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THE ARCHAEOLOGY OF MEDIEVAL NOVGOROD

SERIES PREFACE

Novgorod is one of the most intensively and continuously studied urban sites in northern Europe. Systematic excavations began in 1932 and have continued almost every year since then. The excellent preservation of organic and inorganic material in its anaerobic soils, including the structural remains of streets, properties and buildings, has made it possible to study entire quarters of the town as well as the activities of its inhabitants. With deposits up to 8 m deep in places and with well-dated sequences from the early to mid 10th century, its importance to the study of both medieval Russia and the development of Europe cannot be over emphasized. In addition, excavations have recovered many examples of the organic remains normally lost to archaeologists, including a stunning collection of birch bark letters, unique written documents of the medieval period, which now number over a thousand separate inscriptions. Because of this the site has received attention from scholars with a wide range of specialisms from differing fields including medieval archaeology, history, architecture, botany, zoology and linguistics.

This publication series presents some of the recent results obtained from international, multidisciplinary projects supported by various European universities and institutions into the origins and development of the medieval town and its hinterland. With the support of EU funding via INTAS (the International Association for the Promotion of Scientific Collaboration between the EU and former Soviet Union countries), a number of projects were initiated which have used the Novgorod area as a test bed for wider issues concerning urban origins, town-hinterland relationships, environmental analyses, trade connections, accurate chronologies, innovative artefact studies, and the development of accounting systems and the spread of written language.

These publications are the outcome of collaborative projects that have their origins in the mid 1990s when funding was obtained from INTAS to set up an international collaboration into aspects of medieval towns and their hinterlands in NW Russia. Most of the field work took place from 1993 to 2004 in and around Novgorod, but includes material from other key sites in the area such as Ryurik Gorodishche, Staraya Russa, Pskov and sites, such as Minino, in the Byeloozero region on the northern margin of the territory of Novgorod (a territory that comprised the city’s own medieval state, known as Novgorod Lands, which at its height covered an area larger than modern day France).

The volumes in this series cover some of the topics currently being investigated by the Novgorod Archaeological Research Centre with the support of INTAS-funded projects and focus on the following aspects of medieval Novgorod and its region:

- The pottery from medieval Novgorod and its region (published 2006)
- Wood use in medieval Novgorod (published 2007)
- Animals and archaeology in northern medieval Russia: zooarchaeological studies in Novgorod, Gorodishche and Minino (forthcoming)
- The archaeology of Novgorod in its wider context: a study of the town, its hinterland and its territory (this volume)
The first two volumes contain papers on key materials, namely pottery and wooden artefacts. Whilst elsewhere throughout Europe pottery tends to take the lion’s share of attention and wood less so, partially due to its lack of survival, in Novgorod this position is reversed. Wood survives in abundance and what’s more it was used prolifically for artefacts, fuel, buildings, fences, and even streets, making it the key means of dating site levels by extensive use of dendrochronology. As pottery has never been relied on for dating purposes, its typological and scientific study has lagged behind ceramic studies in Western Europe. For this reason the pottery volume in this series has attempted to set out some preliminary findings as well as discussing differences in methodology, sampling and analysis.

It is the intention that the third volume in this series on zooarchaeological aspects of recent work in Novgorod and the Novgorod Lands will follow on from those on pottery and wood to raise issues to do with recording, sample selection, methodology, and the integration of animal studies into the social and economic context (for example the fur trade and butchery practices), as well as discussing the differences and similarities in the material from the town, its hinterland and its wider territory.

Turning to this particular volume, it was the intention from its inception that this work would include papers by both Russian and non-Russian specialists on aspects of the environmental and technological context of the relationship between urban centre and rural hinterland. This was always going to be a tall order with so much data in most areas, yet little systematic study of key materials such as pollen, animal bones, plant remains, insects, leather, and pottery. Inevitably there were essential matters to deal with first, such as sampling strategies and methodologies, something which is widely acknowledged in many of the papers contained in this volume. In this sense, this collection of papers is best viewed as a starting point for attempting to put Novgorod into a wider context. It does certainly not claim to be definitive, far from it. But if it serves to begin and extend discussion of these issues and brings some of the enormous wealth of evidence to a wider audience, then it will have succeeded.

As to the structure of this volume, it begins by examining the environmental context for the settlement pattern that developed from the 9th to 15th centuries and examining the role that various natural resources had in contributing to that pattern. After a general paper on the natural environment based on a recent palynological study commissioned as part of this project, it presents data from three study areas (the first in the Byeloozero area to the NE of Novgorod; the second in the immediate hinterland of Novgorod and the third within Novgorod itself). It will consider what, where and how certain natural resources were exploited during the medieval period in these areas. Where possible, it will also attempt to explain the processes by which these resources were produced as commodities (via craft production, centralised workshops, household production, specialised settlements, etc) and place the evidence from the three other volumes on ceramics, wood use and zooarchaeology into a wider context, concentrating on the exploitation, manufacture and consumption of these and other materials.

Mark Brisbane
Bournemouth
An offprint from

THE ARCHAEOLOGY
OF MEDIEVAL
NOVGOROD IN CONTEXT

Studies in centre/periphery relations

Edited by

Mark A. Brisbane, Nikolaj A. Makarov
and Evgenij N. Nosov

With Russian translations
by Katharine Judelson

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## CONTENTS

List of Illustrations  xi  
List of Tables and Charts  xv  
Editors’ Preface  xvi  
Editors’ Acknowledgements  xxii  
Contributors  xxiii  
Timeline  xxv  
Dedication  xxvi  

**Introduction**

1 Medieval Novgorod in its wider context  
   M. A. Brisbane, N. A. Makarov and E. N. Nosov  

**The Environmental Context**

2 Results of palynological investigations of the archaeological sites in the Lake Ilmen and Lake Kubenskoye study areas  
   E. A. Spiridonova and A. S. Aleshinskaya  

**The Periphery of Novgorod Lands: A case study from Minino, Byeloozero**

3 The Minino Project: The investigation of a group of medieval sites in the Byeloozero region of northern Russia  
   N. A. Makarov  
4 Buildings and structures of the Minino archaeological complex  
   S. D. Zakharov  
5 The manufacture of metal jewellery in rural settlements on the north-eastern fringe of medieval Russia  
   I. E. Zaitseva  
6 Medieval pottery from the Minino archaeological complex  
   M. L. Mokrushin  
7 Glass beads from the Minino archaeological complex  
   S. D. Zakharov  

**Novgorod’s Hinterland including Ryurik Gorodishche**

8 The natural environment and settlement patterns of the Lake Ilmen region in the last third of the first millennium AD  
   I. I. Yeremeyev  
9 Bronze working at Ryurik Gorodishche and other settlements in the region north of Lake Ilmen in the 9th and 10th centuries  
   N. V. Khvoshchinskaya
<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td>Ferrous metallurgy in the territory around Lake Ilmen at the end of the first and the beginning of the second millennium AD</td>
<td>172</td>
</tr>
<tr>
<td></td>
<td><em>S. E. Toropov</em></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>An analytical study of iron slag from the Novgorod hinterland</td>
<td>185</td>
</tr>
<tr>
<td></td>
<td><em>M. Martinón-Torres and Th. Rehren</em></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Investigating social change in 12th–13th century Novgorod using slag inclusions</td>
<td>195</td>
</tr>
<tr>
<td></td>
<td><em>D. Jeffrey and Th. Rehren</em></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Metal melting crucibles from medieval Novgorod</td>
<td>210</td>
</tr>
<tr>
<td></td>
<td><em>N. Eniosova and Th. Rehren</em></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>The production of textiles in Novgorod from the 10th to the 14th centuries</td>
<td>224</td>
</tr>
<tr>
<td></td>
<td><em>E. K. Kublo</em></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Varieties of timber used to make wooden artefacts in Novgorod: a short case study</td>
<td>259</td>
</tr>
<tr>
<td></td>
<td><em>L. N. Solovyova</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>E. Reilly</em></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>Perspectives on non-wood plants in the sampled assemblage from the Troitsky excavations of medieval Novgorod</td>
<td>283</td>
</tr>
<tr>
<td></td>
<td><em>M. Monk and P. Johnston</em></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>The plant economy of northern medieval Russia</td>
<td>321</td>
</tr>
<tr>
<td></td>
<td><em>A. Alsleben</em></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>From <em>Alces</em> to <em>Zander</em>: A summary of the zooarchaeological evidence from Novgorod, Gorodishche and Minino</td>
<td>351</td>
</tr>
<tr>
<td></td>
<td><em>M. Maltby</em></td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>The fur trade in the economy of the Northern Borderlands of medieval Russia</td>
<td>381</td>
</tr>
<tr>
<td></td>
<td><em>N. A. Makarov</em></td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>Leather working in North-West Russia</td>
<td>391</td>
</tr>
<tr>
<td></td>
<td><em>A. V. Kurbatov</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Appendix A: Leather objects from Troitsky XI, Novgorod by <em>D. I. Solovyov</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Appendix B: Preliminary identification of leather fragments from Novgorod excavations (1991–2001) by <em>D. Sully</em></td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td>Pottery production in the Novgorod region: Local traditions and foreign influences</td>
<td>425</td>
</tr>
<tr>
<td></td>
<td><em>T. Brorsson</em></td>
<td></td>
</tr>
</tbody>
</table>
23. Indicators of craft specialisation in medieval ceramics from North-West Russia
   C. Orton

24. Evidence concerning craft production in the birch-bark documents of Novgorod
   E. A. Rybina

List of Abbreviations
References
Index

CD-ROM (inside back cover)
Index to CD-ROM

Ch. 2 Spiridonova & Aleshinskaya:
Pollen diagrams for all profiles studied
Micro-photographs of pollen grains
Notes on present day vegetation in the Lake Ilmen area

Ch. 5 Zaitseva:
Table of results from analyses of copper alloy objects

Ch. 7 Zakharov:
List of references to unpublished archives used in this chapter

Ch. 8 Yeremeyev:
Details of the nine areas in the Lake Ilmen area considered within the chapter

Ch. 16 Reilly:
Photographs and identifications of insect remains
Species list for all samples from Troitsky XI, XII and XIII, Novgorod

Ch. 17 Monk & Johnston:
Plant remains tables
List of samples analysed
List of taxa found with common names

Ch. 18 Alsleben:
Supporting tables: plant species from sites studied
EDITORS’ PREFACE

The material in this volume, which is the fruit of collaborative research involving Russian and western European archaeologists in the framework of projects funded by INTAS, and initiated and co-ordinated by Mark Brisbane, has made it possible to bring together studies of medieval urbanization and the settlement of rural territories. It addresses specific questions raised by research aimed at piecing together economic activity and production in both towns and a range of rural settlements. Collectively the papers shed light on many aspects of the medieval economy and the cultural landscape of the northern part of Eastern Europe, which had not previously been the object of close study. In addition, they attempt to achieve a more profound and integrated interpretation of Novgorod’s economic base and its utilization of resources from the centre and margins of its territory, in the development of its economy and general prosperity.

None of this study would have been possible without the dedicated research and investigation undertaken by the Novgorod Archaeological Research Centre, supported by the Novgorod State Museum, the Dept of Archaeology of Moscow State University, the Institute of Archaeology (Moscow), and the Institute for the History of Material Culture (St Petersburg). Their achievements in conducting large-scale, open-area excavations continuously since the late 1940s, as well as an excavation pedigree stretching back to 1932, has extended the rich data base for this site to such an extent that they can justifiably claim to have created one of the largest archives and collections on a medieval European city and its hinterland. Through various INTAS-supported projects (Brisbane 2001) it has been possible to bring together specialists from other parts of Europe to work collaboratively on this material.

After an introductory chapter which attempts to sketch out the historical and geographical context of the Novgorod Lands, the volume moves on to a paper by Spiridonova and Aleshinskaya presenting readers with the results of their palaeobotanical research carried out in two historically significant micro-regions: (a) the area around Lake Ilmen near the fortified settlement of Ryurik Gorodishche and (b) the area around Lake Kubenskoye, where the Minino settlements have been identified and excavated. This palynological research has made it possible to piece together a detailed picture of the landscape in the two areas, at the time when settlements were being founded, and has also shown that subsequent changes in the vegetation and natural environment were determined to a significant extent by the impact of human activity. Comparisons of ranges of palynological materials from similar periods show that the emergence of an agrarian landscape around Lake Ilmen began 200 years earlier than it did in the area around Lake Kubenskoye. The results also show that the banks of the River Volkhov near the place where it emerges from Lake Ilmen,
Figure 1 Map showing the location of Novgorod, Lake Ilmen, Minino on Lake Kubenskoye in the Byeloozero region and other places for location purposes. Drawn by John Hodgson and Mark Dover.
constituted a semi-open landscape, in which woods alternated with meadows, in contrast to the wooded landscape around Lake Kubenskoye.

Five chapters are devoted to the archaeological materials from the Minino Archaeological Complex on the shores of Lake Kubenskoye, which was investigated by a team of archaeologists led by Makarov. This area can be seen as a model of a rural micro-region in the northern margins of medieval Russia. Strictly speaking, this area lies just beyond the confines of the Novgorod Lands, but as has been demonstrated by the artefacts found there, the settlements around Lake Kubenskoye were closely linked both economically and culturally with North-Western Russia in the 11th and early-12th centuries. The extremely thorough study of the medieval settlements and burial grounds in the Minino micro-region makes it possible to piece together a detailed picture of the economy, culture, commodity exchange and palaeo-environmental
aspects of the colonization of that region. These sites are of key importance for the interpretation of relations between centre and periphery, and the influence of towns and international trade on the economy and culture of remote rural areas in the North of Russia (see various papers in Makarov 2007 and 2009).

Four chapters are devoted to Ryurik Gorodishche and the area around Lake Ilmen, which formed the original nucleus of the Novgorod Lands and were later to constitute the nearest resource base for the enormous medieval city of Novgorod. The role of Ryurik Gorodishche, as the earliest urban centre in the vicinity of Lake Ilmen, and the precursor of Novgorod, has been convincingly expounded by Nosov (1990). Features of medieval settlement in the area around Lake Ilmen, the culture of the early medieval settlements and the way in which agriculture was developed in this area have already been examined in detail (Nosov 1991: 5–37; 1992: 5–65). The chapter by Yeremeyev published here attempts to create a comprehensive map of Early Slavonic sites near Lake Ilmen, and to analyse the natural conditions encountered by the inhabitants of those settlements. The research also endeavours to identify separate rural micro-regions and to single out the main historical-geographical patterns underlying the settlement of that territory at the end of the first millennium AD. The chapter by Khvoishchinskaya examines jewellery production at Ryurik Gorodishche and other settlements near Lake Ilmen. The author demonstrates that although jewellery was being made in other settlements as well, the main centre for its manufacture was Ryurik Gorodishche, where craftsmen were making jewellery of both Slavonic and Scandinavian types and setting standards for a new material culture in the area around Lake Ilmen from the late 8th century onwards. The chapter by Toropov examines for the first time the evidence of iron production in the settlements around Lake Ilmen, which are important for any evaluation of the economic potential of the environs of Novgorod in the 10th to 13th centuries.

Six chapters are devoted to palaeo-environmental materials and the remains of production from Novgorod, which shed light on the consumption and economic activity of its citizens. Research into the leather articles, remains of textiles, household articles made of wood and metal slags found in the city enables us to appreciate Novgorod as a centre of craft production and consumption, which required a wide range of raw materials and resources to be able to produce such an enormous amount of craft articles. Clarification of the specific origins of various raw materials and completed craft articles, which made their way to Novgorod, is an interesting research subject, on which work has so far only just begun.

The final seven chapters are integrative papers which look at various materials. The first of these by Alsleben concerns plant remains, specifically domesticated cereals from Novgorod’s hinterland and from the sites around Minino. This paper should be compared to the study from Novgorod by Monk and Johnston who have made tremendous inroads into the abundant material from the town. There is also a group of papers on the zooarchaeological remains summarised by Maltby (for a full account of this material see Volume 3 in this series), the fur trade by Makarov and the leather-
Figure 3 Plan of Novgorod showing the five Ends (Districts), the ramparts (cross-hatched), the street layout (known medieval streets in black and modern grid pattern dotted), and the location of excavations undertaken from 1932 to 2001. Based on plans supplied by the Novgorod State Museum. North is to the top.
working industry by Kurbatov, which taken together offer some significant insights into the way in which animals were exploited during this period. There can be little doubt of the importance of the fur trade to the economic success of Novgorod, but these studies show a wider context for a range of economically vital animal products and attempt to move towards a holistic study of these resources.

There follows two papers on pottery and specialisation. The first of these by Brorsson examines some of the local and foreign influences in the ceramic tradition of NW Russia in this period, while the second by Orton is a fresh look at the concept of specialisation applied to the rather conservative styles of medieval Novgorodian pottery. The final chapter by Rybina presents the evidence for craft production contained within the famous birch-bark documents of Novgorod. These stunning documents now total over 1000 individual finds from excavations within the city and are an invaluable source of information on this and many other topics.
BACKGROUND TO THE STUDY

Since the late 1950s, when Kiryanov undertook a study to identify the main cultivated plants from the Novgorod excavations, there has been an awareness of the important insights that could be gained about medieval agriculture and diet from the organic debris that make up the deep archaeological deposits of this incredible site (Kiryanov 1959 and 1967; Kiryanov in Thompson 1967, 87–92; also general studies for northern Russia Kiryanova 1979). While this project was large in scale (identifying numerous carbonized grain and cultural plant remains), its focus was not the mass of plant debris, including wood waste, which made up the major part of the anoxic deposits that formed the archaeology of this unique site. A study of this organic debris could offer considerable potential not only to provide detail of on site activities but also the environment in which these took place.

An exploratory statement of the potential of the Novgorod deposits for environmental study, along with other contexts in the region, was initiated by the Christian-Albrecht University of Kiel in Germany with the Universities of Uppsala and Stockholm in Sweden and published in 1993 (Alsleben et al. 1993). Alsleben has subsequently undertaken systematic sampling of a number of other sites of mostly earlier date in the region with the intention of exploring changes in crop husbandry through time, especially those associated with the Slavic people (see this volume and Alsleben 2001). A more specific programme of environmental work, targeting the Novgorod excavations at Troitsky was initiated in 1994. Funded by INTAS, the aim was the investigation of the relationship between Novgorod and its hinterland. The systematic plant remains study of Troitsky XI, which forms the basis of the present paper, was part of this study. Preliminary results of the work were published by us in 1996, 1998 and in a collective work in 2001 (Monk 1996; Johnston and Monk 1998; Monk and Johnston 2001). The taxa lists and other supporting data are to be found in a CD-ROM within this volume.
Sampling and Extraction

Bulk samples of between four and six litres of dug deposit were taken from different context complexes, as identified by ourselves but by reference to the excavators. Sampling was therefore strictly on the basis of judgement. Three to four litres of each sample were passed through a series of geological sieves with the aid of water. The purpose was to fractionate (but not mechanically break down) their content into manageable sizes for quantitative assessment and description. In addition one litre sub-samples were taken from the primary samples and micro-processed, also using wash-over but using three brass laboratory sieves of decreasing mesh sizes: 1 mm, 500 and 250 microns. A further sub-sample of between 50 and 250 ml (depending on scanned incidence of remains) was taken from the organic material retained on each sieve. This was then sorted using a stereoscopic microscope with a magnification range between ×7 and ×12.5. A micro-scale description was made of the deposit content to complement the macro-scale description and identifiable remains were extracted.

As noted, the samples were taken on site from various context complexes and these included: (i) building interiors – above and below floors; (ii) within cavity walls of buildings; (iii) yard areas; (iv) areas exterior to buildings and between them; (v) boundary fences; and (vi) edges and surfaces of roads. The density of remains extracted per sample varied from between 600 to 3,000 items per litre of sampled deposit, although the actual number of extracted remains was much less, given that most micro-sorted samples were for the most part less than a litre in volume.

Nature of the Deposits

The deposits consisted of varying amounts of, mostly, fibrous plant material, the majority of which were plant stems and wood fragments (including many chips from constructional carpentry). These showed varying degrees of abrasion, encrustation and decay. The macro-description that accompanied the sampling and primary processing of the samples also noted a broad size range, but generally small amounts of charcoal, except in areas of burning as around the ovens. Overall there was very little inorganic material, with occasionally some fine silt and sand. At the micro-scale, noted during the sorting the fine fraction of the processed samples, there was a moderate to high incidence of finely fragmented plant material, including both fibrous (wood and stems of herb plants) and vegetative remains, in amongst which there was a largely moderate to high incidence of anaerobically preserved, distinctively shaped, seeds and fruit remains. The discussion of the analyses of these remains forms the focus of this study.

In addition the samples taken produced occasional charred grains. In a couple of cases where the deposits were mostly burnt, more charred grain was found (for example samples 19 and 81 on Troitsky XI and samples 1–3 on Troitsky XII). The incidence of faunal remains, while often present, also varied from one sample to another and included small mammal bone, small bones of large mammals and fish.
bones. At the micro-scale the faunal evidence was in the form of insects, including especially fragments of beetles and fly pupa (see Reilly this volume and Endnote 1).

The Identifiable Remains
The identified seed and fruiting body remains are listed for each sample and are to be found on the accompanying CD-ROM.

The samples came from spatially distinct context groupings and from stratigraphically definable horizons. Overall the remains from all horizons and different contexts can be grouped on the basis of whether their presence can be interpreted in a primarily cultural way or on the basis of the plant habitat information that can be deduced. From such a division the following groups have been distinguished:

(i) remains of cultivated plants
(ii) remains of those plants that may have been intentionally gathered
(iii) remains of plants from disturbed or waste ground
(iv) remains of plants of damp ground and standing water

PLANTS: THEIR HABITAT, ITS INTERPRETATION AND SITE ACTIVITIES

The majority of the identified seeds, fruits and grains were from plants that either grew on or within the immediate hinterland of the site. They represent several different habitats. The gathered seeds and fruits were mostly from under-story plants that grew around the edges of woodland and may also have formed field margins. A further significant group of remains represent plants that would grow close to slow flowing water and in damp meadows.

The Spatial/context Complex Representation of Diaspores of Plants of Disturbed and Nitrogen Rich Ground

A significant number of seeds present were from plants that are what are now termed ‘ruderals’ to be found in disturbed ground around human habitations and in fields as crop weeds. While many plants can become weeds of cultivated ground, depending on specific local conditions, the majority of those identified as being present (specifically in the Troitsky XI samples) were what might be called ‘classic weeds’ including several members of the Polygonaceae family (Polygonum aviculare, P. persicaria, P. lapathifolium/ lapathifolia, P. persicaria/maculosa and Fallopia convolvulus), the ubiquitous Chenopodium album as well as Chenopodium glaucum-rubrum, Silene nutans, Stellaria media, Circium sp, Urtica dioica, Urtica urens, Galeopsis tetrahit, Lapsana communis, Spergula arvensis, Anthemis cotula and Papaver rhoeas (habitat data based on entries in Clapham et al. 1981, 39, 80, 83, 94, 101, 206–8, 212, 291, 331, 340–42, 345; Tutin et al. 1964, 68, 78–9, 81, 93, 94, 134, 146, 154, 164, 248). All the above, except Papaver sp, Spergula arvensis and
Cirsium sp., were found throughout the samples irrespective of time, context, feature type, etc.

It is perhaps no surprise that Chenopodium album was found in 57 of the Troitsky XI samples and four of the nine samples from Troitsky XIII. It is quite an adaptable plant and may well have thrived in the conditions on site (see below for discussion). This could also have been the case for Polygonum/ P. lapathifolium/lapathifolia, P. aviculare and Urtica dioica (noted in Clapham et al. 1981, 212, 250–1,257; Stace 1995, 144, 226, 230).

Of those weed plants listed that do not have the same frequency, specifically Papaver sp., Spergula arvensis and Cirsium sp., the majority occurred within buildings (six out of six contexts for Spergula arvensis and three of four for Papaver sp.;) as indicated in Figure 17.1. However, on Site XIII both Spergula arvensis and Papaver sp. came from samples taken between two closely set building walls (Spergula arvensis in sample 6 and Papaver in samples 1 and 4). In the case of Cirsium sp. one sample was from within a building while the other was between the walls of the building that produced Spergula and Papaver sp.

For two further weeds, Lapsana communis and Urtica urens, which have a moderate incidence of remains in the samples, seem to be found almost evenly in exterior and interior contexts on Site XI. On Site XII only one sample produced both species and this was taken from within a building (ELS1 sample 16 from below the south wall of structure (3)/(4). On Site XIII Urtica urens came from two of the nine samples (samples 2 and 5 – one between buildings and the second within a building). Lapsana communis was found at a reasonable incidence within five samples, only one of which was within a building (sample 5). (See below for a discussion of possible habitat

![Figure 17.1 Distribution of infrequent weeds.](image-url)
adaptation of *Lapsana communis* and *Urtica urens*).

Taking all the weed species together it does seem that there was a preference for crop processing waste to accumulate within buildings or, alternatively, it is possible that straw containing these seeds as contaminants was being used for bedding inside the buildings. For the most part, as far as the rest of the species in this habitat grouping are concerned, there seems to be little significance in their distribution. This may mean, as implied earlier, that these plants, although deriving from rural waste and cultivated areas, had become naturalized in the town and were contributing their seeds to the steadily accumulating debris that also included byre and household waste (see below for discussion of this possibility).

Of all the samples taken from Site XI, only nine did not produce any evidence of cereals or millet (samples 4, 50A and B, 59, 62, 85, 99, 100 and 103). However, several of these produced seeds of plants that could occur as crop weeds, in particular sample 103 that produced *Spergula arvensis*, *Lapsana communis*, *Polygonum aviculare*, *P. lapathifolium*, *Silene nutans*, *Galium palustre*, *Chenopodium album* (although see below for discussion of the latter species and its more likely habitat choice in this context). On Site XIII three of the samples (6, 7 and 9 – all from between the walls of two buildings) did not produce remains of cereals or millet, though they all produced weed species. Sample 2 on Site XIII was also devoid of cereals and millet apart from fragments of straw.

Cereals and millet were absent from Sample 103 on Site XI but it did produce a high incidence of wetland species particularly *Alisma plantago-aquatica*. *Spergula arvensis* was found in three other samples on Site XI that not only produced evidence of cereals (straw or glumes or grains) but also produced seeds of other plants that, within their range, could be described as weeds. These were samples 5, 57 and 86. Sample 5 produced evidence of *Raphanus raphanistrum*, *Stellaria* sp., *Galeopsis* sp., *Anthemis tinctoria* and *Senecio* sp. Sample 57 contained *Fallopia convolvulus*, *Silene nutans*, *Lapsana communis*, *Chenopodium album*, but also millet husks and cereal straw. Sample 86 in common with 57 also had *F. convolvulus*, *C. album*, *Silene nutans* and *Lapa communis* and *Galeopsis* sp. as well as cereal straw and millet husks. This sample also produced evidence of emmer wheat (*Triticum dicoccum*) glumes and barley (*Hordeum* sp.) rachis.

There were, in addition, 17 samples from Site XI that, although they did not produce evidence of other cereals did contain millet including its husks. Several also had a range of weed seeds. These samples included 5, 48A and B, 49, 60, 64, 73, 75, 83A and B, 93, 94, 95, 97, 98, 104, 106 and ELS 13 Site XII. It may be of some significance that all these samples (other than sample 5) came from the older deposits on the site. Other than this, there seems to have been no pattern in terms of the contextual location of weeds and chaff remains.

Alsleben has expressed some degree of surprise to the authors of this study that no finds of *Agrostemma githago* have been made, especially given its association with the increased adoption of rye cultivation on sites in western Europe from the 10/11th century and the adoption of a three field rotation system (see discussion of later
medieval samples from Site XII below and Endnote 2). Perhaps the explanation for this lies in the cropping regime practiced. Early germinating weeds such as Agrostemma githago were associated with winter-sown crops such as rye (Secale cereale). Possibly the absence of Agrostemma githago in the Novgorod samples indicates that rye was not sown until spring, perhaps because of the harsh winters in this region (see Endnote 3).

However, Almuth Aleleben (pers comm) has pointed out that other areas of northern Europe, with similar climatic regimes to this area of Northern Russia, plant rye in the winter and would have Agrostemma githago as a contaminant. Kiryanov in earlier reports viewed rye as being winter sown and while there is no mention of Agrostemma githago the point is made that 75% of the weed seeds in the rye crops are from plants that are said to indicate winter sowing, including Nipplewort (Lapsana communis) and wild oat (A.fatua) (see Endnote 4).

In the latter case there seems to be confusion with Bromus secalinus which is a key contaminant of rye crops and a usual indicator of winter sowing (Kiryanov in Thompson 1967, 90). Alsleben has noted in our discussions that an earlier study, by Linkola of recent plant communities north of Lake Ladoga in Finland, did not mention Agrostemma githago as a weed contaminant of rye (Linkola 1916). It is therefore possible that a completely different suite of weeds, as implied by Kiryanov, are associated with winter sown crops in this area. Alsleben is also of the opinion that the length of the fallow period could be a factor in the almost total absence of Agrostemma githago. The samples from one context on Site XII (see below and Alseleben this volume) did however have a high incidence of grasses especially Apera spica venti, but also the presence of Rhinanthus (yellow rattle), a plant common in meadows and pastures, which might imply that the rye was sown in fields that had sufficiently long fallow period for grasses to be come established from nearby meadows. Kiryanov notes that rye was sown in fallow fields and perhaps in Novgorod’s case these areas to the south were also former meadows (Kiryanov 1967, 90).

The Spatial Context of Diaspores of those Plants associated with Damp/Wet Ground

The majority of the identifiable plant remains in the samples can be compared with plants that can be found in damp areas and natural meadows in the present: habitats that still exist to the south west of Novgorod today (known as the Poozerie). Many of these plants, as represented by their seeds, could also have become naturalized on the site during the time of occupation. These included Ranunculus sp., (R. repens; R. acris; R. scleratus), Thalictrum flavum, Oenanthe aquatica, Apium sp. (inundatum and graveolens), Mentha arvensis and M. aquatica, Bidens tripartita, Alisma plantago-aquatica, Potamogeton sp., Juncus sp., Typha sp., Eleocharis palustris, Carex sp. Filipendula sp. Of these the most frequently identified species and taxa, irrespective of context, were Ranunculus scleratus, Mentha sp., Alisma plantago-aquatica, Juncus sp., Eleocharis palustris and Carex sp. Most of these had a particularly high frequency, although the actual numbers
per sample varied considerably. The species with the highest frequency throughout were *Ranunculus scleratus* and to a slightly lesser extent *Alisma plantago-aquatica*; the former producing a particularly high incidence in three byre samples and two road samples on Troitsky XI (sample numbers 89, 90, 91, 93 and 106). *Ranunculus scleratus* also had a significant presence in three of the nine samples from Troitsky XIII (samples 2 and 3 from between two buildings and notably sample 5 from within a structure with leather off-cuts). Samples 73 (an exterior sample from between a building and a property boundary) and 102 and 103 (both building interiors at a low level in Site XI’s stratigraphy) produced the highest incidence of *Alisma plantago-aquatica*. Only in one sample on Site XIII (sample 9) was *Alisma plantago-aquatica* significantly present. Both species occur in quite damp situations on mud or, in the case of *Alisma plantago-aquatica*, in shallow water, both highlighting the quite damp conditions underfoot or near the site (see Endnote 5).

*Ranunculus scleratus* is also known to be a common nitrophilous plant occurring in moist to wet nutrient rich open ground on the edge of areas of muddy standing water, in other words areas that could be inundated with water from time to time, possibly colonizing areas as the water receded (Hall *et al.* 1983, 214; Tüxen 1950, 108; Poli and Tüxen 1960; and see below for further discussion).

In addition *Eleocharis palustris* occurs in similar locations but particularly in marshy ground and ditches. *Eleocharis palustris* had a consistent presence in most samples from all sites with particular significance in samples 17, 58 and especially 62, 63, 80 and 84 for Site XI and sample 9 for Site XIII).

Of the lesser represented genera, *Potamogeton* sp., the pond weeds, as their name implies, are also to be found in shallow water in ponds and puddles, further reinforcing the interpretation of the local habitat and the surrounding area. The incidence of this plant across the site was relatively low, except in sample 63 and ELS sample 79 from woodworking waste in a wall cavity on Site XI, where it was very frequent. The distribution of *Eleocharis palustris* on Site XI indicated a significant preference for interior locations. The same is true for the distribution of two other species *Ranunculus acris* and *Thalictrum flavum*, but far less so. Both are common species of meadows and both were found at a low incidence in a number of contexts (see Figure 17.2). Amongst them, both species, were found in byre samples 89 and 91, highlighting the likelihood that at least this deposit included ‘saved’ hay and, unlike the others from which these species and the others (discussed above) were found, was not a mixed infill but was an *in situ* deposit. The study of the insect remains from one of these samples (91) produced a high incidence of species that would occur in the foul conditions associated with stable manure although there was a lack of true dung beetles (see Reilly this volume). The likelihood that these samples included plants from a damp field edge is suggested by the high incidence of *Bidens tripartita* (particularly in sample 89), a plant found locally in ditches, ponds or streams (Clapham *et al.* 1981, 383; Stace 1995, 890).

There was relatively little overlap in terms of high frequency of the different
wetland species across the site. However, there was some overlap, for example in sample 62, which produced a significant incidence of *Eleocharis palustris*, *Juncus* sp., and *Alisma plantago-aquatica*. Sample 63 also produced an overlap for *Potomegeton* sp., *Juncus* and *Ranunculus scleratus* and *Bidens tripartita*. There was also a significant overlap in wetland species in the byre samples (89–93, especially 89).

**Figure 17.2** Distribution of damp-land plants.

Chronological Changes in Proportions of Seeds from Damp Land

An interim statement on the nature of the plant remains in deposits from Troitsky XI by Monk and Johnston (2001, 116), suggested that there was a “relatively higher incidence of seeds from plants of damp ground in the lower deposits on site, as might be expected given the lower topographical position of these deposits.” The statement was instinctual rather than statistical and required further investigation. To this end, a graph of the variation in the percentage of damp land plants against time was plotted (see Figure 17.3).

The results imply that although the earliest samples contained relatively high proportions of seeds from damp land plants, these were gradually declining as time progressed. There are, however, anomalous results from early 13th century samples where suddenly the number of damp land plants increased again.

Stratigraphic information suggests that the site flooded periodically and its low-lying situation explains the higher frequency of damp land plants in the earliest samples. The results plotted here generally support the idea that the retrieval of seeds from damp land plants decreased with time; as cultural material accumulated at the site, the level of the site rose and the frequencies of damp land plants in the samples
decreased. This suggests that a significant quantity of the damp land seeds retrieved were from plants that were growing in the immediate area. However, the picture is probably complicated by the importation of material from nearby damp meadows, for example material used for roofs and floors in the buildings, for animal bedding and for fodder. This brief examination of the percentages of damp land plants illustrates that a purely chronological method can produce a significant incongruity, a danger inherent in any approach that ignores a contextual understanding of the samples. This point has also been made in the examination of the insect remains from the site, (e.g. Reilly and Johnston 2002 and Reilly this volume). Consideration of the context of the macro remains is vital to the interpretation of the results (see Figure 17.2).

Other Species Represented by a Low Incidence of Seeds
On the basis of the presence of their seeds a number of other species were found in the Troitsky samples, but for the most part these were at a low incidence. Their habitats covered the same range as those plants more numerously represented and included (a) waste and cultivated ground; (b) damp areas and areas of shallow water; (c) grass

Figure 17.3 Percentage of damp-land seeds in samples (omitting sample 62).
and heath land; and (d) woodland margins. Amongst these plants the ‘ruderal’ and waste ground group are well represented by *Rumex crispus* (sample 52), *Atriplex* sp., particularly *A. patula* (samples 49, 50A and B, 52, 54A and B, 57, 60, 61, 62, 63, 74, 75, 106, 107, 108 and ELS samples 34 and 77), *Raphanus raphanistrum* (sample 5) and *Potentilla* sp., (samples 1, 2, 3, 4, 5, 17, 19, 29, 48A and B, 50A, 52, 61, 54A and B, 57, 58, 59, 62, 63, 74, 83A and B, 84, 88, 91, 95, 97, 99, 100, 101, 107, 108 and ELS samples 13 and 34; Site XIII – samples 1, 2, 3, 5 with *Potentilla anserina* from samples 2, 4 and 9). Several species do come into various habitat groups but would be common in grassy places and these included *Rumex acetosella* (sample 58 on Site XI and 1, 2 and 6 from Site XIII), *Stellaria gramineae* (samples 4, 5, 19, 48A, 52, 106 and 108; sample 6 from Site XIII), *Dianthus* sp., (sample 48A from a boundary fence, 49, 62, 86, 91 and 103) and various members of the Gramineae family (e.g. cf *Bromus* sp, cf *Lolium* sp.) from samples 3, 17, 48A, 50A, 57, 61, 62, 72, 73, 81, 84, 86, 87, 90, 92, 97, 98, 103 and 104. Of the grasses the most frequently identified group were members of the *Setaria* genus including *Setaria viridus* (samples 86 and 87 from Site XI), *Setaria glauca* (72, 83A and B, 97 and 98 from Site XI) and *Setaria* sp. (samples 85, 89, 98, 103, 104, 107 and ELS 22, the last a fill of a stove). The other species were only represented in individual samples from Site XI and Site XIII. A couple of species, each found at a low incidence, would fit with respectively, a damp ground community and a community that might be expected on wood margins or in open woods. These include in the former environment *Rumex hydrolapathum* (sample 103) and *Sonchus* sp., (samples 48A, 54A and 108 from Site XI) and in the latter one *Rumex conglomerates* (sample 104 from Site XI and sample 1 from Site XIII) and *Stellaria holostea* (samples 3 and 50A).

Seeds and Fruits from Woodland Plants
Apart from those plants whose fruits were gathered, as discussed below (principally members of the Roscaceae family but also *Vaccinium* sp. and *Corylus avellana*) few woodland margin or open wood and heath plants are represented in the collections, despite the very high incidence of constructional timber on the site. Two examples that did occur and may have originally been woodland margin species were *Urtica urens* and possibly *Lapsana communis* (but for the latter see habitat range outlined by Küster 1991, 21).

However, Wieswerowa, in her study of medieval deposits from Cracow, makes the point that *Urtica urens*, while a woodland/forest plant by nature has adapted to synanthropic situations (Wieswerowa 1979, 185). In addition Geraghty (1996) has noted, referring to a study by Wyse Jackson and Sheehy Skeffington in Ireland, that *Lapsana communis*, was an increasingly common weed in medieval samples especially from those located on boundaries. It may have originally been a woodland margin and hedgerow plant that found favourable conditions in waste and cultivated ground (Wyse Jackson and Sheehy Skeffington 1984, 130). It is possible that this ‘migration’ happened during medieval times as former woodland areas became increasingly taken into cultivation (see Endnote 6).
A Phytosociological Interpretation of the Remains (see Endnote 7)

It was noted that *Ranunculus scleratus*, while being a damp land plant, has also been observed on the continent to be a nitrophile and has been found in association with *Chenopodium rubrum*, *Polygonum hydropiper* and *Bidens* sp., in such nutrient rich, though polluted, margins of water bodies, especially in areas with standing water like ponds. These plants are especially characteristic of the phytosociological class Bidentetea tripartite (Lohmayer *et al.* 1962; Shimwell 1971). Although the Novgorod samples did not produce seeds that were clearly *P. hydropiper* (tentatively identified examples in samples 52 and 54B on Site XI). Apart from in three samples (89, 91 and 93, two byre samples and one from a road edge), *Bidens tripartia* only occurred infrequently. *Chenopodium glaucum/rubrum* occurs in recently exposed nutrient-rich muddy areas, especially in and around dirty farmyards, and was a frequent find, as it was at Fishamble Street, Dublin (Geraghty 1996, 37). Its presence, along with *Ranunculus scleratus*, in a number of samples (17 samples from Site XI especially 93, 94, 97, 99, 100, 101, 102) could then be taken to clearly imply the existence of such conditions in and around the site, especially during the earlier period. In his discussion of the finds of this plant on the Lloyds Bank, Pavement site in York and its place in communities defined by the phytosociological approach, Hall has pointed out that it was seen as a characteristic plant of the Rumicetum maritimi association of the Bidens tripartite class of plants. He quotes Tüxen in describing the habitat where this association of plants is most likely to be found as nitrogen and nutrient (nitrophilous) rich open areas on periodically flooded muddy perimeters of various types of polluted water bodies and ponds, including cattle ponds and drained fish ponds found in areas adjacent to human settlements. All the plants in this group are also to be found in bogs and sewage soakaways, drying ponds, ditches, marshes and muddy areas in pastures (Hall *et al.* 1983, 214–215; Tüxen 1950, 110). The situations in which the colonisation of these plants was most likely to develop are in the late summer/early autumn (Wieserowa 1979, 182). *Ranunculus scleratus* is so commonly found in such associations that Tüxen even feels that the name of the group should be changed to Rununculetum scelerati (Hall *et al.* 1983, 214–215; Tüxen 1950, 110).

The plants in this group would find a very suitable natural habitat in the backwaters of a river flood plain. The identification of such a habitat, from the presence of this and other similar plants discussed above, is not surprising given the location of the Troitsky site so close to the river Volkhov, with areas of standing water close to it that are still definable in less built-up locations in this locality today. Wieserowa has noted the occurrence of members of this community in medieval samples from the Market Square excavations in Cracow (Wieserowa 1979, 182–3), as have Lynch and Paap in their study of several samples from medieval deposits in Lübeck (Lynch and Paap 1982, 345 and 354: in this group they also included *Alisma plantago-aquatica*, *Eleocharis palustris*, *Mentha aquatica*, *Stachys palustris* and *Lycopus europaeus*). Barrett *et al.* have similarly identified in particular *Ranunculus scleratus*, and what they describe as other swamp taxa, in samples from the early medieval site at Kaupang (2004, 8 and 2007, 291).
Beněš et al. (2002, 116–117) in their discussion of a plant remains study of the town defences of medieval Prague noted that the wetland/swamp plants (including Lycopus europaeus, Bidens tripartitus, Eleocharis palustris, Carex sp., and Chenopodium polyspermum) were frequent in the waste and dung layers. In the case of Eleocharis palustris, while they concede that it could have grown locally, they felt it was most likely brought to the site in this material.

As noted above another species that has a significant presence in Novgorod and several other similar dated sites in northern Europe is Alisma plantago aquatica, water plantain, which, while not a true aquatic species, occurs in swamp areas on the edge of stagnant or slow flowing water. It was also noted in the Staraya Ladoga samples and from Market Square, Cracow (Aalto and Heinäjoki-Majander 1997, 26; Wieserowa 1979, 177). In the Cracow study it was included in the phytosociological group Phragmitetalia along with Typha sp. (Wieserowa 1979, 177). Its presence in Novgorod would fit more closely the habitat suggested by the presence of Ranunculus scleratus (see Endnote 8).

In terms of the phytosociology groups identified by Wieserowa in the Cracow plant remains assemblage, there are some other parallels that can be drawn with the Novgorod remains. As was the case in the Cracow collection there would appear to have been some members of at least one further present day ruderal group and two communities that would be defined as field weed groups (see Endnote 7).

The Potentilla polygonetalia grouping is characterised by members of the Potentilla genus and Polygonum family but especially Polygonum aviculare, Rumex crispus, Plantago major, Sagina procumbens and Rorippa cf silvestris. It is P. aviculare and the Potentillas generally (probably including P. anglica, P. tormentilla and P. erecta) that were found present together (though in smaller numbers) in the Novgorod samples (identified in samples 29, 54 A and B, 84, 91, 96, 98 and ELS 34). The type of habitat that this plant group characterises includes yards, roadways and trampled areas, all present in medieval Novgorod, as the archaeology of the site has demonstrated. The two other phytosociological weed orders identified in the Cracow study, some of whose members were common in the Novgorod samples, were the Secali violetaia arvensis and Rudero-Secalietea associations. Included in the former and found in the Novgorod samples were Lapsana communis, Polygonum convolvulus, Silene sp., Sinapis arvensis, Spergula arvensis, and Galeopsis tetrahit. The species that occurred in the latter order, Rudero-Secalietea, included Chenopodium album, Galeopsis tetrahit Polygonum lapathifolium, P. persicaria and Stellaria media (Wieserowa 1979, 184–187). Hall has argued that since the natural habitat of these weed plants was disturbed ground, it is likely that they would have found suitable niches on most early urban sites and, by implication, we should not be surprised by their presence (Hall et al. 1983, 216). This could include plants that would not be considered urban colonizers today, for example Anthemis cotula, A. tinctoria. In addition, pioneering plants of bare-waste places were present in the Novgorod samples. Hall has noted the presence of Anthemis cotula in yard areas around buildings in villages within various parts of Europe. Similar habitats would have been typical of early urban centres in the past

294
Hall et al. (1983, 216). Hall et al. further points to the work of Steiner and Kinzel (1980) who have noted that *Chenopodium album*, often taken to have been a nitrophile, is also a pioneer species of abandoned areas (Hall et al. 1983, 216). As it was likely that the deposits in such areas were also nitrogen rich, as would have been the case on the early urban sites, there is little wonder that it occurs in such significant numbers on sites like Novogord. Indeed presently this plant is rampant on previously excavated areas of Troitsky!

Presence and Distribution of Remains of Cultural/Cultivated Plants: The Grains

Overall the incidence of cultural plants was low, but their presence was consistent throughout. These plants included the following grain crops: barley (*Hordeum* sp.), wheat (*Triticum* sp.), oats (*Avena* sp.), rye (*Secale cereale*) and millet (*Panicum millaceum*). A few samples did, however, produce a higher incidence of charred cereals including samples 19 and 81 on Site XI and sample 1 for Site XII. Millet was mostly represented by the presence of husk fragments, occurring in samples 1, 2, 52, 58, 64, 90, 95 on Site XI and ELS 13 on Site XII. Overall, apart from millet, the cereals were usually only represented by a few individual charred grains. In waterlogged deposits non-charred grain is seldom preserved because its relatively thin testas are fragile and will decay unless anoxic conditions develop very quickly after deposition (see elsewhere for discussion of differential preservation at Novgorod and Körber-Grohne 1964 for reference to this phenomenon of anoxic deposits). For the most part, where it was possible to identify the wheat present, it was a hulled species. On the basis of the presence of its characteristic glume bases, it would appear to have been emmer (*Triticum dicoccum*) as in samples 61, 86 and 108. While barley was mostly indeterminate to species it was occasionally possible to identify the hulled form, as in sample 96 on Site XI and sample 5 on Site XIII. The absence of flower parts made it impossible to suggest which species of oats were present. Rye was also represented in a number of samples (for example samples, 2, 3, 19, 52, 64, 108 on Site XI and samples 1 to 3 from Site XII).

The spatial and temporal distribution of these plants within the sampled deposits and contexts varied. Temporally the earliest deposits (Site XI samples 67–96) contained almost entirely wheat and barley. However, one incidence of rye rachis was found in sample 108 at the base of the stratigraphy on Site XI and the latest deposits contained all four cereals (wheat, barley, oats and rye). A reasonable incidence of oats was noted in the samples from the middle of the stratigraphic sequence on Site XI (samples 33–65). Rye also made an appearance at a low incidence in these samples (as a rachis fragment in sample 52 and a possible grain in sample 64). This perhaps ties in with the fact that rye does not appear to be mentioned in the birch bark documents until after AD 1200. After that date it is more frequently mentioned (Rybina 2001, 127 and see below). While rye grains are evident in later dated samples (for example samples 2, 3 and 19), their actual incidence on Site XI remains low.

Millet is ubiquitous throughout the Site XI sequence and in samples from Sites XII
In terms of spatial distribution, millet was present throughout the range of contexts. On its own, without any association with cereals on Site XI, it occurs within buildings (6 instances, 31%), within partition walls (3 instances, 16%), on roads (5 instances, 26%), in or along property boundaries (2 instances, 11%) and other areas exterior to buildings (3 instances, 16%). There were marginally more exterior contexts associations than interior ones overall. However, the largest % of all the context groupings was building interiors (see Figure 17.4).

Millet also occurred with cereals in a similar range of contexts including six instances within buildings. In addition, while cereals were present (in the form of preserved glume bases/spikelet forks and a rachis fragment), millet had a relatively high incidence in three samples from a byre deposit (samples 89, 90 and 91). Overall in this context, as well as in others, it is the husks of millet that were mostly represented. In this instance the remains could have been animal fodder, bedding residue or manure (but see discussion by Hall and Kenward 1998, 123–6 and Kenward and Hall 1997, 663–673). Davidson (1999, 506) suggests millet was used for livestock in the recent past. There seems to be a reasonably broad distribution of the cereals wheat, barley, rye and oats found in different context groupings, e.g. property boundaries, within houses, and house exteriors. However, there was a marked absence of association of cereal remains with roads (e.g. sample 58). While there was an even spread of these remains between interior and exteriors there does seem to have been some increased incidence of barley in house/building interiors (samples 19, 74, 86, 96 on Site XI and sample 5 on Site XIII).

Taking all the remains of grain crops together, there also seems to have been an association of them within buildings rather than exterior areas on Site XI, although this result is, admittedly, based on a small sample (Figure 17.5). This simply reinforces the expected presence of charred grain close to, if not within, buildings. Because the amounts of grain in the samples were mostly relatively small, it is not easy to make an interpretation of their presence beyond casual loss and charring during domestic processing. Sample 19 from Site XI however, produced a higher than average amount
of charred grain. It mostly consisted of barley but the incidence of wheat was almost as high (17 as against 20 identifiable grains), with a few grains of rye. While there was a mixed grain content it had few seeds of other plants (just 2 sedge seeds of the Cyperaceae family) suggesting that whatever its purpose and derivation it had been processed and any chaff and weed seeds removed. By contrast the mass of charred grain from samples 1 and 2 from Site XII (associated with floor boards of a building), examined by the present authors and particularly by Almuth Alsleben, produced not only a very high incidence of mostly charred and partially charred rye grain (and rachis) but a relatively low incidence of other species including barley (the six row hulled type) and bread wheat but by contrast also a broad range of weed seeds (Alsleben 2001, 111 and this volume). Particularly significant was the presence of seeds of the grasses family including Apera spica-venti, Poa annua, Bromus secalinus and Lolium sp. Of these the most frequent was Apera spica venti which, according to Šikula (1979, 112), is a widespread weed of cereals. Growing on light soils it is found at all altitudes. This grass produces a large number of seeds that are dispersed before the infested crop is harvested. Its seeds also germinate early, in the autumn, but they can be destroyed if the ground is ploughed before spring sowing. Its presence in such numbers in this instance may therefore indicate that this was not done or that the rye crop was sown in the autumn and this plant emerged with it (see Notes 3 and 4 for discussion of the rye sowing regime).

The other weeds of cultivation and field edges included Chenopodium album, Chenopodium glaucum/rubrum, Polygonum convolvulus, Lapsana sp., Rumex acetosella, Spergula arvensis, Stellaria mediea, Urtica urens. Urtica dioica and Carex sp. (Alsleben pers comm and this volume). The incidence of these and those other species also present are listed on the CD ROM. The high incidence of weed seeds in this sample, mostly rye crop, would suggest that the grain it contained had not been primarily processed prior to the charring fire or, that the weed contamination was so high that it was destined for animal feed rather than human consumption.

The issue of the extent to which the grain that arrived on the site was already processed is one that cannot be addressed by only one such large sample. The detailed accounts of food produce that appear in the birch-bark documents would suggest that considerable organization was involved in the distribution of grain, which would therefore indicate systematic primary and secondary processing, probably involving the use of mills. However, un-ground grain did arrive on the site, as indicated by the presence of the charred grain. Ethnographic sources indicate that grain was processed to assist in chaff removal and for domestic purposes using large wooden pestles and mortars (Baranov et al. 1999, 324–5).

As noted earlier, in several samples from Site XI, the presence of cereals is indicated by finds of chaff elements and straw. As shown in Table 17.1, the most frequent finds were straw node fragments.

In addition to that shown within Tables 17.1 and 17.2, the presence of a high incidence of millet chaff at a high incidence could be linked to the fact that it was the
only grain/seed crop processed in the household, as mentioned in the Prague report on medieval samples (Beněs et al. 2002, 113).

The content of samples 89 to 91, and certain aspects of this context, clearly indicated that it was a byre deposit and it is likely also that several of the other samples listed were in part derived from such deposits and may represent animal food waste and animal bedding (see below for further discussion in relation to the wild plant species present and cautionary remarks from Kenward and Hall 1997; Hall and Kenward 1998; and Reilly this volume).

**Hops, Hemp and Flax**

A further two plants whose presence on site, noted from finds of parts of their fruiting bodies, is likely to have been a result of their cultural status are hops and hemp, respectively *Humulus lupulus* and *Cannabis sativa*.

Hemp was found in 17 samples from various contexts on Site XI including interiors and exteriors of buildings, partition walls, yard areas, a byre deposit, a boundary fence and property boundaries. There is a higher incidence of finds in exterior locations and particularly along property boundaries. By contrast hops are often found within buildings including on their floors, within partition walls and also within the byre deposit. They were also found in a limited range of external contexts such as along a boundary fence, between two buildings and in road samples (see Figure 17.6). This contrast in distribution between hemp and hops may have some significance, although it is unlikely that the plant remains from all samples were from *in situ* deposits (see Endnote 9).

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**Table 17.1** Presence of cereals as indicated by chaff elements and straw. Number of instances of the different elements identified.

<table>
<thead>
<tr>
<th>Element</th>
<th>No. of instances</th>
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</thead>
<tbody>
<tr>
<td>Straw fragments, nodes &amp; rachis internodes</td>
<td>32</td>
</tr>
<tr>
<td>Rye rachis fragments</td>
<td>2</td>
</tr>
<tr>
<td>Barley rachis fragments</td>
<td>2</td>
</tr>
<tr>
<td>Wheat glume bases, spikelet forks &amp; rachis fragments</td>
<td>3</td>
</tr>
<tr>
<td>Rachis indet.</td>
<td>3</td>
</tr>
</tbody>
</table>

**Table 17.2** Presence of cereals as indicated by chaff elements and straw by sample.

<table>
<thead>
<tr>
<th>Element</th>
<th>Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straw fragments, nodes &amp; rachis internodes</td>
<td>17, 57, 61, 72, 74, 83A, 86, 87, 89, 90, 91, 107</td>
</tr>
<tr>
<td>Rye rachis fragments</td>
<td>29, 108</td>
</tr>
<tr>
<td>Barley rachis fragments</td>
<td>52, 74</td>
</tr>
<tr>
<td>Wheat glume bases, spikelet forks &amp; rachis fragments</td>
<td>86, 91, 108</td>
</tr>
<tr>
<td>Rachis indet.</td>
<td>101, 102</td>
</tr>
</tbody>
</table>

---

No. of instances

<table>
<thead>
<tr>
<th>Element</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straw fragments, nodes &amp; rachis internodes</td>
<td>32</td>
</tr>
<tr>
<td>Rye rachis fragments</td>
<td>2</td>
</tr>
<tr>
<td>Barley rachis fragments</td>
<td>2</td>
</tr>
<tr>
<td>Wheat glume bases, spikelet forks &amp; rachis fragments</td>
<td>3</td>
</tr>
<tr>
<td>Rachis indet.</td>
<td>3</td>
</tr>
</tbody>
</table>

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298
Overall these two species were only found in small amounts. Exceptions include hemp in sample 1 on Site XIII and hops in ELS 2A and 2B and 6, where fragment counts for hop remains were in double figures.

Flax was a rare find in Novgorod, only being present in two samples: sample 64 from beneath a wall and sample 108 associated with an unusual, small building at almost the lowest stratigraphic position on Site XI.

Fruits, Nuts and Gathered Plants (Figures 17.7 to 17.13)

It is the case that many of the plants, whose presence is suggested by the finds of their diaspores, could have been gathered for various uses not least to supplement the diet. In particular amongst them were hazel Corylus avellana (represented by the presence of their nut shells), wild strawberry (Fragaria vesca), wild raspberry (Rubus idaeus), apple pips (Malus sp.), the sour cherry (Prunus cerasus) and the bilberry (Vaccinium myrtillus).

Wild strawberry was found in a number of samples across a range of contexts. The samples include property boundaries (four samples), building interiors (12 interiors including 2 byre samples) and one road. It could be said that wild strawberry was pretty ubiquitous throughout the site. Hazel nuts were found to be present on Site XI in a number of samples, as follows:

<table>
<thead>
<tr>
<th>Hazel Nut fragments on Site XI</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Structures and Partition Walls</td>
<td>6 (Samples 4, 62, 64, 65, ES 6 and 34)</td>
</tr>
<tr>
<td>Building interiors</td>
<td>5 (Samples 52, 60, 81, 94, and ES 33)</td>
</tr>
<tr>
<td>Boundary fences</td>
<td>3 (Samples 48b, 83a and b, and 97)</td>
</tr>
<tr>
<td>Roads</td>
<td>4 (Samples 54a and b, 58, 93, and 100)</td>
</tr>
</tbody>
</table>
Therefore eleven of the samples were from within buildings, including as part of the structures, six were known to be from exterior locations (three from property boundaries and four from road surfaces).
Blackberry (*Rubus fruticosus*) was also found across a wide range of contexts on Site XI and one sample from Site XIII.

Structures and Partition walls 2 (Samples 62 and ELS 34)
Building Interiors 2 (Samples 19 and 74)
Boundary fences 5 (Samples 1, 48B, 73, 83A and B, and 92)

Apple pips were also found in a range of samples including:
Building interiors 6 (Samples 64, 74, 85, 89, 91, ELS 34A and B)
Building exteriors 1 (Sample 95)
Boundary fences 5 (Samples 1, 2, 48A and B, 83A and B, and 97)
Roads 1 (Sample 93)

Raspberry (*Rubus ideaus*) was found in a similar range of samples on Site XI and Site XIII as follows:
Building interiors 3 (Samples 17, 29, and 5 Site XIII)
Boundary fences 5 (Samples 1, 2, 3, 48A, 83A and B)
Roads 1 (Sample 54A)
In all the above cases, but especially raspberry and apple, there is a bias towards property boundaries.

This would mean that the finds of apple were found almost equally from boundary samples (5 examples) and from within building (6 examples) and one each from a road and a building exterior. If the latter two are added to those samples from exterior contexts then this would mean a slight majority of remains were from exteriors.

The finds of the sour cherry, were similarly located though the number of samples with remains were fewer: they included samples 1 and 4 (property boundaries), 17 (within a house), 48A and B (boundary fence) and 64 (beneath wall of a building). Again it seems that the balance of remains was along boundary fences.

The bilberry (*Vaccinium* sp.), whose presence is represented by its seeds, is also very likely to have been gathered and consumed on site. It was found to be present in a number of samples on Site XI.

<table>
<thead>
<tr>
<th>Context</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structures and Partition walls</td>
<td>3 (Samples 64, 75, ELS 13)</td>
</tr>
<tr>
<td>Structure interiors</td>
<td>7 (Samples 60, 74, 89, 90, 103, 104, 108)</td>
</tr>
<tr>
<td>Structure exteriors</td>
<td>3 (Samples 52, 61, 95)</td>
</tr>
<tr>
<td>Boundary fences</td>
<td>5 (Samples 48A and B, 73, 83A and B, 97, 98),</td>
</tr>
<tr>
<td>Roads</td>
<td>5 (Samples 58, 93, 100, 101, 106)</td>
</tr>
</tbody>
</table>

Again the balance of the remains came from exterior contexts (13 instances with five from property boundaries or near them, the others were from a yard area, exterior to a building and roads). By contrast there were seven samples with bilberry that were from within buildings.

In summary the distribution of remains would suggest an almost even spread of remains from the interior and exteriors of buildings. However, there was some variation with hazel nuts being more frequent within buildings and associated with their structures. The other fruit species (including strawberries, raspberries and sour cherry), by contrast, indicated a bias to building exteriors. This was particularly the case for raspberries and blackberries with a significant balance of the exterior finds occurring close to property and other boundaries. Bilberries occurred marginally more in exterior locations, though their highest contextual distribution was within buildings.

Overall there would seem to have been some minor level of patterning in the disposal of food waste during medieval times in Novgorod (that is, if the deposits are considered to be even partially ‘in situ’ (see Endnote 8). Why this would be is not clear accept perhaps that some of the gathered plants were being used in culinary dishes and therefore their waste was more likely to occur within buildings in areas of primary processing whereas others were consumed directly in exterior areas and the residues dumped/discarded close to the property boundaries. It is possible that the distribution of these remains reflects either defecation practices or the deposition of such excrement. Reilly’s study of the insects from one of the property boundary
samples (48) would seem to indicate the presence of species that could inhabit human as well as animal dung. Although she feels the presence of human fecal material is unlikely in such a location and instead has argued that the foul conditions were as likely the result of a combination of decaying plant debris in a situation that also included dung and standing water (Reilly this volume). It is also possible that the concentration of blackberry and raspberry pips along property boundaries results from ‘droppings’ of birds sitting on the fences of these boundaries, where indeed these plants may have been growing anyway. However it does seem that all the gathered plants, identified via the presence of their seeds, would be found in woodland edges or field margins and it is more likely they were brought onto the site rather than have become naturalized there (see discussion of comparanda below).

Wild Plants having known Medicinal and Other Uses Represented by their Seeds
A number of identified remains in the samples came from plants known to have medicinal properties which, according to documentary sources, where utilised in the past. Their contexts on the site however, were not indicative of such usage and in the absence of such evidence it is difficult to make the case based on this study that they served such a purpose in medieval times at the Troitsky site, especially as several of them are also common weeds of disturbed or waste ground in urban environments. A particular case in point is henbane Hyoscymus niger. In discussing its presence in the samples from Fishamble Street, Dublin, Geraghty (1996, 41) cites Roesdahl (1982, 162), who mentions that the plant was used by the Vikings for its medicinal value and was thought to have magical properties. Its seeds were, for example, found in high incidence in association with a Viking age burial at Fyrkat in Denmark (Jensen 1991, 338; from Roesdahl and Nordqvist 1971). Robinson refers to its value as a painkiller in the context of being found on Viking age sites in Denmark (Robinson 1994, 547) and stresses that its growth may have been encouraged (Robinson 1987, 206–207). Hjelmqvist also recovered a few seeds of this plant from 11th to 12th and 13th century deposits in Lund, noting that it might have been cultivated in medieval times for external medical use (Hjelmqvist 1991, 246). However, finds of *Hyoscymus niger* were only made in small numbers in samples 1 from Site XI and samples 2 and possibly 4 from Site XIII.

Another plant whose seeds has been found in the samples, and could have been utilised for its medicinal properties, is self-heal, *Prunella vulgaris*. *Prunella* sp., was found in samples 5, 17, 19, 50A, 54A, 61, 64, 74, 86, 89, 91, 98, 100, 107 from Site XI and samples 7 and 9 from Site XIII. Hall and Kenward have urged caution in making such interpretations both because of the lack of independent contextual information and because it was only certain parts of the plants that were used medicinally (Hall and Kenward 2003, 126).

Other wild plants that could have been utilised, not least for food, included wild
celery *Apium graveolens*, which was found in small numbers in samples 88 and 102 from Site XI and also a higher frequency in sample ELS 79 from the same site (see Endnote 10).

Geraghty notes that it could have been used to flavour food but like the other plants mentioned that had potential uses it would have found suitable habitats for growth in and around the town (Geraghty 1996, 39). Evidence of other plants used for flavouring has also been found including especially caraway (*Carum carvi*) and possibly rough chervil (cf *Chaerophyllum bulbosum*). Both *Apium* sp. and *Carum carvi* were found in several samples, particularly the former. All their contexts were from interiors of buildings.

The Evidence from the Birch-Bark Documents and Other Sources
A unique feature of the archaeological remains from Novgorod is the finds of birch-bark documents. Almost a thousand of them have been recovered from the excavations to date. They are written in an early form of Cyrillic script and have been translated by Zaliznyak (1995). While they cover a range of subjects most of them deal with tribute, taxation, debt and communications about trade or exchange. In a good number of cases various plants, mostly cultivated, are mentioned. Rybina and Konetskii have discussed this information (Rybina 2001; Konetskii 2003). The most frequently mentioned plants are cereals, although these are not mentioned in the earliest, 11th-century documents (Rybina 2001, 127).

Rye has the most numerous mentions (65 times in 34 texts: Rybina 2001, 127; Konetskii 2003), followed by oats (20 instances in 13 texts: Konetskii (2003) and then barley (18 references in 13 texts: Konetskii 2003). Rye seems to increase in importance through time, based on the frequency of references in the documents from the 12th/13th centuries onwards, whereas barley diminishes through time, though remaining significant.

According to Kiryanov, oats became increasingly more important from the 15th century (Kiryanov 1967, 90). Konetskii suggests oats had usurped barley as the crop of the forest zone by the 11th century (Konetskii 2003). Barley is also mentioned in later documents in the context of malt for brewing (Rybina 2001, 127). Oats seem to be regarded as peasant food but were also used as fodder for horses (Rybina 2001, 127). Wheat is occasionally mentioned (14 instances in 12 texts: Konetskii 2003). The first reference to wheat was in the later 12th century and the last in the 15th century (Rybina 2001, 127). Millet remains were the most commonly identified cultural plants found in the samples, yet they do not appear to be unequivocally mentioned in the birch-bark documents. However, Konetskii has discussed the use of the words *pshenka*, which derives from *pes* and *pesh* – ‘to grind’ – (the word gives rise to pestle), and notes that while the word is often used to describe wheat, in one document its context might suggest another form of grain being ground. This could have been millet (Konetskii 2003). Perhaps it is because millet is so ubiquitous that, in complete contrast to rye (which began cultivation as a novelty), it had little or no value as tribute or in taxation
transactions. The 19th-century Russian composer Rimsky Korsakov, in his study of Russian folk tales, noted the frequent reference to millet as a food stable. This inspired him to incorporate the ‘millet chorus’ in his opera *The Snow Maiden* in which the men sang ‘and we sowed and we sowed the millet’ to which the woman replied ‘…and we pound it and we pound it’ (Redwood 1989, 126).

The only other cultivated plant that is referenced in the birch bark documents and found (though not frequently) in the samples is flax (Rybina 2001, 128). In terms of fruits and nuts there is only one reference and that is to sour cherries: also found in a number of the samples. The birch bark documents, while they contain extremely important information about economic behavior in medieval Novgorod, are quite partial when it comes to information about utilized plants by comparison with the evidence from the archaeobotanical record.

**COMPARISON WITH OTHER EARLY AND LATER MEDIEVAL URBAN SITES IN NORTHERN EUROPE AND SCANDINAVIA**

There are few contemporary or even near-contemporary medieval urban sites in Russia comparable to Novgorod that have been extensively sampled for plant remains. Therefore comparable sites within Russia are limited and primarily confined to the earliest levels in Staraya Ladoga. Outside Russia, the plant remains from other early urban centres that have been studied include Cracow and Gniezno in Poland, Birka and Lund in Sweden, Ribe and Aarhus in Denmark, Hedeby and Lübeck in Northern Germany (also the later Hansa towns of Northern Europe), Prague in the Czech Republic, Amsterdam in the Netherlands, Perth in Scotland, York, Winchester, London, Norwich and Southampton in England and Dublin, Cork and Waterford in Ireland.

Obviously, sites within the same geographic region would provide the best comparisons, in particular those within the former Slavic areas such as Staraya Ladoga and the Polish sites. However, archaeobotanical assemblages from medieval sites across Europe are relevant because plant remains studies from all medieval towns hinge on the relationship between the urban centre and the rural hinterland. A hinterland approach has mostly been a key focus of animal bone studies by comparison with research on plant remains from early urban settlements (Prummel 1983; Crabtree 1996; Wigh 2001; O’Connor 2004). There are however some notable exceptions which include, to an extent, Geraghty’s study of the plant remains from Viking Age Dublin (Geraghty 1996); more so van Haastor’s (1994) overview of Lübeck; Griffin (1988) and Schia 1994 for Oslo; Hall’s work (with Kenward and O’Connor) in York, for example Hall *et al.* (1983); and Barrett *et al.* (2004) and (2007) for Kaupang. Tierney and Hannon (1997) for Waterford also aspired to such an approach.
Cultivated Plants: Hops (Humulus lupulus), Hemp (Cannabis sativa) and Flax (Linum usitatissimum)

At Staraya Ladoga the preliminary study by Aalto and Heinäjoki-Majander (1997, 21) of the 10th/11th century levels produced a range of remains, the most frequent economic plant of which were hops. The authors argue that, even at this early stage, hops were being used to flavour beer and the practice could have developed in this area of Eastern Europe following influences from further east (Alato and Heinäjoki-Majander 1997, 21, 26–7; Hansson and Dickson 1997, 209; Behre 1983, 51–53 and 187). However, there are many early discoveries of hops in the north and west. For example, finds of hops have been made in early deposits from Birka, Hedeby (Behre 1984, 115–122), and 8th century deposits at Ribe (Jensen 1985; Robinson et al. 1993, 1–16; Robinson 1994, 546). There are also early discoveries of hops from Kaupang in 8th/9th century pits (Barrett et al. 2007, 291 and 304), the 10th century Graveney boat in Kent (Wilson and Conolly 1978,147), Whitefriars Street, Norwich in late Saxon 10th/11th century deposits (Ayers and Murphy 1983, 41); Wolin (9th to 12th century, Alsleben 1995, 192, 206 and 215); Lund (11th century and 12th to 14/15th century deposits, Hjelmqvist 1991, 246), 13th century levels from Grosse Petersgrube in Lübeck (Lynch and Paap 1982, 344) and 14th century deposits from Prague (Beněš et al. 2002, 116), as well as in the later levels at Coppergate, York (Kenward and Hall 1995). Later still in the Medieval Period it was only the female parts of the hop plant that were used to flavour beer, therefore preventing the development of the fruiting bodies, and in consequence less likelihood of finding them in archaeological deposits. Ninth century documentary sources indicate that rent and renders from French monasteries included hops for flavouring beer and numerous hop gardens are mentioned in the annals of an abbey at Freising in West Germany from later that century (Levillain 1900; Bitterauf 1967: I, 666–715; Wilson and Conolly 1978, 147). In addition, a recipe from an Anglo-Saxon leech book (a medicinal hand-book) comments on the use of hops (Cockayne 1864, 172; Wilson and Conolly 1978, 147). There are therefore clear archaeobotanical and documentary indications that hops were used to flavour beer across northern and western Europe from an early period. During later medieval times trade in hopped beer was a key feature of the exchanges networks set up by the Hanseatic League (Alsleben 2007, 22).

Beer is mentioned in Russian texts from the 11th century onwards with various terms used to denote a hopped ale (Smith and Christian 1984, 75). From the 13th century in Novgorod, hops were a regular item of trade and prices fluctuated considerably, indicating that demand sometimes outstripped supply. A similar scenario was seen at Pskov (Smith and Christian 1984, 78). However, according to the record of foreign observers, by the late 15th century in Russia the brewing of beer, making of mead and using hops were all restricted. This was an attempt to control social order (Smith and Christian 1984, 84). Despite this, domestic brewing continued into the 16th century and hops were mentioned on a par with grain in custom charters (Smith and Christian 1984, 101).
Another plant used to flavour beer in more coastal areas of northern Europe was bog myrtle (*Myrica gale*), which rivaled hops in those areas as a flavouring until later medieval times. There are examples from Scandinavia, for instance the find of its pollen with malted (sprouted) barley in probable 13th century brewery deposits from Bergen (Krzywinski *et al.* 1983, 153). Alslabéen has also noted that it was used to flavour beer in the Rhineland and the northern coast of Germany in medieval times (Alslabéen 2007, 22). Being a plant that occurs in more maritime districts of Europe it is hardly surprising that it was not found in the assemblage from Troitsky.

There was a small amount of evidence at Troitsky to indicate the use of oil and fibre plants such as hemp and flax. Finds of the remains of these plants have been from a number of later medieval and medieval urban sites across Europe. For the most part the more eastern sites have both species present, with a greater frequency of hemp. This was the case at Novgorod where there was considerably more hemp than flax (see Endnote 11). Similar results were obtained from Staraya Ladoga, where there were ‘many charred and non-charred seed fragments of... hemp and some fragments of flax capsules’ in the early deposits (9th/10th century) that have been studied so far (Aalto and Heinajoki-Majander 1997, 13).

While flax was used for making linen, hemp was particularly good for rope making and for the production of durable textiles. For example, there were finds of hemp rope in early excavations at Staraya Ladoga (Aalto and Heinajoki-Majander 1997, 21; Ravdonikas 1950). It is also likely that both flax and hemp plants were being used for oil as well as fibre. The seeds of flax were ground for linseed oil, one of the important vegetable oils used during fasts in medieval and post-medieval Russia (Smith and Christian 1989, 5). Hanseatic traders exported linseed oil from Russia during the later medieval period (Péhaut 2000, 457). The edible seeds of hemp are not narcotic and from them good quality oil can be pressed. Frying the seeds for food is practiced to this day in areas of Poland and the Volga region of Russia and these regions are also places where the oil from the seeds is used for cooking (Davidson 1999, 377–8). Before an 18th century gastronomic revolution, it is thought that most Russian dishes were cooked in hempseed oil, ‘which made all the dishes taste much the same’ (Figes 2002, 164). Even until recently, the former USSR was the main world producer of hemp seed. Vaughan, in a study of oil producing seeds, has noted that the states of the former Soviet Union produced an average of 250,000 tons of hemp seed annually up to 1970 (Vaughan 1970, 23).

Polcyn in his 1994 general survey of early and later medieval Polish sites states that un-charred flax seeds and capsules were common finds in waterlogged deposits. He states that flax was the main early medieval fibre crop and that hemp has been found in similar contexts, suggesting that it was used to produce thick, cloth fragments examples of which were found at Gniezno (Polcyn 1994, 535). Polcyn also sumises that the seeds of flax were being used for the production of oil.

Both hemp and flax were present in the medieval deposits in Oslo and Trondheim (Jensen 1991, 341; Griffin 1988 and Griffin and Sandvik 1991). At Trondheim, there
was sufficient evidence to suggest that flax was processed on site. At Kaupang, flax and hemp were both present in the plant assemblages although the impression is that there was greater representation of hemp in the collection. The achenes were also broken suggesting that they had been processed for their oil, in the same way as may have been the case at Novgorod (Barrett et al. 2004, 9). In addition Lynch and Paap reported that although present in small numbers, flax and hemp are both represented in an early 13th century deposit. They comment that their presence along with gold of pleasure (*Camelina sativa*) could have been either for their oil or fibre (Lynch and Paap 1982, 348, 357). However, *Camelina sativa* is a characteristic weed of flax crops (Fitter et al. 1993, 84; Hall and Kenward 2003, 119).

Both hemp and flax were occasionally found at York (Hall et al. 1983, 205) and also at Norwich (Ayers and Murphy 1983, 40), although in general the medieval sites in the West seldom produced evidence of hemp. On the other hand they often have a high incidence of flax. For example Fishamble Street, Dublin where it is likely that the flax was ‘ribbled’ on site, i.e. the seed capsules were removed (Geraghty 1996, 45–47). Flax was also a regular and relatively frequent find in samples from other Irish medieval towns, for example Waterford and Drogheda, but only an occasional find in samples from Cork (Tierney and Hannon 1997, 857, 861, 869, 873, 889 and 892; Mitchell and Dickson 1985; McClatchie 2003, 404, 405). Flax was also found at Kirk Close in Perth where Robinson is of the view that it was used to produce oil, even though a single flax fibre was found in a sample from elsewhere in Perth at South Methven Street (Robinson 1987, 206). In his 1994 assessment of plant remains from Viking age sites in Denmark, Robinson noted that flax was only an occasional find.

There was no mention of hemp in his assessment (Robinson 1994, 544–5). It seems from Behre’s study that while flax seeds and capsules were present at Hedeby, hemp achenes were not (Behre 1983, 24–5, 186).

Other oil plants include members of the *Brassica* family (namely *Brassica napus* and *campestris*). Opium poppy, *Papaver sominiferum*, can also produce oil (Wieserowa 1979, 188–9). While there were no finds of the latter in the Novgorod samples there were a few seeds identified as *Brassica*, although it was not possible to identify them to species with any confidence.

Cultivated Plants: Cereals
In the case of cultivated plants, all sites produced varying incidences of cereals. These were preserved both by waterlogging and carbonization. In some urban deposits these included bran fragments, as was the case in samples from Waterford and Perth.

However, the relative numbers of cereal remains in waterlogged samples from early urban sites were low. The cereals present included oats, barley, bread wheat and rye, as, for example, Dublin where the main cereals were six-row hulled barley and oats (Geraghty 1996, 48–9).

Rye rose in significance during early medieval times, though it may have been grown on poor soils since the Roman period, having come into Europe as a weed of
other cereals prior to this (Behre 1992, 142–150). By the 10th/11th to 12th centuries its occurrence in archaeobotanical samples is particularly pre-eminent for southern Scandinavia and the Slavic areas, including the sites of Gorodishche, Novgorod, Cracow and Gniezno. Sites where it has been noted include Aarhus (Fredskild 1971 and Jensen 1991, 338), Viborg (Jensen 1991, 338), Hedeby (Behre 1983, 19–20), 12th/13th century deposits at Cracow (Wieserowa 1979, 187); Gniezno (Polcyn 1994, 534); and Gorodishche (Alsleben 2001, 108–9). In addition, studies on some early urban sites outside this region have recorded less significant quantities, for example Waterford (Tierney and Hannon 1997, 890) and Perth (Robinson 1987, 205) where it is believed it was not widely grown. The significance of rye in Novgorod is indicated by the numerous references to it in the birch-bark documents (see above and Rybina 2001, 127). One of the two significant deposits of charred grain found during the course of the project on TroitskyXII was dated to late medieval times and was dominated by rye (see above and Alsleben 2001, 111 and this volume).

Many of the sites produced few incidences of wheat and these were mostly indeterminate to species (Robinson 1987, 202). At Cracow there were some grains of bread wheat *Triticum aestivum* in the early medieval deposits (Wieserowa 1979, 187). Elsewhere in Poland, as at Gniezno, barley was a more frequent find and, where identifiable, it was the six-row type, but wheats were also noted. Two types were distinguished, *Triticum vulgare* and *Triticum compactum* (Polcyn 1994, 534). While rye and barley were most frequently found on the Danish sites, there were very occasional finds of bread wheat, *Triticum aestivum*. The medieval deposits from Trondheim, Oslo and Bergen mostly produced evidence of barley and oats, with a small amount of rye in the case of Bergen (Jensen 1991, 341 and Krzywinski et al. 1983, 153). Earlier dated Viking age carbonized bread loaves from Närke and from graves in Birka in Sweden seem to have been made from hulled barley, but some included bread wheat (*T. aestivum*). There were also a few examples of emmer and even einkorn (*Triticum dicoccum* and *Triticum monococcum*). One loaf was made entirely from rye and another from a mix of rye and wheat. A further one was made from pure oats and other loaves were made from a mix of cereals (Jensen 1991 reporting the work of Hjelmqvist 1983 and 1984).

The evidence for cereals in Novgorod and the earlier sites in its hinterland seems to indicate variations on this theme. While barley, oats and rye were significantly present (particularly rye after the 10th century and later oats) there is clear evidence of the hulled wheats, emmer and spelt. The presence of these species was especially noted at Prost and Georgii in the 8th to 10th century (Alsleben 2001, 108–9). In addition the presence of emmer wheat, along with *Triticum vulgare*, had been previously reported by Kiryanov for the 7th/8th century deposits excavated at Staraya Ladoga (Kiryanov in Thompson 1965, 89). In Novgorod the incidence of wheat was less in the samples, but the presence of probable emmer was noted from occasional finds of its un-charred characteristic spikelet forks and glume bases (samples 86 and 91 on Troitsky XI, see Monk and Johnston 2001, 114). Of the western European sites surveyed, only in the
Waterford samples were there a possibility that the cultivation of hulled wheats (possibly spelt) continued into medieval times (Tierney and Hannon 1997, 861, 873, 889–90). Overall the cultivation of the hulled wheats diminished in Western Europe during the earlier part of the first millennium AD, but it seemed to continue longer in areas further east. Alsleben has noted that the glumed wheats, emmer and spelt as well as millet continued to be grown along with other cereals on the glacially derived soils of the Southern Baltic into medieval times but in Germany, by the time of the Hanseatic League towns, emmer cultivation had ceased and spelt cultivation had become confined to southwest Germany (Alsleben 2007, 19 and 22). In addition, Wasylikowa et al. have argued that hulled wheat cultivation became less common in Poland after the 10th century AD. This change is less clear for other areas of eastern and central Europe (Wasylikowa et al. 1991, 225, 228 and 230).

Millet was a cultivated species that, while not present on western medieval sites, occurred in variable quantities on northern European/southern Scandinavian and on eastern European sites. These sites include Cracow (Wieserowa 1979, 187), Hedeby (Behre 1983, 23–4, 186), various Viking age sites in Denmark (Robinson 1994, 544–5) and various Polish sites (Polcyn 1994, 534). As in the Novgorod samples, millet was the most ubiquitous find from Staraya Ladoga (Aalto and Heinäjoki-Majander 1997, 21) especially during the first half of the 10th century. Polcyn says that by the end of the 11th century it became the most popular grain for bread making and was called the ‘Slavonic grain’ (Polcyn 1994, 534).

Plants Indicative of the Local Environment
Taking an overview of the representation of the groupings of the plant remains from Novgorod by comparison with those from other early to late medieval urban sites, there are some similarities but also contrasts that may reflect temporal variations but are more likely to reflect differences in preservation, context and biogeographical location.

However, as would be expected, one common feature is the presence of plants that colonize ruderal, nitrogen rich and disturbed ground. A number of these would have been weeds of cultivation but, as put forward by Kenward and Hall (1983, 216), they could have become naturalized in these early towns. Geraghty drew on a point made by Robinson in 1979, in her discussion of the Viking age plant material from Dublin, suggesting that the net input of organic material created a large fermenting dung heap and consequently a warm nitrogen rich environment for colonization by many different weed plants. This in turn would have provided a reservoir of former weed type plants in the locality (Geraghty 1997, 70–1; Robinson 1979, 113–4). While these ruderal weeds do differ from site to site the grouping of such plants represents one of the common themes in the samples from the deposits on these early and later medieval sites (Dublin, York, Perth, Cork, Waterford, Hedeby, Kaupang, Lübeck, Birka, and Bergen). Included amongst them are members of the Polygonaceae (persicaria and dock), the Chenopodiaceae (goosefoot/orache) and Caryophyllaceae.
Gathered Plants and Cultivated Fruits

Another common feature of the plant remains from all these early urban sites, from Viking age times onwards, is the presence of gathered hedgerow plants such as blackberry, wild raspberry, wild strawberry, members of the *Prunus* genus including cherry, damson, and sloe (but less so for Novgorod because of its location), wild apple, hops, bilberry, bog myrtle, hazel nuts, acorns, rose hips, bird cherry, wild strawberry and in the case of Hedeby, because of its location, beech mast (Behre 1983, 51, 187). As well as Hedeby other sites with such evidence include Ribe (Robinson 1994, 546), Kaupang (Barrett *et al.* 2004, 8 and 2007, 291), Lübeck (Lynch and Paap 1983, 347), London (Jones *et al.* 1991, 348 and 381), Norwich (Ayers and Murphy 1983, 40), Dublin (Geraghty 1996, 38, 67); Perth (Robinson 1987, 206), Waterford (Tierney and Hannon 1997, 889 and taxa lists 857–878), Cork (McClatchie 2003, 400–1, 403–13), and Trondheim (Jensen 1991, 342). This would seem to highlight the fact that these plants (or rather their fruiting bodies) were not only making an important contribution to human nutrition but were also indicative of woodland within the near hinterlands of these incipient urban centres.

In addition it is also important to stress that it is during this period, and particularly after the 12th century, that various fruits were being grown systematically in orchards. While the beginnings of orchard husbandry in post-Roman northern Europe was linked to ecclesiastical institutions, its full development paralleled the development of urbanism in medieval times. Many of the urban sites listed above that produced remains of gathered plants have also produced remains of cultivated orchard crops. In the case of Novgorod, while it is possible that the pips of apples that were found in the samples were domestic species, the only certain orchard plant would have been the sour cherry (*Prunus cerasus*).

Exotics

A significant feature of the plant remains assemblage from the Troitsky sites is the absence of imported fruits or nuts. This is especially curious because such finds, particularly of walnut and possibly almond, have been made on earlier excavations in the city. These earlier finds, archived in the Novgorod State Museum, were reported on by Kiryanov and Kolchin in Thompson 1967, 7–8). Kiryanov traced the changes in the frequency of walnut fragments from the 10th to the mid-13th century, indicating a steady increase in their incidence in time until the beginning of the 12th century after which there was a dramatic fall off (Kolchin as
outlined in Thompson 1967, 7–8). Alsleben has also reported shells of walnut from the Gorodishche excavations, which she noted would be an indicator of the status of its occupants relative to those people living at near contemporary sites where no such finds were made (Alsleben 2001, 111).

Overall, while imported fruits and nuts are found in some medieval urban deposits that date before the 15th/16th centuries, their occurrence is minimal. Finds of walnut along with silver fir were the only imports noted in the samples studied by Behre from Hedeby, for example. Although the deposits also produced peach stones and grape pips these were not considered by him to have been significant imports (Behre 1983, 187, 43–4). Jensen, reporting on the work of Griffin and Sandvik, noted finds of walnut as an important feature of the Trondheim collection (Jensen 1991, 342). Ayers and Murphy also report finds of walnut and grape from the late Saxon/early Norman excavations at Whitefriars Street, Norwich (Ayers and Murphy 1983, 40) and Jones et al. report on figs and grape pips from a pit dated to the 12th century at Milk Street in London (Jones et al. 1991, 348). In addition Polcyn refers to the occurrence of walnuts from several sites in Poland. He also noted the incidence of peach stones and grape pips at Gniezno, raising the possibility of the local cultivation of vines (Polcyn 1994, 535–6). Wieserowa identified a small number of walnut shells, grape pip and fig seeds from the late medieval deposits on the Market Square site in Cracow. She speculated that the figs were grown locally but does not raise the question about the importation of the walnuts or grapes (Wieserowa 1979, 190).

Excavations in Oslo have produced remains of imported plants including fragments of walnuts shells, grape pips and fig seeds (Jensen 1991, 341). The upper fill of a 13th century latrine in Bergen produced a high incidence of fig seeds (Krzywinski et al. 1983, 161–2). Samples of medieval date in Lübeck produced grape pips. Fig was particularly evident in post-medieval deposits (Lynch and Paap 1982, 349). Figs and grapes can of course grow in sheltered places in northern Europe (see Endnote 12).

In addition walnut was identified from Viking age samples in York and from medieval Perth (Hall et al. 1983, 179; Robinson 1987, 206), though its status as an imported species at this time is unclear. The likelihood is that it was probably introduced into Britain by the Romans, although its pollen is known from an earlier date (Godwin 1975, 248). In Ireland, later early medieval and later medieval deposits from Cork, Dublin and Waterford have all yielded imported plant evidence, principally again walnut but also, from the Cork and Waterford samples, grapes and possibly figs (McClatchie 2003, 401, 404, 407, 408 and 411; Geraghty 1996, 50, 52 and 70; Tierney and Hannon 1997, 859, 863, 874 and 892). In addition the 13th century deposits in Dublin produced a Stone Pine cone \textit{(Pinus pinea)} (Geraghty 1996, 53). The maritime location and an active trade with South-west France and Spain probably would explain these imports. By comparison with these contemporary and near contemporary urban sites, the samples from Troitsky, if the evidence is representative, suggest a more limited taste for such imported plants (from more convivial climates) on the part of those people living in this part of Novgorod in medieval times than elsewhere in the city.
SUMMARY AND CONCLUSIONS

This project was intended to reawaken an interest in the study of the archaeobotany of medieval Novgorod. The genesis of this focus on the non-wood macro remains from the site can be traced back to the work of Kiryanov and Kolchin from the late 1950s to the late 1970s. The current study has raised a number of issues and identified a number of themes, some of which have been partly developed in this phase of archaeobotanical work. This study has successfully prospected the considerable potential for a follow-up of dedicated systematic archaeobotanical research that needs to centre on a greater contextual understanding than was possible for this limited project of the formation history of the deposits that make up the Novgorod sequence (see Endnote 13). Without this contextual understanding the significance of the distributional and chronological patterns in the macro-plant remains record will not be fully realized.

A key part of the sampled plant remains assemblage can be directly interpreted in cultural terms and this has a direct bearing on the theme of this volume. However, the presence of the majority of remains cannot be explained in this way in the first instance as they were first and foremost part of the local vegetational environment that has arisen from the influence of local and regional biogeographical factors and the activities of people. For the latter reason a significant complement of the remains from across the Troitsky excavations, and through time, was made up of seeds and fruits of plants that can best be described as ruderals, i.e. weeds of waste, disturbed and nitrogen rich ground (the kinds of habitats that develop around all human habitations). Some of these plants may have become naturalized at Troitsky. This could have begun before the earliest stage in the urbanization of the area when the land use was both tillage and meadow farmland (see above and Aleksandrovskaia et al. 2001). Subsequently there could have been the deposition and colonization by plants that were brought into the developing urban environment as animal feed, bedding or as weeds of processed crops.

These plants could well have included various members of the Polygonaceae, Chenopodiaceae and Caryophylaceae families. However, one member of the last of these, *Agrostemma githago*, known as a common weed of rye, was significantly absent. Despite Kiryanov’s 1967 suggestion that rye (for which there is plenty of evidence from Novgorod) was winter sown, the absence of *Agrostemma githago* might suggest either a different sowing regime or a longer fallow period. Spring sowing is a possibility, especially since such a practice is preceded by intensive tillage that could destroy winter germinating weeds like *Agrostemma githago*. However, Alseben has pointed out to the authors that an ecological study further north, in Finland around Lake Ladoga, noted that *Agrostemma githago* was a weed of oats, presumably sown in the spring (Alsleben pers. comm., and Linkola 1916). It may simply be that this region is beyond its natural range and, as suggested by Kiryanov, other weeds were indicating a winter sowing regime (Kiryanov 1967, 90). Equally, as postulated by Alseben, its absence could be as much to do with a longer fallow regime as occurs elsewhere in northern Europe, where it regularly occurs as a crop weed as discussed above.
In the case of one large charred grain assemblage from a late dated context on Troitsky XIII, while it did produce a few instances of *Agrostemma githago*, they were insignificantly present by comparison to the high incidence of species such as the grass *Apera spica venti*. This is a plant that is also susceptible to being severely restricted in its growth potential by intensive tillage but, like *Agrostemma githago*, it tends to germinate in the autumn.

Despite the significant presence of seeds of ruderal and weed plants, those seeds with the highest frequency were from plants characteristic of swamp ground conditions including water meadows and locations beside very slow flowing or stagnant water (particularly *Ranunculus scleratus*). Such habitats would include areas periodically inundated with water. These conditions would be expected in the locality with the seasonal range of the Volkhov and its tributaries leading to regular over-bank flooding during the early spring melt, creating the natural water meadows that are still characteristic of the district to the south and east of Novgorod today. As with the weeds of disturbed ground the plants producing these seeds could have adapted to suitable habitats in the developing urban environment.

A study of the buried soils at the base of the stratigraphic sequence produced evidence for damp meadow conditions in that part of the excavated area at Troitsky that had not been cultivated, including most of the area of Troitsky XI (Aleksandrovskaia *et al.* 2001, 17–20). Equally, given the contexts of some of the samples (for example, byre deposits for samples 89 to 91) these swamp plants with their seeds, as with the ruderals, could have been brought in with animal fodder or for bedding (Reilly this volume). A chronological study of the incidence of them in the Troitsky XI samples indicated a decrease in frequency of damp land plants through time, which may suggest that the plants were naturalized in this relatively low-lying situation. However, as deposits accumulated, the on-site habitat of these plants almost certainly diminished.

Although the overall instance of cultural plants, particularly cereals, was low they were a consistent feature. In a few instances burnt destruction deposits produced a high incidence of cereals, and in one case associated weed seeds. An exception to this low incidence pattern was millet, particularly the presence of their husks. The high frequency of these millet husks stands in contrast to the references to this crop in the birch-bark documents. All the other grains are mentioned and most especially rye, but there seems to be no unequivocal reference to millet. The explanation for this may be related to millet’s ubiquity, perhaps reflecting the fact that it had little value as food rent or tribute, a central concern of many of the birch-bark documents. Millet has been a common component in the diet of the Slavic peoples, including the Russians ever since, being mentioned in many Russian folk tales. Following the interpretation made of a similarly high incidence of millet from medieval Cracow, it may have been the only food grain completely processed in the domestic household. In this context however, the highest incidence of millet remains (though mostly husks) on the Troitsky sites was from exterior rather than interior locations. This pattern is
PERSPECTIVES ON NON-WOOD PLANTS

most likely related to the disposal of waste but may also hint to the use of millet chaff to feed animals in the yard areas. Davidson in a general study of food plants makes reference to millet being used to feed livestock (Davidson 1999, 506).

Most of the cereal remains occurred as charred grains and indicated the presence of all the main genera, wheat, barley, oats and rye. Apart from one late destruction deposit on Troitsky XII, mentioned earlier, there was a relative absence of chaff elements. The only other exception to this was a few instances of preserved (by water-logging) glume bases of emmer wheat, cultivated to a quite late date in this region by comparison with Western Europe. These remains are most likely to represent waste from a final stage in crop processing, although their use for fodder or bedding cannot be ruled out (see Endnote 14).

The likelihood however, is that primary cereal processing for human food was taking place away from the site. The high incidence of charred remains from sample 19 (from within a building) produced mainly grains of wheat and barley (perhaps suggesting mixed cropping) with few seeds of other plants. However, the large destruction deposit from Troitsky XII, containing a very high frequency of remains, produced not only a very large number of rye grains but also produced a high incidence of a wide size range of weed seeds, suggesting minimal cleaning before being brought to the site (Alsleben 2001, 111 and Alsleben pers comm). This deposit could be ‘the exception that proves the rule’ but it is perhaps too difficult to draw a sound conclusion from such a few high incidence samples. Pre-culinary processing may have been taking place close to cooking areas (see Endnote 15). While the distribution of cereal remains occurred within buildings, there was no particular association with internal ovens.

In addition to the bread-making grains two other cultural plants, hemp and hops, were significant by their presence, though again not in large numbers (except sample 2 from Troitsky XIII). The contrasting distribution of these remains on Troitsky XI, with hops mainly coming from interior contexts and hemp from exterior locations, raises the question of whether the deposits from which they came were in situ, as well as questions about what uses the plants were put to. Hops are most usually associated with flavouring beer, a practice that seems to have been known from at least the 9th century, but they can also be used to produce a dye and the young shoots can be eaten. Hemp has medicinal and drug properties, but had a common usage in medieval times for fibre and for rope making. The fragmented achene/nut-lets might suggest another practice, namely oil extraction. Despite the predominant exterior location of the nut-lets it is very possible that, as is known for more recent culinary sources, hemp oil was used for cooking (Smith and Christian 1984 and see above). Evidence for another oil-bearing plant, flax, was minimal. Apart from one very significant sample taken towards the base of the stratigraphy on Troitsky XI, which produced a high incidence of seed capsules as well as seeds, there were very few finds of flax in the collection.

An important element in many samples was the remains of gathered plants including shells of hazel nuts, drubes of wild strawberry and raspberry, apple pips and bilberry seeds. The distributional study of these remains across and within
Troitsky XI probably had little significance, although it does seem that raspberries, bilberries and apple remains were frequently located along boundary fences and may represent a variation in discard practices.

There are many similarities and some contrasts between the archaeobotanical finds from Novgorod and other developing late early medieval and later medieval urban settlements in NW Europe. One area that is particularly similar is the presence of such gathered fruits from woodland margin plants suggesting an important and continual link with such locations in the immediate hinterland of these sites (see Endnote 16). The presence of sour cherry in a number of samples distributed throughout the sequence is an important indicator, as elsewhere in northern Europe, of the development of orchard husbandry, which seems to have paralleled increasing urbanization throughout the region (Alsleben 2007, 25).

Comparisons have also been drawn between the range of ruderal and weed plants and indeed the presence of damp-land species. The presence of plants from such habitats reflects both the low-lying location of these early urban sites and the land use prior to their development which in the case of Novgorod was most likely both damp meadowland and tillage fields.

The incidence of remains would also be influenced by the nature of deposits. Hall et al. (1983), Kenward and Hall (1995; 1997) and Hall and Kenward (1998) have discussed such deposits in the context of their work in York and in particular discussed the possibility that they represented stable/byre debris, mainly given the presence of so-called ‘dung and slum’ species in the insect collection. It has, however, been difficult to make this interpretation in Novgorod, though it is believed that deposits represented in samples 89–91 were definitely in situ byre debris. The incidence of insects characteristic of foul conditions in stable manure would seem to confirm this interpretation (see discussion of the insects from sample 91 in Reilly this volume). Overall the insect study carried out by Reilly of a range of samples across both Troitsky XI and XIII has cast important light on the nature of the deposits and the living conditions at the time the site was occupied. The study would also seem to confirm the interpretation of an overall damp to wet marshy environment with pools of standing water on and close by, as is also indicated by the presence of *Alisma plantago aquatica*, *Ranunculus scleratus* and *Eleocharis palustris*. In addition, the insect evidence has confirmed the presence of animals living on the site (at least for a time before they were butchered). This evidence lends support to the suggestion, made earlier, that some of the damp land floral remains could have derived from animal feed (from hay) in their dung or in the bedding material used in on-site byres (Reilly this volume).

The low incidence of grain crop remains (partly influenced by the preservation conditions, except where there were destruction deposits), is also a characteristic of other early urban sites. In addition, in a number of examples from NW Europe, hops and hemp are similarly consistently found. One difference between many of these sites and the remains from Troitsky is the lack of imported exotics in the latter case, though such remains (mainly of walnut and almond) have been found in deposits from the
earlier excavations in other parts of Novgorod. Is this simply the result of sample bias or does it reflect a real situation on Troitsky, perhaps influenced by cultural choice or by social status? It seems that the dietary preference of the inhabitants of this part of Novgorod was for local produce, although this interpretation serves to beg this question for future studies on this site and elsewhere in Novgorod.

Explicit hinterland research has not been a common theme in archaeobotanical studies in the past. However, there are exceptions (see above for references to such work). In the case of Novgorod, the study of the environmental, as well as the artefact assemblages, has been very much influenced by a defined hinterland approach: the city’s relationship with the so-called Novgorod Lands, both near and far. The results of the current study would suggest that the predominant proportion of the organic deposits that go to form the site and the identifiable non-wood plant remains content were sourced locally. The remains of the cultural plants, in particular the cereals, but also the millet, were probably grown from the area to the south west of Novgorod. This area is known as the Poozerie, where earlier dated sites (such as Prost and Georgii) have produced cereal remains (Alsleben 2001, 108–9 and this volume). The area to the south also supported deciduous woodland (the most northerly area for such trees in this region) from which many of the gathered plants found in the deposits were likely to also have been obtained including hazel nuts, wild strawberries, raspberries, apples and wild hops (but see Endnote 1). The common incidence of bilberries on the site would indicate the heath areas in woodland clearings to the north of the city were also being exploited.

The selected discussion of comparable, similarly dated, early urban sites across Europe indicate a not unexpected common theme namely that local sources for gathered plants were consistently exploited, highlighting the fact that it is from the ‘rural hinterlands’ that these early towns emerged and were continually sustained. It is perhaps true to say that the continuity of occupation of such early urban sites across the whole of Europe was far more dependent on their immediate hinterland than their far flung contacts and the exotic material that demonstrated such links. It is a lesson to us that we should not create an unbalanced interpretation by over-emphasizing this imported evidence to the detriment of the overwhelming influence of the immediate hinterland.

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Endnotes

1. The woodland insect fauna found to be present in Reilly’s study were species associated with coniferous forest, with almost no species associated with broad-leaved deciduous trees, even though these trees were present in the area to the south of Novgorod in the past according to recent pollen studies and are still extant in some areas today (Spiridonova and Aleshinskaya this volume). The
suggestion here is that the unidentifiable fragmented vegetative material in the non-wood macro-plant assemblage did not come from the leaves of broad leaved trees but came from either plants associated with coniferous forest or, more particularly, those plant species brought to the site for insulation, bedding or animal feed (see Reilly this volume).

2. Kiryanova has argued that initially rye and oats came into this region of North West Russia as weeds of spring-sown crops before being taken on as crops in their own right. When this happened, rye was sown in the winter (Kiryanova 1979, 85).

3. An ecological study (Bleasdale undated) of traditional non-herbicidal spring-sown rye cultivation and its associated weed flora on the Aran Isles, Ireland, also indicated an absence of Agrostemma githago. A comparison between those weeds present in the late dated charred sample from Troitsky XII (identifications by Alsleben), indicated some similarity with the species in the rye fields on Aran for the most frequently identified taxa (over 17 individuals). These included Avena sp. (A. fatua and A. strigosa in the Aran fields), Brassica rapa, Chenopodium album, Lolium temulentum, Lolium perenne, Poa annua, Fallopia convolvulus, Spergula arvensis (eight of 13 commonest taxa in the Troitsky XII sample).

4. Kiryanov has made reference to an entry in the Novgorod Chronicle for 1127 that notes that rye was winter sown. The question is whether such an entry is made because it represents the norm or the exception (Kiryanova 1967, 90).

5. In an ecological survey by Haslam in Britain, Alisma plantago-aquatica was noted as being a characteristic plant of slow flowing channels, including in the vicinity of man-made dykes (Haslam 1978, 249–251).

6. In this context Ankudinov discusses the meaning of the word ‘suki’ as it appears in the birch-bark documents. It would appear to refer to ‘a cleared patch of land’. He argues that it could have arisen to describe increasing clearance of areas around Novgorod for the cultivation of cereals, particularly rye as it became increasingly favoured after the 12th century (Ankudinov 2003). Both Urtica urens and Lapsana communis have been found in samples 48A, 60, 96 and 100. Though there is little significance in this association and little association with other plants that might be found in woodland or woodland margin.

7. This exercise is undertaken here, but in doing so we bear in mind the cautionary comments in taking such an approach in archaeobotany of in particular Küster. However, in order to help illuminate details of the habitat choices of certain plants, identified as present from their seeds (particularly those from damp-land locations and human created habitats), and to draw on parallels with studies that have used this approach, we believe this discussion has some value. We fully recognise that it is not possible to suggest that the phytosociological groups made reference to here can be said to be present in and around Novgorod in medieval times, because the evidence is based on such a narrow range of plant remains from the archaeological collections, many of which can occur in more than one phytosociological group (Hansjörg Küster 1991, 17–26 especially 18–19). However, this approach may have more validity for anthropologically created habitats that, as has been pointed out by Alsleben (2007, 17) following Hellwig (1990), share many similarities across Europe (according to phytosociological classification these human-influenced assemblages are called thanatocoenose). But as Alsleben has rightly pointed out, the full value of this data can only come about if the archaeobotanical evidence is well supported by good archaeological contextual information (Alsleben 2007, 17).

8. The insect study undertaken by Reilly has noted the varied but consistent presence of species associated with swamp and aquatic locations (samples 48 and 54 on Troitsky XI and samples 1 to 9 on Troitsky XIII).

9. One of the site directors at the Troitsky excavations, Alexander Sorokin, has argued, from his interpretation of the archaeological evidence, that there was a regular and rapid build up of refuse on either side of the buildings and when each went out of use the roof was taken off and the walls taken down to the level that the organic refuse had built up on the outside of them. The interior of
the building was then used as a dump for the adjoining properties. If this interpretation is correct it would suggest initial buildups within buildings were *in situ* but then re-deposition from elsewhere would have taken place including residue from activities outside that property altogether (Sorokin pers comm). A varying range of insect fauna that are either characteristic of interior or exterior locations were found in most samples, though the mix was less in those contexts from within buildings (Reilly this volume). Such evidence further highlights the difficulties in defining the extent to which the Novgorod deposits accumulated *in situ*.

10. *Apium* sp. was found in samples 62, 98, 103 (with significant presence), ELS 13 and sample 2 from Site XIII.

11. A factor that might have had some influence in this bias is soil conditions. Flax prefers dry soils, although it does grow well in oceanic climates, as in Ireland. By comparison, hops do better on damp, though well-aerated, soils (Alsleben 2007, 24).

12. In her discussion of the plant remains evidence from the North German Hanseatic towns, Alsleben noted that the regular occurrence of figs and grapes in deposits from these towns would seem that they could have been afforded even by people from the lower orders of society (Alsleben 2007, 26 and 30).

13. The potential for this approach was explored by the UCL excavation team’s involvement in the Troitsky excavations in 1998 (Reynolds and Sudds 2001, 31–46).

14. Davidson has noted that hulled wheat, like emmer and spelt, is presently used to feed animals (Davidson 1999, 845).

15. Baranov *et al.* (1999, 265) noted, in near recent times in peasant households in Russia, the final cleaning of the crop (and even after milling) involved the use of sieves (*nochva*).

16. Groenman-van Waateringe (1994, 156) has similarly made this point in her general study of medieval dietary evidence from not only urban sites, but also castle and monastic sites in Holland.

Note

1 ELS = Environmental London Sample, being samples collected by the excavation team led by Dr Andrew Reynolds from the Institute of Archaeology, UCL.