

## REDATING THE RADIOCARBON DATING OF THE DEAD SEA SCROLLS

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### *Introduction*

The first request for up-to-date AMS carbon dating on Qumran documents was made by Profs. Robert Eisenman of California State University Long Beach and Philip Davies of Sheffield University in a letter to Amir Drori, Israeli Antiquities Authority Director, on May 2, 1989.<sup>1</sup> Four months later in September of 1989, a spokesman for the Antiquities Authority announced that a run of carbon testing of samples taken from the Scrolls were to be undertaken. The AMS Carbon 14 tests on the Dead Sea Scrolls that were eventually done were conducted in two separate runs, the first in 1989–91 by laboratories in Oxford and Zurich and the second in 1994 at the University of Arizona.<sup>2</sup> Following

<sup>1</sup> Letter, Eisenman and Davies to Amir Drori, 2 May, 1989; see M. Baigent and R. Leigh, *The Dead Sea Scrolls Deception* (London: Jonathan Cape, 1991) 80–82 and 242. In it they included two caveats, one that the new methods be used to determine relative not absolute chronology, that is, earlier versus later in the same test run; absolute chronology is in their view virtually impossible because of the multiple imprecisions to which C14 testing was subject. Second, they insisted that "opposition scholars" be included in the process because they were the ones that had initially felt the most need for such tests and were most likely to understand which were the key documents that should be tested. Neither caveat was heeded.

<sup>2</sup> G. Bonani, M. Broshi, I. Carmi, S. Ivy, J. Strugnell, and W. Wolfi, "Radiocarbon Dating of the Dead Sea Scrolls", *Atiqot* 20 (1991) 127–32, and "Radiocarbon Dating of Fourteen Dead Sea Scrolls", *Radiocarbon* 34 (1992) 643–49; T. Jull, D.J. Donahue, M. Broshi, and E. Tov, "Radiocarbon Dating of Scrolls and Linen Fragments from the Judean Desert," *Radiocarbon* 37 (1995) 11–19. Not incuriously, these were the same laboratories that had previously been selected for the C14 testing of the Holy Shroud of Turin.

both sets of tests, the group controlling the processes was governed by the belief that the C14 results—which were on the whole inconclusive or to characterize the impression given by the first report of the results of these tests in BAR, ‘skewed’<sup>3</sup>—in some manner confirmed the accuracy of the results arrived at by paleography.

This was clear not only from the several articles which appeared following each of the two runs, but also press releases and interviews accompanying the announcements of the results. These not only bordered on being taken as being “official,” but so influential were they that in academic papers around the world these two runs of AMS C14 testing have been looked at as conclusively demonstrating when the Scrolls had been written—and in many cases this was generally taken to be before 40 BC—even though no such results were warranted.<sup>4</sup> Indeed, so widespread was their effect that not a few scholars began to argue that no “sectarian” documents were put in the caves later than a date of approximately 50–40 BC—“sectarian texts” being generally considered to be the most important documents and, in particular, those representing the unique ideas of the movement or “sect” itself.<sup>5</sup>

### Review

The authors have now undertaken an independent review of the results of the two runs of carbon testing, in particular the second for which the actual raw data upon which the analyses are based is more fully available. Our findings are as follows:

1) In both the 1989–91 and 1994–95 AMS C14 dating runs an inaccurate dating curve was utilized or, more succinctly, a dating curve that because of its imprecision has since come to be considered

<sup>3</sup> “New Carbon-14 Results Leave Room for Debate” *BAR* 21/4 (1995), p. 61.

<sup>4</sup> For further analysis see G. Rodley and B. Thiering, “Use of Radiocarbon Dating in Assessing Christian Connections to the Dead Sea Scrolls,” *Radiocarbon* 41 (1999) 169–82.

<sup>5</sup> M. Wise, *The First Messiah* (Harper Collins: San Francisco, 1996); A. Ellgard, *Jesus One Hundred Years Before Christ* (New York: Overlook Press, 1999); G. Doudna, “Dating the Scrolls on the Basis of Radiocarbon Analysis,” *The Dead Sea Scrolls after Fifty Years* (eds P. Flint and J. VanderKam; Leiden: Brill, 1998) 430–71. Doudna actually to some extent gives his agenda away at the end of this article in discussing his ideas about a “Single-Generation Hypothesis”, that is, that most sectarian Scrolls were written in a very short timeframe in the middle of the First Century BC (462–64). Though he gives his credits at the beginning of the article (430), he neglects to mention Eisenman, who first introduced him to the subject of AMS Carbon testing after the initial testing reports, initiated him into its complexities, and on whose behalf he first undertook to write *BAR* questioning the results of the first run of C14 tests in 1991.

inexact.<sup>6</sup> This is surprising because even at the time, the 1986 Stuiver/Pearson dating curve on which the authors were relying was already obsolete and a newer calibration curve which tended towards great 'rejuvenation' was already available in 1993.<sup>7</sup>

This inaccurate 1986 dating curve for the 200 BCE–200 CE period, which was used for calibration purposes in both the 1991 and 1994 tests, made the absolute dating indications for some samples appear older than they actually were—this by a period perhaps of some fifty years or more. Surprisingly, even though a majority of Qumran specialists worldwide have now been relying uncritically upon the interpretation of these results, no retractions or press releases have come forth from the group that issued the original reports based on the outdated, inaccurate, and somewhat erroneous model.

2) The methods used in interpreting the meaning of the AMS carbon testing were also inaccurate from a purely statistical point-of-view.

3) Finally—and this is a general statement—carbon testing is too imprecise a tool to provide conclusive evidence for a time span as short as the one at issue in the debate concerning when the sectarian Scrolls were written.

### Analysis

Let us go into these conclusions separately and more fully. In the first place, radiocarbon dating is only able to give approximate dates and its results, therefore, are given in units of mean and standard deviations—known as sigmas—that represent the statistical 'range' in which the mean date may fall. The first sigma is the time span that radiocarbon dating theory posits would contain the actual date 68% of

<sup>6</sup> M. Stuiver and G.W. Pearson, "High-Precision Calibration of the Radiocarbon Time Scale, AD 1950–500 BC" *Radiocarbon* 28 (1986) 805–38; G. Rodley, "An Assessment of the Radiocarbon Dating of the Dead Sea Scrolls," *Radiocarbon* 35 (1993) 335–38. For the 1998 corrections, see M. Stuiver, P.J. Reimer, E. Bard, J.W. Beck, G.S. Burr, K.A. Hughen, B. Kromer, F.G. McCormac, J. van der Plicht, and M. Spurk, "INTCAL98 Radiocarbon Age Calibration, 24,000–0 Cal BP," *Radiocarbon* 40 (1998) 1041–83. For further analysis, see G. Rodley and B. Thiering, "Use of Radiocarbon Dating in Assessing Christian Connections to the Dead Sea Scrolls," 169–99, and Doudna, "Dating the Scrolls on the Basis of Radiocarbon Analysis," 433–36.

<sup>7</sup> See for instance M. Stuiver and P.J. Reimer, "Extended 14C Data Base and Revised CALIB 14C Age Calibration Program," *Radiocarbon* 35 (1993) 215–30. Therefore, why Jull, Donahue, Broshi, and Tov used the older, more archaizing calibration curve, when a newer more 'rejuvenating' one was already available to them in 1993 (the year before they published their results) is a mystery. See also F.G. McCormac and M.G.L. Baillie, "Radiocarbon to Calendar Conversion: Calendrical Band Widths as a Function of Radiocarbon Precision," *Radiocarbon* 13 (1993) 311–16.

the time; the second sigma is a wider time span that would theoretically include the date approximately 95% of the time.

When it comes to analyzing the results of the carbon testing of Qumran documents, it should be observed that these time spans or "sigmas" are not narrow. Where the first sigma is concerned, the time span can range to over a hundred years. When the second sigma is taken into consideration, this time span can extend to well over two hundred years. Right from the start, this is well beyond the margin of error required to date individual Scrolls with the accuracy necessary to affect the present chronological debate or arrive, for instance, at absolute dates.

To reiterate the reason this debate is so important is it concerns whether all the extra-biblical Scrolls date from before the First Century or whether some of the sectarian Scrolls reach into it and can therefore be considered contemporary with that movement called by most "Christianity" (in some cases, even perhaps indistinguishable from it).

The groups that oversaw the two rounds of AMS C14 used the inexact pre-1993 and 1998 calibration curves in calculating these sigmas. In addition, they presented as a quasi-control the time range arrived at by prior paleographic analysis—analysis that was begun primarily by Frank Moore Cross, S.S. Birnbaum, and Josef Milik, but was now being carried forward by the present and ongoing editors of the DJD series. The relationship between these two sets of time spans—i.e., what are termed as the first and second sigmas—was presumably the basis for the assertion by many of these persons that the carbon dates 'confirmed' the reliability of paleography where the Scrolls were concerned.

The following chart presents these data together with the distance in years between the mean of the carbon dating age and the median of the paleographic age, which we have labeled as "Amount of Error"—we are using here; mainly the results arrived at in the second 1994 run of carbon dating, the raw data concerning which is, as already noted, more complete.

Sample	Carbon Age	Paleographic Age	Amount of Error
4Q266 (The last column of the Damascus Document—not paralleled in CD from the Genizah)	45 BC–CE 120	100–50 BC	+117 years
1QpHab (The Habakkuk Peshet from Cave 1 which mentions the characters famous in Qumran debate known as 'the Righteous Teacher', 'the Liar' or 'Spouter of Lying', and 'the Wicked Priest')	88–2 BC	30–1 BC	–30 years

Table (cont.)

Sample	Carbon Age	Paleographic Age	Amount of Error
1QS (The Community Rule from Cave 1)	206 BC–CE 111	100–75 BC	+40 years
4Q258 (Material from the Community Rule from Cave 4)	95 BC–CE 122	100 BC	+113 years
4Q521 (A Messianic text known as “The Messiah of Heaven and Earth” or “A Messianic Apocalypse”)	93 BC–CE 80	100–80 BC	+83 years
4Q267 (Another supposedly “early” copy of the Damascus Document, including what has been identified as the opening column)	94–45 BC	50–0 BC	–94 years
4Q208 (The Astrological Enoch—this in theory should be an early document)	186–92 BC	200 BC	+61 years
4Q22 (An Exodus manuscript in what is known as “paleo-Hebrew” script—this in theory should also be early, if it is not simply a late copy)	207 BC–CE 63	100–25 BC	–8 years
4Q2 (A biblical patch from Genesis found in Cave 4)	120 BC–63 CE	50 BC–AD 50	–23 years
1QIs <sup>a</sup> (One of the Isaiah scrolls from Cave 1)	356–103 BC	150–125 BC	–97 years

The 1995 report also included the radiocarbon date range for 4Q171. This is the Psalm 37 Peshet, a document also mentioning not only the Liar, but the Righteous Teacher and the Wicked Priest as well. The report did not, however, include its paleographic range, though it had previously been determined by such analysis to be of the same “Herodian semiformal script” as 1QpHab, which was dated to 30–1 BC. Had its paleographic age been included, its “Amount of Error” would have been close to the average of those given above which is 66 years.

Sample	Calibrated Age	Paleographic Age
4Q171	CE 5–111	30–1 BC

What is the weakness of these test results, even as they were originally announced? As already signaled, using the paleographers' own data, the average amount of error between the radiocarbon and the paleographic medians for the samples is virtually the same length of time or longer as the parameters of the debate of when the Scrolls were written. Generally speaking, a measuring instrument that has an average degree of error as large as the phenomenon it is designed to measure is largely without use. It follows, therefore, that the results of the radiocarbon tests cannot be seen as "confirmation" of the accuracy of paleographic analysis with respect to the debate of when the Scrolls or in this case in particular, the sectarian or extra-biblical Scrolls, were written.

On the contrary, if the radiocarbon dates are accurate, they indicate that the technique does not have the sensitivity to delineate between the time-frames in question. In the paper published in *Radiocarbon* presenting the results of the first run of carbon testing in 1989–91, the authors, Bonani, Broshi, Stugnell, Wolfi, et al., stated that "the radiocarbon dates are in good agreement with the estimates based on paleography" and that "the results confirm the reliability of paleography",<sup>8</sup> but this is misleading and those making such assertions were simply using a different definition of "reliability" than the one required for the technique to be useful in this debate. We shall say more about this later.

One scroll in particular, the Habakkuk Peshar (1QpHab), is often cited as proving that the sectarian texts were written before 40 BC. It was dated in the initial run of carbon testing to a first sigma of 104–43 BC, though according to the newer calibration this first sigma should rather read 88–2 BC. As already noted above, this scroll mentions the three central figures of Scroll polemics, the Righteous Teacher, the Spouter of Lying, and the Wicked Priest. Geza Vermes summarized the general position concerning the Habakkuk Peshar on the part of consensus scholars quite well: "If the carbon dating (of 1QpHab) establishes a *terminus ad quem* prior to 30 CE, this will damage almost beyond repair the hypothesis proposing a Christian connection."<sup>9</sup>

<sup>8</sup> G. Bonani, M. Broshi, I. Carmi, S. Ivy, J. Strugnell, and W. Wolfi, "Radiocarbon Dating of the Dead Sea Scrolls", *Atiqot* 20 (1991) 131–32.

<sup>9</sup> G. Vermes, *The Complete Dead Sea Scrolls in English* (New York: Penguin, 1997) 13, a statement aimed primarily at Robert Eisenman's position that some of the sectarian Scrolls are contemporary with what we now call "Christianity". But in his zeal to dismiss Eisenman's theories as silly, Vermes continually sets him up as a "straw man" claiming he identifies Paul as "the Wicked Priest". Not only does Vermes make this error in his Introduction to *The Complete Dead Sea Scrolls in English* above, but he does so in all versions of this introduction in previous editions back to the

This statement is inaccurate. Not only did both the 1993 and 1998 recalibrations substantially move the Scroll's first sigma forward in time, but Vermes neglects to mention that the Habakkuk Peshet is paleographically equivalent to the Psalm 37 Peshet (4Q171) as we just saw. It is also parallel in terms of content. But the first sigma of the Psalm 37 Peshet, even according to the 1994–95 test run was 29 CE–81 CE—22 CE–78 CE using the 1998 calibration curve. The second sigma gives an even wider margin 3 CE to 126 CE. The C14 results, then, do not preclude a date in the first century of the Common Era. On the contrary, given the numerous cleansings and undoubted impurities that have seeped into the process to skew the results where a document as worried over as the Habakkuk Peshet has been—until recently on display in the Shrine of the Book—the Psalm 37 Peshet results are very likely the more accurate calibration.<sup>10</sup>

Results such as these illustrate the vagaries of applying C14 results to confirm paleographic attempts to date absolutely a document's *terminus ad quem*. In this instance, for two documents as typologically similar paleographically speaking and content-wise as 1QpHab and 4Q171 (The Psalm 37 Peshet), one ends up with a C14 first-sigma dating of between 88 BC and 81 CE. When one takes the second sigmas into account, these results diverge by yet another 100 years. This creates a potential range of almost four hundred years for two documents that according to the estimates of paleography were written at approximately the same time!

None of these constraints were even signaled by those who hurried to proclaim the results of paleography proven by the recent run of C14 dating and, in particular, that the sectarian Scrolls were all written before about 50 BC. As already noted too, many such persons derived

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1980s thereby demonstrating that he has never read Eisenman's work in any serious manner because the latter makes no such contention, but rather carefully distinguishes between the two characters, "the Wicked Priest" and "the Liar". The individual who did in fact hold the position Vermes constantly refers to was J. Teicher in the early days of Qumran research. It is rather Vermes who does not distinguish between "the Liar" and "the Wicked Priest" not Eisenman, thereby constantly making this erroneous report. This is what is meant by going according to the 'internal evidence' or what the Scrolls themselves say, not the 'external evidence' of paleography, carbon testing, etc.

<sup>10</sup> To be fair, it is true that Doudna ("Dating the Scrolls on the Basis of Radiocarbon Analysis," 452–53) was aware of this problem, but in line with an avowed design to push the sectarian Scrolls back into a 'single generation' dating formula (that is, around 50 BC), he dismissed the newer dating evidence provided by the Psalm 37 Peshet in favor of the measurements of 1QpHab, this despite the numerous cleansings to which the latter as a principal Dead Sea Scroll document was subjected. Par contra, also see G.A. Rodley and B.E. Thiering, "Use of Radiocarbon Dating in Assessing Christian Connections to the Dead Sea Scrolls," *Radiocarbon* 41 (1999) 176–77.

a second result from all this—that the Scrolls were put into the caves before 40 BC as well. Unfortunately for these assumptions a fragment, recently identified by Hanan Eshel as being from Cave 4, gives dated evidence of a contract carrying the name of a High Priest and date of approximately 46–47 CE; thus giving vivid internal evidence that negates any idea that the documents were deposited in this cave prior to this time.<sup>11</sup> This is also an instructive example of what can be meant by relying on the internal evidence—or what the documents themselves state—rather than the external in debates of this kind.

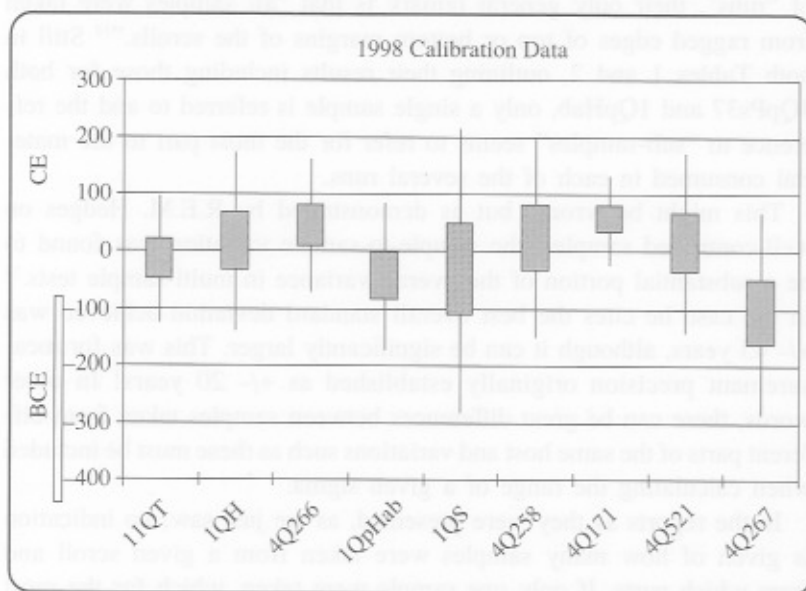
Of the Scrolls that have been dated by radiocarbon, only nine can be seen as in any way relevant to the question regarding whether the sect was active during the First Century CE or not. These are: 11QT, 1QH, 4Q266, 1QpHab, 1QS, 4Q258, 4Q171, 4Q521, and 4Q267. The following table gives the Carbon dating one-sigma time range for the death of the animal whose skin was eventually used to produce the Scroll in question. It should be remarked that these dates are *terminus a quos* not *terminus a quem*s as Vermes and others of a similar mindset would have it, since they only measure when the animal whose skin was eventually used died, not when a given scroll was actually written. The table below gives two calibrated ranges, one based on the 1986 calibration curve being used by those doing the analyses in both sets of reports, those from 1992 and 1995, and the other the one from 1998. As noted, this new calibration curve produced a significant change for the range of documents like 1QpHab and 4Q267 (paleographically speaking considered the earliest fragment relating to the Damascus Document).

Scroll	1998 Calibration	1986 Calibration
11QT (Temple Scroll)	53 BC–21 CE	97BC–1 CE
1QH	37 BC–68 CE	21BC–61 CE
4Q266	4–82 CE	5–80 CE
1QpHab	88–2 BC	104–43 BC
1QS	116–50 CE	159 BC–20 CE
4Q258	36 BC–81 CE	11 BC–78 CE
4Q171	29–81 CE	22–78 CE
4Q521	39 BC–66 CE	35 BC–59 CE
4Q267	168–51 BC	172–98 BC

<sup>11</sup> H. Eshel, "4Q348, 4Q343, and 4Q345: Three Economic Documents from Qumran Cave 4?", *JJS* 52 (2001) 132–35.



As explained, these one-sigma distributions represent a 68% probability that the actual date lies within the specified range. For claims based on results that may include measurement or other types of error, however, it is more instructive to use the 95% per cent confidence intervals. The plot given below illustrates with a veridical rectangle the one-sigma distributions for the more recent calibration (given above) along with the wider 95% percent confidence interval of the calibrated data represented by the line extending from the rectangle.



Where 1QpHab and 4Q267 are concerned, the 1998 recalibration was particularly significant as it brought both of those Scrolls' two-sigma time range well into the First Century CE. There is, however, reason to believe that the reported standard deviations in the C14 measurements of the Scrolls do not represent the true variation within these measurements. This is because for the most part only a single sample seems to have been utilized for dating purposes from each scroll. We are not speaking here about the number of "runs" that might have been done on any given sample. As argued by N.L. Caldararo,<sup>12</sup>

<sup>12</sup> N. Caldararo, "Storage Conditions and Physical Treatments Relating to the Dating of the Dead Sea Scrolls," *Radiocarbon* 37 (1995) 21, in the same journal and as a seeming follow-up article to the Jull piece.

when using only a single sample any variation that would exist between different samples that came from the same host is lost and the imprecision of the measurement technique becomes the predominant contributor to the reported variance.

Though Jull, Donahue, Broshi, and Tov do refer to "several sub-samples" in some instances, they admit that "only a few independent measurements were made due to sample-size limitations."<sup>13</sup> Though the weights of their samples varied from a low of 4.9 mg (4Q521) to a high of 56.5 mg (1QIsa), in turn seemingly dictated the number of "runs", their only general remark is that "all samples were taken from ragged edges of top or bottom margins of the scrolls."<sup>14</sup> Still in both Tables 1 and 2, outlining their results including those for both 4QpPs37 and 1QpHab, only a single sample is referred to and the reference to "sub-samples" seems to refer for the most part to the material consumed in each of the several runs.

This might be wrong, but as demonstrated by R.E.M. Hedges on well-controlled samples, the sample-to-sample variation was found to be a substantial portion of the overall variance in multi-sample tests.<sup>15</sup> In the case he cites the best overall standard deviation achieved was +/- 45 years, although it can be significantly larger. This was for measurement precision originally established as +/- 20 years! In other words, there can be great differences between samples taken from different parts of the same host and variations such as these must be included when calculating the range of a given sigma.

In the reports as they were presented, as we just saw, no indication is given of how many samples were taken from a given scroll and from which parts. If only one sample were taken, which for the most part seems to have been true, this variance is not accounted for and the resulting sigma is less accurate than one obtained from multiple samples.

Though the tables Jull, Donahue, Broshi, and Tov provide do suggest an average of four "runs" were done on documents across the

<sup>13</sup> T. Jull, D.J. Donahue, M. Broshi, and E. Tov, "Radiocarbon Dating of Scrolls and Linen Fragments," 11-12.

<sup>14</sup> T. Jull, D.J. Donahue, M. Broshi, and E. Tov, "Radiocarbon Dating of Scrolls and Linen Fragments," 11.

<sup>15</sup> See R.E.M. Hedges, "Radiocarbon Dating by Accelerator Mass Spectrometry: Some recent Results and Applications," *Philosophical Transactions of the Royal Society of London Series A*, vol. 323 (issue 1569) 57-72.

board, nothing is stated in these tables about how many separate samples they used from different parts of the Scrolls or how many runs were taken on samples from different parts of the document or, if they did use more than one sample from different parts of a scroll, what the variance or disparities in the results might have been in these separate runs.

A series of runs, therefore, on the same sample area—say four—might help make a suggested sigma measurements more precise, but do not really have a determining bearing on the final range of such sigmas since it has been shown that repeated measurements from different samples from the same host are required in assessing the true sample variance. This very definitely presents a lacuna in the reports they provide to say nothing of the results they claim to have achieved.

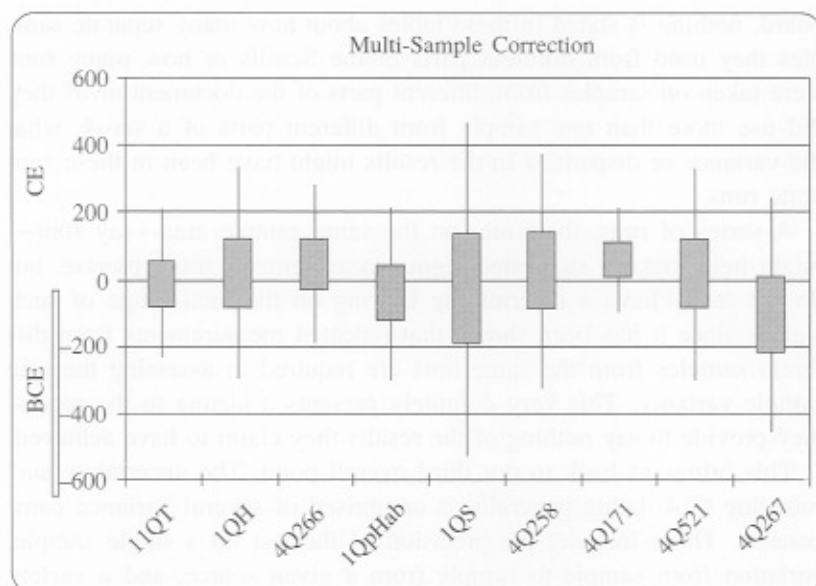
This brings us back to our third overall point. The uncertainty surrounding C14 dating generally is comprised of several variance components. These include: the precision of the test on a single sample, variation from sample to sample from a given source, and a variety of other unknowns such as possible calibration error and the uncertainty remarked above, regarding the period of time between death of the animal whose skin was used for the parchment being tested and when that parchment was written upon.

In general, the different contributions to uncertainty add up according the equation:

$$S^2 \text{ total} = S^2 \text{ precision} + S^2 \text{ reproducibility} + S^2 \text{ other}$$

Therefore, if sample-to-sample variations and other unknowns are left out of the analysis of C14 dates, as they were in both the write-ups and press reports of the 1991 and 1994–95 results, the conclusions are rendered inaccurate in proportion to the degree described by the above equation.

For example, suppose multiple samples from the appropriate scrolls had been run and the reported variance had increased only by a factor of two (the fact that the Scrolls have been contaminated by various cleaning solutions and samples were taken largely only from frayed edges, as noted, make it reasonable to assume that the actual overall variance would be even larger than this); then the calibrated standard deviations or confidence intervals given above would need to be recalculated based on the corrected standard deviation of the new measurements. The graph below gives a picture of what the theoretical results emerging from such a process might look like.



Here even the one-sigma ranges for 1QpHab and 4Q267 move into the first century.

Work done by F.G. McCormac and M.G.L. Baillie suggests that the complex structure of the C14 calibration curve creates more error in the calibrated ranges than suggested even in the aforementioned calibrations.<sup>16</sup> As a general rule of thumb, they state that the calendar age range is typically 100 years for high-precision dates ( $\pm 20$  years). This agrees more closely with the multi-sample correction provided above.

In a recent issue of *Science* it was pointed out, for example, how a "recalibration of Carbon 14 dates . . . indicates the Uruk Period lasted a minimum of 700–800 years." The latter period had appeared formerly to have been "relatively short-lived".<sup>17</sup> Two key words emerge here: "recalibration" and "appear". Most scientists in the physical fields think of "calibration" as something hard, that is, units of measurement

<sup>16</sup> F.G. McCormac and M.G.L. Baillie, "Radiocarbon to Calendar Date Conversion: Calendrical Band Widths as a Function of Radiocarbon Precision," *Radiocarbon* 35 (1993) 311–16.

<sup>17</sup> Elizabeth Carter, "At the Dawn of Tyranny," review of M.S. Rothman, ed., *Uruk, Mesopotamia and Its Neighbors* (Santa Fe: School of American Research, 2001), in *Science*, vol. 296, no. 5574, 7 June, 2002, 1809–10, with reference to the article of H.T. Wright and E.S.A. Rupley, "Calibrated Radiocarbon Age Determinations of Uruk-Related Assemblages," in Rothman, *Uruk*, 85–122.

which can be traced back to the National Bureau of Standards or its equivalent having accuracies in terms of a fraction of—say angstroms for linear units and equally miniscule units for other measures of weight, volume, etc. In these cases calibration is a ‘real’ process involving a real statistical concept of accuracy.

In sciences like the historical field, calibration takes on another meaning having to do with placing an event in context or attempting to create a chronology that makes sense given all the facts. Radiocarbon dating fits into the second class not the first and, as such, typifies the difference of what can be meant by words like “accuracy” and/or “precision”.<sup>18</sup> “Precision” is a statistical concept that allows one to make inferences between two measurements, one say 5.987 units and another—say 6.012 units. Given the “precision” of his work in such a context, an analyst may be able to accept or reject a hypothesis with some specified degree of probability and confidence.

On the other hand, ‘accuracy’ is the statistical concept that enables an analyst to tell the difference between, say 1 unit and 10 units. Carbon 14 testing falls within the latter category. If the analyst is not careful, each successive wave of recalibration can stand history on its head, as for instance in the above example from *Science*. Carbon 14 testing can certainly tell one from which epoch or era a given fragment of carbon-rich scrap may have come, but not much more. Claims like the ones that are sometimes heard in the field of Dead Sea Scrolls studies, that for instance Carbon 14 testing may have a “precision” of 30 years, such as those implied in some of the contexts mentioned above, belie the fact that it may not have an ‘accuracy’ of even 200 years!

It might be possible to achieve a “precision” of 30 years in relative dating between two samples, such as Eisenman and Davies originally called for in their original request to the Israel Antiquities Authority in 1989 starting the whole sequence of events, but not “absolute dating” which many Qumran researchers are misled into thinking has been achieved. The latter rather is affected by the prevailing “systematic errors’ such as those noted above or over-zealous attempts at interpreting the raw data in the interests of a given typological theory or preconception. Where errors emanating out of inaccurate calibration are concerned, these can be as large as +/- 100 years or two Standard Deviations as already noted, a time-frame larger than many of the

<sup>18</sup> Cf. Doudna, “Dating the Scrolls on the Basis of Radiocarbon Analysis,” 433–40 on the subject of “Accuracy and Precision”.

## THE ROYAL CONSCIENCE ACCORDING TO 4QSAM<sup>A</sup>

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In a recent article in *Dead Sea Discoveries*, Alexander Rofé discusses a “small variant” of Ex 2:3 attested in 4QExod<sup>b</sup>, a textual detail pertaining to the transport of the ark of Moses to the Nile River.<sup>1</sup> In light of Rofé’s analysis of Ex 2:3, I would like to suggest that there is a not dissimilar variant of 2 Sam 11:3 attested in 4QSAM<sup>a</sup>, with a number of intriguing literary possibilities. The MT reads “And David sent and inquired about the woman, and he said, ‘Is not this Bathsheba, the daughter of Eliam, the wife of Uriah the Hittite?’”, but 4QSAM<sup>a</sup> includes the phrase “. . . Uriah the Hittite armor-bearer of Joab?” (אִשְׁרָיָה הַחִיטִּי מְבַרְבֵּר יְבוֹאבֵד).<sup>2</sup> For the present article, the issue here is not the perceived “originality” of this variant (or matters of textual or compositional history), but rather some literary implications that arise when the additional designation “armor-bearer of Joab” is considered against the backdrop of the broader narrative canvas.<sup>3</sup> Most readers would agree

<sup>1</sup> A. Rofé, “Moses’ Mother and her Slave-Girl According to 4QExod<sup>b</sup>,” *DSD* 9 (2002) 38–43. Rofé is discussing the text as presented in E. Ulrich, F.M. Cross et al., *Qumran Cave 4.VII: Genesis to Numbers* (DJD 12; Oxford: Clarendon Press, 1994) 79–95. The NRSV renders Ex 2:3 as follows: “When she could hide him no longer she got a papyrus basket for him, and plastered it with bitumen and pitch; she put the child in it and placed it among the reeds on the bank of the river.” However, 4QExod<sup>b</sup> contains an additional three words at 2:3b (based on Cross’ reconstruction), where Moses’ mother issues a command to her maid: “She said to her maid, ‘Go!’” (לְשִׁפְחוֹתָ לֵבִי).

<sup>2</sup> E. Ulrich, *The Qumran Text of Samuel and Josephus* (Missoula, MT: Scholars Press, 1978) 173. Josephus (*Ant.* 7.131) also includes this detail. Cf. P.K. McCarter, *II Samuel: A New Translation with Introduction, Notes, and Commentary* (AB 9; Garden City, New York: Doubleday, 1984) 279. A.A. Anderson (*2 Samuel* [WBC 11; Dallas: Word, 1989] 151) also notes the 4QSAM<sup>a</sup> variant, opining that it is an “explanatory gloss.” NAB renders 2 Sam 11:3 as “David had inquiries made about the woman and was told, ‘She is Bathsheba, daughter of Eliam, and wife of (Joab’s armor-bearer) Uriah the Hittite.’”

<sup>3</sup> Note that Uriah does refer to the general as “my lord Joab” in the king’s presence (11:11). Hence, the 4QSAM<sup>a</sup> variant could quite conceivably be classed as a “scribal performance” (cf. R.F. Person, “The Ancient Israelite Scribe as Performer,” *JBL* 117