{-12}$ %) of the isotope is carried by the solutions and accumulates elsewhere, producing anomalous ages. **Radiocarbon dates being therefore dependent of external factors, contrary to stated by Libby, we must conclude that the $^{14}$C chronometer is not a measure of time, in the great generality of the cases.**

The role of strong complexing agents, such as humic acids, the one of other materials poor in $^{14}$C such as ground waters and hard waters in producing too old dates, or rich in carbon such as charcoal, oil, tar or coal in producing too young ones **are known since very long by every carbonist and are impossible to correct.**

The $^{14}C$ content of the sample is still influenced by other factors, also impossible to control such as volcanic eruptions, hot waters (effect of temperature...), pollutions, microbial attacks, uranium deposits...

The importance of those factors which influence cannot be correctly appraised is evidenced by the questions of a well-known A.M.S. laboratory about the history of the sample, its conditions of burial, further treatments etc. (Table I). The lab still requested to know the expected age... We must not forget that Tite has requested that the age of the reference samples be indicated beforehand to the A.M.S. labs which had also recognized the Shroud thanks to its special weaving (see Damon *et al's*, 1989). Therefore the tests had not been blind at all, contrary to claimed everywhere.

The importance of the reservoirs and the pollutions on the radiocarbon age and the incapacity of the cleaning methods to restore the archaeological or even the prehistorical one is recognized by all the specialists.

Hedges (1998) stresses : ***« ... it is rarely possible to be certain that all extraneous material has been removed*** ». He refers of course to the coincidence with the expected age as the only proof of reliability, by the circular reasoning we know.

The very proof that the mediaeval age of the Shroud was true was explained by him : « ***The fact that, when calibrated, the most probable date was close to the historical time the Shroud was definitily known to exist, while not strenghtening the scientific case for the date, is nevertheless extremely powerful support for it*** ». Hedges refers of course to the result ot the strange statistical calculation found in Damon *et al*'s paper.

The hypothetical character of the grounds of Libby's chronometer is also evidenced by the many « revolutions » which occured in the radiocarbon science since the first, in 1950, when Libby pretended to date everything absolutely up to *ca* 40.000 years B.P. In 1987, announcing the third revolution Chippindale, after enumerating the many false appraisals of the carbonists, refering also to their strange statistical calculations, finally concluded ironically, quoting Orwell 's « Animal farm » in which some unfortunate animals, « more equal than the others », were sent to the slaughterhouse :

« *These (elements) make some radiocarbon determinations more equal than others, and render many worthless*. »

Should all the prehistoric ages be sent to the slaughterhouse ? Their only reference are the prehistoric chronologies, which are quite hypothetical and the only secure dates are those controlled either by egyptology or by dendrochronology which cannot be traced back before 3000 B.C., in spite of many other claims (Söderbergh and Olsson, 1970, Bannsiter and Robinson, 1975).

We arrive therefore to this dramatic question : should evolution be a myth ?

My experience as soil scientist made me evidence another weak point of the method : the carbonists are unable to remove the extraneous carbon fixed in the samples because they have not developed appropriate cleaning methods as performed by the soil scientists for the cleaning of their clay samples, covered by a series of pollutions either crystallized (oxides) or amorphous (mixed gels), or even by organic material. The removal of such pollutions obliged us to develop special methods based on a special kinetics, « heterogeneous phase kinetics » liquid-solid, the removal of the contaminants being followed by all possible physico-chemical tests. In many cases, we did not

succeed to remove completely the contaminants, emprisonned in porous structures or in channels (as it is the case of the cellulose of the Shroud).

Nothing of the kind is found in the radiocarbon science. If Hedges (*op. cit*.) recognizes after refering falsely to the statistical calculations that ***« the question of sample contamination is more difficult to quantify*** », he does not tell that the choice of his « best values » is simply made by circular reasoning...

**The carbonists knew all the weak points of their method, of course. That is the reason why Tite requested the age of the samples be indicated beforehand to the A.M.S. labs, why Gove (1996) recommended that the piece of the Shroud to be analysed by $^{14}C$ be taken « out of the charred areas », why he prevented that the physico-chemical tests intended by the S.T.U.R.P. be performed and why he avoided systematically to refer anymore to the statistical calculations which however are still presented by the medias as having unambiguously proved the « Science verdict ».**

## *7. Conclusion*

The « Science Verdict » announced by Gove and all the carbonists appears to be false for many reasons. First of all, the A.M.S. laboratories never obtained the world famous medieval date for the Shroud neither any date in fact and therefore since all the other tests prove its authenticity, the Shroud is the true burial cloth of Christ.

In addition, the facing of the radiocarbon « chronometer » presented as a « superior science » to the Shroud considered as the remain of an obsolete superstition ended in the total collapse of the radiocarbon idol and, curiously enough, made arise serious questions about the reliability of the evolution theory.

The continuous refusal by the carbonists to debate with the other scientists only proves they have no answer. Therefore they are not true scientists but the followers of an ideology (*i.e.* a magistral error logically arranged), which is in fact the evolution theory...

Should evolution be an ideology after all ? A special one ? And radiocarbon science too ?

This disease corroding today the scientific community has been diagnosed by Jean-François Revel in his interesting book « *La connaissance inutile* » (« The useless knowelege ») under the name of « scientific sounding ideology ». The radiocarbon science has all the characteristics diagnosed for this peculiar ideology as you can read in my book. To summarize : indifferent to experience, this ideology is an indissoluble mixture of partial facts and passional opinions (such as the despise of the carbonists towards the other scientists, the Church, Christ himself). It is utilized - still marks Revel - as a war weapon to insure the domination of a class over another with no attention to the scientific truth nor even to the simplest one either. The conclusions of my book which outpass the scientific appraisal are, as expected by the identity of the Shroud, essentially philosophic and theologic.

In a way, the Shroud is just an ordinary textile attainable by the laws of ordinary science which evidenced in it many factors able to biase the so-called mediaeval age, and finally revealed the inconsistence of the radiocarbon science.

In another way, the investigations of the Shroud by the modern techniques evidenced the extraordinary characteristics of the image, which cannot be other than the one of Christ himself.

The objective study of the Shroud by the modern techniques still allowed to sort between subjective and objective opinions, between false and true creeds. Faith is not a false, subjective

feeling as supposed by the carbonists, but the agreement of our intelligence to a definite truth, either a superior one, given by divine revelation, or an ordinary one, obtained by the objective observation of the material facts.

**The interesting points we may infer from my book are, on the one hand, that radiocarbon is not a « superior science », nor even a science at all and, on the other hand, that both truths match in the Turin Shroud. This is, I think, the true message of the « *silent witness* » for our time. And the fact that the image still remains an « *ongoing mystery* » only proves that our modern techniques, in spite of their impressive achievements, are unable to seize the whole truth because « *we know only partially... but when will come what is perfect, all what is partial will disappear* » (Paul, Cor. I, 13).**

**The message of the Shroud is not aenigmatic. It has remained essentially the same since 2.000 years : *« God loved the world so much that he gave his only Son, in order that anyone who believes in him be saved, and obtain the eternal life* » (John, 3,16).**

## LITERATURE REVIEW

The references quoted here consist only in a small part of those found in my book issued last year which exact reference is :
M.C. van Oosterwyck - Gastuche (1999), *Le radiocarbone face au Linceul de Turin*, 349 p., Ed. F.X. de Guibert, 3 rue Jean-François Gerbillon 75006 Paris
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## Annex I :

- Advices of the French Academy of Science (fig. 1 and 2) and of some well-known radiocarbon specialists about the validity of the mediaeval age (text 3 and fig. 4).
- Table II : some examples of curious $C_{14}$ dates (very few).

## Annex II :

- Some words about my book *Le radiocarbone face au Linceul de Turin* (The radiocarbon facing the Turin Shroud) at the F.X. de Guibert editions, Paris. The radiocarbon method seen by a soil scientist.

## TABLE I

## A.M.S. FACILITY AT THE UNIVERSITY OF TORONTO

**(Prof. Beukens)**

**Isotrace Radiocarbon Sample Submission Form**
**Requests the following indications**

***A. Conditions for the collecting of the sample :***

1. **Sample burial story**
2. **History of water exposure or immersion**
3. **Presence of possible contaminants**
   (including microbial growth)
4. **Matrix material** (soil, sand, **clay, peat, etc.**)
5. **Presence of additional carbon-containing materials in the matrix :**
   vegetation, **humic materials,** charcoal, carbonates oil, tar or coal.
6. **Presence of possible sources of contamination near the site :**
   **volcanoes, hotsprings,** high pollution, high pesticide use, uranium deposits
7. **Climatic conditions at the sample collecting site**

***B. Post-collection history of the sample***

1. **Describe any washing or cleaning performed**
   If contaminants were removed, describe how
2. **If the sample was dried, indicate method, temperature and duration**
3. **List any chemical agents applied to the sample**
   (preservatives, casts, etc.)
4. **Describe sample storage** (location, duration, packaging)
5. **Append any other relevant information**

**IsoTrace Radiocarbone Sample Submission Form**
**Présentation de l'échantillon à dater par C 14 au Labo Isotrace**
**(traduction française du formulaire)**

**Expliquez comment votre échantillon est enfoui dans le sol.**
En surface ☐ Partiellement exposé ☐ Enfoui ☐ Ré-enfoui ☐

Profondeur à laquelle il est enfoui :

**Indiquez s'il a été exposé à l'eau ou immergé.**
Exposition faible ☐ Humidification périodique ☐ Dans les eaux de nappes phréatiques ☐ Dans les eaux de surface ☐ Dans l'eau de mer ☐

Autres détails :

**Indiquez la présence possible de contaminants sur ou dans l'échantillon.**
Incrustations ☐ Pollution microbienne ☐ Pénétration de racines ☐ Activité animale ☐ Odeurs inhabituelles ☐

Autres contaminants :

**Matrice (sol, sable, argile, tourbe, etc.) :**

**Indiquez la présence de matériaux contenant du carbone présents dans la matrice.**
Végétation ☐ Matières humiques ☐ Charbon de bois ☐ Carbonates ☐ Pétrole, goudron, charbon ☐

Autres matériels :

**Indiquez la présence de sources de contamination au voisinage du site.**
Volcans ☐ Sources chaudes ☐ Pollution élevée ☐ Abondance de pesticides ☐ Dépôts d'Uranium ☐

Autres source possible :

**Indiquez les conditions climatiques du site.**
Arctique ☐ Dégel périodique ☐ Tempéré ☐ Tropical ☐ Désertique ☐

Autres détails :

**Histoire de l'échantillon après sa récolte :**
Décrivez les lavages et nettoyages effectués. Si vous avez enlevé des contaminants, décrivez votre technique.

Si vous avez séché votre échantillon, indiquez par quelle méthode. Indiquez aussi la température et la durée du séchage.

Indiquez les substances chimiques que vous avez appliqué (conservants, moulages, etc.).

Décrivez comment vous avez conservé l'échantillon (emplacement, durée, emballage).

Ajoutez quelqu'autre information importante.

# ANNEX I

* **Fig. 1, 2, 4,**
* **Text 3**
* **Table II**

INSTITUT DE FRANCE
ACADÉMIE DES SCIENCES
23, QUAI DE CONTI, VI^e^

CONSEIL POUR LES APPLICATIONS
DE L'ACADÉMIE DES SCIENCES
(CADAS)
*Le Délégué général*

PARIS, LE 27 FEV. 2000

***Madame Marie-Claire VAN OOSTERWYCK-GASTUCHE***
***Agrégée de l'Enseignement supérieur***
***Professeur des universités***
***Quartier Rome***
***84820 Aubignan***

Madame,

Si je ne suis en rien spécialiste de la datation en carbone 14, ni des problèmes d'absorption de traces susceptibles de le polluer, j'ai, par contre, été très souvent obligé de décider sur des valeurs très dispersées et en petit nombre.

Vous démontrez dans ce livre très touffu que, dans le cas étudié, la sensibilité excessive aux perturbations sans méthodes correctives sérieuses conduit, à la fois, à de fortes dispersions des mesures brutes et à un aplatissement des lois de probabilité. La sagesse conduirait, dans ce cas, à essayer de revenir à une loi « quasi-normale » à partir de corrections minutieuses (une thèse ou deux seraient nécessaires pour les établir) ; si l'expérimentateur n'arrive pas à se décider à renoncer humblement à annoncer un chiffre, on sait bien qu'il choisira la valeur la plus probable « à son avis », excluant toute pertinence scientifique à son résultat.

Il y a, en ce moment, des annonces chiffrées trop précisément de façon analogue pour les problèmes de pollution ou d'environnement. Si les scientifiques ne se décident pas à, humblement, dire l'« incertain », l'ensemble des expertises scientifiques perdra toute crédibilité et la porte sera ouverte à mettre en doute tous les efforts de rationalité scientifique dont on a vraiment bien besoin dans notre société à haute technologie.

On peut souhaiter que la communauté scientifique de datation par le carbone 14 reprenne ses bases d'étalonnages et accepte de se fixer à elle-même des règles d'incertitudes et des limites au-delà desquelles le résultat sera seulement annoncé « incertain » au lieu de le fixer sans tenir compte de lois statistiques mal établies. Espérons que le pénible épisode de la fausse datation du linceul puisse servir à ce que les médias et le grand public acceptent la notion d'incertain, que les experts acceptent de dire « je ne sais pas car je n'ai pas la méthode de mesure adéquate ». Alors l'humilité expérimentale sera reconnue et encouragée sans que les médias la transforme en impuissance ou la sollicite à leur idée, alors nous pourrions faire appel à plus de finesse de la part de tous dans l'évaluation des problèmes complexes de notre monde réel.

**Pierre PERRIER**
**Délégué général du Conseil pour les Applications**
**de l'Académie des sciences**

23, QUAI DE CONTI 75006 PARIS - TEL : 01 44 41 44 00 - FAX : 01 44 41 44 04
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CONSEIL POUR LES APPLICATIONS
DE L'ACADEMIE DES SCIENCES
(CADAS)
*Le Délégué Général*

Paris, le 29 février 2000

Madame Marie-Claire van Oosterwyck-Gastuche,

Madame,

Si je ne suis en rien spécialiste de la datation en carbone 14, ni des problèmes d'absorption de traces susceptibles de le polluer, j'ai, par contre, été très souvent obligé de décider sur des valeurs très dispersées et en petit nombre.

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Pierre PERRIER
Délégué général du Conseil pour les Applications
de l'Académie des Sciences

---

**Fig. 1**

This official letter to the French Academy of Science, to whom I submitted my book for appraisal is important. The general delegate of the CADAS, P. Perrier, agrees with my conclusions and confirms that there has never been any mediaeval age, the result deriving from poorly established statistical laws and data revealing the influence of parameters extraneous to the time without any proper correction. He insists on the danger of such over-mediatised false announcements, stressing that they will bring all the scientific appraisals into disrepute.

**Institute of France**
**Academy of Sciences**
2, Quai de Conti 75006 Paris

COUNCIL FOR THE APPLICATIONS
OF THE ACADEMY OF SCIENCES
(CADAS)
*The General Delegate*

Paris, February 29 th 2000

Madame Marie-Claire van Oosterwyck-Gastuche,

Madam,

If I am not a specialist in $^{14}C$ dating at all, nor in the problems of absorption by contaminants, I have been very often obliged to decide about the value of very dispersed and very reduced data.

You prove in this very solid book that, in the case investigated, the excessive sensibility (*of the* $C_{14}$) to the disturbances without any serious correction method results in producing both a large dispersion of the crude data and a flattening of the probability laws. It should be wise, in this case, to try to go back to an « almost normal » law taking in account careful corrections (one or two thesis would be necessary to establish them). If the experimentator is unable to decide, he should humbly renounce to give any datum ; one knows very well he will choose the most probable value « according to his opinion », which will exclude any scientific relevance to his result.

There is, nowadays, a great number such data too precisely announced in a similar way for problems of pollution or environment. If the scientists do not humbly recognize their results are « uncertain » all the scientific appraisals will loose their credibility and the door will be open to doubt about all the efforts towards scientific rationality, quite necessary in our society of high level technology.

One may hope therefore that the scientific community of the $^{14}C$ dating will review its calibration basis and fix both the incertainty rules and the limits beyond which the result will only be announced as « uncertain », instead of fixing it on the basis of poorly-established statistical laws.

LET US HOPE THAT THE PAINFUL EPISODE OF THE WRONG DATING OF THE SHROUD MAY HELP THE MEDIAS AND THE GENERAL PUBLIC TO ACCEPT THE NOTION OF « UNCERTAIN », THAT THE SCIENTIFIC EXPERTS ACCEPT TO TELL : « I DON'T KNOW, BECAUSE I HAVE NOT THE APPROPRIATE METHOD OF MEASUREMENT ». THEN THE EXPERIMENTAL HUMILITY WILL BE RECOGNIZED AND ENCOURAGED WITHOUT THE MEDIAS INTERPRETING THE RESULTS AS POWERLESSNESS OR ACCORDING TO THEIR OWN VIEWS, THEN IT WILL BECOME POSSIBLE TO APPEAL FOR MORE DELICACY IN THE EVALUATION OF THE COMPLEX PROBLEMS OF OUR REAL WORLD.

**Pierre Perrier**
General Delegate for the Council for the Applications
of the Academy of Sciences

---

**Fig. 2**

The same letter, translated into English by the author :

**Text 3**

The last advice from Prof. Gove about the mediaeval age (« Turin Shroud » on Discovery Channel) transmitted by the French « chaîne voyages » end 99.

Gove who had energetically refuted without proof the influence of temperature and neutron irradiation on the radiocarbon dates, is sure today that the biological coating discovered by Garza Valdes on the Shroud has changed its $^{14}C$ content (this is quite unlikeky, since this glassy varnish would have increased the density of the sample, fact which has not been observed).

But, as we learn in my book, Gove does not care about measurements. He told, as energetically as ever (translation from the French by the author) :

« *People who did those tests ignored this bacterial contamination. In fact everybody ignored it until Garza Valdes evidenced it* **(it had been found many times before on Amerindian remains, it is impossible that Gove ignores the fact).** Making then falsely believe that the specialists had in the other cases special cleaning processes able to restore the archaeological age, Gove said :

« *Even if they had been aware of it, they would have been unable to find a cleaning technique for it :* ***therefore, there is no mean to date certainly the Shroud***. ». Forgetting he had told exactly the contrary *ca* ten years ago, he added without complex :

« *Once we find a secure technique able to separate cellulose from this biological varnish, I think we will be able to propose a new C 14 dating for the Shroud, but it is not sure it shall be accepted* » (by the Church).

Then the great scientist roared with laughter.

# CENTRE DE DATATION PAR LE RADIOCARBONE

## Université Claude Bernard Lyon 1

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Monsieur Geoffroy de Kergolay
Directeur de publication
Couvent de la Haye aux Bonshommes
49240 AVRILLE

Villeurbanne le 15 Décembre 1999

Monsieur,

Peut-être parce que il y a quelques année mon laboratoire avait effectué une datation dans le cadre des travaux de restauration du couvent, vous avez plusieurs fois fait envoyer à l'adresse ci dessus votre "lettre des dominicains d'Avrillé".

Je vous précise que je tiens absolument à séparer les domaines professionnels de ceux concernant le religieux, sauf dans le cas de datation de relique. En conséquence je vous prie de bien vouloir faire en sorte qu'aucun autre exemplaire de cette revue ne soit désormais envoyé à cette adresse. Si vous tenez absolument à me faire connaître votre publication vous pouvez me l'adresser chez moi : 381 avenue J.Guillon 01700 MIRIBEL.

Vous n'êtes peut-être pas sans savoir que j'ai été impliqué de très près dans la datation du Linceul de Turin et que j'ai une certitude sans faille sur l' âge médiéval de ce tissu, que je reconnais cependant comme tout à fait vénérable. Je vous mets donc en garde de recommander les texte de Mme VAN OOSTERWYCK qui n'est pas du tout au fait des développement de la méthode du radiocarbone et de son application à l'archéologie et qui, d'après le peu que j'ai pu en lire, ou le peu que j'ai pu en écouter de ses paroles, manque totalement de bon jugement dans cette affaire.

Je compte donc que vous ferez sur votre liste d'adresse les transformations nécessaires et vous prie de recevoir mes salutations distinguées

Jacques E V I N

**CENTRE DE DATATION**
**PAR LE RADIOCARBONE**
Université Claude Bernard Lyon 1
Centre des Sciences et de la Terre U.R.A. CNRS 11

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Jacques E V I N

---

**Fig. 4**

Prof. Evin, the radiocarbon specialist from the University Claude Bernard, Lyon, gave this advice about my book I know he red but avoids to quote. This paragraph is extracted from a letter adressed the 15.12.99 to G. de Kergolay, director of the « Sel de la Terre » where some of my papers have been published. In fact, the letter is essentialy related to the dispatching of the « Lettre des Dominicains d'Avrillé » at his office, instead of this home adress, point that Evin dislikes. He adds incidentally (3d paragraph, translated by the Author) :
« *You certainly know that I have been very closely implied in the dating of the Turin Shroud and that I am absolutely certain of the mediaeval age of this textile which I recognize hovewer to be quite venerable. Therefore I put you on guard about the texts of Mrs Van Oosterwyck who is totally ignorant of the developements of the radiocarbon method and its application to archaelogoy and that, according to the few I could read from her writings and the few I heard from her speeches, lacks utterly of sound opinion in this affair*. ».

## TABLE II
## SOME FEW EXAMPLES OF ANOMALOUS R.C. DATES

| Locality | r.c. age B.P. | Author | Characteristics | Author's comment |
|---|---|---|---|---|
| ***Dates on shells*** | | | | |
| Piombino (Italy)<br>Languedoc (France) | 4.400-5000 | Thommeret<br>(1976) | Very young shells, formed at the present time | « All those dates are likeky false »(Thommeret, now deceased, was a great specialist on C14 dating on shells) |
| Chami series<br>(Mauritania) | 3.570 | Evin *et al.*<br>(1975) | Neolithic site | « The age corresponds to the one expected for the culture and to other ages obtained at Gif-sur-Yvette on the same material ». A modern date obtained on a bone of the same formation is rejected. Comment : « unexpected result ». |
| « Lac Tanma » Senegal,<br>Mbidjem village | 5.302 ± 170 | Cheik Anta Diop<br>(1976) | Neolithic site | « Confirms the chronology of the Neolithic » |
| Gandon, near Saint<br>Louis, Senegal | 1.837 ± 112 | id. | In the same site a charcoal has been dated 550 ± 113 B.P. | « This discrepancy proves that the shells had not been freshly gathered by the inhabitants ». |
| ***Dates on fishes*** | | | | |
| Antarctic Ocean | 600 - 4.000 | Stuiver and Brazunias<br>(1985) | Fresh fishes, alive or recently killed | « Unexpected result ». My comment : possibly influenced by orogenic radiocarbon from a submarine eruption, which gives old ages. |
| Ross Ice Shelf<br>Antarctic Ocean | 1.100 | Natl. Geogr. Mag **123**,<br>260 (Argod) | Frozen fish collected at the top of the Ice Shelf | Supposed to be much older. |
| ***Magdalenean (14.000 - 17.000 B.P.)*** | | | | |
| Engraved bone and antler mobiliary from different places in France | discrepant results on 7 pieces, ages ranging from 3.900 to 9.500 | Hedges *et al.*<br>(1990) | The purpose was to establish a magdalenean chronology independant of the art styles | « The pieces have been contaminated with a preservative sometimes since excavation, most likely a collagen - based contaminant containing young radiocarbon ». |
| Niaux cave<br>(France) | 9.850<br>10.100<br>10.150 | Clottes and Simonet<br>(1974) | Carbon from to the torches of the prehistoric artists | Dates too young for the magdalenian culture.<br>Rejected. |
| Niaux cave<br>(France) | 4.500 | Evin *et al.*<br>(1975) | Charcoal near a calcified human foot-print | « Too young for the paintings dated 14.000 years B.P. » Rejected. |
| ***Iron age - Germano- celtic culture*** | | | | |
| Lindow Moss<br>Cheshire (England)<br>The Lindow Man | Many different ages In short :<br>* the age of the peat *ca* 300 to 600 B.C.<br>* the age of the bones *ca* 400-500 A.D.<br>* the age of the stomach content *ca* 0 A.D. | Gowlett, Hedges and Law<br>(1989) | Body of a man belonging to the germano-celtic culture well preserved, buried in a peat.<br>Results of intercomparison tests between different laboratories and different techniques. The laboratories being the British Museum, Oxford and Harwell and the techniques : the scintillator, the AMS and the small counter. | « The age of the peat is too old, and the age of the body is different than the one of the peat. The true age is the one of the stomach. »<br>The age of the bones is not mentioned.<br>Therefore the Lindow Man official age is the calibrated r.c. date of the stomach content :<br>36 B.C. - 129 A.D.<br>The other ages are rejected, since the A.M.S. from Oxford never fails. |
| Lindow Moss<br>Cheshire (England)<br>The Lindow Woman | *ca* 400 A.D. | B.S.T.S. Newsletter<br>n° 97 (1998) | Skeleton of a woman found in the same peat and supposed to belong to the same germano-celtic culture according the r.c. age of her bones and therefore transported by Prof. Hall to the British Museum. | The woman had been murdered by her husband in *ca* 1960 and buried in the peat.<br>Prof. Hall hates to hear about.<br>My comment : this proves the influence of the humic and fulvic acids in the ageing of r.c. dates. |

etc., etc., etc.

## References of Table II


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# ANNEX II

**Some words about my book *Le radiocarbone face au Linceul de Turin* (The radiocarbon facing the Turin Shroud) at the F.X. de Guibert editions, Paris. The radiocarbon dating method seen by a soil scientist.**

by M.C. van Oosterwyck-Gastuche

I want to explain briefly how the new knowledges issued from the modern techniques from which I am a specialist led me to criticise severely the radiocarbon method. I am, like Libby, Ph. D. in physico-chemistry, but contrary to him, specialized in soil science, mainly in the field of the soil solutions. I investigated the soil components by the new methods which were still unknown at the time Libby set up his chronometer, more peculiarly their structure, and the influence of the solutions on the genesis and the synthesis of the clays minerals.

The new finds provoked a revolution in soil science that should have logically extended to the radiocarbon one and that the radiocarbonists seem to ignore. I speak here as a specialist, refering myself to the annex V of my book. I will mainly stress the leading role of the solutions which convey inorganic and organic ions in the soils and therefore induce changes in the radiocarbon ages, as the radiocarbonists are perfectly aware and as everybody can control by reading the papers written by them.

The influence of the solutions extents to the carbon derivatives which decompose after burial in the soils. This is quite logical since carbon and silicon have similar chemical properties, as illustrated by they common place in row IV of the Mendelejeff's table. Silicon replaces carbon, many silicifications are known and carbon derivatives complex silicon or fix strongly themselves on silicate surfaces. There are thousands of papers published on those topics, many books also.

The radioactive isotope $^{14}C$ present in very small amounts - $10^{-12}$ % - migrates also with the solutions and fixes elsewhere, producing anomalous ages. In fact, the only correct dates for the historical material were obtained on dry locations.

I was surprised when I knew that the mediaeval age had been presented as the « Science Verdict » for the Shroud but had no intention to intervene. Everything began at the Paris symposium in 1989, where I was invited at the « radiocarbon round table » with Prof. Tite and Evin and enumerated during one hour many faults of the radiocarbon clock without upsetting them in the least.

My starting point was a find I had done : the crystallization of the silicates which, until then, were only obtained in conditions of high temperature and high vapor pressure in « calorimetric bombs » (under « hydrothermal conditions ») and were therefore supposed to occur after million years at ordinary temperature, could occur in a very short time at low temperature in « favorable » conditions I evidenced. I did not know at that time that this experiment would help me later on understand the falsity of the $^{14}C$ method and conclude that the world famous mediaeval age obtained by Damon *et al*. through their strange statistics was devoid of scientific meaning. This is the conclusion of my book which was approved by the Academy of Science of Paris.

Having noticed that the Shroud sample had been taken in an area altered by the water during the 1532 fire, recreating « hydrothermal conditions », I supposed that the amounts in $^{14}C$ had been altered and requested for a thermal test reproducing the conditions of the fire. This time, Evin and Tite were upset : they refused violently. I contacted many labs who refused. The test was finally performed at Moscow under my direction with the financial help of Mr. Berthault by Dr. Ivanov and Kouznetsov. The results being positive, I was immediately excluded by Mr. Berthault. Some were then presented at the Rome symposium in 1993 as « the find of the Russian scientists ». Mr. Berthault financed other similar experiments in Moscow which gave again positive results. Discussions arose among MM. Salet, Berthault, the Russians, etc. resulting in a tremendous condusion. My opinion was never requested. You will find it in my book. I am glad to tell that the tests are done again by Prof. Jackson with the financial support of Mr. Berthault. Of course, I was not asked to collaborate.

This experiment not fully understood and wrongly interpreted is the leading thread of my book. It allowed me to enter the very closed domain of the radiocarbonists and made me finally understand why they refused to discuss and experiment.

**This answer was that radiocarbon was not based on science, but on ideology.** It relied in fact upon a series of false hypothesis, an abyssal ignorance of the finds obtained by the modern techniques ; they ignored also the role of the solutions.

I enumerate now the finds in soil science ignored by Libby :

**1. Clay minerals are not gels, but microcrystals** formed by the large Oxygen anions ($O^{-2}$, r = 1,32 Å) in « close packing » and very small cations ($Si^{+4}$, r = 0,39 Å, $Al^{+3}$, $Mg^{+2}$, etc.) held together by electrical forces. The size of the carbon atom being approximetely identical to the one of the silicon ion, one may take the place of the other. The organic compounds being mainly formed by water which has the same size as the oxygen anion, both the inorganic and the organic worlds are composed by a « close packing » of oxygens, held either by silicon or by carbon, forming extremely complex structures which interact in very specific ways. The unit here is the Angstrøm, i.e. $10^{-8}$ cm.

**2. Libby had not only false ideas about the clays, he had also false ideas about their formation.** Contrary to believed in his time, the clays were not inalterable minerals : they form very rapidly at ordinary temperature by leaching with very dilute solutions. Kaolinite appears after three months aging, and more rapidly if the solutions contains silicon complexed by humic acids. The same humic acid exchanges $^{14}C$ with the ground waters almost devoid of this isotope and produces very old ages when fixing on young material. But many other causes of alteration of the $^{14}C$ contents exist, as proved by of the submission form of a well-known A.M.S. laboratory requesting about the conditions of burial, the quality of the solutions, the environment, the presence of contaminants, etc. It still requests to know the date expected, in order to avoid mishaps such as this one : the age of the « Lindow woman » measured by the Oxford lab - which never fails - being of *ca* the fourth century A.D., her remains were considered to belong to the germano-celtic culture until a police inquire revealed she had been murdered by her husband in *ca* 1960 and buried in a peat layer rich in humic acids. This is not the only mishap found in the Libby's method, do believe me, as you can control in my book.

**3. The radiocarbon specialists have no reliable method to remove the contaminants**, as they recognize. I can tell it through my own experience, having set up selective dissolution methods in order to remove **the same inorganic contaminants** fixed on **similar inorganic substrates** : it has been a long, extremely difficult work. Here, a research intended to master the influence of grain size on the rate of dissolution of alumino-silicates. No example of such a work is found in radiocarbon science, which is quite understandable on account of the extreme difficulty of the task : the most different contaminants have to be removed from the most various substracts. Mentionning the clays only, let us mark that they fix organic matter in an irreversible way.

Therefore, the radiocarbonists simply conclude that they have succeeded in removing their contaminants when they obtain the age expected by their chronology, rejecting the other results as « anomalous » without performing any physico-chemical control.

4. This behaviour from the radiocarbonists is logical, because we reach the crux of the matter : **Libby's clock is devoid of standards, not radiocarbon ones, but standards for measuring time.** The $^{14}C$ ages obtained on the historical materials only prove the unreliability of the method : the ages are simply sorted. The same occurs with the prehistorical ages, which are sorted according to the chronology set up by the prehistorians based, as everybody knows, on the subjecive and speculative concepts from the XIXth century. The statistical calculations found in Damon *et al.*'s paper are nothing else than a very clever sorting.

**Finally, the method only dates correctly materials of previously known age**... That is the reason why the age of the reference samples had been communicated to the labs before the analysis in Damon *et al*.'s appraisal.

**5. Let us still enumerate the other false hypothesis basing the Libby 's clock** : the cosmic radiation which produces radiocarbon did not remain constant during 40.000 years, contrary to stated. **The isotope did not distribute uniformously either** : its distribution is quite irregular. Nobody knows exactly the value of the desintegration constant of $^{14}C$...

To conclude, taking in account the amount of false hypothesis basing the Libby's method, the lack of standards for time, the ignorance of the recent finds, the refusal of the carbonists to submit their method to discussion and experimentation, we are obliged to conclude to the non-scientific, ideological character of the method of measure of time set up by Libby.

The French Academy of Science, to which I submitted my book, agreed with my conclusions. The General Delegate of the CADAS (letter dated 29/02/2000) confirmed that the mediaeval date was false and the basis of the $^{14}C$ method needed to be reviewed. Stressing on the damage done to Science by the overmediatisation of this false appraisal, he recommended still some humility to the carbonists. May they listen !

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