COMB-MAKING IN MEDIEVAL NOVGOROD (950-1450).
AN INDUSTRY IN TRANSITION

(Volume 2)

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A thesis submitted in partial fulfilment of the requirements of Bournemouth University for the degree of Doctor of Philosophy

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School of Conservation Sciences
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# TABLE OF CONTENTS

**Volume 2**

<table>
<thead>
<tr>
<th>Section</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of figures</td>
<td>iv-xiv</td>
</tr>
<tr>
<td>Figures</td>
<td>1-227</td>
</tr>
</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>An example of a database entry</td>
<td>1</td>
</tr>
<tr>
<td>1.2</td>
<td>Novgorod in the Northern European context</td>
<td>2</td>
</tr>
<tr>
<td>1.3</td>
<td>Excavation sites in Novgorod</td>
<td>3</td>
</tr>
<tr>
<td>1.4</td>
<td>The location of Novgorod excavation sites within the town’s medieval layout</td>
<td>4</td>
</tr>
<tr>
<td>2.1</td>
<td>Samples of archaeological antler: a) elk antler; b) reindeer antler</td>
<td>5</td>
</tr>
<tr>
<td>2.2</td>
<td>Samples of modern antlers: a) elk antler; b) reindeer antler; c) red deer antler</td>
<td>6</td>
</tr>
<tr>
<td>2.3</td>
<td>Micro structure of antlers. Transverse sections of beams in reflected light (x12): a) elk antler; b) reindeer antler; c) red deer antler</td>
<td>7</td>
</tr>
<tr>
<td>2.4</td>
<td>Micro structure of antlers. Longitudinal thin sections through compacta of beams (x12): a) elk antler; b) reindeer antler; c) red deer antler</td>
<td>8</td>
</tr>
<tr>
<td>2.5</td>
<td>Primary classification of Novgorod combs</td>
<td>9</td>
</tr>
<tr>
<td>2.6</td>
<td>Measurements of combs and their parts</td>
<td>10</td>
</tr>
<tr>
<td>3.1</td>
<td>Single-sided composite combs with retained cases</td>
<td>11</td>
</tr>
<tr>
<td>3.2</td>
<td>Single-sided composite combs with retained cases (A16, 29) and matching pairs (A50-51, A191-197)</td>
<td>12</td>
</tr>
<tr>
<td>3.3</td>
<td>Single-sided composite combs and comb cases. Chronological distribution (a)</td>
<td>13</td>
</tr>
<tr>
<td>3.4</td>
<td>Single-sided composite combs and comb cases. Chronological distribution (b)</td>
<td>14</td>
</tr>
<tr>
<td>3.5</td>
<td>Single-sided composite combs designed to be kept in composite cases when not in use</td>
<td>15</td>
</tr>
<tr>
<td>3.6</td>
<td>Single-sided composite combs. Chronological distribution (c)</td>
<td>16</td>
</tr>
<tr>
<td>3.7</td>
<td>Single-sided composite combs. Chronological distribution (d)</td>
<td>17</td>
</tr>
<tr>
<td>3.8</td>
<td>Single-sided composite combs and comb cases. Construction</td>
<td>18</td>
</tr>
<tr>
<td>3.9</td>
<td>Comb A336 of unusual construction</td>
<td>19</td>
</tr>
</tbody>
</table>

---

1 All objects are depicted in their real sizes unless stated otherwise.
3.10 One-billeted comb A152 and simple comb A145 carved to resemble a form of a composite comb

3.11 Combs with varied width of billets in assembly

3.12 Combs with 'ears' and square terminals

3.13 Attributes of the end plates of cased combs

3.14 'Winged' combs

3.15 Chronological distribution of combs with copper alloy and iron rivets

3.16 Single-sided composite combs. Chronological distribution of combs featuring an average of 1 and 2 rivets per billet a) Iron-riveted; b) Copper alloy-riveted

3.17 Single-sided composite combs. Chronological distribution of all combs featuring an average of 1 and 2 rivets per billet


3.19 Single-sided composite combs. Variations of the eastern Scandinavian tradition of riveting combs

3.20 Single-sided composite combs. Western Scandinavian tradition of riveting combs

3.21 Single-sided composite combs. Side plates a) All combs. Size of the side plates; b) Cased combs. Size of the side plates

3.22 Single-sided composite combs. Relative depth of side plates with plano-convex cross-section

3.23 Single-sided composite combs. Side plates. Chronological distribution of proportional groups

3.24 Comb cases with two pairs of contiguous side plates and a comb case with a single pair of B-shaped cross-sectional side plates imitating pairs of contiguous side plates (A88)

3.25 Comb cases with a single pair of side plates

3.26 Case construction with the emphasis on the form of the end plates

3.27 Lower side plates of cases secured with additional rivet

3.28 Single-sided composite comb cases. Side plates a) Size of the side plates; b) Proportion of the side plates

3.29 Single-sided composite combs and cases with plano-convex cross-section
of side plates. Relative depth of the side plates

3.30 Single-sided composite comb cases with plano-convex cross-section of side plates. Relative depth of the side plates

3.31 Single-sided composite combs with interlaced linear decorations

3.32 Single-sided composite combs and cases with stylised interlaced decorations

3.33 Mid 10th century single-sided composite combs decorated with groups of ring-and-dot eyelets

3.34 Cases decorated with bands of multiple ring-and-dot motifs and groups of ring-and-dot eyelets

3.35 Combs and comb cases decorated with bands of multiple ring-and-dot motifs, arranged vertically and horizontally

3.36 Combs with metal sheeting behind the side plates with T-shaped openings

3.37 The 10th century single-sided composite combs with decorated end plates

3.38 Decorative schemes 0, 1 and 2

3.39 Decorative scheme 3

3.40 Decorative scheme 4

3.41 Decorative schemes 5, 7 and 8

3.42 Decorative scheme 6

3.43 Single-sided composite combs featuring vertically limited ornamental zones (decorative schemes 2, 3 and 4)

3.44 Single-sided composite combs featuring ornamentation according to decorative scheme 6

3.45 Single-sided composite comb cases featuring ornamentation according to decorative scheme 6

3.46 Combs featuring Scandinavian tradition of ornamentation (variant 6.8 of decorative scheme 6)

3.47 The 11th century comb from the Novgorod Kremlin, manufactured and decorated in the Norwegian tradition

3.48 Undecorated combs from 10th (A367) and late 12th (A114 and A337) century deposits and amulets in the forms of a comb (A330) and a sheathed knife
3.49 Chronological distribution of combs with vertical and horizontal arrangement of decoration a) Non-cased combs b) Cased combs  

3.50 Chronological changes in the combination of vertically arranged decorative schemes on single-sided composite combs a) Non-cased combs; b) Cased combs  

3.51 Single-sided composite combs. Dynamics of chronological changes in the use of antler raw material a) Non-cased combs; b) Cased combs  

3.52 10th century single-sided non-cased and cased composite combs made out of elk (A22, A95), red deer (A118, A227) and rein-deer antler (A89, A120)  

3.53 Single-sided composite combs and cases. Antler identification of side plates with varying relative depths (Index K.A.)  

3.54 Single-sided composite combs and cases. Elk and red deer antler use in side plates with varying relative depths (Index K.A.)  

3.55 Single-sided composite combs and cases. Dynamics of chronological changes in the use of antler raw material  

3.56 Single-sided composite combs. Average width of billets  

3.57 Single-sided composite combs. Average width of billets of elk and red deer antler  

3.58 Single-sided composite cases. Proportions of the main groups  

3.59 Chronological distribution of cases with one and two pairs of side plates  

3.60 Proportions of non-cased and cased combs  

3.61 Dynamics of chronological changes in proportions of non-cased combs  

3.62 Dynamics of chronological changes in proportions of cased combs  

3.63 Height of teeth relative to comb height in non-cased and cased combs  

3.64 Dynamics of chronological changes in the relative height of teeth on cased combs  

3.65 Forms of non-cased and cased single-sided composite combs  

3.66 Long toothed and relatively short combs from mid 10th century contexts  

3.67 Classification of forms of the side plates  

3.68 Single-sided composite combs and cases. Main forms of the side plates  

3.69 The Rus lands (after Franklin and Shepard)
3.70 Combs A115 and A357 of Scandinavian origin 80

3.71 Spoons of Scandinavian origin with interlaced linear decoration 81

3.72 Distribution of 10th century single-sided composite combs on the properties of the Nerevsky End (Nerevsky site) 82

3.73 Distribution of 11th century single-sided composite combs on the properties of the Nerevsky End (Nerevsky site) and location of the late 12th century comb 83

3.74 Distribution of 10th century single-sided composite combs on the properties of the Liudin End (Troitsky site) 84

3.75 Distribution of 11th century single-sided composite combs on the properties of the Liudin End (Troitsky site) and location of the late 12th century combs 85

3.76 Waste elements from the Troitsky dwelling XI-29-170 (property І) on and combs deriving from the same context 86

3.77 Bone with part of runic alphabet from the Nerevsky site 87

3.78 Hemispherical gaming pieces of walrus ivory from Troitsky site 87

3.79 Reproduction of the diagram demonstrating the relative depth of 'A' combs and 'B' combs (after Ambrosiani 1981, 71 Fig. 37) 88

4.1 11th century simple double-sided combs in antler featuring secondary use as single-sided 89

4.2 Antler (B861, B865) and elephant ivory (B789) double-sided combs trimmed and reused as single-sided 90

4.3 Simple combs featuring suspension holes (B898 and B1040) and a comb with surviving leather case (B234) 91

4.4 Chronological distribution of simple combs in skeletal materials 92

4.5 Simple combs in skeletal materials. Degree of side slope 93

4.6 Forms of lower parts of beams of red deer and elk antler 94

4.7 Simple combs in skeletal materials. Proportions 95

4.8 Simple combs in skeletal materials. Basic forms 96

4.9 11th century simple combs in skeletal materials. Basic forms 97

4.10 12th century simple combs in skeletal materials. Basic forms 98

4.11 13th century simple combs in skeletal materials. Basic forms 99

viii
4.12 14th – early 15th century simple combs in skeletal materials. Basic forms

4.13 Simple combs with convex sides

4.14 Simple combs in skeletal materials. The degree of concavity of comb sides

4.15 Simple combs with straight sides

4.16 Simple combs with concave sides

4.17 Simple combs with sides slightly curved inwards (0.02 ≤ dsc < 0.04)

4.17a Forms of simple combs with different lines of the sides

4.18 12th century combs with concave sides

4.19 13th – early 14th century combs with concave sides

4.20 13th century semi-lentoid cross-sectional combs

4.21 11th-12th century rhomboid cross-sectional combs

4.22 Combs with slender rectangular cross-section

4.23 Simple combs in skeletal materials. Relative depth

4.24 Simple combs in skeletal materials. Chronological changes in relative depth

4.25 Simple combs in skeletal materials. Sizes of antler combs

4.26 Simple combs. Size of objects in antler and ivory

4.27 Simple combs in skeletal materials. Chronological changes in comb sizes

4.28 Small size simple combs from 11th (B324, B444, B1207, B1269), 12th (B1080, B1108) and 13th (B103) century contexts

4.29 Chronological distribution of miniature simple combs

4.30 Combs featuring obliquely cut teeth

4.31 Combs featuring scratched guidelines for cutting teeth

4.32 Simple combs featuring uneven tooth base line

4.33 Combs featuring sawn guidelines exploited decoratively as linear ornamentation

4.34 12th century combs with fine teeth higher than coarse teeth

4.35 13th century combs with coarse teeth higher than fine teeth
4.36 Simple combs in skeletal materials. Relative height of the central zone 125

4.37 Simple combs in skeletal materials. Chronological changes in relative height of central zone 126

4.38 Late 11th-early 13th century combs featuring narrow central zones 127

4.39 11th century combs featuring wide central zones 128

4.40 Unfinished 12th century combs featuring undecorated central zones 129

4.41 Owner's marks and secondary botched decoration on the 13th century combs 130

4.42 Combs featuring central zones with marginal linear incisions combined with other decorative motifs 131

4.43 Combs featuring marginal linear incisions combined with ring-and-dot motifs in the central zone 132

4.44 11th – 12th century combs featuring central zones with meander patterns 133

4.45 Mid-late 12th century comb with inlaid metal strips 134

4.46 Simple combs featuring central zones with common RDE patterns 135

4.47 Combs featuring central zones with RDF patterns 136

4.48 Combs featuring central zones with DRC patterns 137

4.49 Rare types of decorative motifs and patterns on simple combs in skeletal materials 138

4.50 Patterns based on linear decorations incorporating other (non-RD) motifs 139

4.51 Patterns incorporating linear and RDE decorations (L.RDE patterns) 140

4.52 Patterns incorporating linear and RDB decorations (L.RDB patterns) 141

4.53 RDE patterns 142

4.54 RDF patterns 143

4.55 RDC patterns 144

4.56 Forms of simple combs featuring central zones with ornamental patterns based on linear decorations 145

4.57 Forms of simple combs featuring central zones with no decoration or ring-and-dot non-linear patterns 146

4.58 Combs featuring faces decorated differently 147

x
4.59 Combs with decorated sides of faces

4.60 Types of side edge decoration

4.61 Elk antlers at different stages of maturity and forms of antler parts suitable for sawing comb blanks

4.62 12th century simple combs in walrus ivory from the Fedorovsky site

4.63 11th-13th century simple combs in walrus ivory from the Nerevsky site

4.64 Rus settlements in the 11th and 12th century (after Franklin and Shepard 1996)

4.65 Long-toothed combs

4.66 Novgorod territory in the 13th century (after Fennel 1983)

4.67 Chronological and spatial distribution of class 2a combs on the properties of the Nerevsky End (Nerevsky site)

4.68 Chronological and spatial distribution of class 2a combs on the properties of the Liudin End (Troitsky site)

4.69 Chronological and spatial distribution of class 2a combs on the properties excavated within the Fedorovsky site

4.70 Proposed chronological and spatial distribution of class 2a combs on the properties of the Slavensky End (Il’insky site)

4.71 Comb blanks from the Troitsky site (1-4) and single finds of a comb and a comb blank (5) from the Dmitrievsky site

4.72 Comb blanks and the unfinished comb from the Nerevsky site

4.73 Walrus ivory waste from the Nerevsky site

4.74 Walrus ivory waste from the Fedorovsky site

4.75 Repaired and unrepaired combs ruptured and split along the grain

5.1 Chronological distribution of class 2b combs from Novgorod (evidence from the excavations of the 1970s-1990s)

5.2 Simple combs in wood from the 11th-12th century deposits on the Troitsky, Nutny and Duboshin sites

5.3 Chronological distribution of single-sided composite combs (class 1) and simple combs in skeletal materials (class 2a) and wood (class 2b) on the evidence from the Troitsky site, trenches I-XII (1973-2000)

5.4 Early class 2b combs from the Troitsky site (1)
5.5 Early class 2b combs from the Troitsky site (2) 169

5.6 Kirovsky property A at the 14th century layers (construction horizons 6 and 8) 170

5.7 Simple combs in wood. Basic forms of early and late specimens 171

5.8 Simple combs in wood. Relative depth 172

5.9 Class 2b comb sizes 173

5.10 Two types of guidelines: gently scratched (C266) and deepened grooves exploited decoratively (C290, C292) 174

5.11 Simple combs in wood. Relative height of the central zone 175

5.12 13th-14th century combs featuring secondary decorations 176

5.13 Late wooden combs featuring guidelines for cutting teeth 177

5.14 Common types of late 13th –14th century undecorated combs with straight, concave and convex sides 178

5.15 13th century combs with straight, concave and ornate sides 179

5.16 13th –early 14th century combs with blank central zones and concave, convex or ornate sides 180

5.17 13th-14th century combs featuring rare types of carved decoration 181

5.18 15th century combs with painted decorations 182

5.19 Two faces of a late 13th century comb with the inscription reading 'comb belonging to Zavid' 183

5.20 Wooden combs from early-mid 13th century deposits 184

5.21 14th century combs featuring linear decorations 185

5.22 Late wooden combs featuring rare patterns or techniques of ring-and-dot decoration 186

5.23 Late wooden combs featuring common patterns of ring-and-dot decorations 187

5.24 Common patterns on late combs featuring ring-and-dot decoration 188

5.25 13th century combs featuring decoration of the sides of faces 189

5.26 Undecorated combs from 11th century deposits on the Troitsky site 190

5.27 Comb rejects from 13th-14th century deposits 191
5.28 Damaged wooden combs repaired for reuse (single-sided and double-sided examples)

6.1 Chronological distribution of double-sided composite combs

6.2 Chronological changes in proportions of class 2 and class 3 combs on the evidence from the Troitsky site, trenches I-XII (1973-2000)

6.3 Double-sided composite combs featuring only one billet

6.4 Combs featuring a single row of rivets set at a low frequency

6.5 Combs featuring two rows of offset rivets

6.6 Combs featuring pairs of rivets set vertically or obliquely

6.7 Combs featuring a single row of numerous

6.8 Combs featuring two rows of numerous rivets

6.9 Combs featuring two pairs of side plates

6.10 Variants of sinuous cross-sectional side plates on the evidence from Lund (after Blomqvist 1943) and Novgorod

6.11 Combs featuring flat rectangular cross-sectional side plates

6.12 Proportions of rectangular and trapezoid class 3 combs

6.13 Double-sided composite combs. Basic forms

6.14 Rectangular outlined combs of squat and square proportions

6.15 Late 12th – early 13th century trapezoid combs of squat, square and vertically elongated proportions

6.16 Lavish curves featured on some concave (1) sided class 3 combs

6.17 Early 13th century class 3 comb and comb case with ornate end plates

6.18 Double-sided composite combs. Sizes of a) complete specimens in the main forms, b) complete specimens in the main proportional groups

6.19 Sizes of class 2a combs and class 3 specimens of trapezoid outline and squat proportions

6.20 Chronological changes in sizes of double-sided composite combs

6.21 Chronological changes in sizes of rectangular and trapezoid class 3 combs as well as contemporary class 2a combs a) class 3 combs of rectangular outline, b) class 3 combs of trapezoid outline, c) class 2a combs
6.22 Class 3 combs featuring billets in walrus ivory in combination with antler or bone side plates 214
6.23 Common types of class 3 combs from the First Period 215
6.24 Decorated class 3 combs from the First Period 216
6.25 Undecorated combs from the Second Period 217
6.26 Combs with linear decorations from the Second Period 218
6.27 Combs with RDB decorations from the Second Period 219
6.28 Chronological and spatial distribution of class 3 combs on the properties of the Nerevsky End (Nerevsky site) 220
6.29 Chronological and spatial distribution of class 3 combs on the properties of the Liudin End (Troitsky site) 221
6.30 Spatial distribution of class 3 combs deriving from the deposits of the First Period on the properties excavated within the Fedorovsky site 222
6.31 Repaired class 3 combs 223

7.1 Repertoires of mutually common classes of combs in the medieval towns of Novgorod and Schleswig 224
7.2 Chronological distribution of combs on the evidence from the Troitsky site, trenches I-XII (1973-2000) 225
7.3 Chronological changes in the comb repertoire in Novgorod on the evidence from the Troitsky site, trenches I-XII (1973-2000) 226
Fig. 1.1 An example of a database entry
Fig. 1.2 Novgorod in the Northern European context
Fig. 1.3 Excavation sites in Novgorod

St.-Sophia’s side

- town’s modern layout
- town’s medieval layout
- town's ramparts built in the late 14th-early 15th centuries
- excavation sites referred to in the thesis
Fig. 1.4 The location of Novgorod excavation sites within the town’s medieval layout

A - Kremlin
B - market
C - the Gotland Quarter (Gotsky dvor)
D - the German Quarter (Nemetsky dvor)

Excavation sites referred to in the thesis

Medieval streets (with their reference numbers) mentioned in the thesis

Street reference numbers:
4 - Kholopia
5 - Kuzmodemianskaia
9 - Korzheva
10 - Slavkova
12 - Probnoia
13 - Velikiaia
14 - Il'ina
15 - Slavnaia
16 - Prusskaia
17 - Duboshin
18 - Dobrynia
19 - Irysheva
20 - Chernitsina
21 - Riadiatina
Fig. 2.1 Samples of archaeological antler

a) elk antler

b) reindeer antler
Fig. 2.2 Samples of modern antler

a) elk antler

b) reindeer antler

c) red deer antler
Fig. 2.3 Microstructure of antlers. Transverse sections of beams in reflected light (x12)

a) elk antler

b) reindeer antler

c) red deer antler
Fig. 2.4 Micro structure of antlers. Longitudinal thin section through compacata of beams (x 12).

a) elk antler
b) reindeer antler
c) red deer antler
Fig 2.5 Primary classification of combs

- **COMBS**
  - **SIMPLE**
    - single-sided (not known in Novgorod)
  - **COMPOSITE**
    - double-sided class 2
    - single-sided class 1
    - double-sided class 3
    - in wood class 2b
    - in skeletal materials class 2a
Fig. 2.6 Measurements of combs and their parts
Figure 3.1 Sets of combs and cases

A54

A218

A358
Fig. 3.2 Sets of combs and cases (A16, A29) and matching pairs (A50-A51, A191-A197)
Single-sided composite combs and comb cases. Chronological distribution (a)
Fig. 3.4 Single-sided composite combs and comb cases. Chronological distribution (b)
Fig. 3.5 Single-sided composite combs designed to be kept in composite cases when not in use
Fig. 3.6 Single-sided composite combs. Chronological distribution (c)
Fig. 3.7 Single-sided composite combs. Chronological distribution (d)

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Σ 330 (144/186)
Fig. 3.8 Construction of single-sided composite combs and cases

Comb

Case with two pairs of contiguous side-plates

Case with one pair of side-plates
Fig. 3.9 Comb A336 of unusual construction
Fig. 3.10 One-billeted comb A152 and simple comb A145 carved to resemble the form of a composite comb.
Fig. 3.11 Combs with varying width of billets in assembly
Fig. 3.12 Combs with 'eared' terminals

A149
A12
A13
A15
A130
Fig. 3.13 Attributes of the end-plates of cased combs
Fig. 3.15
Chronological distribution of combs with copper alloy and iron rivets

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Σ 211
Fig. 3.16
Single-sided composite combs.
Chronological distribution of combs featuring an average of 1 and 2 rivets per billet

A) Iron-riveted

<table>
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<tr>
<th>Time Period</th>
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<td>1.11th C</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Σ 67

B) Copper alloy-riveted

<table>
<thead>
<tr>
<th>Time Period</th>
<th>1 rivet per billet</th>
<th>2 rivets per billet</th>
</tr>
</thead>
<tbody>
<tr>
<td>m.10th C</td>
<td>6</td>
<td>21</td>
</tr>
<tr>
<td>1.10th C</td>
<td>6</td>
<td>23</td>
</tr>
<tr>
<td>c.11th C</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>m.11th C</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>1.11th C</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>c.12th C</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>m.12th C</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1.12th C</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

Σ 77
Fig. 3.17
Single-sided composite combs.
Chronological distribution of all combs featuring an average of 1 and 2 rivets per billet

<table>
<thead>
<tr>
<th></th>
<th>m.10th C</th>
<th>l.10th C</th>
<th>e.11th C</th>
<th>m.11th C</th>
<th>l.11th C</th>
<th>e.12th C</th>
<th>m.12th C</th>
<th>l.12th C</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 rivets per billet</td>
<td>32</td>
<td>26</td>
<td>10</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>1 rivet per billet</td>
<td>12</td>
<td>23</td>
<td>22</td>
<td>11</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Fig. 3.18 Combs riveted according to the Eastern Scandinavian tradition
Fig. 3.19 Combs riveted according to the Eastern Scandinavian tradition
Fig. 3.20 Combs riveted according to the Western Scandinavian tradition

A74

A76

A25

A110
Fig. 3.21 Single-sided composite combs. Side-plates

a) All combs. Size of the side-plates

b) Cased combs. Size of the side-plates
Fig. 3.22: Single-sided composite combs.

<table>
<thead>
<tr>
<th>Relative depth of side-plates with plano-convex cross-section</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.24</td>
</tr>
<tr>
<td>18</td>
</tr>
</tbody>
</table>
Fig 3.23 Single-sided composite combs. Side-plates. Chronological distribution of proportional groups

mid 10th century

late 10th century

early 11th century

mid-late 11th century
Fig. 3.24 Comb cases with two pairs of contiguous side-plates and a comb case with a single pair of B-shaped cross-sectional side-plates imitating pairs of contiguous plates (A88)
Fig. 3.25 Comb cases with a single pair of side-plates
Fig. 3.26 Case construction with the emphasis on the form of the end-plate
Fig. 3.27 Cases featuring lower side-plates secured with an additional rivet
Fig. 3.28 Single-sided composite comb cases.

Side-plates

a) Size of the side-plates

b) Proportions of the side-plates
Fig. 3.29 Single-sided composite combs and cases
with plano-convex cross-section of side-plates. Relative depth of the side-plates
Fig. 3.30 Single-sided composite comb cases with plano-convex cross-section of side-plates. Relative depth of the side-plates

<table>
<thead>
<tr>
<th>Depth Range</th>
<th>4 side-plated</th>
<th>2 side-plated</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2-2.4</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>2.5-2.7</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2.8-3.0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3.1-3.3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3.4-3.6</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>3.7-3.9</td>
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<td>0</td>
</tr>
<tr>
<td>4.0-4.2</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>4.3-4.5</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>4.6-4.8</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4.9-5.1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5.2-5.4</td>
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<td>0</td>
<td>2</td>
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<tr>
<td>5.5-5.7</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5.8-6.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6.1-6.3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6.4-6.6</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6.7-6.9</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
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<td>7.0-7.2</td>
<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>7.3-7.5</td>
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<td>7.9-8.1</td>
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<tr>
<td>&gt;8.1</td>
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<td>0</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Total (Σ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>87</td>
</tr>
</tbody>
</table>
Fig. 3.31 Comb with interlaced linear decoration
Fig. 3.32 Single-sided composite combs and cases with stylised interlaced decoration
Fig. 3.33 Mid 10th century combs decorated with groups of ring-and-dot motifs
Fig. 3.34 Cases decorated with bands of multiple ring-and-dot motifs and groups of ring-and-dot motifs
Fig. 3.35 Combs and cases decorated with bands of multiple ring-and-dot motifs arranged vertically and horizontally
Fig. 3.36 Combs with bronze sheeting behind the side-plates with T-shaped openings
Fig. 3.37 The 10th century single-sided composite combs with decorated end-plates
Fig. 3.38 Decorative schemes 0, 1 and 2

- **0.1**: Decorated areas single decorative motifs
- **0.2**: Decorated areas
- **0.3**: Decorative openings

- **1.1**: Decorated areas
- **1.2(?)**: Decorative openings

- **2.1**: Decorated areas
- **2.1a**: Decorative openings
Fig. 3.39 Decorative scheme 3

3.01 3.02 3.03
3.1 3.1a 3.1b
3.2 3.2a 3.21 3.21a
3.22
3.3 3.3a

decorated areas
Fig. 3.40 Decorative scheme 4

areas decorated differently

50
Fig. 3.41 Decorative schemes 5, 7 and 8

5
5.1
5.2

7
7.1
7.2

8
8.1
8.2

decorated areas
Fig. 3.42 Decorative scheme 6

- Single decorative motifs
- Areas decorated differently

- 6.01
- 6.10
- 6.11
- 6.12
- 6.20
- 6.21
- 6.22
- 6.23
- 6.24
- 6.25
- 6.30
- 6.31
- 6.32
- 6.40
- 6.51
- 6.52
- 6.53
- 6.55
- 6.61
- 6.62
- 6.71
- 6.72
- 6.73
- 6.81
- 6.82
- 6.83
- 6.84
- 6.90

52
Fig. 3.43 Single-sided composite combs featuring vertically limited ornamental zones (decorative schemes 2, 3, and 4)
Fig. 3.44 Single-sided composite combs featuring ornamentation according to decorative scheme 6

A112
A107
A60
A92
A69
A91
A187
Fig. 3.45 Cases featuring ornamentation according to decorative scheme 6

A348

A134

A159

A161

A37
Fig. 3.46 Combs featuring Scandinavian tradition of ornamentation (variant 6.8 of decorative scheme 6)
Fig. 3.47 The 11th century comb from the Novgorod Kremlin, manufactured and decorated in the Norwegian tradition
Fig. 3.48 Undecorated combs from the 10th (A367) and the late 12th (A114 and A337) century deposits and amulets in the forms of a comb (A330) and a sheathed knife
Fig. 3.49 Chronological distribution of combs with vertical and horizontal arrangement of decoration

a) Non-cased combs

<table>
<thead>
<tr>
<th></th>
<th>m.10thC</th>
<th>l.10thC</th>
<th>e.11thC</th>
<th>m.11thC</th>
<th>l.11thC</th>
</tr>
</thead>
<tbody>
<tr>
<td>vertical</td>
<td>34</td>
<td>33</td>
<td>19</td>
<td>4</td>
<td>2</td>
</tr>
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<td>horizontal</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>1</td>
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</tbody>
</table>

Σ 104

b) Cased combs

<table>
<thead>
<tr>
<th></th>
<th>m.10thC</th>
<th>l.10thC</th>
<th>e.11thC</th>
<th>m.11thC</th>
<th>l.11thC</th>
</tr>
</thead>
<tbody>
<tr>
<td>vertical</td>
<td>12</td>
<td>21</td>
<td>7</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>horizontal</td>
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<td>39</td>
<td>48</td>
<td>39</td>
<td>4</td>
</tr>
</tbody>
</table>

Σ 180
Fig. 3.50 Chronological changes in the combination of vertically arranged decorative schemes on single-sided composite combs

a) Non-cased combs

<table>
<thead>
<tr>
<th></th>
<th>m.10thC</th>
<th>l.10thC</th>
<th>e.11thC</th>
<th>m.11thC</th>
<th>l.11thC</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
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<tr>
<td>2</td>
<td>29</td>
<td>18</td>
<td>12</td>
<td>1</td>
<td>0</td>
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<td>1</td>
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<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Σ</td>
<td>113</td>
<td></td>
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</tbody>
</table>

*including undecorated objects

b) Cased combs

<table>
<thead>
<tr>
<th></th>
<th>m.10thC</th>
<th>l.10thC</th>
<th>e.11thC</th>
<th>m.11thC</th>
<th>l.11thC</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3</td>
<td>7</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
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<td>11</td>
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<tr>
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<td>4</td>
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<td>0</td>
</tr>
<tr>
<td>Σ</td>
<td>49</td>
<td></td>
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</tr>
</tbody>
</table>

*including undecorated objects
Fig. 3.51 Single-sided composite combs. Dynamics of chronological changes in the use of antler raw material

(a) Non-cased combs.

(b) Cased combs
Fig. 3.52 10th century combs in elk (A22, A95), red deer (A118, A227) and reindeer (A89, A120) antler
Fig. 3.53
Single-sided composite combs and cases.
Antler identification of side-plates with varying relative depths (Index K.A.)

<table>
<thead>
<tr>
<th>Width (cm)</th>
<th>Reindeer</th>
<th>Red Deer</th>
<th>Elk</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0-2.1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2.2-2.3</td>
<td>0</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>2.4-2.5</td>
<td>0</td>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td>2.6-2.7</td>
<td>1</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>2.8-2.9</td>
<td>2</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>3.0-3.1</td>
<td>1</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>3.2-3.3</td>
<td>1</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>3.4-3.5</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3.6-3.7</td>
<td>0</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>3.8-3.9</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>4.0-4.1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4.2-4.3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4.4-4.5</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>4.6-4.7</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>4.8-4.9</td>
<td>7</td>
<td>50</td>
<td>6</td>
</tr>
<tr>
<td>&gt;4.9</td>
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<td>50</td>
<td>6</td>
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</table>

Σ 268
Fig. 3.54
Single-sided composite combs and cases.
Elk and red deer antler use in side-plates with varying relative depths (Index K.A.)

Σ 254 = 100%
Fig. 3.55 Single-sided composite combs and cases.
Dynamics of chronological changes in the use of antler raw material
Fig. 3.56: Single-sided composite combs. Average width of billets.
Fig. 3.57

Single-sided composite combs. Average width of billets of elk and red deer antler
Fig. 3.58 Single-sided composite cases. Proportions of the main groups

<table>
<thead>
<tr>
<th></th>
<th>2-paired %</th>
<th>1-paired %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.11-0.12</td>
<td>0.0</td>
<td>5.0</td>
</tr>
<tr>
<td>0.13-0.14</td>
<td>5.6</td>
<td>45.0</td>
</tr>
<tr>
<td>0.15-0.16</td>
<td>11.1</td>
<td>40.0</td>
</tr>
<tr>
<td>0.17-0.18</td>
<td>22.2</td>
<td>10.0</td>
</tr>
<tr>
<td>0.19-0.20</td>
<td>16.7</td>
<td>0.0</td>
</tr>
<tr>
<td>0.21-0.22</td>
<td>33.3</td>
<td>0.0</td>
</tr>
<tr>
<td>0.23-0.24</td>
<td>11.1</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Σ (2paired/1paired) 18/40 = 100%/100%
Fig. 3.59 Chronological distribution of cases with one and two pairs of side-plates

<table>
<thead>
<tr>
<th>Century</th>
<th>2-paired %</th>
<th>1-paired %</th>
</tr>
</thead>
<tbody>
<tr>
<td>m.10th C</td>
<td>3.6</td>
<td>1.8</td>
</tr>
<tr>
<td>L.10th C</td>
<td>10.9</td>
<td>20.9</td>
</tr>
<tr>
<td>c.11th C</td>
<td>4.5</td>
<td>22.7</td>
</tr>
<tr>
<td>m.11th C</td>
<td>5.5</td>
<td>28.2</td>
</tr>
<tr>
<td>L.11th C</td>
<td>0.9</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Σ 110 = 100%
Fig. 3.60 Proportions of non-cased and cased combs

|    | 0.17 | 0.18 | 0.19 | 0.2  | 0.21 | 0.22 | 0.23 | 0.24 | 0.25 | 0.26 | 0.27 | 0.28 | 0.29 | 0.3  | 0.31 | 0.32 | 0.33 | 0.34 | 0.35 | 0.36 | 0.37 | 0.38 | 0.39 | 0.4 |
|----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| non-cased % | 2.2  | 3.2  | 4.3  | 2.2  | 1.1  | 3.2  | 7.5  | 7.5  | 11.8 | 6.5  | 7.5  | 10.8 | 9.7  | 5.4  | 3.2  | 2.2  | 5.4  | 1.1  | 0.0  | 2.2  | 1.1  | 1.1  | 0.0  | 1.1  |
| cased %     | 1.4  | 0.0  | 1.4  | 2.9  | 5.8  | 13.0 | 11.6 | 14.5 | 17.4 | 8.7  | 2.9  | 8.7  | 5.8  | 1.4  | 1.4  | 0.0  | 1.4  | 1.4  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |

Σ (non-cased/cased) 93/69 = 100%/100%
Fig. 3.61 Dynamics of chronological changes in proportions of non-cased combs

<table>
<thead>
<tr>
<th></th>
<th>m.10th C</th>
<th>1.10th C</th>
<th>e.11th C</th>
<th>m11th C</th>
<th>1.11th C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.32-0.40 (%)</td>
<td>4.8</td>
<td>4.8</td>
<td>3.6</td>
<td>0.0</td>
<td>1.2</td>
</tr>
<tr>
<td>0.27-0.31 (%)</td>
<td>17.9</td>
<td>11.9</td>
<td>6.0</td>
<td>0.0</td>
<td>1.2</td>
</tr>
<tr>
<td>0.22-0.26 (%)</td>
<td>19.0</td>
<td>13.1</td>
<td>4.8</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>0.17-0.21 (%)</td>
<td>3.6</td>
<td>1.2</td>
<td>4.8</td>
<td>2.4</td>
<td>0.0</td>
</tr>
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</table>

$\Sigma 84 = 100\%$
Fig. 3.62 Dynamics of chronological changes in proportions of cased combs

<table>
<thead>
<tr>
<th></th>
<th>m.10th C</th>
<th>1.10th C</th>
<th>c.11th C</th>
<th>m11th C</th>
<th>1.11th C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.27-0.34 (%)</td>
<td>7.8</td>
<td>9.4</td>
<td>3.1</td>
<td>1.6</td>
<td>1.6</td>
</tr>
<tr>
<td>0.17-0.26 (%)</td>
<td>4.7</td>
<td>28.1</td>
<td>31.3</td>
<td>12.5</td>
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</tbody>
</table>

\[ \sum 64 = 100\% \]
Fig. 3.64 Dynamics of chronological changes in the relative height of teeth on cased combs

<table>
<thead>
<tr>
<th></th>
<th>m.10th C</th>
<th>1.10th C</th>
<th>c.11th C</th>
<th>m.11th C</th>
<th>1.11th C</th>
</tr>
</thead>
<tbody>
<tr>
<td>rel.height&gt;0.59 (%)</td>
<td>8.6</td>
<td>12.9</td>
<td>4.3</td>
<td>1.4</td>
<td>0.0</td>
</tr>
<tr>
<td>rel.height&lt;0.60 (%)</td>
<td>2.9</td>
<td>25.7</td>
<td>31.4</td>
<td>11.4</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Σ 70 = 100%
Fig. 3.65 Forms of non-cased and cased single-sided composite combs
Fig. 3.66 Long toothed, relatively short combs from the mid 10th century contexts
Fig. 3.67 Classification of forms of the side-plates

Group I

Group II

Group III

Group IV

Group V

Group VI
Fig. 3.68 Single-sided composite combs and cases.
Main forms of the side plates
Fig. 3.70 Mid 10th century combs of Scandinavian origin
Fig. 3.71 Spoons of Scandinavian origin with interlaced decoration
Fig. 3.72 Distribution of 10th century single-sided composite combs on the properties of the Nerevsky End (Nerevsky site)
Fig. 3.73 Distribution of the 11th century single-sided composite combs on the properties of the Nerevsky End (Nerevsky site) and the location of the 12th century comb.

- ■ early 11th century combs
- ○ mid 11th century combs
- ○ late 11th century combs
- × late 12th century combs
Fig. 3.74 Distribution of 10th century single-sided composite combs on the properties of the Liudin End (Troitsky site)
Fig. 3.75 Distribution of the 11th century single-sided composite combs on the properties of the Liudin End (Troitsky site) and the location of the 12th century combs

- ■ early 11th century combs
- ○ mid 11th century combs
- ○ late 11th century combs
- × late 12th century combs
Fig. 3.76 Waste elements from the Troitsky dwelling XI-29-170 (property D) and combs deriving from the same context
Fig. 3.77 Bone with part of runic alphabet from the Nerevsky site

Fig. 3.78 Hemispherical gaming pieces of walrus ivory from the Troitsky site
Fig. 3.79 Reproduction of the diagram demonstrating the relative depth of 'A' combs and 'B' combs (after Ambrosiani 1981, 71 Fig. 37)
Fig. 4.1 11th century simple double-sided combs trimmed and reused as single-sided
Fig. 4.2 Antler (B861 and B865) and elephant ivory (B789) double-sided combs trimmed and reused as single-sided
Fig. 4.3 Simple combs featuring suspension holes (B898 and B1040) and comb B234 with surviving leather case.
Fig. 4.4 Chronological distribution of simple combs in skeletal materials

Σ 1132
Fig. 4.5
Simple combs in skeletal materials. Degree of side slope

<table>
<thead>
<tr>
<th>Σ 1072</th>
<th>0.26-0.30</th>
<th>0.31-0.35</th>
<th>0.36-0.40</th>
<th>0.41-0.45</th>
<th>0.46-0.50</th>
<th>0.51-0.55</th>
<th>0.56-0.60</th>
<th>0.61-0.65</th>
<th>0.66-0.70</th>
<th>0.71-0.75</th>
<th>0.76-0.80</th>
<th>0.81-0.85</th>
<th>0.86-0.90</th>
<th>0.91-0.95</th>
<th>0.96-1</th>
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<tr>
<td></td>
<td>1</td>
<td>5</td>
<td>24</td>
<td>46</td>
<td>53</td>
<td>47</td>
<td>81</td>
<td>79</td>
<td>83</td>
<td>110</td>
<td>115</td>
<td>118</td>
<td>150</td>
<td>116</td>
<td>44</td>
</tr>
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</table>
Fig. 4.6 Forms of lower parts of antler suitable for simple combs

red deer
reindeer
elk
Fig. 4.7
Simple combs in skeletal materials. Proportions

<table>
<thead>
<tr>
<th>height/average width ratio</th>
<th>0.51-0.60</th>
<th>0.61-0.70</th>
<th>0.71-0.80</th>
<th>0.81-0.90</th>
<th>0.91-1.00</th>
<th>1.01-1.10</th>
<th>1.11-1.20</th>
<th>1.21-1.30</th>
<th>1.31-1.40</th>
<th>1.41-1.50</th>
<th>1.51-1.60</th>
<th>1.61-1.70</th>
<th>1.71-1.90</th>
<th>1.91-2.00</th>
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</thead>
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<tr>
<td>Σ1072</td>
<td>3</td>
<td>4</td>
<td>27</td>
<td>58</td>
<td>110</td>
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<td>185</td>
<td>132</td>
<td>76</td>
<td>33</td>
<td>16</td>
<td>5</td>
<td>0</td>
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</tbody>
</table>
Fig. 4.8 Simple combs in skeletal materials. Basic forms
Fig. 4.9 11th century simple combs in skeletal materials
Basic forms

- Early 11th century
- Mid 11th century
- Late 11th century

The diagrams show the relationship between the height/average width ratio and the degree of side slope for different time periods.
Fig. 4.10 12th century simple combs in skeletal materials

Basic forms

early 12th century

mid 12th century

late 12th century

height/average width ratio

degree of side slope

Σ 486
Fig. 4.11 13th century simple combs in skeletal materials
Basic forms

early 13th century

mid 13th century

late 13th century

height/average width ratio
Fig. 4.12 14th-15th century simple combs in skeletal materials
Basic forms

early-mid 14th century

late 14th - early 15th centuries

Σ 42
Fig. 4.13 Simple combs with convex sides
Fig. 4.14
Simple combs in skeletal materials. The degree of concavity of comb sides

<table>
<thead>
<tr>
<th>Degree of concavity of comb sides</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00-0.009</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>800</td>
</tr>
</tbody>
</table>
Fig. 4.15 Simple combs with straight sides

B92

B717

B928

B1235
Fig. 4.17 Simple combs with sides slightly curved inwards

\[ 0.02 \leq \text{dsc} \leq 0.04 \]
Fig. 4.17a Forms of simple combs featuring sides with different degrees of concavity.

- **with straight sides** ($dsc < 0.02$)
  - $\Sigma 330$

- **with slightly concave sides** ($0.02 \leq dsc < 0.04$)
  - $\Sigma 144$

- **with concave sides** ($0.04 \leq dsc < 0.1$)
  - $\Sigma 326$
Fig. 4.18 12th century combs with concave sides

B1272

B1244

B919

B944
Fig. 4.19  13th - early 14th century combs with concave sides
Fig. 4.20 13th century semi-lentoid cross-sectional combs
Fig. 4.21 11th-12th century rhomboid cross-sectional combs
Fig. 4.22 Combs with slender rectangular cross-section
Fig. 4.23 Simple combs in skeletal materials. Relative depth

<table>
<thead>
<tr>
<th>Relative Depth</th>
<th>0.03-0.04</th>
<th>0.05-0.06</th>
<th>0.07-0.08</th>
<th>0.09-0.10</th>
<th>0.11-0.12</th>
<th>0.13-0.14</th>
<th>0.15-0.16</th>
<th>0.17-0.18</th>
<th>0.19-0.20</th>
<th>0.21-0.22</th>
<th>0.23-0.24</th>
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</thead>
<tbody>
<tr>
<td>Σ 1018</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1018</td>
<td>1</td>
<td>12</td>
<td>119</td>
<td>361</td>
<td>285</td>
<td>138</td>
<td>60</td>
<td>24</td>
<td>10</td>
<td>5</td>
<td>3</td>
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</table>
Fig. 4.24
Simple combs in skeletal materials. Chronological changes in relative depth

<table>
<thead>
<tr>
<th>Century</th>
<th>Thin (ird &gt; 0.09)</th>
<th>Medium (0.09-0.12)</th>
<th>Thick (ird &gt; 0.12)</th>
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<tbody>
<tr>
<td>11th</td>
<td>2</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>11th</td>
<td>2</td>
<td>20</td>
<td>22</td>
</tr>
<tr>
<td>12th</td>
<td>0</td>
<td>48</td>
<td>40</td>
</tr>
<tr>
<td>12th</td>
<td>11</td>
<td>85</td>
<td>55</td>
</tr>
<tr>
<td>12th</td>
<td>19</td>
<td>94</td>
<td>18</td>
</tr>
<tr>
<td>12th</td>
<td>28</td>
<td>130</td>
<td>17</td>
</tr>
<tr>
<td>13th</td>
<td>20</td>
<td>80</td>
<td>8</td>
</tr>
<tr>
<td>13th</td>
<td>20</td>
<td>37</td>
<td>7</td>
</tr>
<tr>
<td>13th</td>
<td>12</td>
<td>26</td>
<td>1</td>
</tr>
<tr>
<td>14th</td>
<td>5</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>14th</td>
<td>6</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>14th</td>
<td>1</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>15th</td>
<td>2</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

Σ 852
Fig. 4.25 Simple combs in skeletal materials. Sizes of antler combs
Fig. 4.26 Simple combs. Size of objects in antler and ivory
Fig. 4.27
Simple combs in skeletal materials. Chronological changes in comb sizes
Fig. 4.28 Small combs from 11th (B324, B444, B1207, B1269), 12th (B1080, B1108) and 13th (B103) century contexts
Fig. 4.29 Chronological distribution of miniature simple combs

<table>
<thead>
<tr>
<th>Century</th>
<th>%</th>
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<tbody>
<tr>
<td>e. 11th C.</td>
<td>9.6</td>
</tr>
<tr>
<td>m. 11th C.</td>
<td>7.2</td>
</tr>
<tr>
<td>l. 11th C.</td>
<td>20.5</td>
</tr>
<tr>
<td>e. 12th C.</td>
<td>18.1</td>
</tr>
<tr>
<td>m. 12th C.</td>
<td>9.6</td>
</tr>
<tr>
<td>l. 12th C.</td>
<td>20.5</td>
</tr>
<tr>
<td>e. 13th C.</td>
<td>7.2</td>
</tr>
<tr>
<td>m. 13th C.</td>
<td>4.8</td>
</tr>
<tr>
<td>l. 13th C.</td>
<td>1.2</td>
</tr>
<tr>
<td>e. 14th C.</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Σ 83 = 100%
Fig. 4.30 Combs featuring obliquely cut teeth

B125

B63

B322

B94
Fig. 4.31 Combs featuring scratched guidelines for cutting teeth
Fig. 4.32 Simple combs featuring uneven tooth base line

B1012

B246

B430

B430
Fig. 4.33 Combs and unfinished specimens featuring sawn guidelines exploited decoratively as linear decoration.
Fig. 4.34 12th century combs with fine teeth higher than coarse teeth
Fig. 4.35 13th century combs with coarse teeth higher than fine teeth
Fig. 4.36
Simple combs in skeletal materials. Relative height of the central zone

<table>
<thead>
<tr>
<th>Relative height of the central zone</th>
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<tbody>
<tr>
<td>0.07-0.08</td>
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<tr>
<td>700</td>
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</table>
Fig. 4.37
Simple combs in skeletal materials. Chronological changes in relative height of central zone

<table>
<thead>
<tr>
<th>Century</th>
<th>rh=0.32-0.50 (wide)</th>
<th>rh=0.19-0.31 (medium)</th>
<th>rh&lt;0.19 (narrow)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>e.11th C.</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>m.11th C.</td>
<td>9</td>
<td>15</td>
<td>7</td>
<td>25</td>
</tr>
<tr>
<td>L.11th C.</td>
<td>11</td>
<td>35</td>
<td>24</td>
<td>60</td>
</tr>
<tr>
<td>e.12th C.</td>
<td>11</td>
<td>78</td>
<td>64</td>
<td>153</td>
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<tr>
<td>m.12th C.</td>
<td>5</td>
<td>51</td>
<td>42</td>
<td>108</td>
</tr>
<tr>
<td>L.12th C.</td>
<td>9</td>
<td>48</td>
<td>59</td>
<td>116</td>
</tr>
<tr>
<td>e.13th C.</td>
<td>9</td>
<td>37</td>
<td>32</td>
<td>98</td>
</tr>
<tr>
<td>m.13th C.</td>
<td>10</td>
<td>25</td>
<td>8</td>
<td>33</td>
</tr>
<tr>
<td>L.13th C.</td>
<td>9</td>
<td>14</td>
<td>1</td>
<td>24</td>
</tr>
<tr>
<td>e.14th C.</td>
<td>3</td>
<td>8</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>m.14th C.</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>L.14th C.</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>e.15th C.</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

Σ 645
Fig. 4.38 Late 11th - early 13th century combs featuring narrow central zones

B406

B1106

B47

B194

B390
Fig. 4.39 11th century combs featuring wide central zones

B409

B492

B953

B112

B410
Fig. 4.40 Unfinished 12th century combs featuring undecorated central zones
Fig. 4.41 Owner's marks and secondary botched decoration on the 13th century combs
Fig. 4.42 Combs featuring central zones with marginal linear incisions combined with other decorative motifs
Fig. 4.43 Combs featuring marginal linear incisions combined with ring-and-dot motifs in the central zone
Fig. 4.44 11th and 12th century combs featuring central zones with meander patterns.
Fig. 4.45 Mid-late 12th century comb with inlaid metal strips
Fig. 4.46 Simple combs featuring central zones with common RDE pattern
Fig. 4.47 Simple combs featuring central zones with RDF patterns

B225

B77

B56

B202
Fig. 4.48 Simple combs featuring central zones with RDC patterns
Fig. 4.49 Rare types of decorative motifs and patterns on simple combs in skeletal materials
Fig. 4. 50 Patterns based on linear decorations and incorporating other (non-RD) motifs
Fig. 4.51 Patterns incorporating linear and RDE decorations
(L.RDE patterns)
Fig. 4.52 Patterns incorporating linear and RDB decorations (L.RDB patterns)
Fig. 4.53 RDE patterns
Fig. 4.54 RDF patterns
Fig. 4.55 RDC patterns
Fig. 4.56 Forms of simple combs featuring central zones with ornamental patterns based on linear decorations

L patterns

height/average width ratio

degree of side slope

0.2 0.4 0.6 0.8 1 1.2 1.4 1.6 1.8 2

Σ 411

L. + patterns

height/average width ratio

degree of side slope

0.2 0.4 0.6 0.8 1 1.2 1.4 1.6 1.8 2

Σ 121

L.RDB - L.RDE patterns

height/average width ratio

degree of side slope

0.2 0.4 0.6 0.8 1 1.2 1.4 1.6 1.8 2

Σ 94 / 27
Fig. 4.57
Forms of simple combs featuring central zones with no decoration or ring-and-dot non-linear patterns
Fig. 4.58 Combs featuring faces decorated differently
Fig. 4.59 Combs with decorated sides of faces
Fig. 4.60 Types of side edge decoration

L1

Lo

L.S.RDE.Lo L.CV.RDE RDE.Lv

L1

L2

L.Lo1

L.IVMB

CV

L3 L.Lo2a - L.Lo2b - L.Lo2c

CV.Lv
Fig. 4.61 Elk antlers at different stages of maturity and forms of antler parts suitable for sawing comb blanks.
Fig. 4.62 12th century simple combs in walrus ivory from the Fedorovsky site
Fig. 4.63 11th-13th century simple combs in walrus ivory from the Nerevsky site
Fig. 4.64 Rus settlements in the 11th and 12th centuries (after Franklin and Shepard 1996)
Fig. 4.65 Long-toothed combs

B1268

B171

B778

B995

B8

B1315
Fig. 4.66 Novgorod territory in the 13th century (after Fennel 1983)
Fig. 4.67 Chronological and spatial distribution of class 2a combs on the properties of the Nerevsky End (Nerevsky site)

First Period

Second Period

Third Period

Fourth Period

low concentration

medium high concentration (average and up to 50% above average)

high concentration
Fig. 4.68 Chronological and spatial distribution of class 2a combs on the properties of the Liudin End (Troitsky site)

First Period

Second Period

Third Period

Legend:
- Low concentration
- Medium high concentration (average and up to 50% above average)
- High concentration

N 30m

0 30m

0 30m
Fig. 4.69 Chronological and spatial distribution of class 2a combs on the properties excavated within the Fedorovsky site.

First Period

Second Period

Slavkova Street
(from ca 1090)

Korzeva Street
(from ca 1140)

low concentration

medium high concentration
(average and up to 50% above average)

high concentration
Fig. 4.70 Spatial distribution of class 2a combs on the properties of the Slavensky End (Il'insky site) within the four Periods (based on the revised chronology)
Fig. 4.71 Comb blanks from the Troitsky site (1-4) and single finds of a comb and a comb blank (5) from the Dmitrievsky site
Fig. 4.72 Comb blanks and the unfinished comb from the Nerevsky site
Fig. 4.73 12th century walrus ivory waste from the Nerevsky site
Fig. 4.74 12th century walrus ivory waste from the Fedorovsky site
Fig. 4.75 Repaired and unrepaired combs ruptured and split along the grain
Fig. 5.1 Chronological distribution of class 2b combs from Novgorod
(evidence from the excavations of the 1970s-1990s)
Fig. 5.2 Simple combs in wood from the 11th-12th century deposits on the Troitsky, Nutny and Duboshin sites
Fig. 5.3 Chronological distribution of single-sided composite combs (class 1) and simple combs in skeletal materials (class 2a) and wood (class 2b) on the evidence from the Troitsky site, trenches I-XII (1973-2000)
Fig. 5.4 Early class 2b combs from the Troitsky site

Scale 3:4
Fig. 5.5 Early class 2b combs from the Troitsky site
Fig. 5.6 Kirovsky property A at the 14th century layers

Construction horizon 8

Construction horizon 6
Fig. 5.7 Simple combs in wood. Basic forms of early and late specimens

Degree of side slope

Height/average width ratio

Σ 114 (35/79)
Fig. 5.8 Simple combs in wood. Relative depth

<table>
<thead>
<tr>
<th>Relative depth</th>
<th>0.05-0.06</th>
<th>0.07-0.08</th>
<th>0.09-0.10</th>
<th>0.11-0.12</th>
<th>0.13-0.14</th>
<th>0.15-0.16</th>
<th>0.17-0.18</th>
<th>0.19-0.20</th>
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</thead>
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<td>5</td>
<td>14</td>
<td>25</td>
<td>48</td>
<td>25</td>
<td>9</td>
<td>9</td>
<td>2</td>
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</table>

Σ 137
Fig. 5.9 Sizes of simple combs in wood

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<th>Size (sq.mm)</th>
<th>4000-4449</th>
<th>4500-4999</th>
<th>5000-5449</th>
<th>5500-5999</th>
<th>6000-6449</th>
<th>6500-6999</th>
<th>7000-7449</th>
<th>7500-7999</th>
<th>8000-8449</th>
<th>8500-8999</th>
<th>9000-9449</th>
<th>9500-9999</th>
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</thead>
<tbody>
<tr>
<td>4000-4449</td>
<td>7.9</td>
<td>3.1</td>
<td>14.2</td>
<td>14.2</td>
<td>15.7</td>
<td>18.9</td>
<td>5.5</td>
<td>8.7</td>
<td>5.5</td>
<td>3.1</td>
<td>1.6</td>
<td>1.6</td>
</tr>
<tr>
<td>total 127 (100%)</td>
<td>7.9</td>
<td>3.1</td>
<td>14.2</td>
<td>14.2</td>
<td>15.7</td>
<td>18.9</td>
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<td>8.7</td>
<td>5.5</td>
<td>3.1</td>
<td>1.6</td>
<td>1.6</td>
</tr>
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</table>
Fig. 5.10 Two types of guidelines: gently scratched lines (C266) and deepened grooves exploited decoratively (C290 ans292)
Fig. 5.11 Simple combs in wood. Relative height of the central zone

| Σ | 278 | 3 | 6 | 23 | 27 | 40 | 37 | 40 | 19 | 31 | 12 | 14 | 7 | 9 | 2 | 3 | 1 | 3 | 0 | 0 | 1 |
Fig. 5.12 13th - 14th century combs featuring secondary decorations

Scale 4:5
Fig. 5.13 Late wooden combs featuring guidelines for cutting teeth
Fig. 5.14 Common types of late 13th - 14th century undecorated combs with straight, concave and convex sides

Scale 4:5
Fig. 5.15 13th century combs with straight, concave and ornate sides
Fig. 5.16 13th - early 14th century combs with blank central zones and concave, convex or ornate sides
Fig. 5.17 13th-14th century wooden combs featuring rare types of carved decoration
Fig. 5.18 15th century combs with painted decorations

C265

C283

C139
Fig. 5.19 Two faces of a late 13th century comb with the inscription reading 'comb belonging to Zavid'.
Fig. 5.20 Wooden combs from early-mid 13th century deposits

C8

C65

C34

C39

C35

Scale 3:4
Fig. 5.21 14th century combs featuring linear decoration
Fig. 5.22 Late combs featuring rare patterns or techniques of ring-and-dot decoration
Fig. 5.23. Late wooden combs featuring common patterns of ring-and-dot decoration.

C147

C106

C132
Fig. 5.24 Common patterns of late combs featuring ring-and-dot decoration

C181

C176

C55

C54

C164

C96

Scale 4:5
Fig. 5.25 13th century combs featuring decoration of the sides of faces.
Fig. 5.26 Undecorated combs from 11th century deposits on the Troitsky site

C84

C76

C77

C79

C167

Scale 4:5
Fig. 5.27 Comb rejects from 13th-14th century deposits
Fig. 5.28 Damaged wooden combs repaired for reuse (single-sided and double-sided examples)
Fig. 6.1 Chronological distribution of double-sided composite combs

<table>
<thead>
<tr>
<th>Century</th>
<th>Count</th>
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</thead>
<tbody>
<tr>
<td>e.12th C.</td>
<td>4</td>
</tr>
<tr>
<td>m.12th C.</td>
<td>12</td>
</tr>
<tr>
<td>1.12th C.</td>
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</tr>
<tr>
<td>e.13th C.</td>
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</tr>
<tr>
<td>m.13th C.</td>
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</tr>
<tr>
<td>l.13th C.</td>
<td>70</td>
</tr>
<tr>
<td>e.14th C.</td>
<td>32</td>
</tr>
<tr>
<td>m.14th C.</td>
<td>4</td>
</tr>
<tr>
<td>l.14th C.</td>
<td>3</td>
</tr>
<tr>
<td>e.15th C.</td>
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</tr>
</tbody>
</table>

Σ 421
Fig. 6.2 Chronological changes in proportions of class 2 and class 3 combs on the evidence from the Troitsky site, trenches I-XII (1973-2000)

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Class 2b (154 items)</th>
<th>Class 2a (402 items)</th>
<th>Class 3 (184 items)</th>
</tr>
</thead>
<tbody>
<tr>
<td>e.12th C.</td>
<td>6</td>
<td>94</td>
<td>1</td>
</tr>
<tr>
<td>m.12th C.</td>
<td>5</td>
<td>71</td>
<td>3</td>
</tr>
<tr>
<td>l.12th C.</td>
<td>2</td>
<td>85</td>
<td>14</td>
</tr>
<tr>
<td>e.13th C.</td>
<td>9</td>
<td>64</td>
<td>45</td>
</tr>
<tr>
<td>m.13th C.</td>
<td>13</td>
<td>43</td>
<td>65</td>
</tr>
<tr>
<td>l.13th C.</td>
<td>34</td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td>e.14th C.</td>
<td>34</td>
<td>13</td>
<td>23</td>
</tr>
<tr>
<td>m.14th C.</td>
<td>35</td>
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<td>2</td>
</tr>
<tr>
<td>l.14th C.</td>
<td>16</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
Fig. 6.3 Double-sided composite combs featuring only one billet

D284

D312

D435
Fig. 6.4 Combs featuring a single row of rivets set at a low frequency

D30

D31

D406

D391
Fig. 6.5 Combs featuring two rows of offset rivets
Fig. 6.6 Combs featuring pairs of rivets set vertically or obliquely
Fig. 6.7 Combs featuring a single row of numerous rivets

D529

D192

D526
Fig. 6.8 Combs featuring two rows of numerous rivets
Fig. 6.9 Combs featuring two pairs of side-plates
Fig. 6.10 Variants of sinuous cross-sectional side-plates on the evidence from Lund (after Blomqvist 1943) and Novgorod

A-E - Blomqvist's variants

A  B  C  D  E

F  G
Fig. 6.11 Combs featuring flat rectangular cross-sectional side-plates

D160

D428

D180
Fig. 6.12 Proportions of rectangular and trapezoid class 3 combs

Σ 259 (239/120)

<table>
<thead>
<tr>
<th></th>
<th>0.31-0.40</th>
<th>0.41-0.50</th>
<th>0.51-0.60</th>
<th>0.61-0.70</th>
<th>0.71-0.80</th>
<th>0.81-0.90</th>
<th>0.91-1.00</th>
<th>1.01-1.10</th>
<th>1.11-1.20</th>
<th>1.21-1.30</th>
<th>1.31-1.40</th>
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<tbody>
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<td>53</td>
<td>47</td>
<td>12</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>trapezoid</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>18</td>
<td>43</td>
<td>31</td>
<td>15</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
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</table>
Fig. 6.13 Double-sided composite combs. Basic forms
Fig. 6.14 Rectangular outlined combs of squat and square proportions
Fig. 6.15 Late 12th - early 13th century trapezoid combs of squat, square and vertically elongated proportions
Fig. 6.16 Lavish curves featured on some concave (1) sided class 3 combs

D422

D172

D389
Fig. 6.17 Early 13th century comb and comb case with ornate end-plates

D381

D387
Fig. 6.18 Double-sided composite combs. Sizes

a) of complete specimens in the main forms

<table>
<thead>
<tr>
<th>Sizes (sq. mm)</th>
<th>rect.</th>
<th>trapez.</th>
<th>all</th>
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</thead>
<tbody>
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<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2250-2499</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2500-2749</td>
<td>3</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>2750-2999</td>
<td>4</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>3000-3249</td>
<td>12</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>3250-3499</td>
<td>14</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>3500-3749</td>
<td>16</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>3750-3999</td>
<td>15</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>4000-4249</td>
<td>4</td>
<td>4</td>
<td>4</td>
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<td>4250-4499</td>
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<tr>
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b) of complete specimens in the main proportional groups

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<th>other</th>
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<tbody>
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<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2250-2499</td>
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<td>6</td>
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<td>2750-2999</td>
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<td>11</td>
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<td>12</td>
</tr>
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<td>10</td>
<td>7</td>
<td>10</td>
</tr>
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<td>3250-3499</td>
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<td>3</td>
<td>2</td>
<td>3</td>
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</table>

Σ 259 (135/100/24)
Fig. 6.19 Sizes of class 2a combs and class 3 specimens of trapezoid outline and squat proportions

Double-sided composite combs of trapezoid outline

Sizes (sq.mm)

Σ 120

Double-sided composite combs of squat proportions

Sizes (sq.mm)

Σ 100

Simple combs in skeletal materials

Sizes (sq.mm)

Σ 1072
Fig. 6.20 Chronological changes in sizes of double-sided composite combs

<table>
<thead>
<tr>
<th></th>
<th>e. 12th C.</th>
<th>m. 12th C.</th>
<th>l. 12th C.</th>
<th>e. 13th C.</th>
<th>m. 13th C.</th>
<th>l. 13th C.</th>
<th>e. 14th C.</th>
<th>m. 14th C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large (S&gt;4759)</td>
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<td>3</td>
<td>6</td>
<td>20</td>
<td>17</td>
<td>14</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Medium (4087≤S&lt;4760)</td>
<td>0</td>
<td>1</td>
<td>10</td>
<td>17</td>
<td>16</td>
<td>9</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Small (S&lt;4088)</td>
<td>1</td>
<td>3</td>
<td>16</td>
<td>25</td>
<td>25</td>
<td>7</td>
<td>2</td>
<td>0</td>
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</table>

Σ 259
Fig. 6.21 Chronological changes in sizes of rectangular and trapezoid class 3 combs as well as contemporary class 2a combs

a) class 3 combs of rectangular outline

<table>
<thead>
<tr>
<th></th>
<th>e.12th C.</th>
<th>m.12th C.</th>
<th>l.12th C.</th>
<th>e.13th C.</th>
<th>m.13th C.</th>
<th>l.13th C.</th>
<th>e.14th C.</th>
<th>m.14th C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large (S&gt;4759)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>13</td>
<td>13</td>
<td>14</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Medium (4087&lt;S&lt;4760)</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>9</td>
<td>7</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Small (S&lt;4088)</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>9</td>
<td>10</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Σ 113

b) class 3 combs of trapezoid outline

<table>
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<tr>
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<th>e.12th C.</th>
<th>m.12th C.</th>
<th>l.12th C.</th>
<th>e.13th C.</th>
<th>m.13th C.</th>
<th>l.13th C.</th>
<th>e.14th C.</th>
<th>m.14th C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large (S&gt;4759)</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>7</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Medium (4087&lt;S&lt;4760)</td>
<td>0</td>
<td>1</td>
<td>8</td>
<td>11</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Small (S&lt;4088)</td>
<td>0</td>
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<td>11</td>
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</table>

Σ 94

c) class 2a combs

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<th>m.12th C.</th>
<th>l.12th C.</th>
<th>e.13th C.</th>
<th>m.13th C.</th>
<th>l.13th C.</th>
<th>e.14th C.</th>
<th>m.14th C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large (S&gt;4323)</td>
<td>17</td>
<td>22</td>
<td>23</td>
<td>31</td>
<td>19</td>
<td>14</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Medium (S 2476-4323)</td>
<td>90</td>
<td>87</td>
<td>107</td>
<td>58</td>
<td>27</td>
<td>16</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Small(S&lt;2476)</td>
<td>61</td>
<td>31</td>
<td>48</td>
<td>22</td>
<td>10</td>
<td>3</td>
<td>1</td>
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Σ 712
Fig. 6.22 Class 3 combs featuring billets in walrus ivory in combination with antler or bone side-plates.
Fig. 6.23 Common types of class 3 combs from the First Period

D32

D317

D407

D209
Fig. 6.24 Decorated class 3 combs from the First Period
Fig. 6.25 Undecorated combs of the Second Period

D83

D91

D142

D94

D221
Fig. 6.26 Combs with linear decorations from the Second Period
Fig. 6.27 Combs with RDB decorations from the Second Period
Fig. 6.28 Chronological and spatial distribution of class 3 combs on the properties of the Nerevsky End (Nerevsky site)

**First Period**

- imports

- low concentration

- medium high concentration (average and up to 50% above average)

- high concentration

**Second Period**

- imports

- low concentration

- medium high concentration (average and up to 50% above average)

- high concentration
Fig. 6.29 Chronological and spatial distribution of class 3 combs on the properties of the Liudin End (Troitsky site)
Fig. 6.30 Spatial distribution of class 3 combs deriving from the deposits of the First Period on the properties excavated within the Fedorovsky site.

Slavkova Street (from ca 1090)

- Imports

* low concentration

medium high concentration (average and up to 50% above average)

high concentration
Fig. 6.31 Repaired class 3 combs

D325

D26 D155

D156
Fig. 7.1 Repertoires of mutually common classes of combs in the medieval towns of Novgorod, Trondheim and Schleswig

<table>
<thead>
<tr>
<th>1a) Novgorod</th>
<th>1b) Trondheim</th>
<th>1c) Schleswig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Troitsky I-XII (deposits of the 11th-12th centuries)</td>
<td>'Folkebiblioteks' (deposits of the 11th-12th centuries)</td>
<td>'Plessenstraße' (11th-12th centuries)</td>
</tr>
<tr>
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<td><img src="chart1b.png" alt="Pie Chart" /></td>
<td><img src="chart1c.png" alt="Pie Chart" /></td>
</tr>
<tr>
<td>21%</td>
<td>3%</td>
<td>29%</td>
</tr>
<tr>
<td>75%</td>
<td>94%</td>
<td>57%</td>
</tr>
<tr>
<td>4%</td>
<td>3%</td>
<td>14%</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>2a) Novgorod</th>
<th>2b) Trondheim</th>
<th>2c) Schleswig</th>
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</thead>
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<tr>
<td>Troitsky I-XII (deposits of the 11th-14th centuries)</td>
<td>'Folkebiblioteks' (deposits of the 11th-14th centuries)</td>
<td>'Schild' (11th-14th centuries)</td>
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<tr>
<td>12%</td>
<td>1%</td>
<td>30%</td>
</tr>
<tr>
<td>25%</td>
<td>20%</td>
<td>35%</td>
</tr>
<tr>
<td>63%</td>
<td>79%</td>
<td>35%</td>
</tr>
</tbody>
</table>

Legend: class 1, class 2a, class 3
Fig. 7.2 Chronological distribution of combs on the evidence from the Troitsky site, trenches I-XII (1973-2000)
Fig. 7.3 Chronological changes in the comb repertoire in Novgorod on the evidence from the Troitsky site, trenches I-XII (1973-2000)