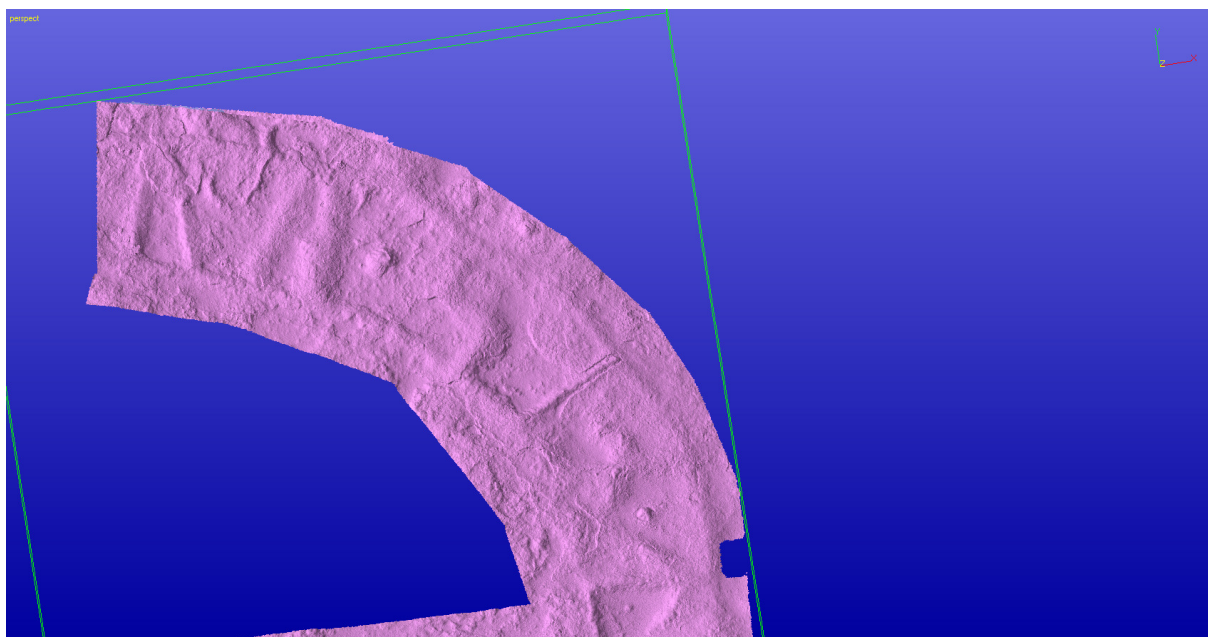


## Supplementary Material: Sampling for Groove Analysis

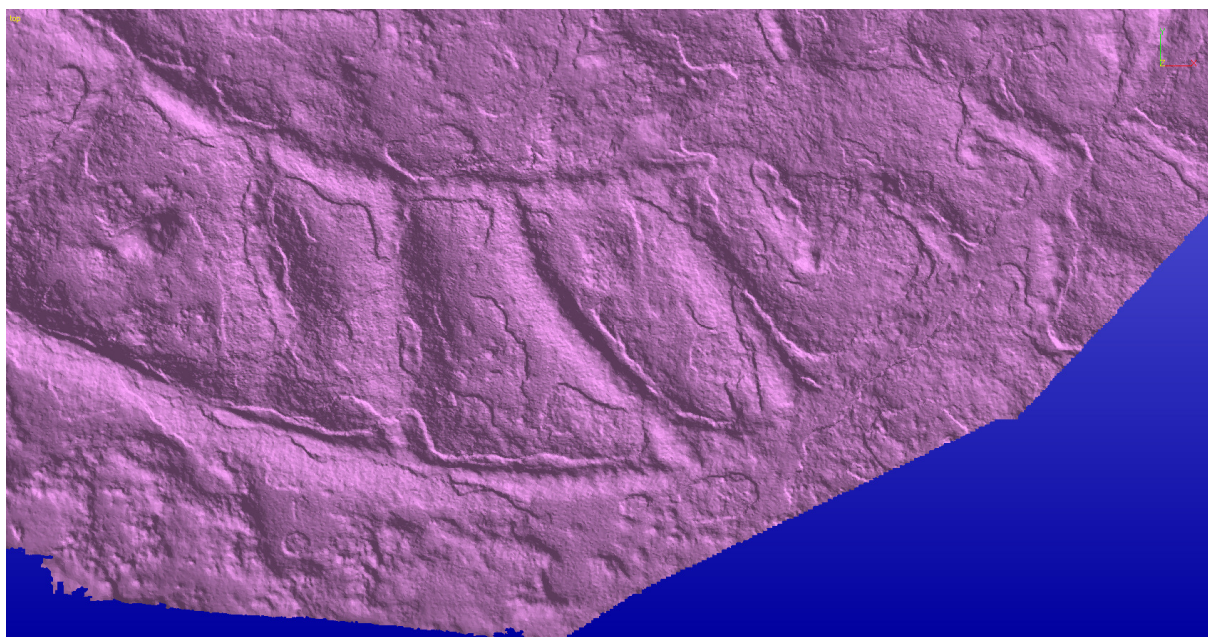
### SAMPLING

#### Principles

In sampling, well preserved areas of the stone surfaces were chosen. Areas heavily affected by trampling or weathering were avoided as illustrated in the 3D models (Figures 1–2 here). The samples are marked on the photographs (Figures 3–14 here).



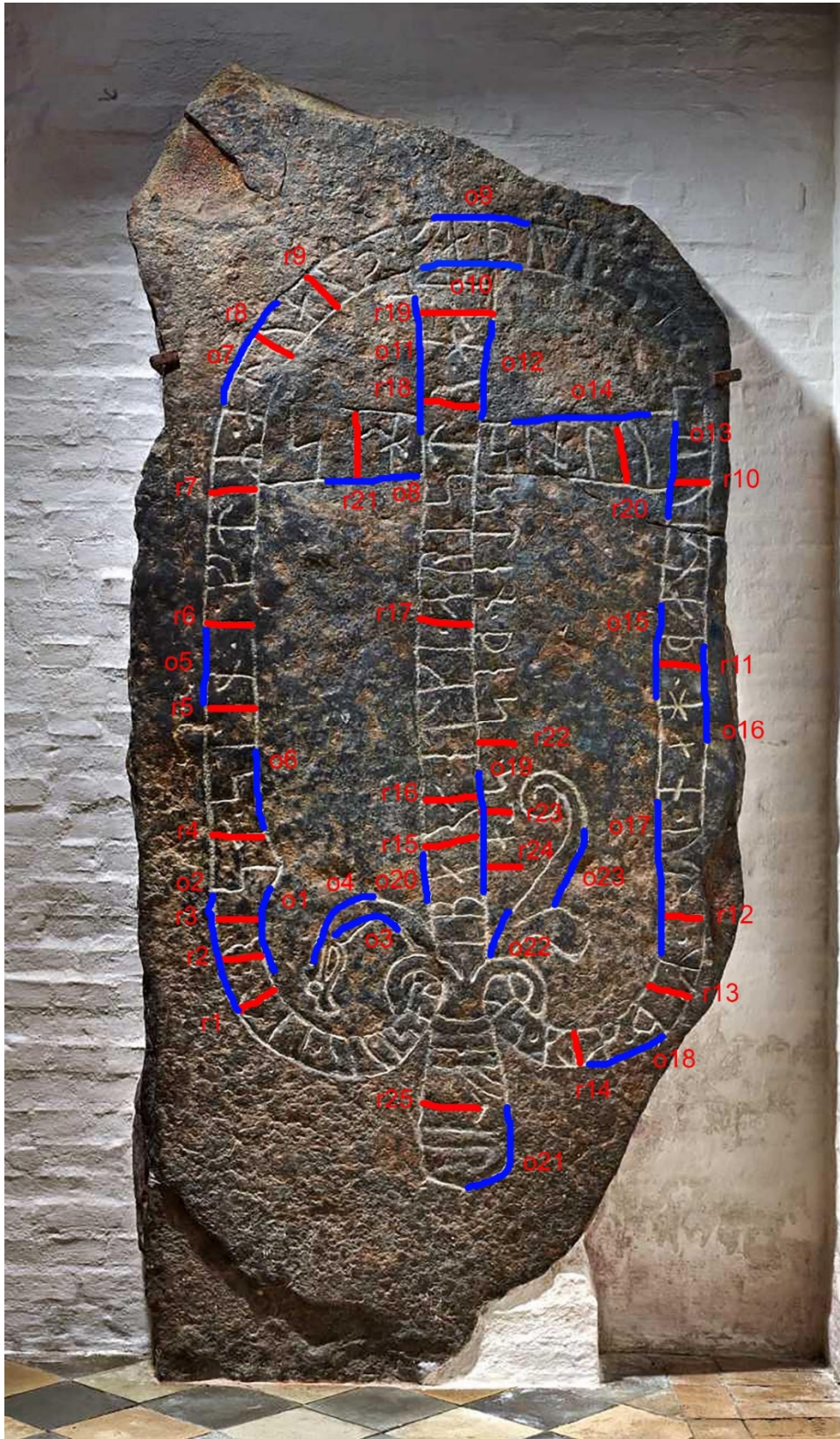
*Figure 1. Example of an area that has been avoided in the sampling (DR 379 Nylars 1).*



*Figure 2. Example of an area that has been avoided in the sampling (DR 379 Nylars 1).*

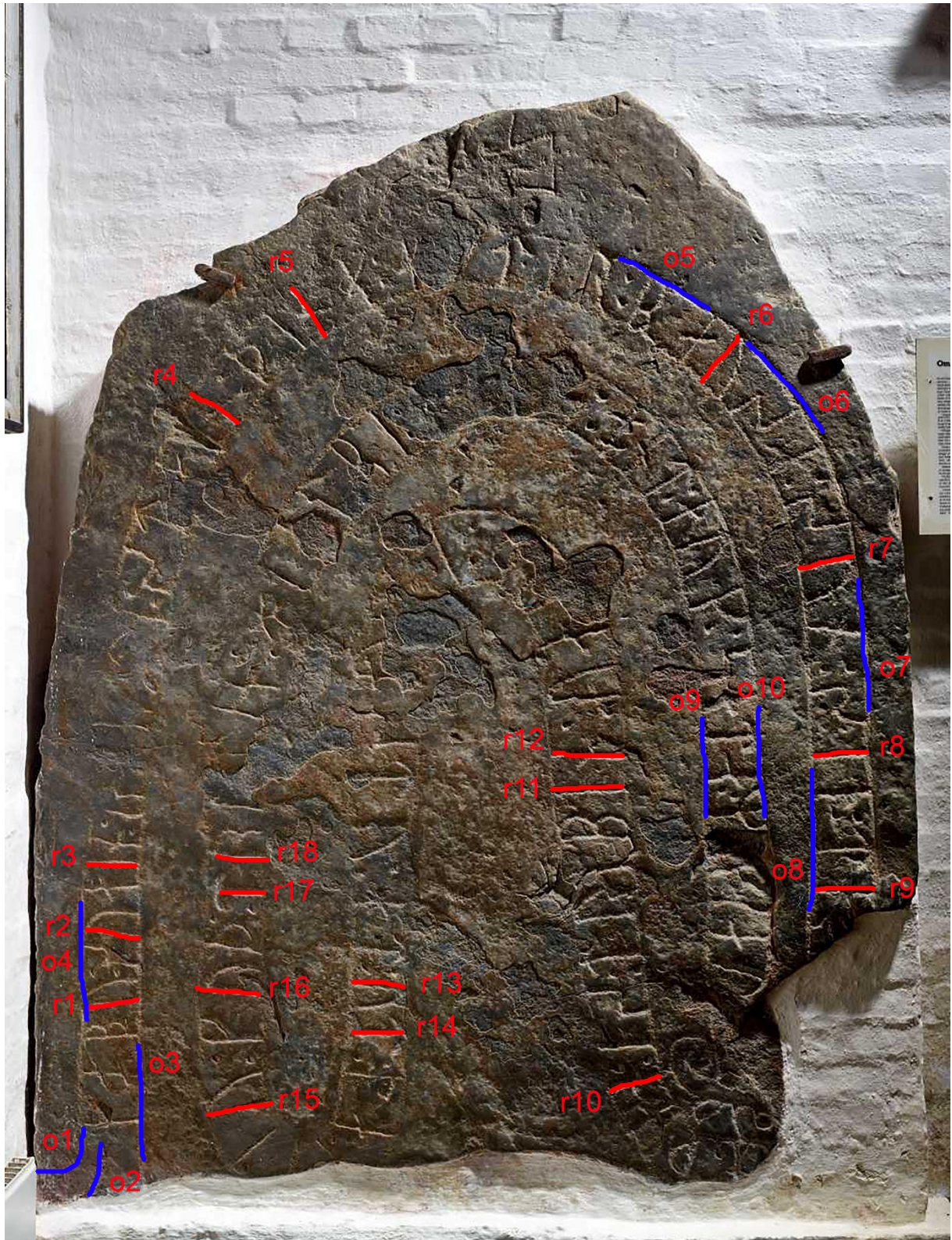


### Samples of the Bornholm stones



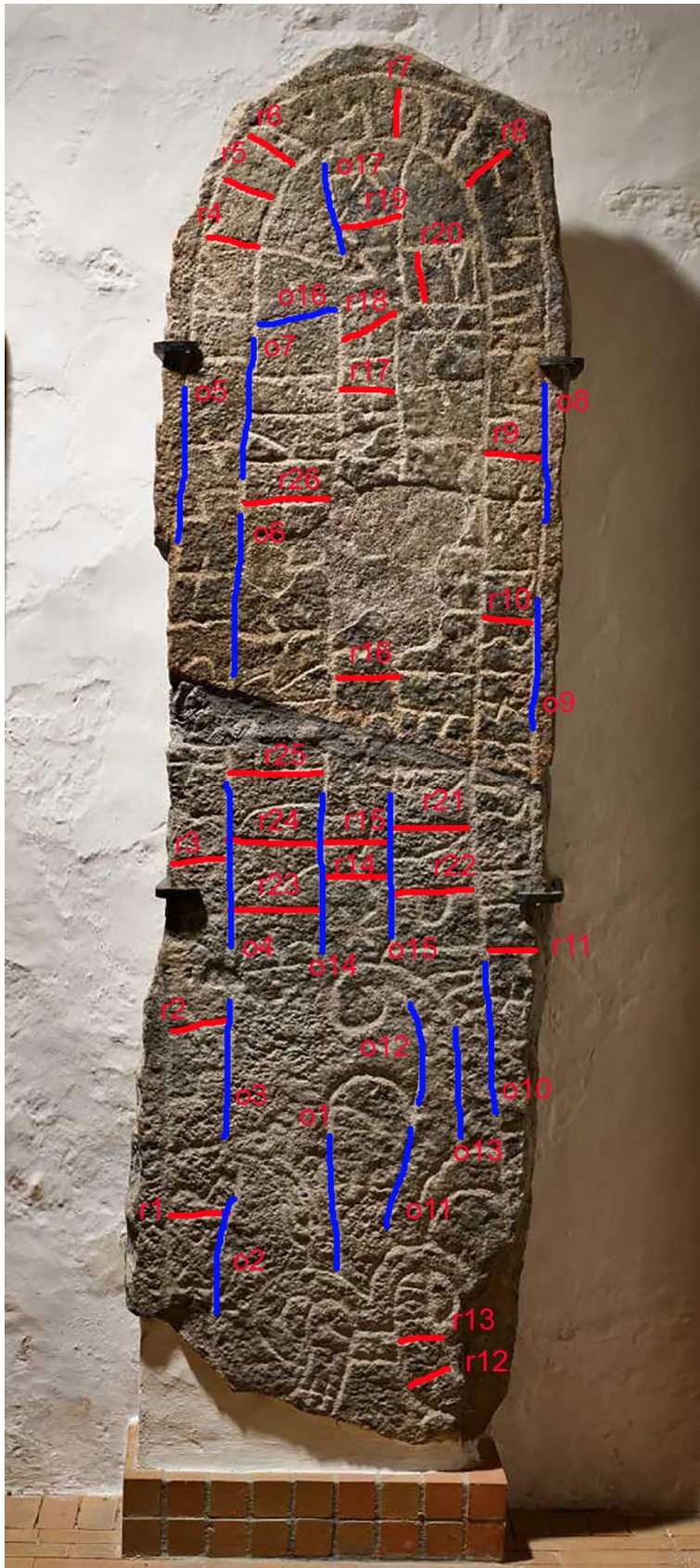
**Figure 3.** DR 379 Nylars 1. CC-BY-SA, Roberto Fortuna, Nationalmuseet, Copenhagen. Modified by L. Kitzler Åhfeldt.





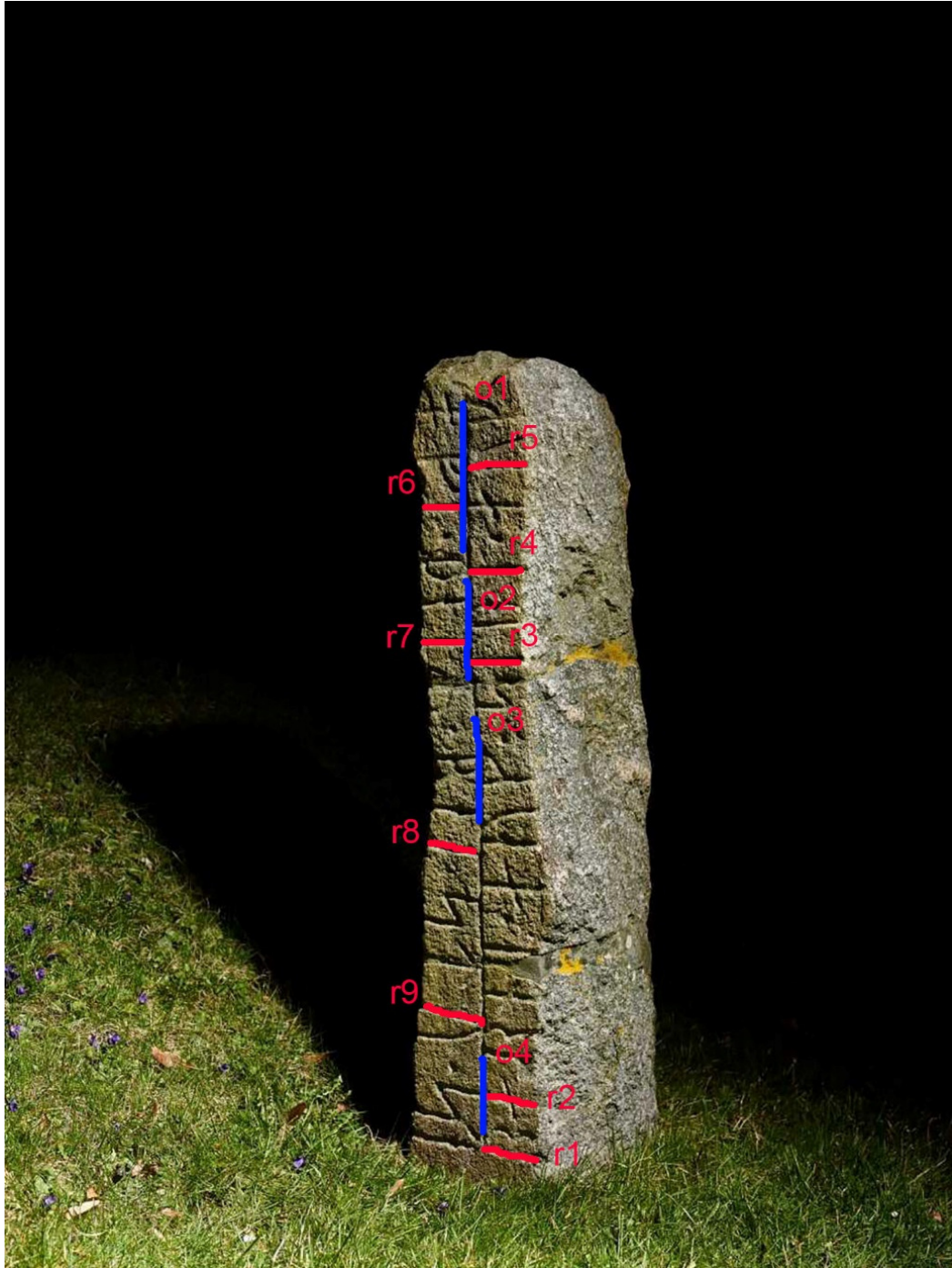
**Figure 4.** DR 380 Nylars 2. CC-BY-SA, Roberto Fortuna, Nationalmuseet, Copenhagen.  
Modified by L. Kitzler Åhfeldt.





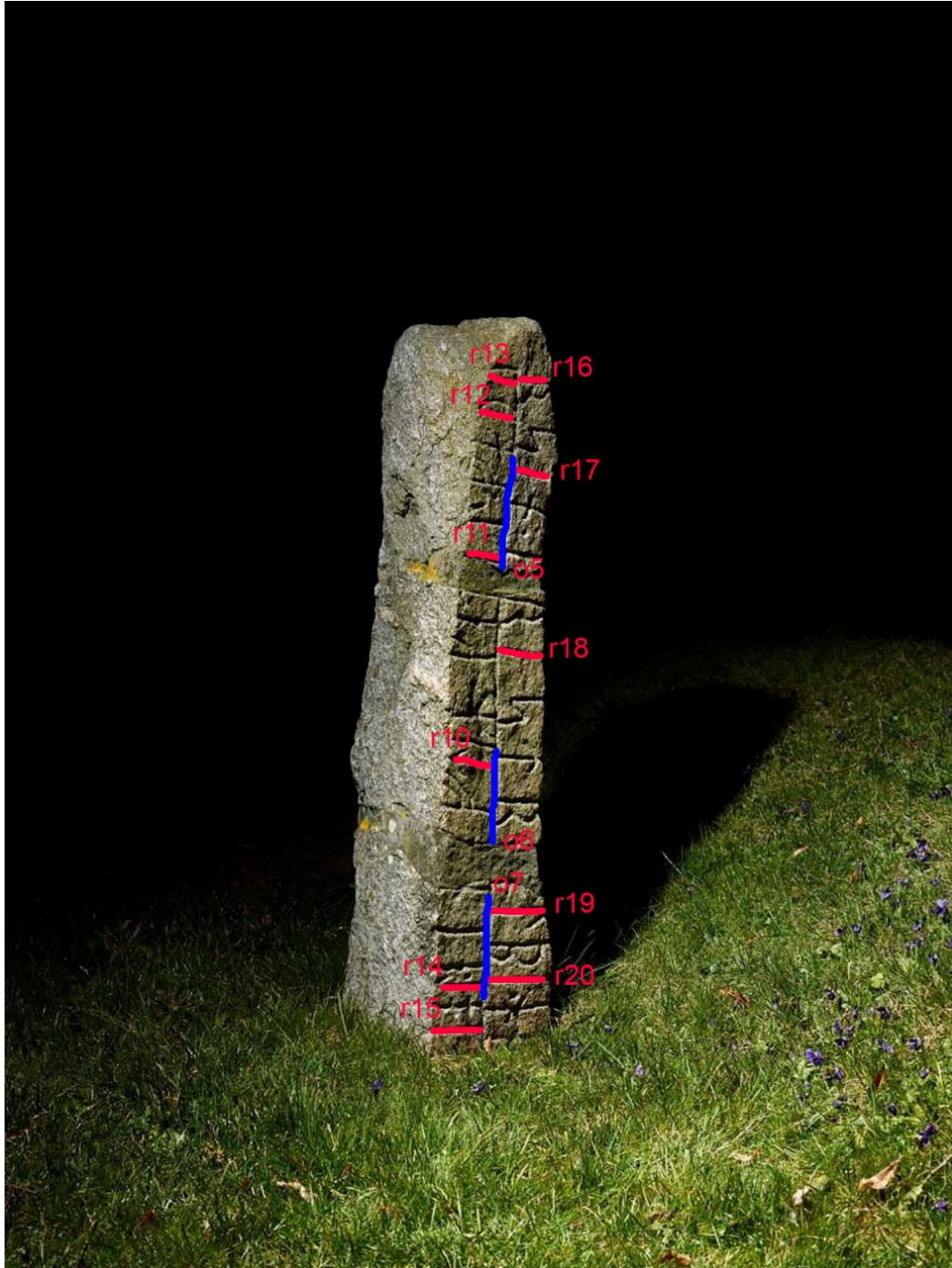
**Figure 5.** DR 389 Nyker. CC-BY-SA, Roberto Fortuna, Nationalmuseet, Copenhagen. Modified by L. Kitzler Åhfeldt.





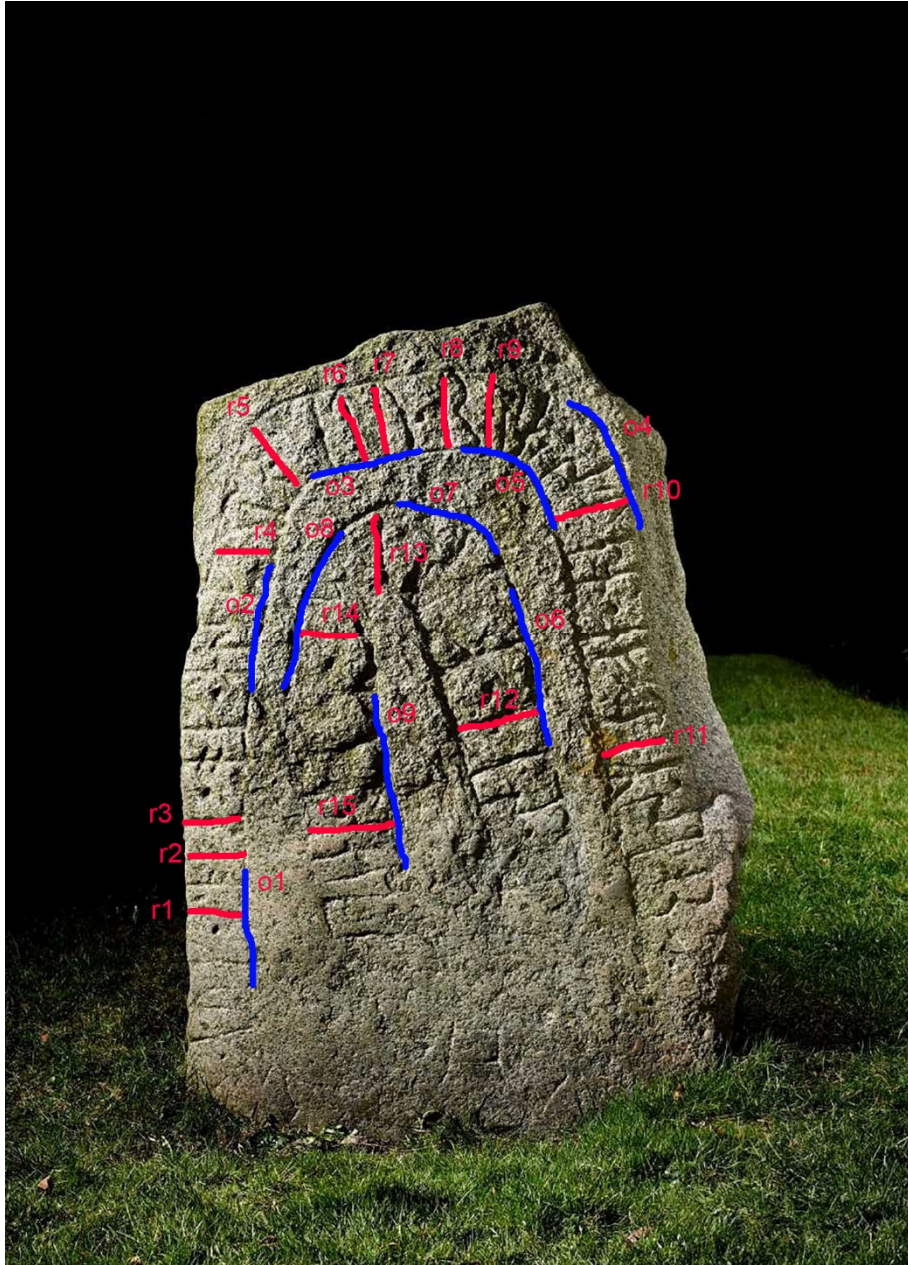
**Figure 6.** DR 391 Østermarie 2, side A. CC-BY-SA, Roberto Fortuna, Nationalmuseet, Copenhagen. Modified by L. Kitzler Åhfeldt.





**Figure 7.** DR 391 Østermarie 2, side B. CC-BY-SA, Roberto Fortuna, Nationalmuseet, Copenhagen. Modified by L. Kitzler Åhfeldt.





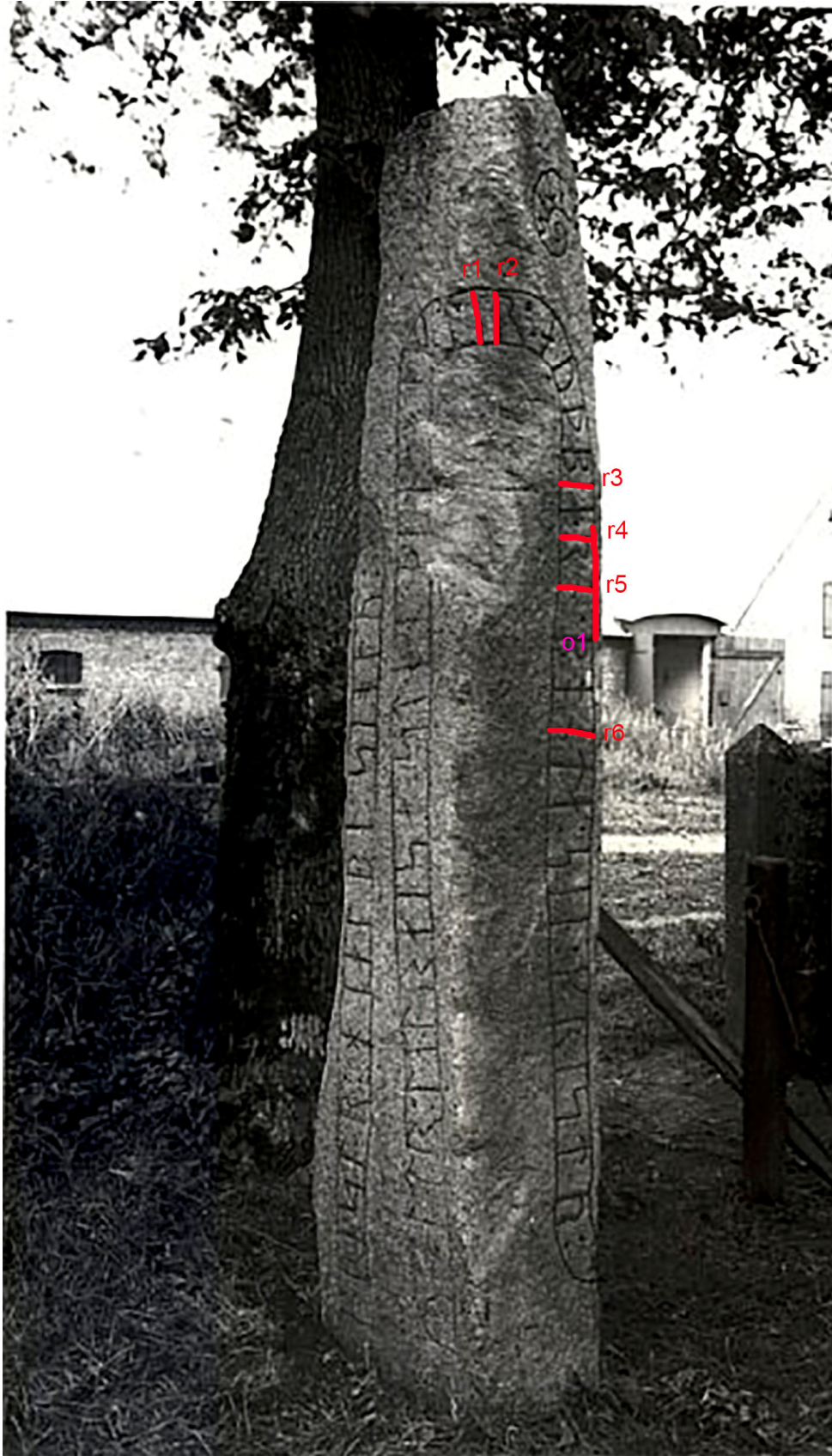
**Figure 8.** DR 392 Østermarie 3, side A. CC-BY-SA, Roberto Fortuna, Nationalmuseet, Copenhagen. Modified by L. Kitzler Åhfeldt.





**Figure 9.** DR 392 Østermarie 3, side B. CC-BY-SA, Roberto Fortuna, Nationalmuseet, Copenhagen. Modified by L. Kitzler Åhfeldt.





**Figure 10.** DR 399 Klemensker 1. CC-BY-SA, Erik Moltke, Nationalmuseet, Copenhagen. Modified by L. Kitzler Åhfeldt.



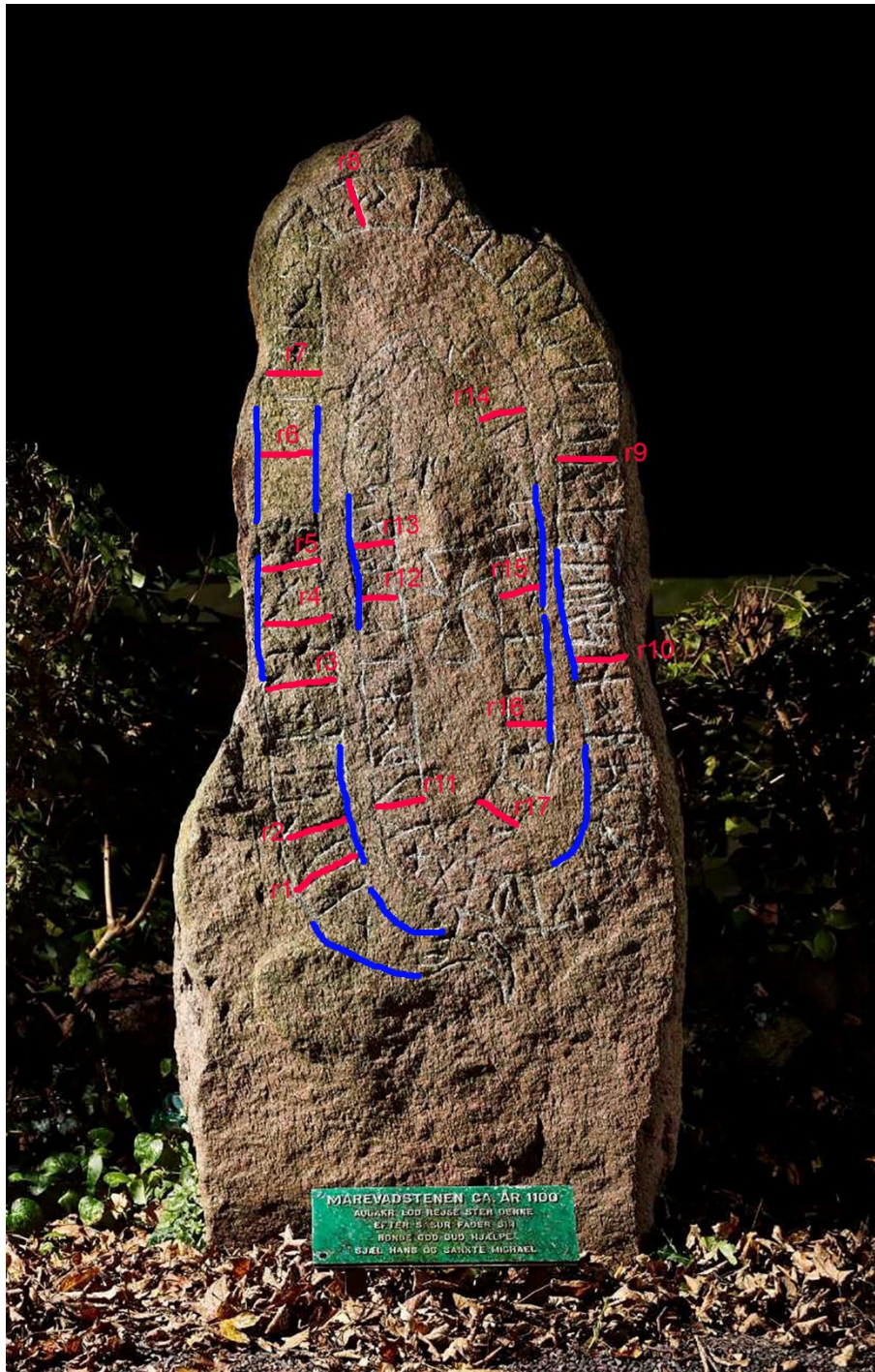
**Figure 11.** DR 399 Klemensker I. CC-BY-SA, Erik Moltke, Nationalmuseet, Copenhagen. Modified by L. Kitzler Åhfeldt.





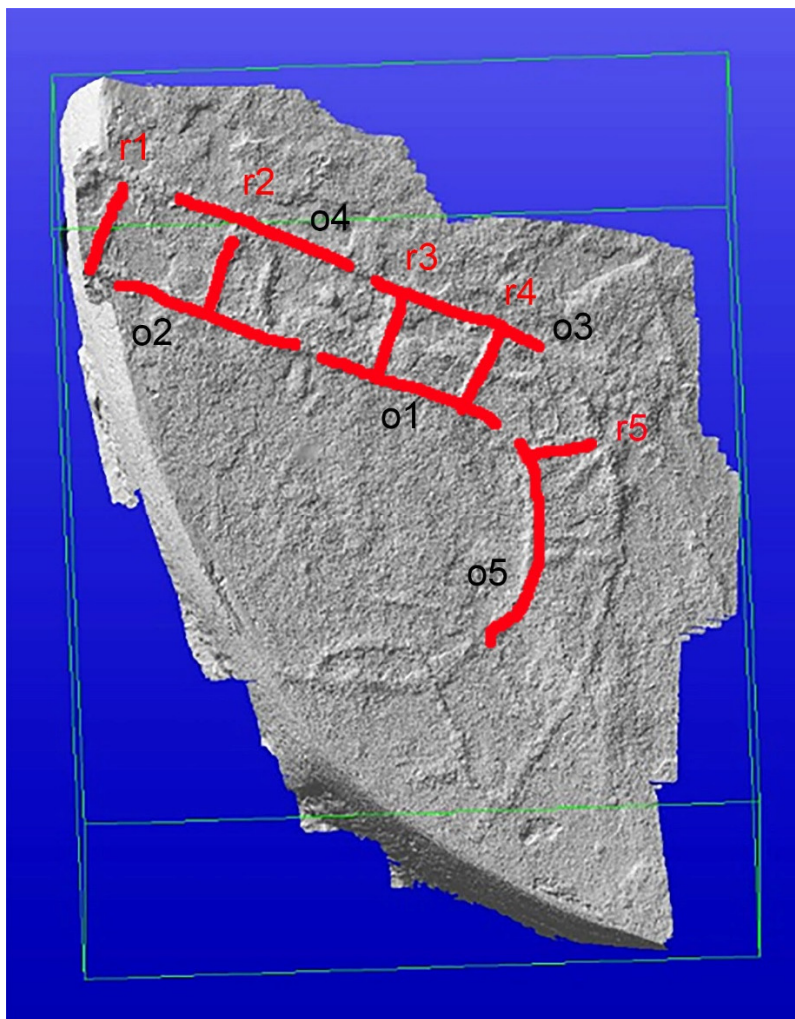
**Figure 12.** DR 399 Klemensker 1. CC-BY-SA, Erik Moltke, Nationalmuseet, Copenhagen.  
Modified by L. Kitzler Åhfeldt.





*Figure 13. DR 402 Klemensker 4 (now in Hasle). CC-BY-SA, Roberto Fortuna, Nationalmuseet, Copenhagen. Modified by L. Kitzler Åhfeldt.*





**Figure 14.** *New find, 2017 St Knud (Knudsker). 3D-scanning by s3Di. Image by L. Kitzler Åhfeldt.*

## COMMENTS ON THE ANALYSIS

### Preparation

The 3D models were converted to STL format. Noise was reduced by using the function Thin, with tolerance 0.03mm, in GOM Inspect V8. The models were opened in Deskartes Design Expert and data for groove analysis were sampled by using the specialized function Groove Measure, created in 2004 by Ismo Mäkelä at Deskartes according to instructions by Laila Kitzler Åhfeldt.

The original data included 2878 samples from 245 stones. As a preliminary step, outliers were identified in bivariate matrix plots (runes and ornament separately) and excluded. After this procedure, the dataset included 2855 samples from 245 stones (see Table 4 here). The outliers may be due to measuring errors or deviating special cases, but on closer examination it may prove that these outliers may be the archaeologically most interesting cases (Everitt et. al. 2011: 29; Baxter 2016: 5–6).

### **Discriminant Analysis (DIS)**

From the classification matrix further details emerge. The column ‘Percent correct’ in the classification matrix (Table 3) shows how large proportion of the stones from each province that are correctly classified by the DIS. The numbers in the rows show how the stones from one region can be distributed on different other provinces. For example, in Table 3a, the 11 stones from Gotland are distributed on Gotland (8) and Södermanland (3). In the column for Gotland in Table 3a, we find that the Gotland group (as defined by DIS) has been allocated 16 stones although only eight are actually of Gotlandic origin. The most closely matching group is the Öland group: all stones in this group indeed come from this island (but three of the Öland stones are classified as Gotlandic). The Östergötland and Västergötland groups mostly consist of stones from the relevant region: The Östergötland group contains 6 stones from Östergötland and 1 from Västergötland (86 per cent), the Västergötland group contains 8 from Västergötland and 1 from Södermanland (89 per cent), which is good under the circumstances. The Södermanland and Uppland groups, on the other hand, are mixed to a high degree.

### **THE REFERENCE MATERIAL**

#### **Representativity**

The map shows that the runestones are not evenly distributed over the provinces in the analysis (Figure 1 of the main article), the reason being that data have been collected for various other research questions. Öland is represented by one site only, the church in Köpingsvik. On the other hand, this is a large collection of runestone fragments from many different runestones, probably carved by at least 7–8 carvers (Kitzler Åhfeldt 2009: 93). Gotland is represented by runestones and open cist monuments of sedimentary rock types only, as none made of metamorphic rock exists on this island with the exception of the tenth-century Pilgard stone. Västergötland and Östergötland are represented by smaller, more concentrated areas than Södermanland and Uppland, which probably explains why these are easier to define and thus have a higher hit ratio in the analysis.

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- This study uses material collected in earlier studies, referred to in Table 4 here. These are:
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- G + number = Entry number of runic inscription in: Jansson, S. B. F. & Wessén, E. (eds.) (1962). *SRI 11, Gotlands runinskrifter, D. 1*. Stockholm: Almqvist & Wiksell international; Jansson, S. B. F., Wessén, E. & Svärdström, E. (eds.) (1978). *SRI 12, Gotlands runinskrifter, D. 2*. Stockholm: Almqvist & Wiksell international; *Gotlands runinskrifter 3* [online, Riksantikvarieämbetet] [accessed 30 May 2018]. Available at: <<https://www.raa.se/kulturarv/runor-och-runstenar/digitala-sveriges-runinskrifter/gotlands-runinskrifter-3/>>.
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- Öl + number = Entry number of runic inscription in Söderberg, S. & Brate, E. (eds.) (1900-1906). SRI 1, *Ölands runinskrifter*. Stockholm: Almqvist & Wiksell international
- Öl Köping + number = Entry number of runic inscription or runestone fragment in Owe, J. 2002. *Runfynden vid Köpings kyrka*. Bro: [Jan Owe]



**Table 3. Result of Discriminant Analysis: Classification Matrix of provinces.**

Classification Matrix

Rows: Observed classifications

Columns: Predicted classifications

Exclude condition: Province="Bornholm"

| Province      | Percent Correct | Gotland<br>p=0,16667 | Östergötland<br>p=0,16667 | Södermanland<br>p=0,16667 | Uppland<br>p=0,16667 | Västergötland<br>p=0,16667 | Öland<br>p=0,16667 | Number of stones |
|---------------|-----------------|----------------------|---------------------------|---------------------------|----------------------|----------------------------|--------------------|------------------|
| Gotland       | 73              | 8                    | –                         | 3                         | –                    | –                          | –                  | 11               |
| Östergötland  | 86              | –                    | 6                         | –                         | 1                    | –                          | –                  | 7                |
| Södermanland  | 55              | –                    | –                         | 6                         | 4                    | 1                          | –                  | 11               |
| Uppland       | 53              | 5                    | –                         | 2                         | 8                    | –                          | –                  | 15               |
| Västergötland | 80              | –                    | 1                         | 1                         | –                    | 8                          | –                  | 10               |
| Öland         | 83              | 3                    | –                         | –                         | –                    | –                          | 15                 | 18               |
| <i>Total</i>  | <i>71</i>       | <i>16</i>            | <i>7</i>                  | <i>12</i>                 | <i>13</i>            | <i>9</i>                   | <i>15</i>          | <i>72</i>        |

| Province      | Percent Correct | Gotland<br>p=0,16667 | Östergötland<br>p=0,16667 | Södermanland<br>p=0,16667 | Uppland<br>p=0,16667 | Västergötland<br>p=0,16667 | Öland<br>p=0,16667 | Number of stones |
|---------------|-----------------|----------------------|---------------------------|---------------------------|----------------------|----------------------------|--------------------|------------------|
| Gotland       | 67              | 8                    | –                         | 2                         | 1                    | –                          | 1                  | 12               |
| Östergötland  | 86              | –                    | 6                         | –                         | –                    | 1                          | –                  | 7                |
| Södermanland  | 75              | 1                    | –                         | 9                         | 2                    | –                          | –                  | 12               |
| Uppland       | 47              | 3                    | –                         | 3                         | 8                    | 1                          | 2                  | 17               |
| Västergötland | 71              | –                    | 3                         | 6                         | 1                    | 29                         | 2                  | 41               |
| Öland         | 65              | 2                    | –                         | –                         | 3                    | 3                          | 15                 | 23               |
| <i>Total</i>  | <i>67</i>       | <i>14</i>            | <i>9</i>                  | <i>20</i>                 | <i>15</i>            | <i>34</i>                  | <i>20</i>          | <i>112</i>       |

| Province      | Percent Correct | Östergötland<br>p=0,25000 | Södermanland<br>p=0,25000 | Uppland<br>p=0,25000 | Västergötland<br>p=0,25000 | Number of stones |
|---------------|-----------------|---------------------------|---------------------------|----------------------|----------------------------|------------------|
| Östergötland  | 50              | 3                         | 1                         | 1                    | 1                          | 6                |
| Södermanland  | 29              | 8                         | 12                        | 8                    | 13                         | 41               |
| Uppland       | 69              | 6                         | 6                         | 31                   | 2                          | 45               |
| Västergötland | 56              | 1                         | 1                         | 2                    | 5                          | 9                |
| <i>Total</i>  | <i>50</i>       | <i>18</i>                 | <i>20</i>                 | <i>42</i>            | <i>21</i>                  | <i>101</i>       |

| Province      | Percent Correct | Östergötland<br>p=0,25000 | Södermanland<br>p=0,25000 | Uppland<br>p=0,25000 | Västergötland<br>p=0,25000 | Number of stones |
|---------------|-----------------|---------------------------|---------------------------|----------------------|----------------------------|------------------|
| Östergötland  | 50              | 3                         | –                         | 2                    | 1                          | 6                |
| Södermanland  | 39              | 5                         | 15                        | 7                    | 11                         | 38               |
| Uppland       | 60              | 7                         | 8                         | 25                   | 2                          | 42               |
| Västergötland | 50              | 1                         | 2                         | 1                    | 4                          | 8                |
| <i>Total</i>  | <i>50</i>       | <i>16</i>                 | <i>25</i>                 | <i>35</i>            | <i>18</i>                  | <i>94</i>        |

**Table 4.** *Runestones included in each subset for analysis.*

Code = sigla of runic inscriptions in *Samnordisk runtextdatabas* (SRD), with the following exceptions:

DR New find 2017, Knudsker, is not yet included in SRD.

Vg L + number = Catalogue number in *Gravmonument i sten från sen vikingatid och äldre medeltid* (Lundberg 1997), not included in SRD.

| Rock type   | Region   | Code             | Samples<br>runes | Samples<br>ornament | 3D scan                       | Reference                     |                               |
|-------------|----------|------------------|------------------|---------------------|-------------------------------|-------------------------------|-------------------------------|
| Sedimentary | Bornholm | DR 379, Nylars 1 | 25               | 23                  | Artec 2017                    | This article                  |                               |
|             |          | DR 380, Nylars 2 | 21               | 10                  | Artec 2017                    | This article                  |                               |
|             |          | DR 389, Nyker    | 26               | 17                  | Artec 2017                    | This article                  |                               |
|             | Gotland  | G 59             | 7                | 7                   | ATOS I<br>2012                | Kitzler Åhfeldt 2019          |                               |
|             |          | G 94             | 7                | 4                   | ATOS II<br>2007               | Kitzler Åhfeldt 2019          |                               |
|             |          | G 111            | 12               | 6                   | ATOS II<br>2007               | Kitzler Åhfeldt 2019          |                               |
|             |          | G 112            |                  | 5                   | ATOS II<br>2007               | Kitzler Åhfeldt 2019          |                               |
|             |          | G 114            | 23               | 2                   | ATOS II<br>2007               | Kitzler Åhfeldt 2019          |                               |
|             |          | G 134            | 20               | 15                  | ATOS II<br>2007               | Kitzler Åhfeldt 2019          |                               |
|             |          | G 135            | 26               | 14                  | ATOS II<br>2007               | Kitzler Åhfeldt 2019          |                               |
|             |          | G 181            | 8                | 5                   | ATOS II<br>2007               | Kitzler Åhfeldt 2019          |                               |
|             |          | G 200            | 18               | 17                  | ATOS II<br>2007               | Kitzler Åhfeldt 2019          |                               |
|             |          | G 203            | 43               | 12                  | ATOS II<br>2007               | Kitzler Åhfeldt 2019          |                               |
|             |          | G 370            | 17               | 9                   | ATOS I<br>2012                | Kitzler Åhfeldt 2019          |                               |
|             |          | G 373            | 13               | 6                   | ATOS I<br>2012                | Kitzler Åhfeldt 2019          |                               |
|             |          | Södermanland     | Sö 128           | 4                   | 5                             | ATOS I<br>2011                | Kitzler Åhfeldt 2015,<br>2017 |
|             |          |                  | Sö 134           | 12                  | 8                             | ATOS I<br>2011                | Kitzler Åhfeldt 2015,<br>2017 |
|             | Sö 160   |                  | 20               | 7                   | ATOS I<br>2011                | Kitzler Åhfeldt 2015,<br>2017 |                               |
|             | Sö 161   |                  | 11               | 6                   | ATOS I<br>2011                | Kitzler Åhfeldt 2015,<br>2017 |                               |
|             | Sö 162   |                  | 11               | 4                   | ATOS I<br>2011                | Kitzler Åhfeldt 2015,<br>2017 |                               |
|             | Sö 163   |                  | 8                | 10                  | ATOS I<br>2011                | Kitzler Åhfeldt 2015,<br>2017 |                               |
|             | Sö 207   |                  | 8                | 8                   | ATOS I<br>2011                | Kitzler Åhfeldt 2015,<br>2017 |                               |
|             | Sö 335   | 10               | 6                | ATOS I<br>2011      | Kitzler Åhfeldt 2015,<br>2017 |                               |                               |
|             | Sö 370   | 6                | 4                | ATOS I<br>2011      | Kitzler Åhfeldt 2015,<br>2017 |                               |                               |



|  |               |                         |    |    |                 |                               |
|--|---------------|-------------------------|----|----|-----------------|-------------------------------|
|  |               | Sö 371                  |    | 8  | ATOS I<br>2011  | Kitzler Ähfeldt 2015,<br>2017 |
|  |               | Sö Fv1948_282           | 8  | 8  | ATOS I<br>2011  | Kitzler Ähfeldt 2015,<br>2017 |
|  |               | Sö Fv1954_19            | 8  | 5  | ATOS I<br>2011  | Kitzler Ähfeldt 2015,<br>2017 |
|  | Uppland       | U 1                     | 2  | 2  | AFL 1998        | Kitzler Ähfeldt 2002          |
|  |               | U 3                     | 1  | 1  | ATOS II<br>2007 | Unpublished                   |
|  |               | U 4                     | 4  | 2  | ATOS II<br>2007 | Unpublished                   |
|  |               | U 5                     | 2  |    | ATOS II<br>2007 | Unpublished                   |
|  |               | U 6                     | 3  | 10 | ATOS II<br>2007 | Unpublished                   |
|  |               | U 9                     | 5  | 4  | ATOS II<br>2007 | Unpublished                   |
|  |               | U 10                    | 2  | 2  | ATOS II<br>2007 | Unpublished                   |
|  |               | U 23                    | 6  | 4  | AFL 1998        | Kitzler Ähfeldt 2002          |
|  |               | U 24                    | 3  | 3  | AFL 1998        | Kitzler Ähfeldt 2002          |
|  |               | U 26                    |    | 4  | AFL 1998        | Kitzler Ähfeldt 2002          |
|  |               | U 27                    |    | 6  | AFL 1998        | Kitzler Ähfeldt 2002          |
|  |               | U 28                    | 2  | 4  | AFL 1998        | Kitzler Ähfeldt 2002          |
|  |               | U 179                   | 12 | 3  | AFL 1998        | Kitzler Ähfeldt 2002          |
|  |               | U 541                   | 9  | 4  | AFL 1998        | Kitzler Ähfeldt 2002          |
|  |               | U 559                   | 8  | 4  | AFL 1998        | Kitzler Ähfeldt 2002          |
|  |               | U 560                   | 8  | 4  | AFL 1998        | Kitzler Ähfeldt 2002          |
|  |               | U 1072                  | 8  | 4  | AFL 1998        | Kitzler Ähfeldt 2002          |
|  |               | U ATA351-1904-<br>2013  |    | 4  | ATOS I          | Unpublished                   |
|  | Västergötland | Vg 22                   | 4  | 4  | ATOS I<br>2010  | Kitzler Ähfeldt 2012          |
|  |               | Vg 23                   | 6  | 4  | ATOS I<br>2010  | Kitzler Ähfeldt 2012          |
|  |               | Vg 24                   | 4  | 2  | ATOS II<br>2008 | Kitzler Ähfeldt 2012          |
|  |               | Vg 27                   | 4  | 7  | ATOS II<br>2008 | Kitzler Ähfeldt 2012          |
|  |               | Vg 41                   | 6  | 4  | ATOS II<br>2008 | Kitzler Ähfeldt 2012          |
|  |               | Vg 50                   | 14 | 8  | ATOS II<br>2008 | Kitzler Ähfeldt 2012          |
|  |               | Vg 51                   | 6  | 15 | ATOS II<br>2008 | Kitzler Ähfeldt 2012          |
|  |               | Vg 53                   |    | 2  | ATOS II<br>2008 | Kitzler Ähfeldt 2012          |
|  |               | Vg ATA322-4412-<br>2011 | 3  | 5  | ATOS II<br>2008 | Kitzler Ähfeldt 2012          |
|  |               | Vg L1                   |    | 6  | ATOS II<br>2008 | Kitzler Ähfeldt 2012          |
|  |               | Vg L2                   |    | 1  | ATOS II<br>2008 | Kitzler Ähfeldt 2012          |
|  |               | Vg L3                   |    | 5  | ATOS II<br>2008 | Kitzler Ähfeldt 2012          |
|  |               | Vg L4                   |    | 4  | ATOS II<br>2008 | Kitzler Ähfeldt 2012          |
|  |               | Vg L5                   |    | 4  | ATOS II<br>2008 | Kitzler Ähfeldt 2012          |
|  |               | Vg L6                   |    | 4  | ATOS II<br>2008 | Kitzler Ähfeldt 2012          |

|  |              |          |   |    |                 |                       |
|--|--------------|----------|---|----|-----------------|-----------------------|
|  |              | Vg L7    |   | 6  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L10   |   | 2  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L13   |   | 4  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L14   |   | 4  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L16   |   | 6  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L19   |   | 2  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L20   |   | 5  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L21   |   | 4  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L23A  |   | 7  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L23B  |   | 4  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L24   |   | 2  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L25A  |   | 5  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L25B  |   | 3  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L26   |   | 4  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L27   |   | 13 | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L28   |   | 11 | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L29   |   | 10 | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L31   |   | 1  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L32   |   | 1  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L41   | 2 |    | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L42   |   | 2  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L43   |   | 6  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L44   |   | 4  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L45   | 1 | 1  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L46   |   | 1  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L47   |   | 9  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  |              | Vg L47B  |   | 4  | ATOS II<br>2008 | Kitzler Ähfeldt 2012  |
|  | Östergötland | Ög 2     | 8 | 8  | ATOS II<br>2007 | Kitzler Ähfeldt 2008a |
|  |              | Ög 5     | 6 | 5  | ATOS II<br>2007 | Kitzler Ähfeldt 2008a |
|  |              | Ög 6     | 4 | 4  | ATOS II<br>2007 | Kitzler Ähfeldt 2008a |
|  |              | Ög 14_22 | 4 | 4  | ATOS II<br>2007 | Kitzler Ähfeldt 2008a |



|  |       |             |   |   |                 |                       |
|--|-------|-------------|---|---|-----------------|-----------------------|
|  |       | Ög 15_22    | 4 | 4 | ATOS II<br>2007 | Kitzler Ähfeldt 2008a |
|  |       | Ög 240      | 9 | 9 | ATOS II<br>2007 | Kitzler Ähfeldt 2008a |
|  |       | Ög Hov      | 5 | 6 | ATOS II<br>2007 | Kitzler Ähfeldt 2008a |
|  | Öland | ÖI Köping2  | 1 |   | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping8  | 1 |   | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping9  | 1 |   | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping10 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping11 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping12 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping16 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping17 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping18 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping19 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping20 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping22 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping24 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping25 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping29 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping31 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping32 | 1 |   | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping33 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping34 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping35 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping37 | 1 | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping39 | 2 |   | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping40 | 1 |   | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping41 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping42 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping43 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping44 |   | 1 | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |
|  |       | ÖI Köping46 | 1 |   | ATOS II<br>2006 | Kitzler Ähfeldt 2009  |

|             |              |                               |    |    |                 |                               |
|-------------|--------------|-------------------------------|----|----|-----------------|-------------------------------|
|             |              | Öl Köping47                   | 1  |    | ATOS II<br>2006 | Kitzler Åhfeldt 2009          |
|             |              | Öl Köping49                   | 1  |    | ATOS II<br>2006 | Kitzler Åhfeldt 2009          |
|             |              | Öl Köping50                   | 1  |    | ATOS II<br>2006 | Kitzler Åhfeldt 2009          |
|             |              | Öl Köping52                   | 1  |    | ATOS II<br>2006 | Kitzler Åhfeldt 2009          |
|             |              | Öl Köping53                   | 2  |    | ATOS II<br>2006 | Kitzler Åhfeldt 2009          |
|             |              | Öl Köping55                   | 1  |    | ATOS II<br>2006 | Kitzler Åhfeldt 2009          |
|             |              | Öl Köping56                   | 1  |    | ATOS II<br>2006 | Kitzler Åhfeldt 2009          |
|             |              | Öl Köping58                   | 1  |    | ATOS II<br>2006 | Kitzler Åhfeldt 2009          |
|             |              | Öl Köping59                   | 1  |    | ATOS II<br>2006 | Kitzler Åhfeldt 2009          |
|             |              | Öl Köping60                   |    | 1  | ATOS II<br>2006 | Kitzler Åhfeldt 2009          |
|             |              | Öl Köping61                   |    | 1  | ATOS II<br>2006 | Kitzler Åhfeldt 2009          |
|             |              | Öl Köping62                   | 1  |    | ATOS II<br>2006 | Kitzler Åhfeldt 2009          |
| Metamorphic | Bornholm     | DR 391, Østermarie<br>2       | 20 | 7  | Artec 2017      | This article                  |
|             |              | DR 392, Østermarie<br>3       | 15 | 16 | Artec 2017      | This article                  |
|             |              | DR 399, Klemensker<br>1       | 22 | 12 | Artec 2017      | This article                  |
|             |              | DR 402, Klemensker<br>4       | 17 | 12 | Artec 2017      | This article                  |
|             |              | DR New find 2017,<br>Knudsker | 5  | 5  | Artec 2017      | This article                  |
|             | Södermanland | Sö 9                          | 10 | 6  | AFL 2000        | Augustsson 2000               |
|             |              | Sö 45                         | 18 | 8  | ATOS I<br>2011  | Kitzler Åhfeldt 2015,<br>2017 |
|             |              | Sö 52                         | 12 | 7  | ATOS I<br>2011  | Kitzler Åhfeldt 2015,<br>2017 |
|             |              | Sö 75                         | 12 | 6  | ATOS I<br>2011  | Kitzler Åhfeldt 2015,<br>2017 |
|             |              | Sö 96                         | 9  | 4  | AFL 2000        | Augustsson 2000               |
|             |              | Sö 105                        | 7  | 6  | AFL 2000        | Augustsson 2000               |
|             |              | Sö 107                        | 11 | 4  | AFL 2000        | Augustsson 2000               |
|             |              | Sö 108                        | 9  | 5  | AFL 2000        | Augustsson 2000               |
|             |              | Sö 112                        | 14 | 14 | ATOS I<br>2011  | Kitzler Åhfeldt 2015,<br>2017 |
|             |              | Sö 113                        | 24 |    | ATOS I<br>2011  | Kitzler Åhfeldt 2015,<br>2017 |
|             |              | Sö 129                        | 8  | 8  | ATOS I<br>2011  | Kitzler Åhfeldt 2015,<br>2017 |
|             |              | Sö 131                        | 26 | 12 | ATOS I<br>2011  | Kitzler Åhfeldt 2015,<br>2017 |
|             |              | Sö 137                        | 14 | 8  | ATOS I<br>2011  | Kitzler Åhfeldt 2015,<br>2017 |
|             |              | Sö 143                        | 15 | 9  | ATOS I<br>2011  | Kitzler Åhfeldt 2015,<br>2017 |
|             |              | Sö 149                        | 6  | 5  | ATOS I<br>2011  | Kitzler Åhfeldt 2015,<br>2017 |
|             |              | Sö 164                        | 16 | 11 | ATOS I<br>2011  | Kitzler Åhfeldt 2015,<br>2017 |



|  |         |                         |    |    |                |                               |
|--|---------|-------------------------|----|----|----------------|-------------------------------|
|  |         | Sö 165                  | 19 | 9  | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö 166                  | 23 | 11 | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö 173                  | 11 | 7  | AFL 2000       | Augustsson 2000               |
|  |         | Sö 179                  | 9  | 7  | AFL 2000       | Augustsson 2000               |
|  |         | Sö 184                  | 12 | 8  | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö 205                  | 7  | 9  | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö 206                  | 8  | 8  | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö 208                  | 8  | 8  | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö 211                  | 13 | 7  | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö 254                  | 9  | 5  | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö 277                  | 8  | 4  | AFL 2000       | Augustsson 2000               |
|  |         | Sö 279                  | 4  | 3  | AFL 2000       | Augustsson 2000               |
|  |         | Sö 281                  | 7  | 5  | AFL 2000       | Augustsson 2000               |
|  |         | Sö 307                  | 15 | 6  | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö 319                  | 12 | 5  | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö 320                  | 9  | 5  | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö 333                  | 16 | 8  | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö 360                  | 10 | 10 | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö 367                  | 18 | 10 | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö 377                  | 3  | 6  | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö ATA322-4237-<br>2011 | 20 | 12 | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö ATA6058_54           | 7  |    | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö Fv1954;20            | 12 |    | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö Fv1973;189           | 15 | 11 | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  |         | Sö NOR1998;22           | 7  | 6  | ATOS I<br>2011 | Kitzler Åhfeldt 2015,<br>2017 |
|  | Uppland | U 20                    | 3  | 2  | AFL 1995       | Kitzler Åhfeldt 2002          |
|  |         | U 25                    | 1  | 3  | AFL 1998       | Kitzler Åhfeldt 2002          |
|  |         | U 29                    | 2  | 3  | AFL 1995       | Kitzler Åhfeldt 2002          |
|  |         | U 37                    | 6  |    | AFL 1995       | Kitzler Åhfeldt 2002          |
|  |         | U 43                    | 5  |    | AFL 1995       | Kitzler Åhfeldt 2002          |
|  |         | U 167                   | 8  | 6  | AFL 1998       | Kitzler Åhfeldt 2002          |
|  |         | U 181                   | 10 | 5  | AFL 1998       | Kitzler Åhfeldt 2002          |
|  |         | U 210                   | 11 | 5  | AFL 1998       | Kitzler Åhfeldt 2002          |
|  |         | U 212                   | 26 | 18 | AFL 1998       | Kitzler Åhfeldt 2002          |
|  |         | U 225                   | 8  | 4  | AFL 1998       | Kitzler Åhfeldt 2002          |
|  |         | U 226                   | 12 | 4  | AFL 1998       | Kitzler Åhfeldt 2002          |
|  |         | U 229                   | 12 | 4  | AFL 1998       | Kitzler Åhfeldt 2002          |
|  |         | U 231                   | 8  | 4  | AFL 1998       | Kitzler Åhfeldt 2002          |
|  |         | U 232                   | 8  | 4  | AFL 1995       | Kitzler Åhfeldt 2002          |
|  |         | U 267                   | 8  | 4  | AFL 1998       | Kitzler Åhfeldt 2002          |

|  |               |                                   |              |                 |                 |                       |
|--|---------------|-----------------------------------|--------------|-----------------|-----------------|-----------------------|
|  |               | U 268                             | 5            | 4               | AFL 1998        | Kitzler Ähfeldt 2002  |
|  |               | U 329                             | 2            | 3               | AFL 1995        | Kitzler Ähfeldt 2002  |
|  |               | U 330                             | 2            | 4               | AFL 1995        | Kitzler Ähfeldt 2002  |
|  |               | U 331                             | 1            | 4               | AFL 1995        | Kitzler Ähfeldt 2002  |
|  |               | U 337                             | 12           | 5               | AFL 1998        | Kitzler Ähfeldt 2002  |
|  |               | U 356                             | 8            | 6               | AFL 1998        | Kitzler Ähfeldt 2002  |
|  |               | U 379                             | 8            | 8               | AFL 2004        | Kitzler Ähfeldt 2008b |
|  |               | U 391                             | 8            | 6               | AFL 2004        | Kitzler Ähfeldt 2008b |
|  |               | U 392                             | 6            | 2               | AFL 2004        | Kitzler Ähfeldt 2008b |
|  |               | U 393                             | 10           | 11              | AFL 2004        | Kitzler Ähfeldt 2008b |
|  |               | U 394                             | 7            | 8               | AFL 2004        | Kitzler Ähfeldt 2008b |
|  |               | U 444                             | 10           | 10              | AFL 2004        | Kitzler Ähfeldt 2008b |
|  |               | U 445                             | 10           | 10              | AFL 2004        | Kitzler Ähfeldt 2008b |
|  |               | U 448                             | 10           | 10              | AFL 2004        | Kitzler Ähfeldt 2008b |
|  |               | U 454                             | 9            | 7               | AFL 2004        | Kitzler Ähfeldt 2008b |
|  |               | U 455                             | 12           | 9               | AFL 2004        | Kitzler Ähfeldt 2008b |
|  |               | U 457                             | 8            | 7               | AFL 2004        | Kitzler Ähfeldt 2008b |
|  |               | U 459                             | 10           | 14              | AFL 2004        | Kitzler Ähfeldt 2008b |
|  |               | U 460                             | 10           | 13              | AFL 2004        | Kitzler Ähfeldt 2008b |
|  |               | U 463                             | 11           | 8               | AFL 2004        | Kitzler Ähfeldt 2008b |
|  |               | U 485                             | 10           | 5               | AFL 1998        | Kitzler Ähfeldt 2002  |
|  |               | U 678                             | 9            | 6               | AFL 1998        | Kitzler Ähfeldt 2002  |
|  |               | U 687                             | 8            | 4               | AFL 1998        | Kitzler Ähfeldt 2002  |
|  |               | U 1014                            | 8            | 5               | AFL 1998        | Kitzler Ähfeldt 2002  |
|  |               | U 1034                            | 9            | 5               | AFL 1998        | Kitzler Ähfeldt 2002  |
|  |               | U 1036                            | 8            | 5               | AFL 1998        | Kitzler Ähfeldt 2002  |
|  |               | U 1140                            | 10           | 4               | AFL 1998        | Kitzler Ähfeldt 2002  |
|  |               | U 1142                            | 14           | 4               | AFL 1998        | Kitzler Ähfeldt 2002  |
|  |               | U 1144                            | 25           |                 | ATOS I<br>2013  | Kitzler Ähfeldt 2016  |
|  |               | U Fv1958:250                      | 12           | 4               | AFL 2004        | Kitzler Ähfeldt 2008b |
|  | Västergötland | Vg 30                             | 9            | 8               | ATOS II<br>2010 | Kitzler Ähfeldt 2012  |
|  |               | Vg 32                             | 10           | 9               | ATOS II<br>2010 | Kitzler Ähfeldt 2012  |
|  |               | Vg 33                             | 8            | 5               | ATOS II<br>2010 | Kitzler Ähfeldt 2012  |
|  |               | Vg 37                             | 8            | 5               | ATOS II<br>2010 | Kitzler Ähfeldt 2012  |
|  |               | Vg 40                             | 9            | 4               | ATOS II<br>2010 | Kitzler Ähfeldt 2012  |
|  |               | Vg 102                            | 20           |                 | ATOS II<br>2010 | Kitzler Ähfeldt 2012  |
|  |               | Vg 103                            | 14           | 8               | ATOS II<br>2010 | Kitzler Ähfeldt 2012  |
|  |               | Vg 105                            | 15           | 3               | ATOS II<br>2010 | Kitzler Ähfeldt 2012  |
|  |               | Vg 108                            | 8            | 3               | ATOS II<br>2010 | Kitzler Ähfeldt 2012  |
|  | Östergötland  | Ög 81                             | 3            | 2               | AFL 1995        | Kitzler Ähfeldt 2002  |
|  |               | Ög 82                             | 4            | 2               | AFL 1995        | Kitzler Ähfeldt 2002  |
|  |               | Ög 83                             | 4            | 2               | AFL 1995        | Kitzler Ähfeldt 2002  |
|  |               | Ög 207                            | 4            | 2               | AFL 1995        | Kitzler Ähfeldt 2002  |
|  |               | Ög 208                            | 3            | 2               | AFL 1995        | Kitzler Ähfeldt 2002  |
|  |               | Ög 209                            | 3            | 2               | AFL 1995        | Kitzler Ähfeldt 2002  |
|  |               | <b>All</b>                        | <b>Runes</b> | <b>Ornament</b> |                 |                       |
|  |               | Number of stones in the analysis  | <b>240</b>   | 181             | 214             |                       |
|  |               | Number of samples in the analysis | <b>2855</b>  | 1651            | 1204            |                       |



| <b>Subsets</b>                  | <b>Stones</b> | <b>Samples</b> |
|---------------------------------|---------------|----------------|
| Subset 1: Sedimentary, Runes    | 75            | 557            |
| Subset 2: Sedimentary, Ornament | 115           | 555            |
| Subset 3: Metamorphic, Runes    | 106           | 1094           |
| Subset 4: Metamorphic, Ornament | 99            | 649            |

| <b>Region</b> | <b>Stones</b> | <b>Sedimentary rock</b> | <b>Metamorphic rock</b> |
|---------------|---------------|-------------------------|-------------------------|
| Bornholm      | 8             | 3                       | 5                       |
| Gotland       | 12            | 12                      |                         |
| Södermanland  | 53            | 12                      | 41                      |
| Uppland       | 63            | 18                      | 45                      |
| Västergötland | 51            | 42                      | 9                       |
| Öland         | 40            | 40                      |                         |
| Östergötland  | 13            | 7                       | 6                       |
| <b>Total</b>  | <b>240</b>    | <b>134</b>              | <b>106</b>              |

Outliers (excluded from list):

Öl Köping 13, Öl Köping 30, Öl Köping 38, Öl Köping 48,

Sö ATA6058\_54 ornament (the  
runes remain in the analysis)

U 453