The reconstruction proposed here is based on mathematic calculations. Methodologically, the aim of these calculations is to estimate the location of the fragments in the original scroll, using the extant material signs in 4Q415 and in 4Q414. As opposed to exact sciences, the results of the calculations do not aim to reflect accurate numbers, but to give an estimation which is accompanied by an evaluation of margin of error. Despite the potential margin of error, the fact that the proposal intersects with additional items of data narrows down this margin, and strengthens the basic reconstruction. However, parts of the reconstruction stand by their own, and do not depend on the calculations. This is mainly the case in the order of the fragments in the reconstructed scroll.

The digital presentation of fragments’ borders was initially produced by Davis at the reconstruction of *Apocryphon of Jeremaia* (4Q385). The SQE team adopted this method and elaborated it. This method is a digitization of Steudel’s suggestion to prepare photocopies of all the fragments of a manuscript in order to find corresponding traces of decay.

The images of fragments 2 and 11 were enhanced using an image manipulation program. **Fragment 2** comprises a join of a little triangular fragment on the bottom left-hand side of column 2ii (documented separately in PAM 41.860 and PAM 42.456, and joined in PAM 43.549). We rotated the triangular fragment 2° counterclockwise in order to improve its location and to align lines 7-9. In Addition, a little piece of the fragment in the end of line 7 is absent in the new IAA image. Using GIMP, we cut out the image of the missing piece from PAM 43.459 and pasted it into the IAA image. The IAA image of **fragment 11** shows that parts from its right-hand side were detached and pasted back with Japanese paper. As a result, the lines are not straight. We used GIMP again in order to align the lines: we rotated the little top-right piece 3°counterclockwise and moved the bottom-right piece 2 mm to the right.

Due to the resemblance of the script of 4Q418a to the script of 4Q415, both in form and in size, the amount of text in given area in the scroll is similar in 4Q418a and in 4Q415. Thus, we can cast the amount of hypothetical text between fragments 11 and 6 in the layout if 4Q415.

Text written in the script of 4Q415 and in the script of 4Q418a

Assuming that 4Q415 contained 28 lines, the width of the blank column between fragments 11 and 6 in the layout of the scroll is 8.2cm (tab. 1, 28 lines). The margin of error for the column width ranges from –1.6 cm to +2.9 cm, according to the possible range of the column width discussed above.

Figure 20 present the composite text, while the text of 4Q418a 15 13 is written in green, and the text of 4Q418 167a 167b is written in blue.

If this is correct, the vertical damage at the right edge of fragment 11 may be due to the seam between the columns. The distance between the damage and the hypothetical seam ranges between 9.9 cm and 10.3 cm. As I will demonstrate at §8.1 sec. 6, this distance is more or less the circumference of the scroll at this point.

These distances are measured by location of the fragments in a digital canvas that simulates the open scroll. In the next stage, we will explore the meaning of this data to the reconstruction of the rolled scroll.

Since the poor preservation of the scroll, we cannot tell the direction in which the scroll was rolled. However, the great majority of the scrolls that were found still rolled had been rolled with the end of the scroll at their inner side.[[1]](#footnote-1) Therefore, I have assumed that it was rolled in the correct direction, i.e. with the beginning of the text on the outside.

The leather of 4Q415 is characterized by SH as medium-thin (SH, “A. Instruction,” 41). Although the value of d is greater than the upper value given by Stegemann, this growth was already attested in several layers of 11QPsa. Since the leather is not thick, we can conclude that the scroll was not rolled tightly.

Measuring the distance between the beginning of the column IV, i.e. 1.1 cm after the end of column III, and the end of the lines in fragments 1i and 2ii, gives column width of 8.3 cm.

This paper proposed a reconstruction of seven consecutive layers in 4Q415 applying Stegemann method. The reconstruction was repeatedly examined and shown a correspondence of all the relevant material data. Nonetheless, as in further material reconstructions, there may be a margin of error.

Since the reconstruction is limited to seven columns, there is no advantage in detailed calculations of the margin of error for the placement of each fragment. These calculations are only required while reconstructing a long scroll. In these cases, error in the position of the first fragment causes a cumulative error in the position of all the fragments through the scroll.

For the sake of the estimation of the margin of error of the reconstruction suggested hereby, it is helpful to isolate the two basic claims of the reconstruction and separately evaluate their certainty.

*Wad of Fragments 1, 2, 6, 7, 9, 10, 11*

The reoccurring patterns of damage in the fragments 1, 2, 6, 7, 9, 10 and 11 constitute significant milestones for the material reconstruction of scroll, and for finding the relative position of the fragments within the scroll. Since the fragments of 4Q415 were found scattered, the recurring patterns of damage were identified throughout the physical shape of the fragments, i.e. similarities in the borders of the fragments. The level of certainty in this case is less good than in cases which the fragments were preserved in wad. Nonetheless, the fragments discussed hereby constitute three groups of corresponding points of damage, while their position in the scroll demonstrates incremental growth which fits the all the three groups of the corresponding points. This fact strengthens the claim that the fragments were wadded and were damaged while the scroll was rolled.

*The Order of the Fragments*

The order of the fragments is a key factor in the reconstruction procedure. This order drawn from indicators such as seam preservation, intercolumnar margins, ruling and spaces between lines. It does not depend on calculations or measurements, and therefore its level of certainty is good.

The material reconstruction comprises several factors that are compatible with each other: the position of the fragments according to Stegemann method, external material signs in the fragments, the information drawn from the verso (4Q414) and the assumption regarding the number of lines in the scroll. The matching of the distance between the fragments and the column division based on the verso, as well as the matching of the further abundant material evidence, strengthens the reconstruction and constitute an important criterion for assessing its plausibility.

 Moreover, the reconstruction of 4Q415 is based on the reconstruction of 4Q418a (§4.1). However, the reconstruction of 4Q415 also affect 4Q418a, while it partially fills the missing text between the fragments of 4Q418a. Successfully applying data from 4Q418a to 4Q415 and vice versa increases the chance that these reconstructions reflect the actual circumstances of these copies.

In addition, the reconstruction of 4Q415 also fits with the current information drawn from 4Q418, a further copy of *Instruction*. This information includes material signs in the fragments comprise textual overlaps with 4Q415, and the initial material reconstruction of 4Q418.

All these considerations indicate that the skeleton of the reconstruction of 4Q415 is stable and had been established on abundant evidence. The possible margin of error may slightly change the values of the calculations or the position of the fragments, but will not significantly affect the order of the fragments and the arrangement of the main text of the scroll.

1. Tov, *Scribal Practices*, 40. [↑](#footnote-ref-1)