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# Multidisciplinary investigations at Viru-Nigula churchyard and settlement

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## INTRODUCTION AND PREVIOUS FIELDWORK

In late September and early October 2023, rescue excavations took place in the churchyard and settlement site of Viru-Nigula in northeastern Estonia. Reconstruction work of the Kunda – Pada road was undertaken in the area, designed to run through the protected zone of two monuments: the churchyard (no. 5809 in the National Register of Cultural Monuments) and the settlement site (no. 10916). Archaeological monitoring was carried out by OÜ Muinasprojekt. Still, in spite of the monitoring, the work damaged both the burials

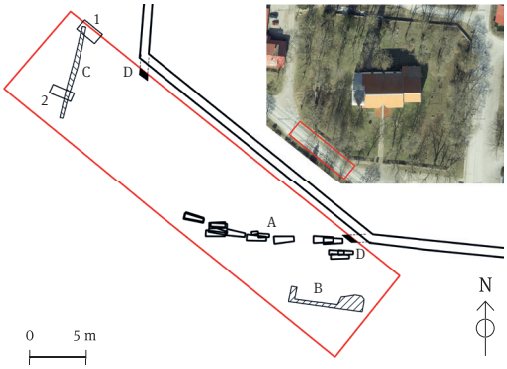


**Fig. 1.** *Plan of the studied area in Viru-Nigula. 1–2 – test pits, A – investigated burials, B – a fragment of the building foundation, C – the fence, D – fragments of the churchyard wall foundations.*

**Jn 1.** *Viru-Nigula uuringuala plaan. 1–2 – prooviaugud, A – uuritud matused, B – hoone vundamendi katke, C – tara, D – kirikaia vundamendi jäänused.*

*Drawing / Joonis: Marie Anna Blehner*

and the occupation layer of the settlement site, including constructions.[1] Thereafter archaeological excavation of the burials was directed by osteoarchaeologist Martin Malve and necessary additional excavations in the settlement site by Tõnno Jonuks. The aim of the fieldwork was to investigate the burials and to document constructions in the study area (Fig. 1). Some of the burials were already unearthed and earlier work had significantly affected all the studied inhumations. In 1988 (Aus & Tamla 1989) and 1990 (Tamla 1991) test pits were excavated around the church and 15 inhumations were found. As a result of these studies, the Viru-Nigula church was dated to the middle or to the second half of the 13th century. The test excavations also revealed striated ceramics, suggesting that the site has been occupied already since the beginning of the 1st millennium AD (Tamla 1991; 1993). Despite the centuries-long activity at the site, the preservation of the habitation layer south and southwest of the churchyard, where current fieldwork took place, was unexpectedly good. Apparently, the road pavement in the 1960s had been laid directly on top of the 19th and 20th-century pavements and thus protected earlier strata beneath these.

## THE OCCUPATION LAYER, THE BUILDING FOUNDATION AND THE FENCE

A settlement layer was discovered all over the area of roadbuilding activity next to the churchyard. Two test-pits were excavated to study the occupation layer. The layer had been preserved for 50–70 cm thickness with no intermediary visible layers. Regardless of the thickness of this layer, it contained relatively few pieces of pottery. Only a few animal bones could be collected from the test pits and these had been preserved remarkably poorly. The reason could be the clayish natural layer, which holds humidity in the occupation layer, making it moist. The soil samples that were sieved in the laboratory revealed some microscopic fragments of ceramics. Possibly the humid soil in combination with low-temperature burning of ceramic vessels is the reason why the layer contained only single finds. From the lower horizon of the occupation layer a large piece of burnt wood, probably from a part of a fireplace, as indicated by heavily burnt stones, was found. The charcoal was dated to the 3rd and 4th century AD (Table 1: 1). Such a date is in accordance with striated pottery found from the excavations around the church building (Tamla 1991) and confirms the human habitation of the site for a long period. A limestone slab situated edgewise, found next to the burnt wood, suggested that some stone constructions are probably preserved in the bottom horizons.

Some 4–5 m westwards of the present churchyard, a stone construction was unearthed (Fig. 2), placed into the occupation layer. This construction consisted of two parallel lines of edgewise limestone slabs placed to the lower horizon of the occupation layer but not beneath it. This would indicate that this foundation post-dates the occupation layer. The limestone

[1] As of time of writing (autumn 2024), the National Heritage Board is evaluating whether the fieldwork was done as agreed beforehand or not.

**Table 1.** *Radiocarbon datings from Viru-Nigula*[2]
**Tabel 1.** *Radiosüsinikudateeringud Viru-Nigulast*
*Compiled by / Koostanud: Kristiina Johanson, Martin Malve, and Tõnno Jonuks*

| No. / Nr | Context / Kontekst | Lab no. / laborikood | Material / materjal | Radiocarbon age / radiosüsiniku vanus | Calibrated with 95.4% probability / Kalibreeritud 95,4% tõenäosusega | Calibrated with 68.3% probability / Kalibreeritud 68,3% tõenäosusega |
|---|---|---|---|---|---|---|
| 1 | Charred wood from the lower horizon of the occupation layer | UBA-52676 | charcoal | 1759±27 BP | 236–377 AD | 247–260 AD (12.2%)<br>279–338 AD (56.1%) |
| 2 | Foundation of a log-house | UBA-52675 | wood | 788±28 BP | 1219–1278 AD | 1228–1270 AD |
| 3 | Lower horizon of the occupation layer, Testpit 1 | Poz-180905 | grain | 960±30 | 1025–1160 AD | 1034–1048 AD (12.6%)<br>1083–1151 AD (55.7%) |
| 4 | Upper horizon of the occupation layer, Testpit 1 | Poz-180906 | grain | 1745±30 | 242–401 AD | 249–266 AD (13.1%)<br>272–297 AD (19.8%)<br>309–353 AD (35.5%) |
| 5 | Burial no. 7 | Poz-174620 | bone | 655±30 | 1280–1328 AD (46.5%)<br>1349–1395 AD (49.0%) | 1291–1316 AD (30.8%)<br>1361–1388 AD (37.5%) |
| 6 | Burial no. 10 | Poz-174619 | bone | 645±30 | 1283–1329 AD (43.0%)<br>1342–1396 AD (52.4%) | 1296–1320 AD (28.8%)<br>1359–1390 AD (39.5%) |

lines were 40 cm apart and originally possibly supported a vertical log fence. For additional support, two lines of small-scale boulders were placed on top of the limestone layer, thus forming a simple but probably effective foundation. Such a fence was perhaps erected as a marker of a churchyard, but considering the thickness of logs, it also could have functioned as a defensive structure. No finds or other data were obtained for dating the construction directly. Only an early 15th-century *seestling* minted in Tallinn (AI 8796: 146) was found in between the boulders, suggesting the date of the fence to be medieval. The latter dating is supported by both hand-made and wheel-made pottery collected from the occupation layer next to the construction.

**Fig. 2.** *Remains of the fence bordering the original churchyard.*
**Jn 2.** *Kirikaia algse piirdemüüri säilinud osa.*
*Photo / Foto: Tõnno Jonuks*

At the eastern part of the excavation area, immediately south of the inhumations, remains of a foundation were found (Fig. 3). Only a southern foundation was preserved for 6.2 m and partially a half-metre-long fragment of the eastern foundation could be followed. The foundation was just 30 cm wide, corresponding to one line of small limestone slabs and just one or two layers had been preserved. This indicates that the building was probably a light log-house. In the SE-corner

[2] Calibrated with computer programme OxCal v.4.4 using IntCal20 calibration curve.

**Fig. 3.** *A fragment of the building foundation in Viru-Nigula churchyard.*
**Jn 3.** *Viru-Nigula kirikaiast avastatud hoone vundamendi jäänused.*
*Photo / Foto: Tõnno Jonuks*

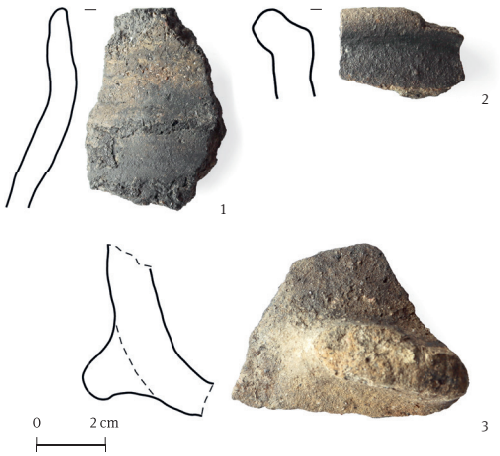


**Fig. 4.** *A selection of ceramic finds. 1 – a fine ware fragment with an ornament of wavy lines, 2 – a rim fragment of a wheel-made vessel, 3 – a bottom fragment of a wheel-made vessel with a short pulled leg.*
**Jn 4.** *Valik keraamikaleide. 1 – peenkeraamika servakatke lainejoonornamendiga, 2 – kedrakeraamika servakatke, 3 – kedrakeraamika põhjakatke lühikese jalaga.*
*(AI 8796: 83, 100, 114.)*
*Photo and drawing / Foto ja joonis: Arvi Haak, Maria Smirnova*

a base of *keris* stove was found with a maximum diameter of 140 cm. No basement for a chimney was found, thus indicating a smokehouse. Between the foundation slabs some animal and fish bones were found together with fragments of wood. A partly charred fragment of wood was dated to the 13th century (Table 1: 2). No floor layer or any other constructions were distinguished.

The ceramic finds form the most numerous category among those collected from the occupation layer. This includes sherds of both hand-made (129) and wheel-made vessels (27), as well as stoneware (3), glazed redware (7), stove tiles (7), daub (5) and burnt clay (15), but also a stem fragment of a white clay pipe. Among the hand-made vessel fragments, fine ware sherds (90), although many of these tiny, clearly dominated over coarse ware (42).

The severe fragmentation of the ceramic material allows only a rather broad dating of the complex. A large amount of fine ware sherds with polished surfaces (43) stand out, but only two were ornamented: one with parallel horizontal straight lines (no. 55) and another with wavy lines (Fig. 4: 1). The latter can be dated to the 8th–10th century. Among the wheel-made sherds, the type 3: 3, dating from the late 13th until the 15th century (Tvauri 2000, 104–105) could be distinguished. A very short pulled leg of a wheel-made vessel (Fig. 4: 3) may indicate Scandinavian influences, yet there are no close parallels to this particular form.

The current investigations allowed establishing the presence of wheel-made vessels in the investigated occupation layer, including the surroundings of the possible fence foundation, but also in at least three grave pits (burials nos 1, 9 and 16), the latter including one rim sherd of the type 3: 3 (Fig. 4: 2). A few sherds of Early Modern and Modern Period ceramics, pot-like stove tile fragments and glass vessels confirm that also the younger habitation layers of the settlement unit are preserved in the centre of Viru-Nigula.

## PLANT REMAINS

Two soil samples, 10 litres of volume each, were taken for plant remains analysis from the occupation layer of the NW part of the settlement site, from the test pit 1 (Fig. 1), one from the depth of 70–90 cm and the other from the depth of 90–110 cm from the ground level (about 51 m a.s.l.). Soil samples were soaked in tap water for 24 hours to loosen the clayey soil and flotated under 1 mm and 0.3 mm sieves. Both samples contained plant remains that were identified with the naked eye and under the stereomicroscope Nikon DS-Fi1 with the magnification of 2×–8×. Only carpological finds could be identified, whereas vegetative remains of plants were not found. Identification of cereal grains and smaller seeds was done using the manual by Stefanie Jacomet (Jacomet 2006), the handbook by Cappers *et al.* (2006) and Cappers & Neef (2012) and the reference collection of seeds and fruits stored at the archaeology lab at the University of Tartu Institute of History and Archaeology.

Altogether 175 cereal grains were collected (Table 2), of which more than half remained unidentified because the heavily charred material was fragmentary, lacking the precise identification characteristics. Of identified grains, barley (*Hordeum vulgare*) was the most common, with 46 grains gathered from the upper sample and 15 from the lower sample. Common wheat (*Triticum aestivum*) was detected only in small numbers and while rye (*Secale cereale*) was definitely present in the upper sample, only one possible rye grain was detected in the lower sample. Of other plants, the presence of common weeds, such as white goosefoot (*Chenopodium album*), cleavers (*Galium aparine*) and campion (*Silene* sp.) was detected.

Two barley grains were selected for dating, one from the upper and the other from the lower soil sample. The grain from the soil sample of the lower horizon of the occupation layer yielded a 11th–12th-century date (Table 1: 3), while the grain from the upper sample resulted in a 3rd–4th-century dating (Table 1: 4). The results seem somewhat confusing, but this discrepancy means that the occupation layer in this location is mixed due to the building of the fence to the depth of 110 cm and no chronological layers can be distinguished within it. Currently the Viru-Nigula barley grains are the second oldest directly dated grains in Estonia after these from Tallinn, Pärnu Road 41, dated to 405–360 cal BC (Niinesalu-Moon *et al.* 2023).

**Table 2.** *Number of identified plant remains from Viru-Nigula settlement*
**Tabel 2.** *Viru-Nigula asulakohast tuvastatud taimejäänuste hulk*
*Compiled by / Koostanud: Kristiina Johanson*

| Taxon (in Latin) / Takson (ladina keeles) | Taxon (in Engl) / Takson (inglise keeles) | Sample 1 (upper) / Proov 1 (kõrgemalt) | Sample 2 (lower) / Proov 2 (sügavamalt) | Sum / Kokku |
|---|---|---|---|---|
| **Cultivated plants / Kultuurtaimed** | | | | |
| *Hordeum vulgare* | Barley | 46 | 17 | **63** |
| *Triticum aestivum* | Common wheat | 5 | 3 | **8** |
| *Secale cereale* | Rye | 13 | 1? | **14** |
| *Cerealia fr.* | | 82 | 8 fr | **90** |
| | **Sum** | **146** | **29** | **175** |
| **Other plants / Muud taimed** | | | | |
| *Galium aparine* | | | + | |
| *Chenopodium album* | | + | + | |
| *Silene* sp. | | + | + | |

## FAUNAL REMAINS

Animal remains were collected from 36 different contexts/places: mainly from the grave pits, test pits, settlement layers and during the cleaning of profiles and the building floor. The heavier fraction of two sediment samples (á=10 L) described above, yielded also many small bone fragments.

Altogether 1331 animal bone remains were collected and analysed (Table 3). The majority of them, i.e. 1280 fragments, come from mammalian skeletons. Due to heavy fragmentation, 827 were taxonomically identified only as mammals and 131 as ungulates. Bird bones (n=23), fish bones (n=26) and two bones of amphibians (frogs) were also present.

321 mammalian bones were more precisely taxonomically identified (Table 3). They belong to cattle (*Bos taurus*), sheep and/or goat (*Ovis aries*/*Capra hircus*), pig (*Sus domesticus*), horse (*Equus caballus*) and cat (*Felis catus*). Some bones of which the species remained unidentified, the higher taxon was fixed. They originate from one of the middle size Canidae (cf. *Canis*/*Vulpes*), the hare (*Lepus* sp.) and one of the Mustelidae (cf. *Mustela*/*Martes*). In addition, a few bones come from the animals belonging to order Rodentia (rodents): the beaver (*Castor fiber*), water vole (*Arvicola amphibius*) and rat (*Rattus* sp.).

From 23 bird bone fragments, only two were preserved almost completely and therefore it was possible to identify them as chicken (*Gallus gallus domesticus*). From 26 fish bones, two were identified as pike (*Esox lucius*), one as the cyprinids (no exact species is known) and one as cod (*Gadus morhua*). In addition, two bones originate from a frog (Anura) species (*Rana* sp.).

**Table 3.** *Taxonomic identifications of animal bone finds from Viru-Nigula*
**Tabel 3.** *Viru-Nigula loomaluude liigiline jaotus*
*N – the number of bone fragments / Luukatkete arv*
*Compiled by / Koostanud: Lembi Lõugas*

| Taxon / Takson | N | Relative amount (%) / osakaal (%) |
|---|---|---|
| Cattle (*Bos taurus*) | 184 | 13.8 |
| Sheep/goat (*Ovis aries*/*Capra hircus*) | 59 | 4.4 |
| Pig (*Sus domesticus*) | 51 | 3.8 |
| Horse (*Equus caballus*) | 15 | 1.12 |
| Cat (*Felis catus*) | 1 | 0.1 |
| Canidae (cf. *Canis*/*Vulpes*) | 1 | 0.1 |
| Hare (*Lepus* sp.) | 2 | 0.15 |
| Mustelidae (cf. *Mustela*/*Martes*) | 3 | 0.22 |
| Beaver (*Castor fiber*) | 1 | 0.1 |
| Water vole (*Arvicola amphibius*) | 3 | 0.22 |
| Rat (*Rattus* sp.) | 1 | 0.1 |
| Ungulates (Ungulata) | 131 | 9.8 |
| Mammals (*Mammalia* indet.) | 828 | 62.2 |
| Chicken (*Gallus gallus domesticus*) | 2 | 0.15 |
| Birds (*Aves* indet.) | 21 | 1.6 |
| Pike (*Esox lucius*) | 2 | 0.15 |
| Cyprinids (Cyprinidae) | 1 | 0.1 |
| Cod (*Gadus morhua*) | 1 | 0.1 |
| Fish (*Pisces* indet.) | 22 | 1.64 |
| Frog (Anura; cf. *Rana* sp.) | 2 | 0.15 |
| **Total** | **1331** | **100** |

The predominance of cattle bones is evident in this region, in contrast to islands and coastal areas where sheep and/or goats are more abundant. In the Iron Age, horses were also consumed, although in smaller quantities than cattle. When the wild fauna like the fox, hare, polecat or marten and beaver can derive from the Iron Age settlement layer, then cat and rat probably date since the 13th–14th century. This is the time when rats first appeared in Estonian archaeofauna in coastal towns. The presence of dogs in Viru-Nigula is proved by the gnawed bones of other domesticates like e.g. the horse (Fig. 5). Beaver bones are rare in northern Estonia, but are well represented in the Iron Age sites of southern Estonia.


**Fig. 5.** *Phalanx of the horse. The distal part has been gnawed by a dog.*
**Jn 5.** *Hobuse varbalüli. Distaalne osa on koera poolt näritud.*
*Photo / Foto: Lembi Lõugas*

The Iron Age zooarchaeological material is quite poor in terms of bird bones. Chicken is present in the later Iron Age in Estonia, but the bones found from the Viru-Nigula, could derive from the medieval time. The number of fish bones is also modest, but special attention should be paid to the find of the cod vertebra in Viru-Nigula. It was found from the floor layer of the building, but most probably is associated with the medieval period, as previous studies have shown that fishing of marine fish was non-existent during the Iron Age (Lõugas 2024).

## INHUMATIONS

In 2023, five individual graves and four multiple burials were unearthed. In addition to these at least one inhumation, possibly more, remained under the new road in the area that was covered already with gravel by the time of fieldwork. The total number of individuals was 16: eleven adults and five sub-adults. Most of the deceased were placed in graves in supine position, with their head toward the west (angle 250–290 degrees). Two of the four multiple burials were double burials. In one of these, two adult women (burials nos 11 and 12) were buried simultaneously, the younger woman (burial no. 11) was positioned on the left side of the thorax of the older (burial no. 12). In the second one, a child whose age-at-death was 11.5–12.5 years (burial no. 13) was placed next to a young adult woman (burial no. 14), both were laid in the same grave pit, but presumably in separate coffins. Besides the triple burial described below, there was a quadruple burial (Fig. 6), where skeletons were positioned in two layers. A woman aged 60–87 years (burial no. 3) was positioned on the left side of an older man (burial no. 4). Next to them on the left side an adult woman (burial no. 6) was situated exactly below


**Fig. 6.** *Quadruple burial in Viru-Nigula churchyard.*
**Jn 6.** *Viru-Nigula kirikaiast avastatud nelikmatus.*
*Photo / Foto: Martin Malve*

a 6–8-year-old child (burial no. 5). All four were buried simultaneously, which indicates that they had died in a short time period, possibly because of a disease outbreak, etc.

Three graves could be pointed out, based on elements of the burial practice and grave goods. In one of these graves lay a young female (burial no. 10) was equipped with an iron decorative pin (Fig. 7: 2) on her thoracic area, she had a necklace of seed beads (Fig. 7: 3) around her neck and a flat pin with joint cross-shaped terminals, accompanied with a bunch of her hair (Fig. 7: 1). Similar, but much better elaborated pins have been found from e.g. Pada and Kukruse cemeteries in Virumaa and Valjala churchyard in Saaremaa and have been dated to the first half of the 13th century (Mägi *et al.* 2019, 103–104 and references). The skeleton, however, was radiocarbon dated to the late 13th – 14th century (see Table 1: 6). The burial of a young man (no. 7), dated exactly to the same period (Table 1: 5), was accompanied with a small penannular brooch with rectangular knobs on the left side of his thorax (Fig. 7: 4). A knife was placed next to his right hip, and two belt rings and a buckle in the belt area (Fig. 7: 5–8).


**Fig. 7.** *Finds associated with burials. 1, 2 – decorative pins, 3 – seed beads, 4 – a penannular brooch, 5 – a belt buckle, 6–7 – belt rings, 8 – a knife. 1–3 – burial no. 10, 4–8 – burial no. 7.*
**Jn 7.** *Matustega seonduvad leiud. 1, 2 – ehtenõelad, 3 – kudrused, 4 – hoburaudsõlg, 5 – pannal, 6–7 – vöörõngad, 8 – nuga. 1–3 – matus nr 10, 4–8 – matus nr 7.*
*(AI 8796: 11, 12, 10, 2, 4, 5, 3, 6.)*
*Photo / Foto: Arvi Haak*

The third grave (Fig. 8) may be a collective burial, i.e. the first individual to be placed in the grave was an adult man (no. 16; Fig. 8: B), on top of him, ca. 10 cm above the skeleton, three large field stones had been placed in a row, covering the body from head to foot. At the same level as the stones, situated towards their straight edge and parallel to the male burial, two small children (nos 8 and 9) had been placed (Fig. 8: A). The subadults were positioned in a single row, one (no. 8) with flexed lower limbs, probably to fit into an already existing grave pit. The decomposition of the adult burial had made both the granite stones and the child skeletons sink from their original position, and the child skeletons were partially on top of the adult when unearthed.


**Fig. 8.** *A row of stones covering an adult body in the triple burial, two subadult skeletons (nos 8 and 9) next to it (A) and a male burial under the stone row (B).*
**Jn 8.** *Kivirida, mis katab kolmikmatuses asunud täiskasvanu luustikku, ja kaks selle kõrval paiknenud lapseluustikku (nr 8 ja 9; A) ning kivirea alt avastatud mehe matus (B).*
*Photos / Fotod: Martin Malve*

## HUMAN REMAINS

Besides the skeletons and unarticulated human bones from the 2023 excavations, the osteological analysis included the skeletons unearthed in 1988 and 1990.[3] Altogether 31 skeletons and 3675 unarticulated skeletal elements collected during fieldwork in 2023 were analysed.[4] 13 males, 11 females, and seven subadults could be distinguished. The scarcity of child burials attracts attention, the possible reasons include the location of the investigated area, i.e. children may have been buried outside the studied area, or that they remained below the investigated horizon, under the reconstructed road. Usually, subadults form nearly a half of all investigated graves in peacetime cemeteries.

The preservation of the skeletal material was excellent, only in rare cases, slight erosion could be seen on bone surfaces. Mechanical damage was quite common, it was the result of removing soil too close to the burials during archaeological monitoring. The medium stature was 169.8 cm for males (n=11, from 161.37 to 178.27 cm) and 157.4 cm for females (n=9, from 146.23 to 162.04 cm). Age-at-death of the subadults was determined between 10.5 months and 12.5 years; neonates and adolescents were totally missing. In the case of the adults, age-at-death remained between 17 and 87 years. Younger adults (from 17 to 25 years), and those older than 40 were more numerous adult age groups in the skeletal material.

A large number of pathologies could be distinguished on the skeletons from the graveyard. Viru-Nigula stands out among other churchyards investigated in Estonia to date by the existence of active new woven bone on different areas of eight skeletons (burial nos 5, 6/1990; 2, 4, 6, 7, 11, 14/2023). The new bone formation could be observed mostly on the diaphyses of the long bones, on foot, on the anterior side of sacrum and scapula, and the posterior side of the ilium. But in two cases (burials nos 2/2023 and 6/1990) also cranial bones were affected.

[3] This article does not include the analysis of the 19th-century burials found from the crypt of the von Adelberg family in the Viru-Nigula churchyard, investigated in 2004 (Johanson *et al.* 2006).
[4] The sex of the burials was determined according to the morphological traits on the pelvis and cranium (Buikstra & Ubelaker 1994, 16–20), maximum length of the long bones (Garmus & Jankauskas 1993, 6–8), and tarsal bones (Garmus 1996, 26). The age at death was determined according to tooth wear (Brothwell 1981, 72), pubic symphyseal face (Todd 1920; 1921; Brooks & Suchey 1990), and age caused changes on the limb joints (Ubelaker 1989, 84–87). The age of subadults was determined by examining the development and eruption of the teeth (AlQahtani *et al.* 2010; Moorrees *et al.* 1963a–b), limb bone length (Scheuer *et al.* 1980) and epiphyseal fusion (Schaefer *et al.* 2009). Pathological conditions were identified based on Buikstra (2019) and Roberts & Manchester (2012). Stature was calculated according to the formula of Trotter and Gleser (Trotter 1970), using measurements of the right femora.

Unfortunately, these are non-specific features which may be related to several pathologies, it can be caused by bacteria, systemic disease, mild trauma or a reaction to specific stress.

The 11.5–12.5-year-old subadult (no. 1/2023) had an active new woven bone on the inside of the V–IX ribs on the left side of the thoracic cage. This might be the result of an unidentified active chronic lung disease. Signs of a similar lung disease were found on the dorsal side of the ribs on the left side of the thoracic cage of a young, 17–25-year-old woman (no. 1/1988), on both sides IX ribs of a young male, 16–18-year-old (no. 2/1990) and on the right rib, presumably one of the VIII–X ribs on the posterior surface of the tubercule, of a male aged 25–29 (no. 3/1990).


**Fig. 9.** *A possible healed injury on the central part of the right transverse process of the III lumbar vertebra of a non-adult (no. 13/2023).*
**Jn 9.** *Võimalik paranenud murd alaealise III nimmelüli parem poolsel ristijätkel (nr 13/2023).*
*Photo / Foto: Marie Anna Blehner*

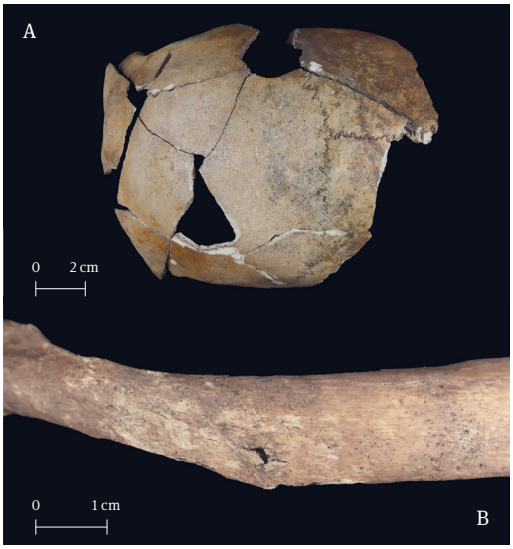


**Fig. 10.** *Peri mortem injuries on an adult male skeleton (no. 10/1990). A – A circle wound on the right side of the squamous part of the frontal bone, presumably related to a firearm, B – a possible arrow wound on the shaft of the right VIII rib.*
**Jn 10.** *Surmaaegsed vigastused täiskasvanud mehe luustikul (nr 10/1990). A – Tõenäoliselt tulirelvaga tekitatud ümmargune haav otsmikuluu soomusosa paremal poolel, B – võimalik noole vigastus VIII roide kaareosas.*
*Photo / Foto: Marie Anna Blehner*

Several healed traumas were detected on the axial and appendicular skeleton. Healed fractures were mostly found on cranial bones, clavicula, ribs and on tibiae. In all three cases healed clavicle fractures were documented only on male skeletons (nos 1 and 7/1990; 7/2023). The right body side was sole represented. The clavicles had been fractured in the mid-shaft. Healed cranial injuries were found among three males (nos 15/2023; 3 and 9/1990) and three females (nos 6, 12 and 14/2023). All traumas were on the neurocranium, mostly on the frontal bone, but also on the parietal bones. Mostly all circular fractures were small, sizes varied from 3.98 to 33.35 mm. A 11.5–12.5-year-old subadult had several healed traumas (no. 13/2023). On the dorsal side of the right parietal bone there was a healed depressed fracture (12.51 × 12.17 mm). The possible healed injury on the central part of the right transverse process of the III lumbar vertebra deserves attention (Fig. 9), as such healed injuries are extremely rare in the case of non-adults. It is difficult to determine whether these injuries are caused by interpersonal violence or an accident in everyday life.

In one case a non-adult aged 11.5–12.5 years (no. 13/2023) had a healed depressed injury on the right parietal bone. In the case of the burial no. 10 (1990), the male had suffered multiple peri-mortem injuries. A penetrating trauma was visible on the right side of the squamous part of the frontal

bone (Fig. 10: A). An injury also slightly affected the right parietal bone and coronal suture. Presumably the wound was caused by a firearm. The external circular part (27.29 × 31.57 mm) was slightly smaller than the clear exit wound external bevelling (37.79 × 35.53 mm). Beside probable firearm injury the man had also a possible peri mortem projectile wound caused by an arrow on the anterior side of the sternum. The hit was visible in the central part of the body of the sternum (22.84 × 11.36 mm). The sternum was also missing the cranial part of the body, it is possible that the sternum was sliced in two with a bladed weapon. Another possible projectile wound was found on the right side of the torso, where the blow had penetrated the shaft of VIII rib (Fig. 10: B). Beside projectile injuries the deceased had also a cut wound in the rib cage, on the inferior side of the shaft of the left IX rib. The same hit also went through the superior side of the shaft of the left X rib. The blow had come to the left side of the torso from the lateral side. These kinds of multiple *peri mortem* injuries are not common in churchyard burials. Besides the case of Viru-Nigula churchyard, a male skeleton with multiple wounds is known from Kose churchyard (Malve *et al.* 2014). Such fatal injuries are common to graves related to interpersonal violence (e.g. battle graves). The injuries caused by various weapons and their profusion gives us an idea of the frenzy and brutality of the battles.

## ISOTOPE ANALYSIS

Stable carbon, nitrogen and sulfur isotope analyses were conducted on the 16 human individuals excavated in 2023 (burials 1–16). A rib bone was sampled from all individuals, except for burial 8, for which the sample was taken from the femoral shaft. Samples were prepared in Tallinn University,[5] and collagen was analysed for stable isotope ratios at SUERC, United Kingdom. The results are presented in Table 4.

Viru-Nigula individuals have the average values of –20.1±0.3‰ (1SD) for $\delta^{13}C$, 10.5±0.9‰ for $\delta^{15}N$, and 3.2±1.9‰ for $\delta^{34}S$. The results indicate a relatively homogenous, terrestrial-based diet, which likely comprised both vegetables and grains, and products of domestic livestock. Viru-Nigula humans have $\delta^{13}C$ and $\delta^{15}N$ values very similar to those from the nearby St Michael's churchyard in Rakvere (Aguraiuja-Lätti & Malve 2023) and from the rural village cemetery at Kaberla (Aguraiuja-Lätti & Lõugas 2019), suggesting similar dietary practices for these communities.

A few outliers stand out in the dataset. Burial no. 8 was a small child, around 1.5–2.5 years of age, with a very high $\delta^{15}N$ value of 13.4‰ (Fig. 11). Values in this range are typically only seen for individuals, whose diet has a high percentage of aquatic foods. However, considering its corresponding $\delta^{13}C$ value and the age of the individual, a more likely explanation is that the elevated $\delta^{15}N$ has been caused by the child being breastfed (i.e., literally feeding off their mother). Since there is a small lag-time associated with a change in diet and its reflection in bone collagen isotope ratios, the child may have already been weaned from breastmilk by the time of its death. Another male individual (burial no. 7) stands out as having the highest $\delta^{13}C$ value of the group (–19.4‰). This individual may have consumed more animal protein than the others, likely including coastal aquatic resources.

Sulfur isotope values ($\delta^{34}S$) of Viru-Nigula humans reflect the origin of consumed dietary protein. The values reported here are very similar to those seen at Kaberla (on average 4.5± 2.4‰; from Aguraiuja-Lätti & Lõugas 2019), and are consistent with $\delta^{34}S$ values of terrestrial herbivores from coastal North-East Estonia (on average 1.6±3.8‰; from Aguraiuja-Lätti *et al.* 2022), suggesting a local origin. Burial no. 11 is an outlier, with the highest $\delta^{34}S$ value of 7.2‰.

[5] Sample preparation and analysis followed the methodology outlined in Aguraiuja-Lätti *et al.* 2022.

**Table 4.** *Stable isotope ratios (‰) of carbon ($\delta^{13}C$), nitrogen ($\delta^{15}N$), and sulfur ($\delta^{34}S$) analysed from Viru-Nigula human bone collagen, including corresponding quality indicators for elemental concentrations (%C, %N, %S) and atomic ratios (C/N, C/S, N/S). The 'Sample ID' number corresponds with the burial number.*

**Tabel 4.** *Viru-Nigula inimluude kollageenist analüüsitud süsiniku ($\delta^{13}C$), lämmastiku ($\delta^{15}N$) ja väävli ($\delta^{34}S$) stabiilsete isotoopide tulemused (‰) koos kvaliteedi indikaatoritega – kaaluprotsendid (%C, %N, %S) ning aatomi suhted (C/N, C/S, N/S). Proovi number vastab matuse numbrile.*

*Compiled by / Koostanud: Ülle Aguraiuja-Lätti*

| Lab ID / Laborikood | Sample ID / Proovi nr | Age / Vanus | Sex / Sugu | $\delta^{13}C$ | $\delta^{15}N$ | $\delta^{34}S$ | %C | %N | %S | C/N | C/S | N/S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GUsi18520 | VN1 | Sub-adult | N/A | -20.3 | 9.5 | 5.2 | 42.4 | 14.8 | 0.17 | 3.3 | 656 | 197 |
| GUsi18521 | VN2 | Adult | M | -20.1 | 9.6 | 3.8 | 42.7 | 15.0 | 0.18 | 3.3 | 644 | 194 |
| GUsi18522 | VN3 | Adult | F | -19.9 | 10.4 | 4.7 | 42.2 | 14.9 | 0.19 | 3.3 | 585 | 178 |
| GUsi18523 | VN4 | Adult | M | -20.0 | 10.8 | 1.3 | 42.5 | 14.7 | 0.19 | 3.4 | 600 | 179 |
| GUsi18524 | VN5 | Sub-adult | N/A | -20.0 | 10.1 | 3.8 | 42.4 | 15.1 | 0.19 | 3.3 | 584 | 178 |
| GUsi18525 | VN6 | Adult | F | -20.2 | 10.2 | 2.3 | 42.5 | 15.2 | 0.17 | 3.3 | 657 | 201 |
| GUsi18526 | VN7 | Adult | M | -19.4 | 11.0 | 4.7 | 42.1 | 14.8 | 0.17 | 3.3 | 658 | 199 |
| GUsi18527 | VN8 | Sub-adult | N/A | -20.5 | 13.4 | 1.4 | 42.1 | 14.9 | 0.19 | 3.3 | 580 | 176 |
| GUsi18528 | VN9 | Sub-adult | N/A | -20.5 | 10.6 | 0.5 | 42.8 | 14.8 | 0.18 | 3.4 | 620 | 183 |
| GUsi18529 | VN10 | Adult | F | -20.2 | 10.1 | 3.4 | 42.0 | 15.0 | 0.18 | 3.3 | 618 | 190 |
| GUsi18530 | VN11 | Adult | F | -20.0 | 9.6 | 7.2 | 42.2 | 14.4 | 0.20 | 3.4 | 556 | 163 |
| GUsi18531 | VN12 | Adult | F | -20.1 | 10.5 | 4.8 | 43.2 | 15.0 | 0.20 | 3.3 | 574 | 171 |
| GUsi18532 | VN13 | Sub-adult | N/A | -20.3 | 9.8 | 1.2 | 42.5 | 15.0 | 0.16 | 3.3 | 698 | 211 |
| GUsi18533 | VN14 | Adult | F | -20.5 | 10.4 | 0.0 | 43.1 | 14.8 | 0.20 | 3.4 | 573 | 169 |
| GUsi18534 | VN15 | Adult | M | -19.8 | 11.6 | 3.3 | 42.8 | 15.0 | 0.19 | 3.3 | 614 | 185 |
| GUsi18535 | VN16 | Adult | M | -20.4 | 9.8 | 4.1 | 41.8 | 14.8 | 0.20 | 3.3 | 570 | 173 |
| | | **Average** | | **-20.1** | **10.5** | **3.2** | **42.5** | **14.9** | **0.2** | **3.3** | **612** | **184** |
| | | STDEV | | 0.29 | 0.94 | 1.91 | 0.38 | 0.18 | 0.01 | 0.04 | 39.6 | 12.9 |

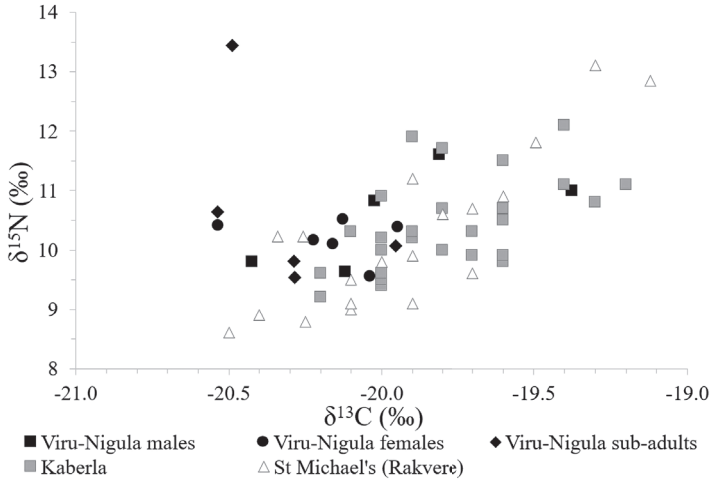


**Fig. 11.** *Scatterplot of $\delta^{13}C$ and $\delta^{15}N$ values for Viru-Nigula males, females and sub-adults, alongside comparative data from Kaberla (Aguraiuja-Lätti & Lõugas 2019) and St Michael's churchyard in Rakvere (Aguraiuja-Lätti & Malve 2023).*

**Jn 11.** *Hajuvusdiagramm Viru-Nigula meeste, naiste ja alaealiste $\delta^{13}C$ ja $\delta^{15}N$ väärtustega. Võrdluseks on võetud andmed Kaberla (Aguraiuja-Lätti & Lõugas 2019) kalmistult ning Rakvere Püha Mihkli kirikaiast (Aguraiuja-Lätti & Malve 2023).*

*Graph / Graafik: Ülle Aguraiuja-Lätti*

While consumption of aquatic resources with high $\delta^{34}S$ values can also increase human $\delta^{34}S$ values, this individual's corresponding $\delta^{13}C$ and $\delta^{15}N$ values are not distinct in any way from the rest of the dataset. Instead, burial no. 11 may have spent her adolescence in southern Estonia (only moving up north some years before her death), where the local terrestrial $\delta^{34}S$ baseline is much higher (on average 7.8±1.7‰; from Aguraiuja-Lätti *et al.* 2022), at the same time maintaining a similar diet to the rest of the Viru-Nigula population.

## DISCUSSION AND CONCLUSIONS

It was suggested already in 1991 that the history of Viru-Nigula site stretches back to two millennia (Tamla 1991). The current research confirmed the early dating, the distribution of the occupation layer over a large area and proved that some prehistoric features may still have been preserved under younger layers. However, constant activity at the same site has disturbed the occupation layer, the stratigraphy of the site was mixed at the studied area and the same may be true for the remainder of the village. In addition, the finds from the nearly metre-thick occupation layer under the present road suggest different periods from the early I millennium AD to Early Modern Period. However, hand-made pottery forms the majority of the finds from the layer, suggesting that a large part of the layer has formed during the Iron Age. Seeds found from the layer suggest that barley dominated in cultivation, as common in Estonian and Nordic Iron Age settlements (Tvauri & Vanhanen 2016). Of animal bones the ones identified as cattle, sheep/goat, pig and horse were found. Such a terrestrial diet from the Iron Age to the Medieval Period is also confirmed by the stable isotope studies of medieval human bones. As usual in many Iron Age settlements, the collected animal bones include a few wild animals as demonstrated by the bones of (probable) fox, beaver, and hare. Fish bones are also expected, considering the river in the vicinity and the closeness of the Finnish Gulf. Stable isotope analyses from the medieval inhumations also confirmed that small quantities of marine and brackish-water fish were consumed by the locals.

Probably during the second half of the 13th century a church was built in the *Akedolae* village (Tamla 1991), as it was called in *Liber Census Daniae*. While wheel-made pottery confirms continuous habitation till then, the houses were demolished probably soon after founding the church, as demonstrated by the 13th century date of a partially preserved foundation of a log-house dwelling, indicated by the remains of a stove. However, the foundation was partially destroyed and the area was used for burials in the late 13th and 14th century as shown by ceramic finds from the infill of burial no. 16 and by radiocarbon dates of inhumations nos. 7 and 11.

The research established that the medieval churchyard was much larger than the current one and it was surrounded by a massive fence. The fence consisted of a stone foundation, which probably supported vertical logs. The studied section of the fence runs straight parallel to the modern churchyard wall. Most likely the fence was constructed already in the Middle Ages and was definitely present by the 15th century as indicated by a Tallinn coin, found in between the foundation stones. As the studied 13th–14th century inhumations seem also to be in the area surrounded by the fence, it could indirectly support the suggested dating of the fence. In this case, a large part of the village must have been cleared off and new arbitrary borders did not consider the previous ground plan of the village.

Altogether 31 medieval inhumations have been excavated from the churchyard, divided into two groups – 15 inhumations were located at the northern side of the church (excavated in 1988 and 1990) and 16 at the southern part of the churchyard (current studies). All the

investigated burials were situated at an approximately similar depth and formed a cluster where no burials overlapped, which might indicate a similar late 13th – early 14th century date. Some inhumations from the northern side of the church are of similar dating. However, as only some inhumations were accompanied with grave goods and only two are directly dated, the exact dating of all the burials is not known. The Early Modern burials (16th–18th cc), usually dominating in Estonian churchyards, were missing at the studied site. This is because the churchyard was reduced probably soon after the Livonian War (1558–1583) and thus the studied area was not used for later burials. A large number of unarticulated human bones collected in the area where soil had been removed under monitoring show that some, possibly also medieval inhumations are destroyed by now. Unarticulated human remains were also documented when excavating the medieval burials. These indicate that the burials studied were not the earliest in the churchyard, as these had already disturbed earlier ones. A skull of a young male was seen just below the quadruple burial, yet his grave had remained undisturbed. The large number of collective graves is also noteworthy.

To conclude, despite the problematic beginning, where probably a considerable amount of archaeological data got lost, the current research opens a new perspective to the entire Viru-Nigula site. It was demonstrated that the original occupation layer was well-preserved under the historical road. This indicates the need to consider the possibility of well-preserved historical layers under 20th-century constructions also elsewhere. Numerous new interpretations and research problems raised about the Viru-Nigula churchyard suggest urgent future research is needed, but also to allow reconsidering the entire plan and purpose of the medieval Viru-Nigula church complex.

## ACKNOWLEDGEMENTS

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# MULTIDISTSIPLINAARSED UURINGUD VIRU-NIGULA KIRIKAIAS JA ASULAKOHAL

Martin Malve, Tõnno Jonuks, Ülle Aguraiuja-Lätti, Arvi Haak, Kristiina Johanson ja Lembi Lõugas

2023. a septembri lõpus ja oktoobris toimusid Viru-Nigula asulakoha ja kirikaia alal päästekaevamised (jn 1). Välitööd said alguse Kunda–Pada maantee rekonstrueerimisest, millega kaasnes arheoloogiline järelevalve (OÜ Muinasprojekt). Paraku said teetööde tulemusel kahjustada nii luustikud kui ka asula üllatavalt hästi säilinud kultuurkiht koos selles paljandunud rajatistega, mistõttu tuli ette võtta päästekaevamised. Need piirdusid matuste uurimisega (M. Malve), väikesemahuliste proovikaevanditega asula kultuurkihi uurimiseks ning paljandunud konstruktsioonide dokumenteerimisega (T. Jonuks). Kuna asulakoha kultuurkiht oli uuritaval alal säilinud hästi, oli kogutud andmestik väga rikkalik ja nii esitatakse artiklis lisaks välitööde ülevaatele ja leiuanalüüsile ka zooarheoloogiliste ja botaaniliste andmete analüüs ning inimluude osteoloogilise ja isotoopuuringute tulemused.

Viru-Nigula varasemate uuringute põhjal (1988, 1990, 2004) oli teada, et sealne asulakoht on hakanud kujunema juba I aastatuhande algul. Uute välitööde proovikaevandist 1 kogutud radiosüsinikuproovid (tabel 1: 1, 4) kinnitasid, et kultuurkiht on kujunenud hiljemalt alates 3.–4. sajandist. Leiuaines viitab järjepidevale asustusele, isegi hoolimata välitööde tagasihoidlikust mahust. Kultuurkihi ülaosas olid jälgitavad kaks kividest rajatist, millest üks osutus kerisahjuga hoone jäänuseks, teist aga tõlgendasime kirikaia kirikukompleksi piiranud massiivse aia vundamendina (jn 2). Hoonest (jn 3) leitud puidukatkest tehtud radiosüsiniku analüüs kinnitas, et see oli kasutusel 13. sajandini (tabel 1: 2), piirdeaed oli aga rajatud tõenäoliselt 13.–14. sajandil. Asula kultuurkihist kogutud loomaluud ja taimejäänused osutasid rauaajal tavapärasele toitumisele, milles mängisid põhirolli koduloomad ja oder, vähemal määral rukis.

Päästekaevamistel puhastati välja ja võeti üles 16 *in situ* matust: 11 täiskasvanut ja viis alaealist. Leiti kaks kaksikmatust, üks nelik- (jn 6) ja kolmikmatus ning viis üksikmatust. Avati vaid pinnase koorimisel kannatada saanud hauad. Surnud olid valdavalt sängitatud selili-siruli asendis peaga läänekaartesse. Kolmes hauas oli säilinud kirstu kõdupuit. Hauapanuseid ja riietusega seotud esemeid avastati seitsme surnu juurest (jn 7). Kokku leiti viis nuga, kolmes matuses oli kaks vöörõngast koos rauast või vasesulamist pandlaga.

Osteoloogilise analüüsi käigus vaadati läbi nii 2023. kui ka 1988. ja 1990. aasta uuringutelt kogutu – kokku 31 luustikku, samuti 3675 irdset inimluud 2023. aastast. Skelettidest 13 olid mehed, 11 naised ja seitse alaealised. Meeste keskmine kasv oli 169,8 cm ja naistel 157,4 cm. Alaealiste vanus surmahetkel jäi vahemikku 10,5 kuud kuni 12,5 aastat, imikuid ja noorukeid luuaineses ei esinenud. Täiskasvanud olid surmahetkel vanuses 17–89 aastat. Enim olid esindatud noored täiskasvanud (18–25 aastat) ja üle 40-aastased.

Luustikel tuvastati arvukalt kesk- ja varauusaegsetele matmispaikadele iseloomulikke patoloogiaid, eriti erinevaid hambapatoloogiaid. Silmapaistvaim leid oli aktiivse uue luukoe esinemine mitmete luustike kolju-, jäseme-, jala-, aba- ja niudeluudel. Kuna tõvel puuduvad kindlale haigusele omased tunnused, võivad uue luukoe teket põhjustada nii bakter, süsteemne haigus, kerge trauma kui ka stress.

Traumadest enim leiti luustikel paranenud luumurde, seda valdavalt ajukolju luudel, rangluudel ja roietel, üksikutel juhtudel ka muudel luuosadel. Haruldase vigastusena avastati ühel 11,5–12,5-aastasel võimalik paranenud murd III nimmelüli paremal ristijätkel (jn 9). Täiskasvanud mehe (10/1990) skeletil leidus mitmeid surmaaegseid vigastusi, mis oli tekitatud nii terariistaga kui ka laskerelvadega (jn 10). Leitud vigastused näitavad, et mees suri tõenäoliselt võitluse käigus (nt lahingus).

2023. aasta 16st luustikust tehti süsiniku ($\delta^{13}C$) lämmastiku ($\delta^{15}N$) ja väävli ($\delta^{34}S$) stabiilsete isotoopide analüüsid (tabel 4), et lähemalt uurida nende maetute toitumist ja päritolu. Analüüsi tulemused viitavad, et maetute toidulaud oli sarnane teiste keskaegsete Põhja-Eesti kalmistute omadele ning menüü koosnes peamiselt teraviljadest ning koduloomade lihast ja saadustest. Vähesel määral tarbiti ka kalu, sealjuures nii avamere liike kui ka rannikulises riimvees elavaid mageveekalu. Viru-Nigula maetute väävli isotoopanalüüside tulemused osutavad, et tegu oli tõenäoliselt kohalike elanikega. Erandiks oli matus nr 11, kes erineb oma $\delta^{34}S$ poolest teistest maetutest, ning võis pärineda Lõuna-Eestist, kus on palju kõrgemad $\delta^{34}S$ väärtused.

Ehkki uuringute algfaasis hävis tõenäoliselt osa väärtuslikku teavet, lubavad käesolevad uuringud Viru-Nigula arengulugu uues valguses vaadelda. See kehtib nii väikeses mahus uuritud, kuid uute teekihtide all säilinud asulaladestuste osas, mis rõhutab ka teiste 20. sajandi rajatiste puhul vajadust selliste ladestuste säilimisega arvestada, kui ka Viru-Nigula kirikaia uurimistulemuste ja kirikla tekkeloo osas.