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MEDIEVAL RECORDER FROM TARTU, ESTONIA

In summer 2005 a complete and well preserved recorder was unearthed during archaeological excavations in the centre of Tartu in a latrine dated to the 14th century. The instrument is nearly cylindrical and is made of maple. Tartu recorder belongs to three oldest surviving medieval recorders. We are thus dealing with an extremely rare find and as yet the Tartu recorder is the best survived medieval recorder ever found.

2005. aasta suvel leiti Tartu kesklinnast arheoloogilistel väljakaevamistel 14. sajandiga dateeritud käimla lampkastist terviklikult säilinud plokkflööt. Pill on peaaegu silindrilise kujuga ja treitud ühes tükis harilikust vahtrast. Tartu plokkflööt kuulub kolme kõige vanema säilinud keskaegse plokkflöödi hulka. Tegemist on seega üliharuldase leiuga ja teadaolevalt on Tartu plokkflööt ka kõige paremini säilinud keskaegseks plokkflöödiks.

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Introduction

In the centre of Tartu in the courtyard of 15 Ülikooli Street archaeological excavations were carried out in summer 2005 and spring 2007 by the University of Tartu directed by Andres Tvauri. The aim of those excavations was to investigate the whole courtyard area (115 sq. m in total) archaeologically in order to enable the construction of underground rooms. Six wooden cesspits from 14th–16th centuries were found from the area (Tvauri & Bernotas 2005; 2006; Tvauri 2007).

Among other finds a completely preserved wooden recorder was found in 2005 from one of the latrines (Fig. 1). Because a medieval recorder, as well as medieval musical instruments in general, is an extremely rare find, it deserves a publication of its own.

Context of the find

The recorder was found from the centre of medieval Tartu (Fig. 2) in medieval and also current back yard area, from latrine no. 1b. The latrine was made from

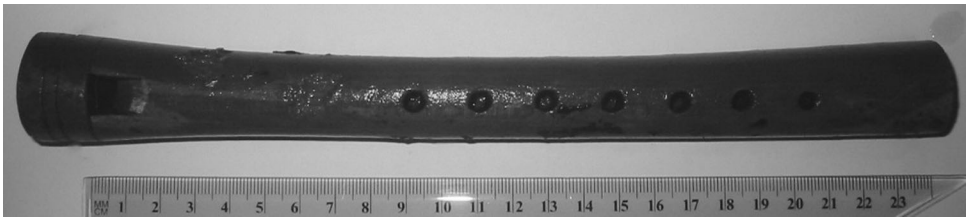

Fig. 1. Tartu recorder before conservation (TM A 141: 170). Photo by Andres Tvauri.
Joon 1. Tartu pokkflööt enne konserveerimist. Foto Andres Tvauri.

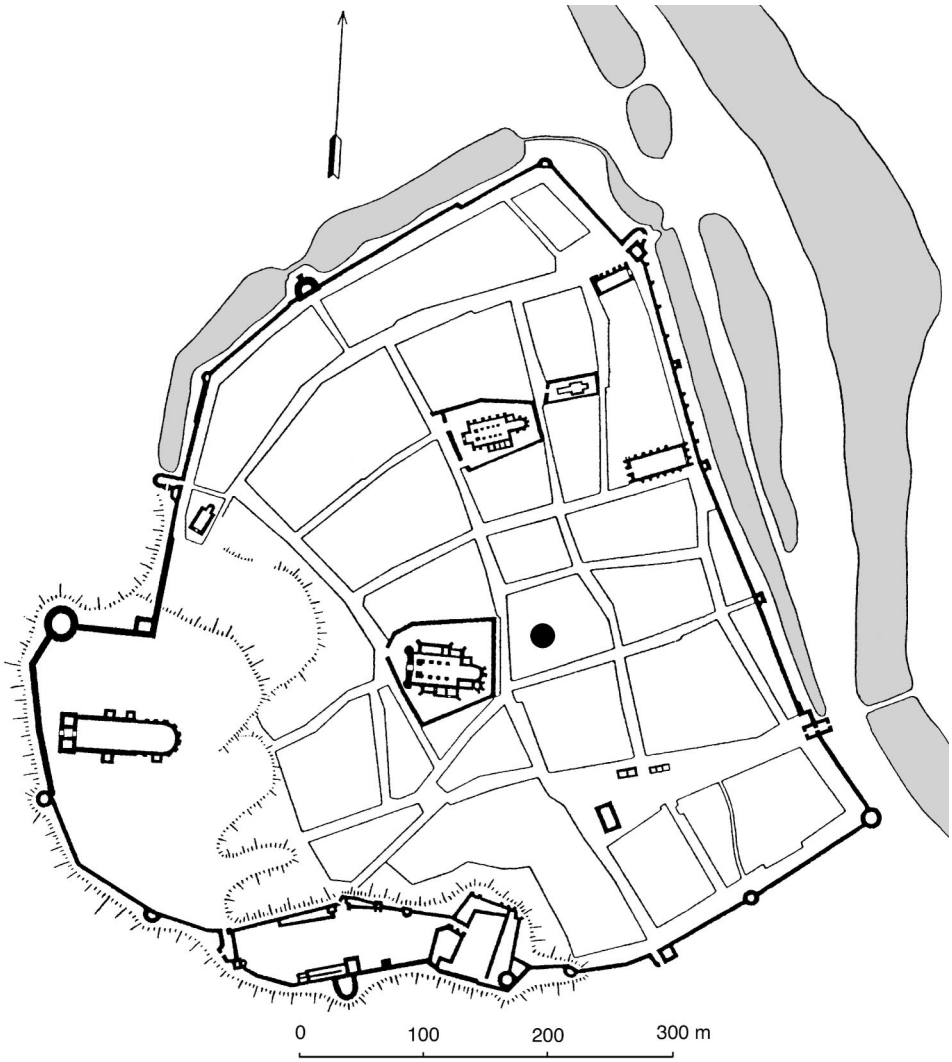

Fig. 2. Location of findplace on the map of medieval Tartu. Photo by Andres Tvauri.
Joon 2. Leiukoha asend keskaegse Tartu plaanil. Foto Andres Tvauri.

pine logs (Fig. 3) and its measurements were 1.8 × 1.8 m, the height being 1.9 m (15 layers of logs). On the upper side of the cesspit, at the height of the 1st–2nd log layers from the top, there was a thin layer of decayed wood, seemingly originating from boards covering the cesspit. Underneath, the pit was filled with thick and sticky layer of excrements, containing abundant branches, wood chips, fire-sticks, textile remains, animal and fish bones, cherry and plum stones, shells of Persian walnuts, fragments of wooden vessels, potsherds, fragments of window glass and other finds.

Archaeological objects of this kind are common in Tartu – at least 35 wooden cesspits dated to the 13th–16th centuries have been found and investigated in town. As the medieval cultural layer of Tartu is in most cases situated in wet and oxygen-free environment of the low and flat river valley, the organic material found there (wood, textile, leather, bone, etc.) is often very well preserved. Conditions for the preservation of organic material are particularly favourable in the latrines filled with excrements.

The contents of the cesspit at 15 Ülikooli Street can be interpreted as one stratigraphic unit. It means that the entire filling of the pit has deposited in quite

Fig. 3. Tartu recorder's finding place – latrine made of logs. Photo by Andres Tvauri.
Joon 3. Tartu flöödi leiukohaks olnud palkidest lampkast. Foto Andres Tvauri.

similar conditions in a relatively short time. Only on the very bottom of the pit there was a 50-cm thick layer different in content and with no finds. The recorder was situated near the centre of the latrine, 1 m below the survived upper log.

Dating of the Tartu recorder

Other finds from the same layer can be used for dating the recorder. For example, there was a stoneware jug 14 cm in height (TM A 141: 70), which originates from southern Lower Saxony where vessels with similar characteristics were produced in the second half of the 14th century (Stephan 1981, pl. 43: 1–3; Russow 2006, 74–75). In addition fragments of several jugs from Siegburg, Rhineland were found. A completely preserved jug (Fig. 4) can be dated to the period 1290–1400 (Russow 2006, fig. 12: 1; personal comment by Erki Russow). An upper part of a bulhy jug is almost completely preserved (TM A 141: 505); it obviously belongs to the turn of the 14th–15th centuries (personal comment by Erki Russow). Pieces of Jacoba jug (TM A 141: 72) originating from western part of Saxony, Waldenburg, were also found. Those jugs are considered to date to the period 1375/1400–1525/1550 (Scheidemantel 2005, 110–111). Besides stoneware, fragments of two earthenware vessels (TM A 141: 550, 552) came to light from the latrine. We are dealing with pottery of NW-Russian-style, which can be dated to the 14th–15th centuries based on the rim shapes of the vessels and ornaments of sparse or wavy lines made with stick (Tvauri 2000, 105–107, fig. 9; Кильдюшевский 2002, 12, fig. 4: 1–5).

Fig. 4. Stoneware jug from Siegburg, found from the latrine (TM A 141: 506). Photo by Andres Tvauri.

Joon 4. Lampkastist leitud Siegburgi päritolu kivikeraamiline kann. Foto Andres Tvauri.

Beaker or beakers of thin clear glass with blue glass-string decorations (TM A 141: 44–55) were also found from the cesspit. Fragments of such beakers have been found only in towns of the Baltic Sea

region from deposits of the 14th–early 15th century. In Finland this kind of glass findings from the layers of the town of Turku have been dated to the period 1360–1410 (Haggrén 2003, fig. 4; 2005, fig. 3: 2). An upper part of a small glass bottle, the so-called *Ribbenflasche* (TM A 141: 543) is a unique find in Estonia – it is the first and so far the only one found here. Such glass bottles have been uncovered elsewhere in Europe in the 13th–14th-century context (Baumgartner & Krueger 1988, 270–280). A push key spring lock made of iron (TM A 141: 154) can be dated to the 14th century or to the first half of the 15th century (Колчин 1982, fig. 3, type Д).

Summing up the dates of the finds from the cesspit in question one can see that in most cases they belong to the 14th–15th centuries. In the case of those objects dated to the 15th century it is also possible that they come from the turn of the 14th–15th centuries. Based on the finds, the content of the cesspit most likely comes from the second half of 14th century. The rest of the archaeological finds from the latrine also fit into the proposed period.

Fortunately it was possible to date the logs of the latrine using dendrochronological method. The logs were cut down in 1335 (Bernotas 2008, in print).

Summing up the information presented above we can date the contents of the latrine to the period between 1335 and the end of the 14th century. However, this does not show the time when the instrument was made but the time when it was deposited in the ground.

To date the recorder itself, a radiocarbon dating (AMS) was conducted in the Dating Laboratory of the University of Helsinki in winter 2007. For that purpose a sample of wood was taken from the recorder, which was dated to 690±30 BP (Hela-1338). When calibrated with computer program OxCal v.3.10, two possible time intervals were achieved with 95.4% certainty (Fig. 5), first fitting to 1260–1315, and second 1355–1390.

It must be considered that the radiocarbon dating represents the age of the material that the instrument is made of. More precisely even, the time when the tree-rings of the wood sample were formed. If the recorder was made of the inner part of a tree, the result of radiocarbon dating can be tens of years older than the actual time of cutting down the tree. Additionally, it can be presumed that the instrument was made of carefully dried wood and it could have been in use for many years. Considering the above-mentioned aspects, it is quite plausible that the recorder was produced at the beginning of the 14th century. Thus the active use of the instrument falls into the first half of the 14th century.

In the 14th century, Tartu was an important and wealthy Hanseatic city, the main income of which came from transit-commerce between western and northern European Hanseatic towns and Novgorod and Pskov in Russia. At that time the Old Livonian towns belonged explicitly to Northern German, i.e. Hanseatic cultural sphere. The latrine where the Tartu recorder was found was probably situated on the land of a wealthy German merchant. Both the central position of the plot of land in town (near the market square and next to the largest church in town)

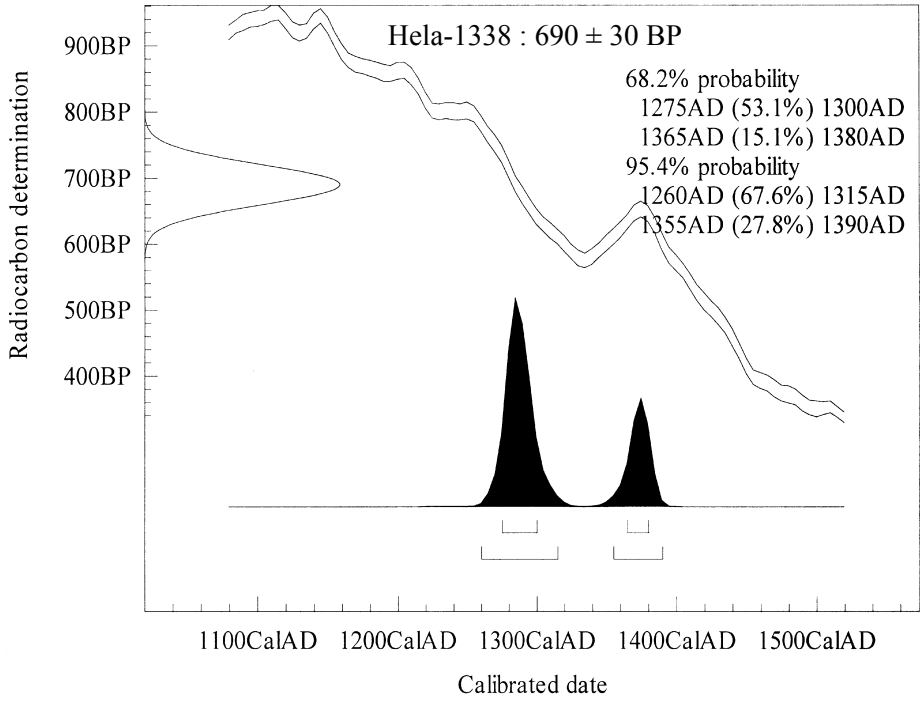

Fig. 5. Date and calibration interval from the Tartu recorder (Athmospheric data from Reimer et al. 2004; OxCal v3.10 Bronk Ramsey 2005; cup r: 5 sd: 12 prob usp [chron]).

Joon 5. Tartu plokkflöödi AMS-dateeringu kalibreering (aluseks Reimer jt 2004; OxCal v3.10 Bronk Ramsey 2005; cup r: 5 sd: 12 prob usp [chron]).

as well as fragments of imported glass-beakers and exotic archaeobotanic finds (grape seeds, shells of Persian walnuts, plum stones, peppercorns), which in this case can be described as luxury items, give evidence of the lavatory owner's wealth.

Tartu recorder

The recorder is made of maple (*Acer platanoides*).[1] There are ornamental rings at the mouthpiece end (Fig. 6). External outline of the recorder is nearly cylindrical, resembling a bone in shape. Directly after uncovering (being soaked in water) the total length of the recorder was 250 mm and the largest diameter was 30.7 mm on the mouthpiece end. Its bore has a diameter of 12 mm at the end of foot section.

[1] Identified by dendrologist Regino Kask (Estonian University of Life Sciences).

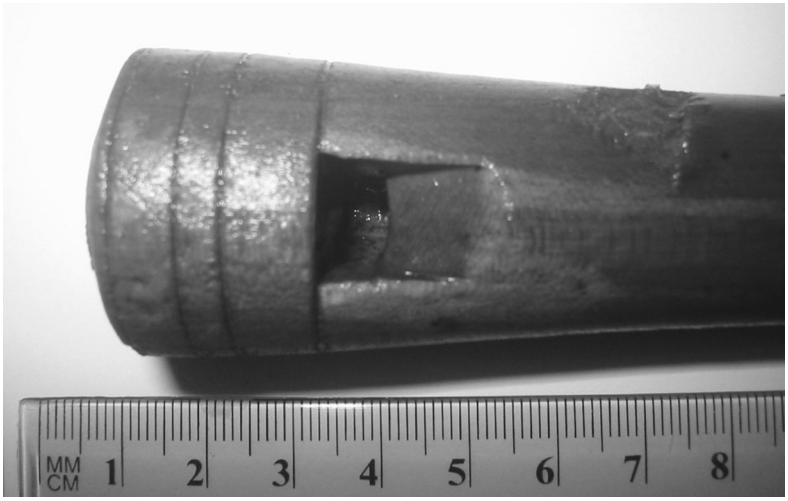

Fig. 6. The labium of Tartu recorder before conservation. Photo by Andres Tvauri.
Joon 6. Tartu plokkflöödi laabium enne konserveerimist. Foto Andres Tvauri.

The bore seems to be near cylindrical, conic by the block and mildly descending at the other end of the instrument. Still there is no doubt that the violation of cylindrical form is deliberate and not the outcome of deformation. The bore is slightly bent, while the existence of dirt inside the instrument and the oval form of the bore make it hard to measure the exact dimensions.

There was a crack at the end of the instrument already when found. Fortunately this does not go right through and will not affect the bore. The instrument was slightly bended, which is rather surprising in case of maple-wood. This was probably caused by extreme humidity and the pressure of the soil. On the surface of the recorder there are some notches inflicted in the course of excavations. Luckily they are in such places where they do not affect the musical qualities of the instrument. The recorder was conservated in the Department of Archaeology of the University of Tartu. In the process of boiling the instrument in paraffin its dimensions diminished to some extent.

The windway and block of the instrument are well preserved and very precisely made especially when compared to not so accurately prepared labium. The latter has a bowed edge which withdraws in the centre. It seems, however, that the labium is not worn out in any way and we see the original shape.

The block is made from a birch branch (*Betula*) and is 23 mm in height (Fig. 7). Amazing is the even concavity and high quality (of refinement) of the block's windway which is characteristic also to instruments from later periods. The block has a conical shape with a diameter of 11.7–12.3 mm. The more surprising is a small hole drilled horizontally through the instrument and block (Fig. 8). An X-ray photo shows spots on the edges of that hole where the Roentgen rays have reflected

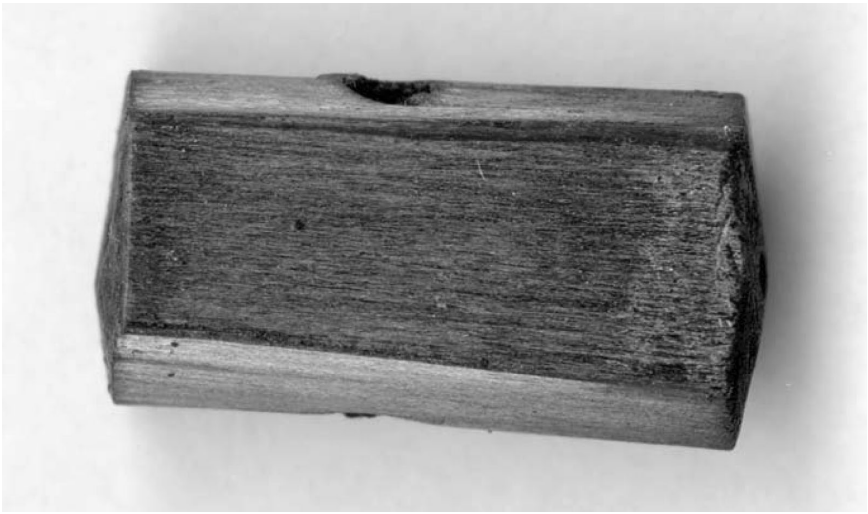

Fig. 7. The block of Tartu recorder. Photo by Taavi-Mats Utt.
Joon 7. Tartu plokkflöödi plokk. Foto Taavi-Mats Utt.

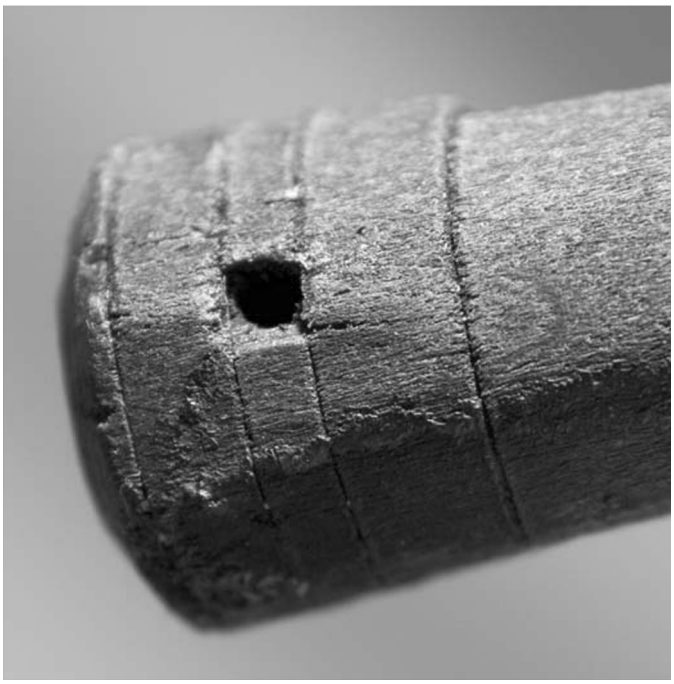

Fig. 8. A small hole in mouthpiece end of Tartu recorder drilled through the instrument and block. Photo by Taavi-Mats Utt.

Joon 8. Pilli ja plokki läbiv ava Tartu plokkflöödi huulikupoolses osas. Foto Taavi-Mats Utt.

back (oxide?). It can be assumed that the block was fixed with a metal pin, although there was no need for that because of the conicity of the block. As the block is made of birch which reacts to changing humidity and temperature more than cedar, which was used as block-material in later periods, the block could have been made with extra room for expanding. In that case it would have needed a metal rod for additional fixing. We must not exclude the possibility that the rod was meant for hanging the instrument, especially while taking in account its small parameters. The blowing end of the recorder is not beaked (as usual by modern recorders in order to ascertain the best position for blowing) but flat.

Unlike all other surviving medieval recorders, the Tartu recorder has finger holes in one row and the lower, seventh hole is not doubled. This is not very surprising considering the small size of the instrument. Remarkable is the regular placing of the finger holes and similarity of diameters of the holes. All the holes are drilled in the direction of the labium. The finger holes are cylindrical and almost entirely not undercut.

Compared with the modern classification of recorder sizes and pitches it is closest to a low sopranino at a^1 = 440 Hz. Indeed, this is only contemporary classification which does not claim to be potential medieval standard. The lowest tone of the instrument is *ca* 30 cents lower than second octave F, and the seventh finger hole produces a half tone, unlike the later standards.

The instrument has survived so well that it makes sound when blown. The range of the Tartu recorder is two octaves and a second. Unfortunately we cannot decide upon the original range of the instrument with certainty. It is possible that the shrinkage of wood in the process of conservation and the presence of some dirt (urinary calculus?) inside the bore have narrowed it, and paradoxically, the range could have even widened. Despite the fact that such theoretical possibility exists it is quite likely that we are dealing with the original range of the recorder. Considering that the range of most renaissance recorders was an octave and major sixth, such a wide range in such an old instrument is definitely surprising. Already external observation revealed a relatively large window compared to the small parameters of the instrument which also did not predict such a wide range.

Hundreds of years in wet environment, deformation under the weight of the soil and later conservation have undoubtedly changed the dimensions of the instrument, among others placing labium and windway towards each other. Thus the current musical qualities of the Tartu recorder, sound, articulation and temperament do not correspond to the initial ones and describing them as they are now would only discredit the instrument. Additional information to the experts is the fact that there is no flat edge on the end of windway and it is very delicate, almost invisible on the block.

All the materials used to produce the instrument were common in Estonia but considering the wide geographic scope of the cesspit-finds it is very likely that the recorder is not of local origin.

Tartu recorder in the context of medieval recorders

The number of recorders from the 14th century and earlier period is not known exactly because in most cases only fragments of instruments have been found. In addition to labium, block and windway the classificatory features of recorder are holes for seven fingers and a thumbhole which serves as an octaving vent. Thus it is hard to distinguish recorder and whistler in case of incomplete exemplars. The latter was in extensive use as a folk instrument in different countries.

The oldest almost completely preserved recorder is the "Dordrecht Recorder". This was discovered in 1940 from the moat surrounding the ruins of the Huis te Merwede castle, about 3 km east of the town of Dordrecht, Holland. "Dordrecht Recorder" is dated to the 14th century (Weber 1976; Rowland-Jones 1996, 17) or even to the 13th century (Hakelberg 1995, 11). A second well-know medieval recorder dating from the 14th century is a more or less complete instrument found in a latrine in Göttingen, Germany, in 1987 (Hakelberg 1994; 1995; Reiners 1997). A fragment of a third 14th-century recorder has recently been found near Stuttgart, southern Germany. It was excavated from the sediment of the mill channel of the Carmelite' Monastery in Esslingen. Although all the finger-holes have not been preserved it can be regarded as a recorder due to the very same characteristic turning profile as has the Göttingen recorder (Lander 2006). A recorder found during the excavations in Poland, Elbląg, is also worth mentioning (Popławska 2004) although any further investigations about the instrument have not yet been published. According to preliminary data the recorder probably dates from the 15th century.

Unfortunately the list of reliably medieval recorders hereby ends. As none of the forementioned instruments makes sound, nor are they completely preserved it is impossible to overestimate the importance of the Tartu recorder.

How to act in case of finding medieval woodwind musical instrument?

Musical instruments constitute a very small part of archaeological finds but the more valuable is the information gained through them. Taking into account the experience received with finding, conservation and documentation of the Tartu recorder, we would like to give some suggestions of how to act in case an instrument is found.

In case of woodwind instruments the level of accuracy necessary in measuring the instruments is far greater than usually presumed. For instance, in case of recorder, the minimal level of precision would be 0.1 mm. Concerning acoustics, bore and labium, block and windway are remarkably interesting in addition to the placing of finger-holes. As it is usually beyond the capacities and competence of archaeologists (and unskilled measuring can cause damages), a specialist should be contacted immediately.

Measuring of the instrument should be done already before the conservation of the find. Till then it is appropriate to place the instrument hermetically into a plastic bag with some soil that surrounded it. If the measuring cannot be done immediately the artefact should be deep frozen to avoid deformation.

While documenting, scanning the object is preferred to traditional photographing. Advantages are lack of aberrations and noticeably better quality of the image. In case only camera can be used in addition to ruler placed next to the instrument while photographing, distance between the object and camera should be clarified. This would simplify to find photographic aberrations later. Such a precision may seem exaggerated but measuring the wet instrument (and doing necessary recalculations) would give a result quite close to the original. This again would enable to make an exact copy of the recorder and thus reconstruct the medieval musical scale.

Conclusions

The Tartu recorder, which was found in 2005 from a latrine, and can be dated to the 14th century, is an extremely rare finding and as yet it is the best-preserved medieval recorder ever found. The instrument widens the geography of recorder use in Europe significantly and shifts forward in time the implementation of several instrument-making methods. But namely due the rareness of the find we must be very careful in making generalizations regarding recorders of that period. There is no doubt that the instrument raises many questions for both theoreticians and practicians and at least some of them will get answers with the help of feasibly precise reconstructions and their use in practice.

Acknowledgements

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KESKAEGNE PLOKKFLÖÖT TARTUST

Resümee

Tartus leiti 2005. aastal Ülikooli 15 hoovist arheoloogiliste kaevamiste käigus keskaegsest lampkastist muude leidude hulgas ka terviklikult säilinud puidust plokkflööt (joon 1). Pilli leiukohaks oli 1,8-meetrise küljepikkusega ja keskmiselt 10 cm paksustest koorimata männipalkidest ristpalktehnikas valmistatud kast

(joon 3), mis oli säilinud 1,9 m (15 palgikihi) kõrgusena. Kasti täitis väljaheidetest ja keskaegsest rämpsust moodustunud tihke orgaaniline mass.

Flöödi dateerimiseks annavad pidepunkti sellega samast kihist saadud muud leiud (näiteks joon 4), mis pärinevad 14.–15. sajandist, ent 15. sajandi dateeringuga esemete puhul on võimalik ka nende päritolu 14. sajandi lõpust. Seega pärineb uuritud lampkasti sisu kõige tõenäolisemalt 14. sajandi teisest poolest. Kasti palkide dendrokronoloogilisel dateerimisel saadi tulemuseks, et need on langetatud 1335. aastal. Plokkflöödist võetud puiduproovi radioaktiivse süsiniku meetodil dateerimine andis pilli materjali vanuseks 690±30 radiosüsinikuaastat (Hela-1338). Tulemust kalibreerides saadi kaks võimalikku dateeringut kalendriaastates – 1260–1315 ja 1355–1390 (joon 5).

Pill on treitud ühes tükis harilikust vahtrast. Huulikupoolses osas asub treitud ringornament (joon 6). Tegemist on peaaegu silindrilise plokkflöödiga, mis oma väliskujult meenutab pisut konti. Pill on ligikaudu 250 mm pikk ja suurim läbimõõt on huulikupoolses otsas 30,7 mm. Tuulekanali läbimõõt alumisest otsast mõõdetuna on 12 mm. Pilli õõs on peaaegu silindriline, ploki juures kooniline ja pilli teises otsas kergelt kahanev. Instrumendi tuulekanal on väga hästi säilinud ja ka tehtud, eriti võrreldes pisut hooletumalt valmistatud laabiumiga, mida iseloomustab kaarjas keskelt kaugenev serv. Tundub siiski, et ka laabiumi kulumine on minimaalne ja tegu on originaalkujuga. Plokk on valmistatud kaseoksast ja on 23 mm pikk (joon 7). Selle puhul hämmastab hilisematest pillidest tuttav ploki tuulekanali ühtlane nõgusus ja kõrge viimistlustase. Plokk on küllalt kooniline: selle läbimõõt on 11,7–12,3 mm. Seda üllatavam on põigiti huulikut ja plokki läbiv ava (joon 8). Pillist tehtud röntgenifotol on ava servades näha laigud, kust röntgenikiired on tagasi peegeldunud (metallioksiid?). See võimaldab oletada, et pilli ja plokki läbis algselt metallist tihvt. Silindrilise ploki puhul oleks sellel olnud plokki fikseeriv ülesanne, mille järele tundub antud juhul otsene vajadus puuduvat. Siiski on võimalik, et kuna plokk on kasest ja selle puidu reageerimine muutuvale niiskusele ning temperatuurile on suurem kui hiljem levinud plokimaterjalil seedripuul, võis plokk olla tehtud teadlikult paisumisvaruga, nõudes siiski täiendavat kinnitamist tihvtiga. Pilli mõõtmeid arvestades ei saa välistada, et tihvtil oli kinnituskoht plokkflöödi kaela või vööle riputamiseks. Plokkflöötidel on enamasti mugavama puhumisasendi saamiseks huulikupoolses otsas iseloomulik lõige, mis algab tavaliselt tagaküljelt ja jõuab välja peaaegu tuulekanali alguseni, Tartu pillil see puudub. Erinevalt kõikidest teistest säilinud keskaegsetest plokkflöötidest asetsevad sõrmeavad ühel joonel ja viimane, seitsmes ava, ei ole dubleeritud. Tähelepanuväärne on sõrmeavade paigutuse regulaarsus ja nende diameetrite sarnasus. Kõik sõrmeavad on puuritud nurga all suunaga laabiumi poole. Samas on kõik avad peaaegu silindrilised ja neid ei ole alt laiendatud.

Oma suuruselt võib Tartu plokkflööti võrrelda kaasaegse häälestuse $a^1 = 440$ Hz suhtes madala F-sopraninoga. Puhudes teeb pill häält. Pilli alumine noot on 2. oktavi f-noodist ligikaudu 30 senti madalam ja seitsmes sõrmeava annab erinevalt hilisematest standarditest pooltooni. Tartu plokkflöödi ulatuseks on kaks oktavit ja sekund. Kahjuks ei saa täie veendumusega otsustada pilli algse ulatuse

üle. Võimalik, et plokkflöödi konserveerimisest tulenev puidu mõõtmete muutumine ja mõningane mustus on teinud mensuuri kitsamaks ning seega võis ulatus isegi suureneda. Hoolimata sellisest teoreetilisest võimalusest on siiski tõenäoline, et tegemist on plokkflöödi originaalulatusega. Arvestades seda, et ka enamiku renessanssplokkflöötide ulatuseks oli oktav ja suur sekst, on nii varase perioodi pilli nii suur ulatus üllatav. Juba instrumendi välisel vaatlusel näeme selle pilli mõõtude kohta küllalt suurt akent, mis samuti ei lubaks nõnda suurt ulatust prognoosida.

Aastasadadepikkune seismine märjas keskkonnas, deformeerumine pinnase raskuse mõjul ja hilisem konserveerimine on kahtlemata muutnud pilli mõõtmeid, sealhulgas ka laabiumi ning tuulekanali omavahelist asetust. Seepärast ei vasta Tartu plokkflöödi tänased muusikalised kvaliteedid, nagu tämber, artikulatsioon ja temperatsioon, algsetele omadustele. Erialaspetsialistidele annab lisaks eelkirjeldatud detailidele lisainfot ka fakt, et tuulekanali lõpus ei ole faasi ja plokil on see väga delikaatne, et mitte öelda vaevumärgatav.

Kõik pilli tegemiseks kasutatud materjalid olid tavalised ka Eestis, kuid lampkasti leidude laia geograafilist haaret arvestades on siiski tõenäoline, et pill ei ole kohaliku päritoluga.

14. sajandist või varasemast ajast säilinud plokkflöötide arv ei ole täpselt teada, kuna põhiliselt on leitud vaid pillide fragmente. Plokkflöödi tunnuseks on lisaks laabiumile, plokile ja tuulekanalile ka seitse sõrmeava ning pilli vastasküljel paiknev pöidlaava. Seepärast on mittetäielike leidude puhul raskusi plokkflöödi ja vilepilli eristamisega. Viimased olid rahvapillidena eri maades laialdaselt kasutusel.

Vanimaks peaaegu tervikuna säilinud plokkflöödiks on Hollandist leitud nn Dordrechti flööt, mis on dateeritud 14. või isegi 13. sajandiga. Teiseks tuntumaks keskaegseks plokkflöödiks on Saksamaalt Göttingenist leitud pill, mis pärineb 14. sajandist. Katke 14. sajandi plokkflöödist on leitud ka Saksamaalt Esslingeni karmeliitide kloostri veskikraavi põhjast. Mainida võib ka Poolast Elblagist leitud oletatavasti 15. sajandist pärinevat plokkflööti.

Kuna ükski eelpool loetletud pillidest häält ei tee ega ole ka tervikuna säilinud, siis on Tartu pilli kohta keskaegsete plokkflöötide seas raske üle hinnata. Tartu plokkflöödi näol on tegemist üliharuldase leiuga, mis on seni teadaolevalt kõige paremini säilinud keskaegne plokkflööt. See pill laiendab oluliselt plokkflöödi kasutusgeograafiat keskaegses Euroopas ja nihutab varasemaks mitmete pilliehituslike võtete kasutuselevõttu.