Cultural Heritage Agency
Ministry of Education, Culture and Science

Nederlandse
Archeologische
Rapporten
069

The Wooden Artefacts from the Early Roman Fort Velsen 1

Silke Lange

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Colophon
Nederlandse Archeologische Rapporten nr. 69

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Cover: Tent pegs and other wooden artefacts from Velsen 1 (design: J. Ranzijn, Happyfolio).

Illustration editors: J. Ranzijn (Happyfolio)

Layout and print: Xerox/Osage

ISBN/EAN 978-90-5799-338-1

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www.cultureelerfgoed.nl

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Summary

The wooden artefacts from the Roman fort Velsen 1 are presented in this study. The excavations at Velsen 1, situated on the coast of Noord-Holland about 20 km from Amsterdam, took place between 1972 and 1994, carried out by members of the Archaeological Working Society of the Netherlands (AWN Vereniging van vrijwilligers in de archeologie) and the Archaeological Working Group Velsen (Archeologische Werkgroep Velsen, AWV) and, later from 1974 onwards, in a joint venture with the Institute for Prae- and Protohistory (IPP) of the University of Amsterdam. The wooden artefacts from the Roman fort and harbour of Velsen 1 are a special find complex, also from a European point of view. Wood forms an archaeological group of materials that is only preserved under special conditions. Large assemblages of wooden artefacts are limited to the wetland sites of Northwestern and Central Europe. From the Mediterranean area, primarily known are the wooden artefacts of Pompeii and Herculaneum which were preserved by the rapid covering of an ash layer. Importantly, the wooden artefacts from Velsen 1 come from a context accurately dated and described in historical sources. The Cultural Heritage Agency of the Netherlands (Rijksdienst voor het Cultureel Erfgoed, RCE) commissioned the research and publication of the available data, thus making these data generally accessible.

In the present study, the wooden artefacts were inventoried, described, and identified when no wood identification had yet taken place. During the inventory, many of the originally listed objects were discovered to be missing. After excavation, several objects had dried out or decayed so considerably over the years that they had eventually been thrown away. Therefore, the actual number of wooden artefacts that was excavated remains unclear. A total of 597 of the most recognisable finds are known to have been identified and selected for conservation by wood specialist Pauline van Rijn. In addition, 996 objects from bulk samples were found during the present study in the depot of the National Museum for Antiquities in Leiden (Rijksmuseum van Oudheden, RMO). They were conserved some years after the excavations by Tineke Spruijt, then the curator at the IPP, and were described and identified within the framework of the present study. This means that almost 1,600 objects of the total number of excavated artefacts are still present in the RMO's depot for further research and educational purposes.

The wooden artefacts from Velsen 1 can be divided into functional categories. They include wooden objects of a military nature as well as artefacts from daily life such as furniture components, locks and keys, kitchen utensils, footwear, tools, and fishing equipment. In addition, there are artefacts whose function has not been ascertained, but for which it is hoped that, by publishing them, they can be interpreted in the future.

The assemblage provides insight into the handling of natural resources, the woodlands in the vicinity of the fort, and contacts with elsewhere. The large quantity of tent pegs suggests that Velsen 1 had an important function for temporary encampments. Remarkable is the large number of furniture pieces from beds or couches, chairs, and cabinets that testify to some level of comfort in the fort. Wooden objects made of non-indigenous boxwood and silver fir make it clear that many of these were not made locally, but probably reached the fort as ready-made products. The silver fir barrels, for example, which probably contained wine, were imported from other parts of the Roman Empire before they were given a second life as well-linings. However, it cannot be ruled out that wood was traded to the fort as a raw material. Boxwood, for example, grows in the Mediterranean region. Nevertheless, it was found as a piece of turning waste in the fort, suggesting the local production of wooden objects on a lathe. Together with a possible tool support, the turning waste constitutes the earliest indication of woodturning in Dutch contexts. There are more indications for woodworking: two planes, at least two mallets, tool handles, processing waste, and a few roughouts are indicative of craft activities in the fort. Tool marks on processing waste indicate that axes, adzes, and saws were used. Some of the furniture, made of local wood species such as ash and alder, was probably made locally.

There are also wooden tools for textile processing. These are spindles, thread winders, and a weaving sword. It is quite possible that, in

peaceful times, the soldiers in the fort carried out crafts including woodworking and textile manufacturing in addition to their normal work. However, women and children were also present in the fort, as the wooden soles of clogs with small sizes attest. This group, too, will have carried out activities in the fort, which may have included spinning thread and weaving fabric.

Based on the wooden finds, little can be ascertained about the relationship between the fort and the local inhabitants. The Romans used the same wood species for specific purposes as did the indigenous population. Examples are alder for bowls and ash for tool handles. The availability of the species probably played the most important role in the choice of wood, in addition to the wood-specific properties that were known to both the Romans and the indigenous population. Moreover, some of the items made of local wood may also have been made by the indigenous inhabitants outside the fort.

The shape of some objects can be called typically Roman and has no equivalent in the indigenous manufacture. These objects are the grip and pommel of a *gladius*, the obstacles, tent pegs, *pyxides*, clogs, and a pan flute. Such objects may have ended up in an indigenous settlement as gifts or loot. There are no known examples of them being copied locally.

This study sheds light on many activities in the Roman fort and suggests the presence of inhabitants of both genders. There are no comparable sites from this early period which have such large quantities of wooden objects. For example, compared to the Velsen 1 assemblage, relatively few wooden objects have been recovered from the excavations at the Roman fort in Valkenburg (approximately AD 40) and from the vicus Valkenburg-Marktveld/De Woerd (AD 70-240). However, it is striking that, in terms of appearance and wood use, the wooden artefacts from other Roman contexts often match those from Velsen. This also applies to wooden finds from younger contexts, such as from Alphen aan den Rijn, Vindonissa (Windisch, Switzerland), and Vindolanda (Bardon Mill, Hexam, United Kingdom). Some appear not to have changed in shape through the centuries and will have been the result of mass production, such as combs.

At the same time, very personal objects were also found: two pieces of wood of the common grape vine. Both pieces are carved and show the knob-like end of a rod or staff. These vine rods were the property of a centurion and were a military emblem. This status symbol also had a practical function and was used for corporal punishment. These two wooden finds confirm what is otherwise only known from Tacitus' historical reports and from iconographic sources. An example of a vine rod as the symbol for the status of a centurion is depicted on the tombstone of Marcus Caelius, who died in the Battle of the Teutoburg Forest in AD 9. As far as is known, the finds from Velsen 1 are the first centurion rods from an archaeological context.

From the wooden assemblage of Velsen 1, a certain standard can be deduced with regard to the layout of the fort, provisioning, and personal equipment. Apparently, even in the furthest corner of the Roman empire, people did not have to completely renounce their accustomed level of luxury and comfort

Zusammenfassung

In dieser Studie werden die hölzernen Artefakte aus dem römischen Kastell Velsen 1 vorgestellt. An der nordholländischen Küste, etwa 20 km von Amsterdam entfernt, fanden zwischen 1972 und 1994 zahlreiche Ausgrabungen statt, die von Mitgliedern der Archäologischen Arbeitsgemeinschaft der Niederlande (AWN Vereniging van vrijwilligers in de archeologie), der archäologischen Arbeitsgruppe Velsen (Archeologische Werkgroep Velsen, AWV) und ab 1974 in Zusammenarbeit mit dem Institut für Ur- und Frühgeschichte (IPP) der Universität Amsterdam durchgeführt wurden. Die hölzernen Artefakte aus dem römischen Vorposten und Hafen Velsen 1 sind ein besonderer Fundkomplex, auch aus europäischer Sicht. Holz ist eine archäologische Materialgruppe, die nur unter besonderen Bedingungen erhalten bleibt. Große Vorkommen von Holzartefakten sind auf die Feuchtgebiete Nordwest- und Mitteleuropas beschränkt. Aus dem Mittelmeerraum selbst sind vor allem die Holzfunde von Pompei und Herculaneum bekannt, die durch die rasche Überdeckung mit einer Ascheschicht erhalten geblieben sind. Darüber hinaus stammen die Holzartefakte aus Velsen 1 aus einem genau datierten und in historischen Quellen beschriebenen Kontext. Neben dem Bauholz haben die Grabungen eine große Anzahl von hölzernen Gegenständen hervorgebracht. Das Niederländische Landesamt für Kulturerbe (Rijksdienst voor het Cultureel Erfgoed, RCE) hat die vorliegende Studie mit dem Ziel in Auftrag gegeben, die vorhandenen Daten des Fundkomplexes auszuarbeiten und durch die Publikation allgemein zugänglich zu machen.

Die Publikation umfasst die Ergebnisse der Datenausarbeitung, nämlich die Präsentation der inventarisierten und auf Holzart bestimmten Gegenstände. Falls keine Holzartbestimmung vorlag, wurde diese nachträglich vorgenommen. Während der Inventarisierung stellte sich heraus, dass viele der ausgegrabenen Holzobjekte nicht mehr vorhanden sind. Jahrelang haben die Holzfunde unkonserviert im Magazin gelegen, bevor 597 der erkennbarsten Funde von der Holzspezialistin Pauline van Rijn identifiziert und für die Konservierung ausgewählt worden sind. Im Laufe der Jahre sind viele von den nicht konservierten Objekten ausgetrocknet oder so stark zerfallen, dass sie schließlich weggeworfen wurden. Daher bleibt die ursprüngliche Anzahl der hölzernen Artefakte unklar. Im Laufe der vorliegenden Studie wurden zudem 996 Objekte im Depot des Reichsmuseum für Altertümer in Leiden (Rijksmuseum van Oudheden, RMO) entdeckt, die zwar konserviert, aber nicht analysiert worden waren. Es geht um Objekte die von der ehemaligen Restauratorin Tineke Spruijt vom IPP in den Jahren nach den Grabungen konserviert worden sind. Im Rahmen des Projektes sind von diesen Objekten die Holzart und Funktion ebenfalls bestimmt. Das bedeutet, das von den ausgegrabenen Holzfunden heutzutage noch etwa 1600 Artefakte im Depot des RMO's für zukünftige Forschungs- und Museumszwecke vorhanden sind.

Die hölzernen Artefakte aus Velsen 1 lassen sich aufgrund ihrer Funktion in unterschiedliche Kategorien einteilen. Es handelt sich dabei um militärische Objekte, als auch Gebrauchsgegenstände die das tägliche Leben im Kastell widerspiegeln, beispielsweise Küchenutensilien, Schuhe, Werkzeuge und Fischereigeräte. Bemerkenswert sind die vielen Möbelteile, die auf einen gewissen Komfort und Luxus der höheren, militärischen Ränge schliessen lassen. Hinzu kommen Artefakte, deren Funktion nicht geklärt ist, von denen man sich aber durch die Veröffentlichung erhofft, dass sie in Zukunft interpretiert werden können.

Der Fundkomplex gibt Aufschluss über den Umgang mit den natürlichen Ressourcen, den Wäldern in der Umgebung des Kastells, aber auch über regionale und überregionale Kontakte. Die große Menge an Zeltheringen lässt darauf schließen, dass Velsen 1 wahrscheinlich auch eine wichtige Funktion als temporäres Lager hatte. Holzobjekte aus Buchsbaum und Weißtanne machen deutlich, dass viele von den Artefakten nicht vor Ort hergestellt wurden, sondern vermutlich als Fertigware im Kastell landeten. Die Weißtannenfässer, die vermutlich Wein enthielten, wurden aus anderen Teilen des Römischen Reiches importiert, bevor sie als Brunnenauskleidung ein zweites Leben erhielten. Es ist jedoch nicht auszuschließen, dass Holz als Rohstoff an den Außenposten gehandelt wurde. Buchsbaum zum Beispiel wächst im Mittelmeerraum. Dennoch wurde er als Drechselabfall im Kastell gefunden, was auf die lokale Herstellung von Buchsbaumobjekten auf der Drechselbank hindeutet. Zusammen mit

einem möglichen Werkzeugträger stellen die Drechselabfälle die früheste Präsenz eines Drechslers in niederländischen Kontexten dar. Es gibt weitere Hinweise auf Holzbearbeitung und Holzhandwerk. Zwei Hobel, mindestens zwei Schlägel, Werkzeugstiele, Bearbeitungsabfälle und einige Rohlinge deuten auf Holzhandwerk im Kastell hin. Werkzeugspuren auf Bearbeitungsabfällen lassen erkennen, dass Äxte, Beile und Sägen verwendet wurden. Aufgrund einer Reihe von Möbelteilen die aus einheimischen Holzarten hergestellt wurden, wird auch ein Schreiner im Kastell gearbeitet haben.

Einige der hölzernen Werkzeuge beziehen sich auf Textilherstellung und -verarbeitung. Dies sind Spindeln, Fadenwickler und ein Webschwert. Es ist gut möglich, dass die Soldaten im Kastell in friedlichen Zeiten neben ihrer normalen Arbeit auch handwerkliche Tätigkeiten ausübten, darunter Holzbearbeitung und Textilherstellung. Aber auch Kinder und Frauen sind im Kastell präsent, wie die Sohlen von Holzschuhen mit kleinen Größen bezeugen. Auch diese Gruppe wird im Kastell Tätigkeiten ausgeübt haben, zu denen das Spinnen und Weben gezählt haben wird.

Die römischen Bewohner von Velsen 1 verwendeten die gleichen Holzarten für bestimmte Zwecke wie die einheimische Bevölkerung. Beispiele sind Erlenholz für Schalen und Eschenholz für Werkzeugstiele. Neben den holzspezifischen Eigenschaften, die sowohl den Römern als auch der einheimischen Bevölkerung bekannt gewesen sein dürften, spielte die Verfügbarkeit des Holzes wahrscheinlich die wichtigste Rolle bei der Wahl. Darüber hinaus könnten einige der aus lokalem Holz gefertigten Gegenstände auch von der einheimischen Bevölkerung außerhalb des Kastells hergestellt und als Tausch- oder Handelsware an das Kastell geliefert worden sein.

Die Form einiger Objekte kann als typisch römisch angesehen werden und hat kein Equivalent in der einheimischen Produktion. Dies sind die Griffe der militärischen Objekte, die Mauerspeere, Zeltheringe, *Pyxide*, Holzschuhe und eine Panflöte. Diese Gegenstände können als Geschenk oder als Beute in eine indigene Siedlung gelangt sein. Es sind keine Beispiele bekannt, dass sie lokal kopiert und hergestellt wurden.

Die Studie wirft Licht auf zahlreiche Aktivitäten im römischen Kastell und lässt auf die Anwesenheit von Bewohnern unterschiedlichen Geschlechts mit unterschiedlichen Rollen schließen. Es gibt im niederländischen Raum keine vergleichbaren Fundstellen mit grösseren Fundkomplexen aus der Augusteisch/Tiberischen Zeit. Im Vergleich zu den Holzfunden von Velsen 1 wurden im Kastell Valkenburg (rund 40 nach Chr.) und im angrenzenden Vicus Valkenburg-Marktveld/De Woerd (zwischen 70-240 nach Chr.) relativ wenige Holzobjekte geborgen. Es fällt jedoch auf, dass sie in Bezug auf die Herstellung und Verwendung des Holzes oft mit denen aus Velsen übereinstimmen. Dies gilt auch für Holzfunde aus jüngeren Kontexten, wie aus Alphen aan den Rijn, Vindonissa (Windisch, Schweiz) und Vindolanda (Bardon Mill, Hexam, Vereinigtes Königreich). Form und Funktion einiger Holzgegenstände, wie beispielsweise die zweireihigen Kämme, haben sich in Jarhunderten nicht geändert. Es ist gut möglich, das dergleiche Gegenstände als Massenprodukt hergestellt worden sind.

Dagegen sind die bearbeiteten Reste zweier Weinruten eher als Gegenstände mit einer pesönlichen Note zu nennen. Stöcke oder Stäbe vom Holze des Weins, waren Besitz des Zenturions und galten als militärisches Emblem. Dieses Statuszeichen hatte durchaus auch eine praktische Funktion, nämlich zur Züchtigung und Disziplinierung der untergestellten Legionäre. Beide Holzfunde bestätigen was man ansonsten nur aus den historischen Berichten von Tacitus und aus ikonographischen Quellen kennt. Ein Vorbild von einem Zenturionstab findet sich auf dem Grabmal des Marcus Caelius, der bei der Schlacht im Teutoburger Wald in 9 nach Chr. ums Leben kam. Soweit bekannt, handelt es sich bei den zwei Zenturionstäben aus Velsen 1 von den ersten aus archäologischem Kontext.

Aus der Zusammmenstellung der Holzfunde lässt sich ein gewisser Standard in Bezug auf den Aufbau des Kastells, die Versorgung und die persönliche Ausrüstung ableiten. Offenbar brauchte man auch im hintersten Winkel des römischen Reiches nicht auf einen bestimmten Lebensstandard und Komfort zu verzichten.

Samenvatting

In deze studie worden de houten gebruiksvoorwerpen van het Romeinse fort Velsen 1 gepresenteerd. Gelegen aan de kust van Noord-Holland, circa 20 km van Amsterdam, vonden hier in de jaren 1972 tot en met 1994 intensieve graafwerkzaamheden plaats, uitgevoerd door de leden van de Archeologische Werkgemeenschap Nederland (AWN), de Archeologische Werkgroep Velsen (AWV, aangesloten bij de AWN) en vanaf 1974 in een samenwerkingsverband met het Instituut voor Prae- en Protohistorie (IPP) van de Universiteit van Amsterdam. De houten artefacten van de Romeinse voorpost en haven Velsen 1 vormen een bijzonder vondstcomplex, ook vanuit Europees oogpunt. Hout vormt een archeologische materiaalgroep die alleen onder bijzondere omstandigheden bewaard blijft. Grote assemblages van houten artefacten beperken zich tot de waterverzadigde laaglandgebieden van Noordwest- en Centraal-Europa. Uit het Middellandse Zeegebied zijn vooral de houten artefacten van Pompeï en Herculaneum bekend die bewaard zijn gebleven door de snelle bedekking met een aslaag. Belangrijk is dat de houten artefacten van Velsen 1 afkomstig zijn uit een context die nauwkeurig is gedateerd en beschreven in historische bronnen. Naast bouwhout heeft het onderzoek een groot aantal houten gebruiksvoorwerpen opgeleverd. De Rijksdienst voor het Cultureel Erfgoed (RCE) heeft opdracht gegeven om de gegevens over de assemblage van houten gebruiksvoorwerpen uit te werken en te publiceren, en zo voor algemeen gebruik toegankelijk te maken. De voorliggende studie omvat de inventarisatie en beschrijving van de houten voorwerpen. Hiertoe behoren ook de resultaten van het aanvullende onderzoek, waarbij de niet eerder onderzochte houten gebruiksvoorwerpen alsnog zijn beschreven en gedetermineerd.

Tijdens de inventarisatie bleek een deel van de oorspronkelijke houtvondstenassemblage niet meer aanwezig te zijn. In de jaren tussen de opgravingen en het besluit tot conservering zijn namelijk talrijke voorwerpen verdroogd en vervormd geraakt, en uiteindelijk weggegooid. Omdat van de opgegraven houtvondsten geen vondstenlijst is bijgehouden, is het daadwerkelijke aantal voorwerpen dat ooit is geborgen, onduidelijk. In elk geval zijn 597 van de meest als voorwerp herkenbare houtvondsten door houtspecialist Pauline van Rijn geselecteerd voor conservering, en voorafgaande aan het conserveringsproces gedetermineerd. Daarnaast zijn vlak na de opgravingen 996 voorwerpen uit bulkmonsters door de toenmalige restaurator Tineke Spruijt van het IPP geconserveerd. Het zijn deze laatstgenoemde voorwerpen waarvan geen determinatiegegevens en beschrijvingen beschikbaar waren, die in het kader van de voorliggende studie alsnog zijn onderzocht en op houtsoort zijn gedetermineerd. Bij elkaar gaat het om circa 1600 houten artefacten die geconserveerd zijn en voor toekomstig onderzoek en educatieve doeleinden in het depot van het Rijksmuseum voor Oudheden (RMO) ter beschikking staan.

Op basis van functie kunnen de houten artefacten in verschillende categorieën worden verdeeld. Het betreft houten voorwerpen van militaire aard, naast meubelonderdelen, sloten en sleutels, keukengerei, schoeisel, gereedschappen en visgerei. Ook bewerkingsafval in de vorm van afgezaagde uiteinden van planken en latten, maakt deel uit van de assemblage. Bovendien zijn er voorwerpen waarvan de functie niet is achterhaald, maar waarbij door publicatie ervan wordt gehoopt dat deze in de toekomst alsnog kunnen worden geïnterpreteerd.

De assemblage geeft inzicht in de omgang met de natuurlijke grondstoffen, de bossen in de omgeving van het fort, als ook met contacten elders. Opmerkelijk zijn de meubelonderdelen die van enige comfort in het fort getuigen. Het grote aantal tentharingen suggereert dat Velsen 1 ook een belangrijke functie voor tijdelijke kampementen zal hebben gehad. Het voorkomen van houten voorwerpen van niet-inheemse houtsoorten, zoals buxus en zilverspar, geeft aan dat tenminste een deel van deze voorwerpen niet lokaal is vervaardigd, maar waarschijnlijk als kant en klaar product in het fort terecht is gekomen. In dit verband zijn de tonnen van zilverspar te noemen, die oorspronkelijk als containers voor het transport en de opslag van wijn naar het fort zijn gebracht. Afgedankte tonnen kregen vaak een tweede leven als beschoeiing van waterputten, of ze werden uit elkaar gehaald en de duigen werden hergebruikt als grondstof voor allerlei voorwerpen.

Hout werd ook als grondstof naar het fort gebracht. Waarschijnlijk werd zelfs buxushout, een boomsoort die van oorsprong in het

Mediterrane gebied groeit, geïmporteerd en binnen het fort verwerkt. Zo getuigt een stuk draaiafval van buxushout van de lokale productie van buxushouten voorwerpen op de houtdraaiersbank. Samen met een mogelijke gereedschapssteun voor draaigutsen of draaibeitels vormt het draaiafval de vroegste aanwijzing voor het ambacht van houtdraaier in Nederland.

Twee schaven, tenminste twee houten hamers, handvatten van gereedschap waaronder gereedschap voor houtbewerking, bewerkingsafval en enkele halfproducten getuigen van houtnijverheid in het fort. Uitgaande van de bewerkingsporen op het houtafval werd vooral gewerkt met bijlen, dissels en zagen.

Opvallend is het voorkomen van houten gereedschap dat op textielverwerking duidt. Dit zijn spindels, draadklosjes en een weefzwaard. Het is goed mogelijk dat de soldaten in het fort in vreedzame perioden naast het gewone werk ook ambachtelijke activiteiten uitvoerden, waaronder houtbewerking en textielvervaardiging. Echter, ook vrouwen en kinderen waren aanwezig in het fort, waarvan de schoenzolen in kleine schoenmaten getuigen. Ook zij zullen werkzaamheden, zoals spinnen en weven, in het fort hebben verricht.

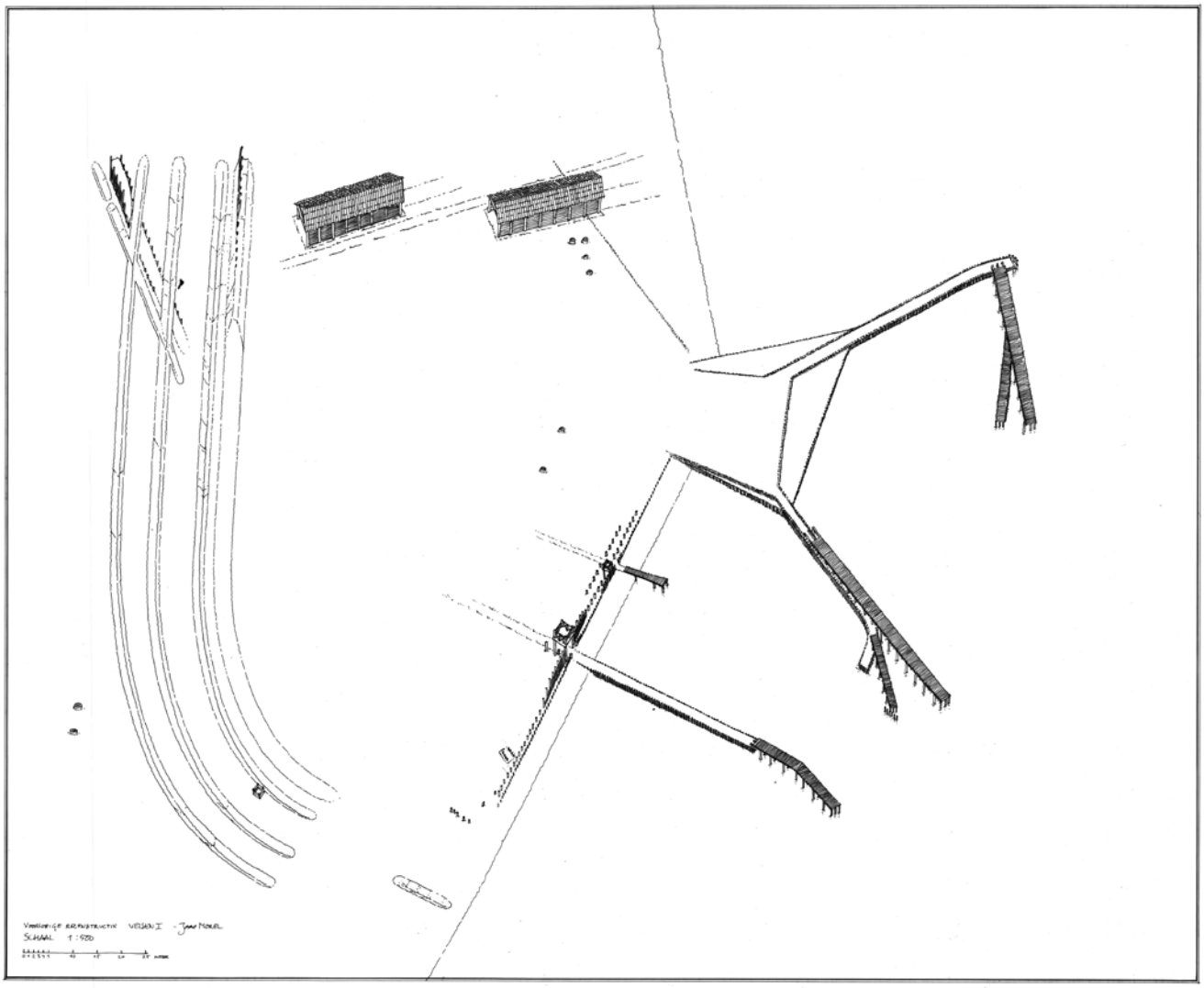
Over de relatie tot de bewoners in de omgeving valt op basis van de houtvondsten niet veel op te maken. Wel is duidelijk dat de Romeinen dezelfde houtsoorten gebruikten voor specifieke doeleinden als de inheemse bevolking. Voorbeelden zijn elzenhout voor schalen en essenhout voor gereedschapsstelen. De soortspecifieke eigenschappen zullen zowel bij de Romeinen als ook bij de inheemse bevolking bekend zijn geweest. Beschikbaarheid van hout zal vermoedelijk de voornaamste rol in de houtkeuze hebben gespeeld.

Enkele voorwerpen kunnen als typisch Romeins worden omschreven. Het gaat om voorwerpen die in archeologische contexten niet als lokaal vervaardigd product worden aangetroffen. Dit zijn de handgrepen van de militaire voorwerpen, de houten schanspalen, tentharingen, *pyxides*, sandalen en een panfluit. Dit soort voorwerpen kan weliswaar als geschenk of buit in een inheemse nederzetting terecht zijn gekomen, er zijn echter geen voorbeelden bekend dat deze ook door de lokale bevolking werden geproduceerd.

De studie werpt een licht op tal van activiteiten in het Romeinse fort, en suggereert de aanwezigheid van bewoners met verschillende achtergronden, waaronder vrouwen en kinderen. Vergelijkbare vindplaatsen uit de vroeg-Romeinse periode met grote hoeveelheden houten voorwerpen zijn er niet in Nederland. Vergeleken met de assemblage van Velsen 1 zijn er in het fort van Valkenburg (gebouwd in 40 n.Chr.) en in de aangrenzende vicus Valkenburg-Marktveld/De Woerd (70-240 n.Chr.) relatief weinig houtvondsten geborgen. Wel valt op dat voorwerpen uit andere Romeinse contexten qua makelij en houtgebruik vaak overeenkomen met die van Velsen. Dit is ook van toepassing op houtvondsten uit jongere contexten, zoals uit Alphen aan den Rijn, Vindonissa (Windisch, Zwitserland) en Vindolanda (Bardon Mill, Hexam, Verenigd Koninkrijk). Blijkbaar is er in de Romeinse periode al sprake van een bepaalde standaardisering in de productie van bepaalde voorwerpen, bijvoorbeeld bij de productie van de tweerijige kammen.

De bewerkte uiteinden van twee uit druivenhout gesneden staven duiden op persoonlijk bezit. Een dergelijke staf behoorde toe aan een centurio en werd beschouwd als een symbool voor zijn militaire rang. De staf fungeerde niet alleen als een statussymbool, maar had ook een disciplinaire functie en werd gebruikt om ondergeschikten te disciplineren. De betekenis en functie is bekend dankzij de schriften van Tacitus en uit de iconografie. Een voorbeeld van een iconografische bron is de afbeelding van een centurio-staf op de grafsteen van centurio Marcus Caelius die in de slag in het Teutoburgerwoud in 9 n.Chr. om het leven kwam. De twee vondsten uit Velsen 1 zijn de eerste centurio-staven uit archeologische context.

Uit de samenstelling van de assemblage van houten gebruiksvoorwerpen uit Velsen 1 valt een bepaalde standaard af te leiden wat betreft inrichting van het fort, bevoorrading en persoonlijke uitrusting. Blijkbaar hoefde men ook in de verste uithoek van het Romeinse rijk niet af te zien van enig gemak en comfort.



Impression of the harbour through the eyes of Jaap Morel, who led the excavations of the Institute for Prae- and Protohistory for many years and who obtained his PhD on Velsen 1 (drawing: J. Morel).

Preface

The Roman fortifications at Velsen are among the most exciting archaeological discoveries of the Netherlands. Although the first finds were collected as early as 1972, large-scale research did not start until 1978. From that year on, excavations took place for almost two decades. In 1988 and 1997, the archaeological features and finds were published in two dissertations, leaving the impression that the sites were published and that everything was known about the Roman military activity in this area. Only a few people, such as students and volunteers who participated in the excavation and scholars who studied some of the find material, knew about the hidden treasures that still had to be unlocked. From this perspective, the rather swift publication of the features and finds of Velsen appears to have been counterproductive: nobody was interested in studying a site that was already published.

One person who persisted in unlocking the data from Velsen was Pauline van Rijn. She studied the wooden objects that were found in large numbers in the waterlogged contexts of the wells and in the silted-up Roman harbour. The artefacts were found because many contexts were excavated manually, often by the careful hands of volunteers. Pauline van Rijn was not only responsible for the first analysis of the material, but also for the conservation of hundreds of these objects. In that sense, she is responsible for the preservation of a collection that is only paralleled by well-known Roman wooden artefact collections including those of Vindolanda in Northern England, Vindonissa in Switzerland, and the charred remains from Herculaneum. And yet, the Velsen objects are decades older than most of the other collections, which makes them unique on a Roman empire-wide scale. Sadly, Pauline van Rijn passed away in 2015, leaving her work unfinished.

Earlier, at the end of the twentieth century, the importance of the Velsen excavations was acknowledged by the National Museum of Antiquities (Rijksmuseum van Oudheden, RMO) and the finds and documentation were included in the national archaeological collection in the museum. Funded by the Dutch Research Council (NWO) in 2009, Velsen was studied again and more comprehensively, using unpublished student theses and a new study of the archaeological structures and finds. The preliminary results were published in several articles. Still, the wooden artefacts were not studied, and Pauline van Rijn's documentation remained in the archives of the National Museum of Antiquities. Finally, in 2019, a commission from the Cultural Heritage Agency (Rijksdienst voor het Cultureel Erfgoed, RCE) enabled a new study of the wooden artefacts from Velsen.

During the hot summer of 2019, Silke Lange, often accompanied by Raf Timmermans, studied the wooden objects from Velsen 1 in my office, because the study room in the museum was temporarily unavailable. During these weeks, I was able to gain insight into the Velsen wood collection and how the objects were documented. Soon, it became apparent that the wooden objects also needed to be presented to the general public which is largely unaware of these remarkable finds. Luckily, 'Velsen' is part of the permanent exhibition of 'The Netherlands in the Roman Period' in the National Museum of Antiquities. Until now, only three wooden artefacts are on display. This publication, which helps us to understand the value of the collection of wooden artefacts from Velsen, could be the incentive to increase the number and the diversity of wooden objects in the presentation in the museum, enabling the general public a view of the collection more than forty years after its discovery.

Jasper de Bruin

Curator of Roman Archaeology of The National Museum of Antiquities Leiden, 12 March 2021

For Pauline van Rijn, with gratitude for her inspiration and mentorship and for sharing her knowledge and her love for wood with us.

Pauline van Rijn, archaeologist and wood specialist (1941-2015).

1 Site Information

1.1 Introduction

The Cultural Heritage Agency of the Netherlands (Rijksdienst voor het Cultureel Erfgoed, RCE) commissioned the present study with the aim of analysing the wooden find assemblage from the early Roman fort Velsen 1. The Ministry of Education, Culture and Science of the Netherlands (Ministerie van Onderwijs, Cultuur en Wetenschap, OCW) intends to make additional investments in the field of heritage, including archaeology. Within the theme 'Heritage Counts' ('Erfgoed telt') this intention has been further elaborated in the programme 'Knowledge for Archaeology' ('Kennis voor Archeologie'). One of the purposes is to systematically analyse, with science-based methods and techniques, promising data sets from field research conducted before 2007 to gain more knowledge of the past. This concerns archaeological data obtained prior to the introduction of the Valletta Convention and the related legislation in the Netherlands. The analysis of wooden artefacts from Velsen 1 (Fig. 1.1) falls into this category.

Due to high water tables, organic materials, such as leather, bone, and wood, are often well preserved in the Holocene coastal landscape of the Low Countries. This is one of the reasons why the archaeological excavations at Velsen 1, conducted between 1972 and 1990, and in 1994, yielded approximately 2,500 wooden artefacts (Fig. 1.2). The late Pauline van Rijn, wood specialist and partner at the company for Biological Archaeology and Environmental Reconstruction BIAX *Consult*, identified 597 of the most representative wooden artefacts, and provided them with short descriptions. These artefacts are housed in the depot of the National Museum of Antiquities (Rijksmuseum van Oudheden, RMO) in Leiden. Until the beginning of this investigation, it was unclear what had happened to the remaining objects. In the course of the research, another 996 conserved wooden artefacts came to light, having lain hidden in the depot of the National Museum of Antiquities. They had been conserved as bulk samples and had not been examined. As part of the present study, the artefacts have been described and the wood species have been identified. Nevertheless, a large part of the wooden artefacts has been lost in the course of time.

[1] Lange 2017a.

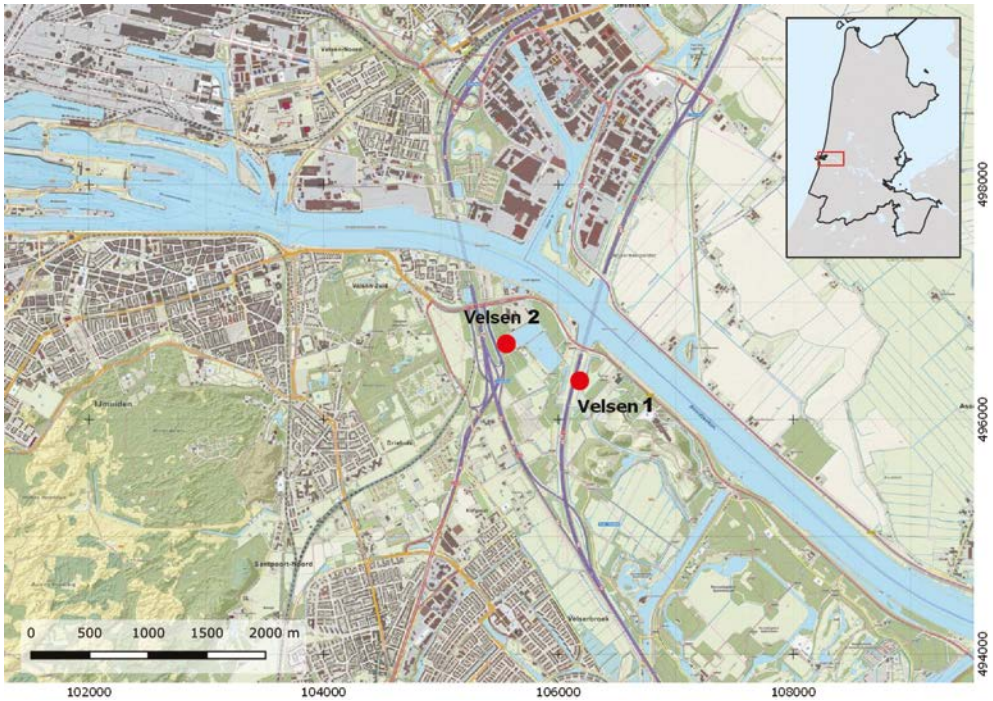


Figure 1.1 Location of Velsen 1 and Velsen 2 in the province of Noord-Holland, the Netherlands.

Figure 1.2 Excavation of part of the harbour installations from Velsen 1 by the Amateur Archaeological Working Group of Velsen 1 in the early seventies (source: archive of the Archaeological Working Group Velsen, AWV).

Wood is an important category within the archaeological find assemblage. It is one of the oldest building materials in the world, one of the most important combustibles, and also forms the raw material for a wide variety of utensils and goods.[1] Knowledge of the functionality and uses of wooden utensils provides insight into daily life and other aspects of the settlement complex. The wooden finds assemblage of Velsen 1 includes tent pegs, parts of weaponry, various tools, kitchen and dining utensils, and also objects that seem to have had a purely aesthetic value. In addition, three fish traps were recovered from the harbour basin and discarded wine barrels were employed as lining for wells. Knowledge of the origin, function and manufacture of these wooden objects leads to new insights into the design and use of the Roman fort Velsen 1.

The aim of the research is to provide an inventory and analysis of the wooden finds of the Roman fort Velsen 1 in order to gain knowledge about wood use, wood technology and the functions of the objects. This knowledge has been brought together in the present publication with a catalogue in which the objects are grouped into categories. In consultation with the Cultural Heritage Agency, the wooden finds from Velsen 2 were eventually also included in the research. The reason for this is the high cultural value of the entire assemblage. The wooden artefacts retrieved from the immediate vicinity of the site would otherwise have remained unknown, since the number is too small for a separate publication. The data is (digitally) accessible via the international wood database WOODAN.org. Here, these data are made available for future research and for the archaeological community in general.

A further aim is that the present study will lead to greater awareness of the high information value of wood assemblages from archaeological contexts. It would be beneficial if more attention would be paid to this frequently neglected archaeological category, be it in the handling of wooden objects in the field, the selection recommendations, or the decision process for conservation and analysis.

Chapter 1 deals with the location and landscape of the site, as well as with the main features of the military site and the harbour layout. Data on the whereabouts of the wooden objects, their field administration and conservation are included in Chapter 2. The third chapter is about the aim and scope of the project, and the fourth presents the underlying questions of the study. Chapter 5 elaborates on the research methodology. Chapter 6 discusses in more detail

the inventory of artefacts, the spatial distribution, and the division into functional categories. The wooden utensils are described by theme and category in Chapters 7 to 23. The order of the descriptions is in accordance with the catalogue. Finally, Chapter 24 synthesises the research results and highlights the significance of the wooden assemblage for the Roman period and for the establishment of the earliest forts in the northernmost corner of continental Europe.

Acknowledgements
The author is incredibly grateful for the support of various colleagues at home and abroad, and for the availability of information and images by institutions, as mentioned in the list below. Special thanks go to Carol van Driel, Laura Kooistra, Mark Driessen, Robert Sands, and Arjen Bosman for the inspiring conversations about the wood from Velsen 1, to Carla Rosenberg for reading and editing the English text, and to Julien Ranzijn for the layout of the images and plates. Most of the drawings were made by Raf Timmermans, who over the years has developed into a true wood specialist.

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Justus Willberg, Weissenburg
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Maximilian Ontrup, Historical Museum of Regensburg

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François Blondel, Gonsans

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1.2 Velsen 1: location and landscape

The site of the early Roman military outpost and harbour of Velsen 1 is located in the western coastal region of the province of Noord-Holland, about twenty kilometres northwest of Amsterdam in the current Spaarndammerpolder. Immediately after World War II, archaeological artefacts were retrieved from a tank ditch and later, during the construction of the Velsertunnel.[2] This led to the discovery of the second fort we now know as Velsen 2. Velsen 1 is situated southeast of Velsen 2, near the Wijkertunnel. Velsen 1 and Velsen 2 follow each other chronologically and, in fact, belong to a single context. Bosman places Velsen 1 in the Augustan/Tiberian period and Velsen 2 during the reign of Caligula/Claudius.[3] Velsen 1 was operational between AD 15 and 30, while Velsen 2 was operational between approximately AD 39 and 47. The discussion concerning to what extent Velsen 1 was actually abandoned after AD 30 is still ongoing. The presence of fine colour-coated wares (early forties AD) and coins of Caligula (AD 37-41) suggest that the fort had a temporary overlap with Velsen 2. This leads Bosman and De Weerd to the statement that 'today, we no longer consider Velsen 1 and 2 as two individual, non-related sites'.[4] Research on Velsen 1 took place between 1972 and 1990, and in 1994 (Fig. 1.3). This was carried out by the AWN Society of Volunteers in Archaeology (AWN Nederlandse Archeologievereniging, the former Archeologische Werkgemeenschap Nederland, AWN), and the Institute for Prae- and Protohistory (IPP) of the University of Amsterdam. In contrast to Velsen 2, the site of Velsen 1 has been almost entirely excavated and the results were published. Two PhD dissertations emerged from the research. Morel was concerned with the construction of fortifications and harbour constructions and Bosman wrote his dissertation on the cultural find material of the early Roman fortification.[5]

Figure 1.3 The site of Velsen 1 during the excavation campaign in the eighties (source: archive of the Archaeological Working Group Velsen, AWV).

From a landscape point of view, the site Velsen 1 lies on the south bank of the southwestern main channel of the former Oer-IJ tidal system. The Oer-IJ tidal channel was a northerly branch of the Rhine (the Vecht river) which flowed into the North Sea near the current village of Castricum. The fort was situated on the part of the channel containing freshwater.[6]

To the west of the fort and harbour was the dune area and to the east, on the other side of the Oer-IJ, there was an extensive reed fen (Fig. 1.4). During the Middle Iron Age, the Oer-IJ system began to silt up. The silting was caused by a new opening between Lake Flevo and the Wadden Sea around 400 BC. This resulted in the Oer-IJ system losing its function in the hinterland. The outflowing water could no

2 Calkoen 1952, 11-12; Calkoen 1954, 34-37.
3 Bosman 1997, 6, 24-25.
4 Bosman & de Weerd 2004, 50.
5 Morel 1988a; Bosman 1997.
6 Vos 2015, 101.

longer keep the tidal inlet open and between 200 and 100 BC the tidal area of the Oer-IJ was closed from the sea by a barrier ridge. The river channel connection between Velsen and the southwestern part of the Flevo lake at the east side of the system remained open.[7]

Already in the 1950s, De Cock described the connection between the Oer-IJ and the Vecht river as the most northern arm of the Rhine. In the early Roman period, this side arm would have carried most of the water until, in a later period, the more southern side arms took over part of the water drainage.[8] Based on the palaeographic reconstruction of Vos, the Roman harbour had no direct link to the North Sea. The significance of the harbour was threefold, consisting of the shipping movement over the Oer-IJ channel between Velsen and the fort at Vechten, through the Flevo lakes and the

7 Vos 2015, 98-201.
8 De Cock 1954.

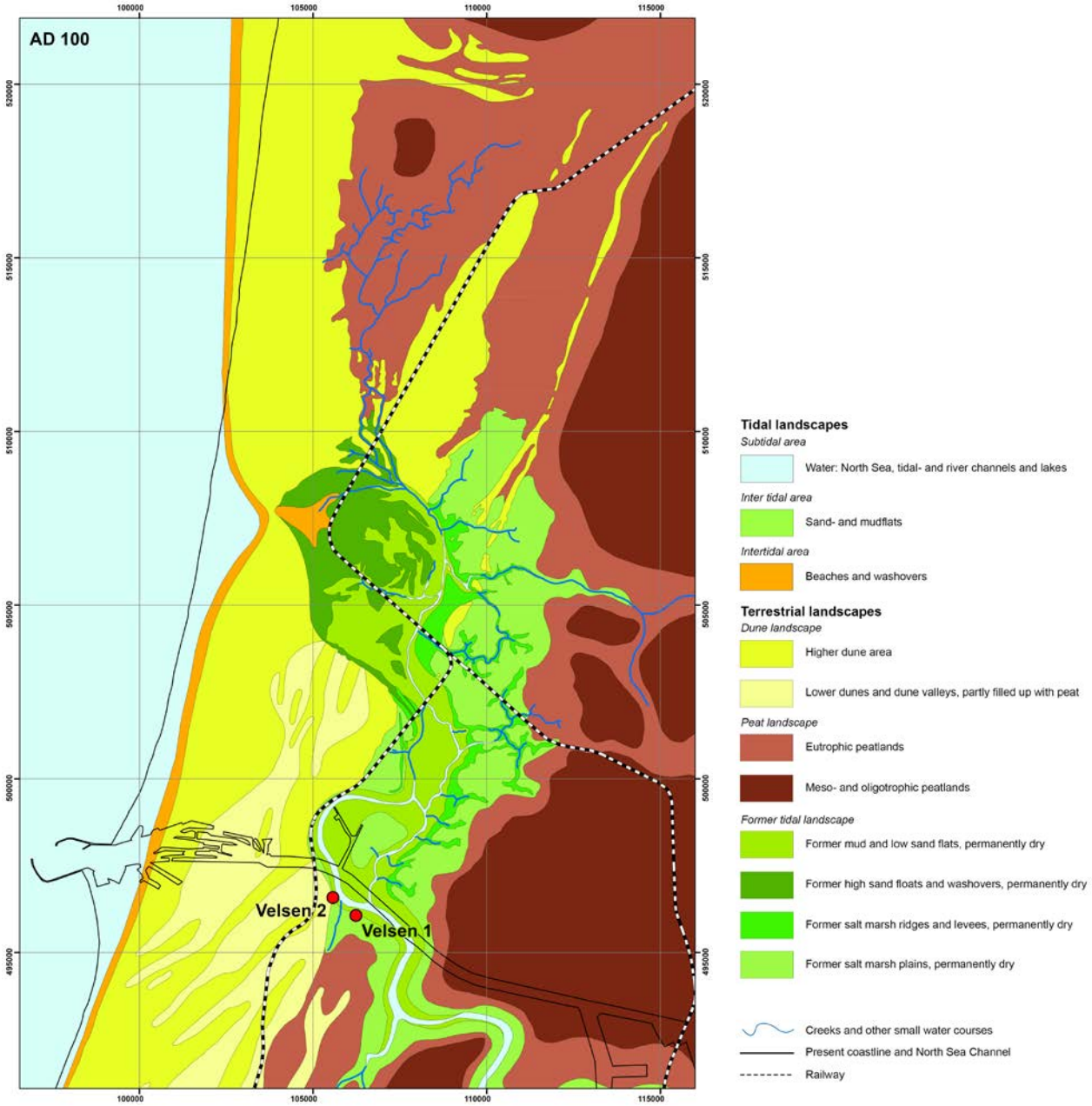

Figure 1.4 Palaeogeographical map of the Oer-IJ tidal system around AD 100 and the location of Velsen 1 and 2 (palaeogeographical map: Vos 2021).

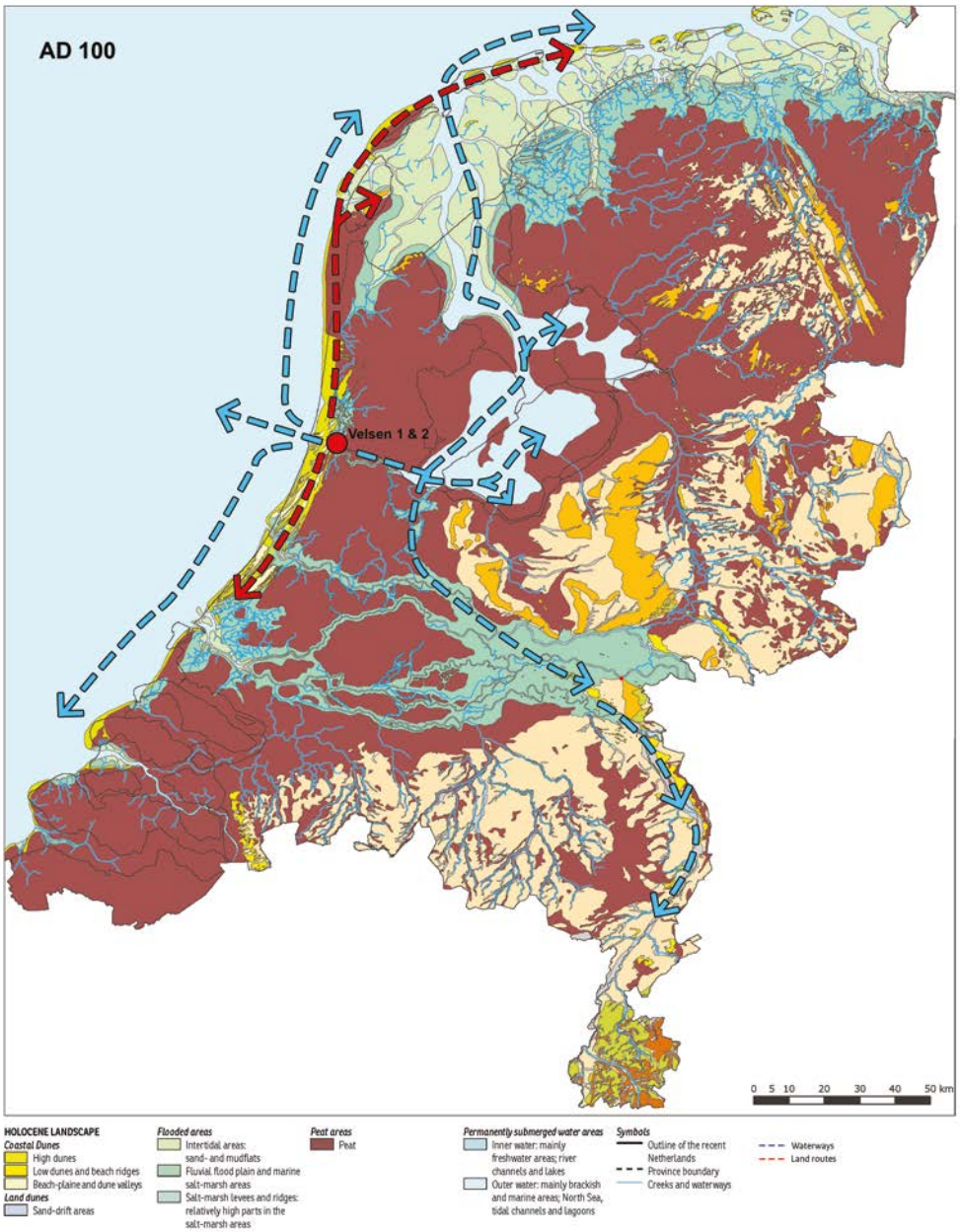

Figure 1.5 Location of Velsen 1 and Velsen 2 in relation to land routes and waterways (palaeogeographical map: after Vos 2015).

Utrechtse Vecht in the direction of the Wadden Sea, as well as a shipping route along the Rhine in the direction of Germany, towards the Ems river. Also, the fort was located at the level of the barrier ridges along the coastline which formed the main route over land to the north (Fig. 1.5). Velsen 1 was therefore at a well-chosen strategic location from which the Romans were able to control water transport and the land routes on the beach barriers and embankments (Fig. 1.6).[9] Considering the natural characteristics of the landscape, this choice does not seem to have been intended for maritime shipping unless the aim was to construct a canal right through the dune area. After all, it was a rather narrow strip of dunes that lay between the fort and the sea and, as Polak and Kooistra point out, 'The presence of the fort can be taken as proof that the tidal outlet of the Oer-IJ still functioned and was actually used by Germanicus for the transfer

[9] Morel 1988a, 302.

of troops or supplies from riverine to seagoing ships'.[10] Tacitus, in his *Germania*, also refers to a connection between Velsen and the sea. 'Towards the river are the Frisii, distinguished as the Greater and Lesser Frisii, according to their strength. Both these tribes, as far as the ocean, are skirted by the Rhine, and their territory also embraces vast lakes which Roman fleets have navigated. We have even ventured on the ocean itself in these parts.'[11]

10 Polak & Kooistra 427-428.
11 Tacitus, *Germania* 34.

Figure 1.6 Excavation in 1979 of part of the harbour with a revetment on the edge of the western jetty (photos above and below left) and retrieving finds from the spoil heaps shortly after the discovery of the site in 1972 (photo below right; source: archive of the Archaeological Working Group Velsen, AWV/P. Vons).

Figure 1.7 Excavation in 1970 on the site of Velsen 2, southwest of the Velsertunnel (source: archive of the Archaeological Working Group Velsen, AWV).

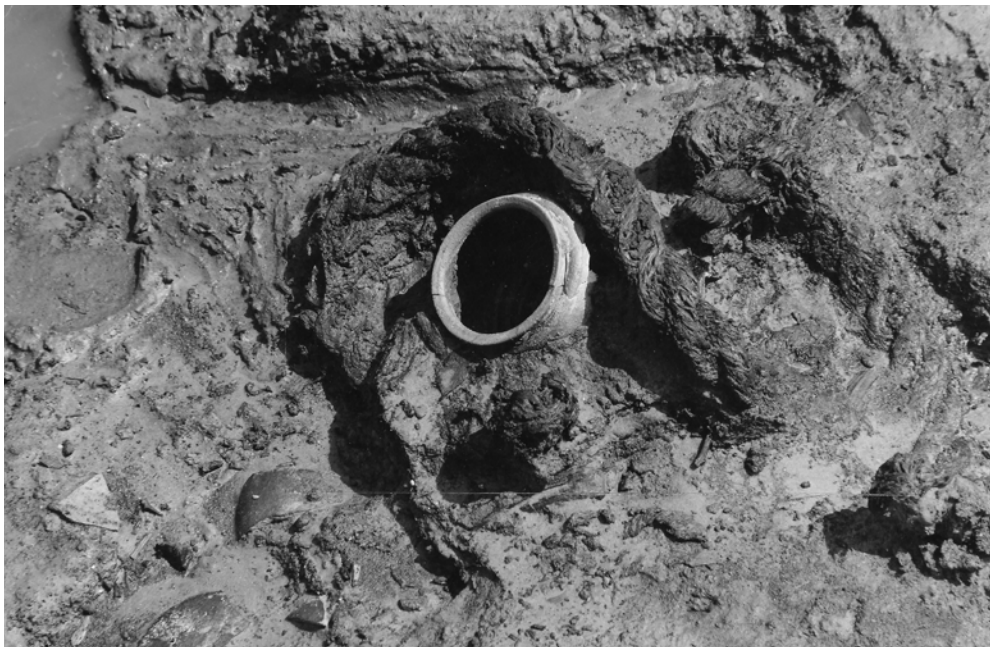

Figure 1.8 Find of a complete pot and a rope at the harbour basin of Velsen 2 (source: archive of the Archaeological Working Group Velsen, AWV/photo: M. Bosman).

After the revolt of the Frisians in AD 28, the fort was abandoned. However, around AD 39 there are indications that the site - at least temporarily - was being used again, possibly by quartermasters who inspected the condition of the area and the surroundings.[12] Despite the fact that a well was restored at Velsen 1, eventually a location 600 m upstream was chosen for reoccupation. This second fort is known as Velsen 2 (Figs. 1.7 and 1.8). Velsen 2 was abandoned in AD 47, when Corbulo received the order from emperor Claudius to retreat behind the Rhine.[13]

12 Bosman 1997, 18, 28; Bosman 2016, 52.
13 Calkoen 1952, 11-12; Bosman 2016, 58-75; Bosman 2021, III, 57.

1.3 The military installations

Constructed around AD 15, the fort is related to the military expeditions of the Romans towards the north, in which Velsen 1 served as a base of operations to Germania.[14] Velsen 1 may possibly correspond with the fort *Flevum* described by Tacitus which was, according to his *Annales*, attacked by the Frisians in AD 28.[15] The question of whether Velsen corresponds to *Flevum* was examined in detail by Morel. He concludes that based on the landscape setting, the clues in Tacitus about the relationship between the rural population and the revolts, Velsen may be regarded as the most likely candidate for *Flevum*, as mentioned in the *Annales* of Tacitus.[16] The fort of Velsen was largely abandoned in the AD 40s.

The identity of the troops stationed here is still unknown, but it is likely that they were soldiers of the *Classis Germanica*, and epigraphy points to troops with an Iberian origin.[17] In this context, the find of a tile stamp of the *Classis Germanica* (CGPF) at Velsen 1 is noteworthy.[18]

The construction of the fort started around AD 15 with a temporary platform secured with an earthen wall, and a single palisade towards the waterfront side (phase 1A, Fig. 1.9). Shortly after, this building phase was replaced by a trapezoidal platform with a quay construction (phase 1B, AD 16-22; Fig. 1.10): from a wider quay head, two massive quay moles split off in a V-shape towards the middle of the watercourse. On the eastern side of this structure there are two shorter quay moles constructed at right angles to a waterfront rampart wall and a sheet

14 Glasbergen 1966, 102-121; Glasbergen *et al.* 1974, 42-45; Vons 1977, 157; Morel 1988a, 320; Bosman 1997, 6.
15 Tacitus *Annales* IV: 72-74.
16 Morel 1988a, 322-329.
17 Bosman 1997, 317; Bosman 2016, 45; Zandstra 2019, 49, 172-173.
18 Bosman 1997, 135.

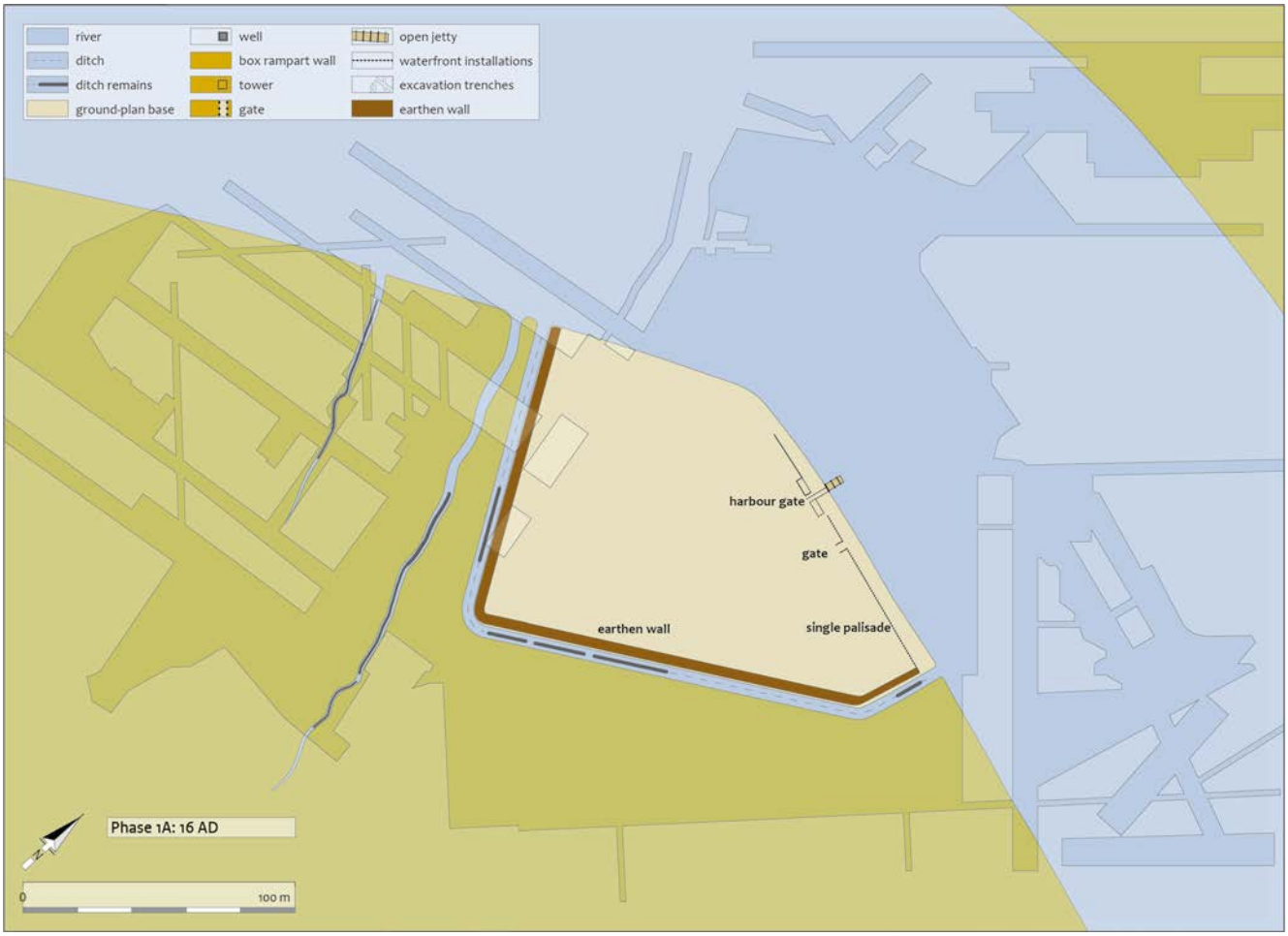

Figure 1.9 Velsen 1. The temporary building phase 1A of the fort and harbour around AD 16 (source: Driessen & van Driel-Murray forthcoming)

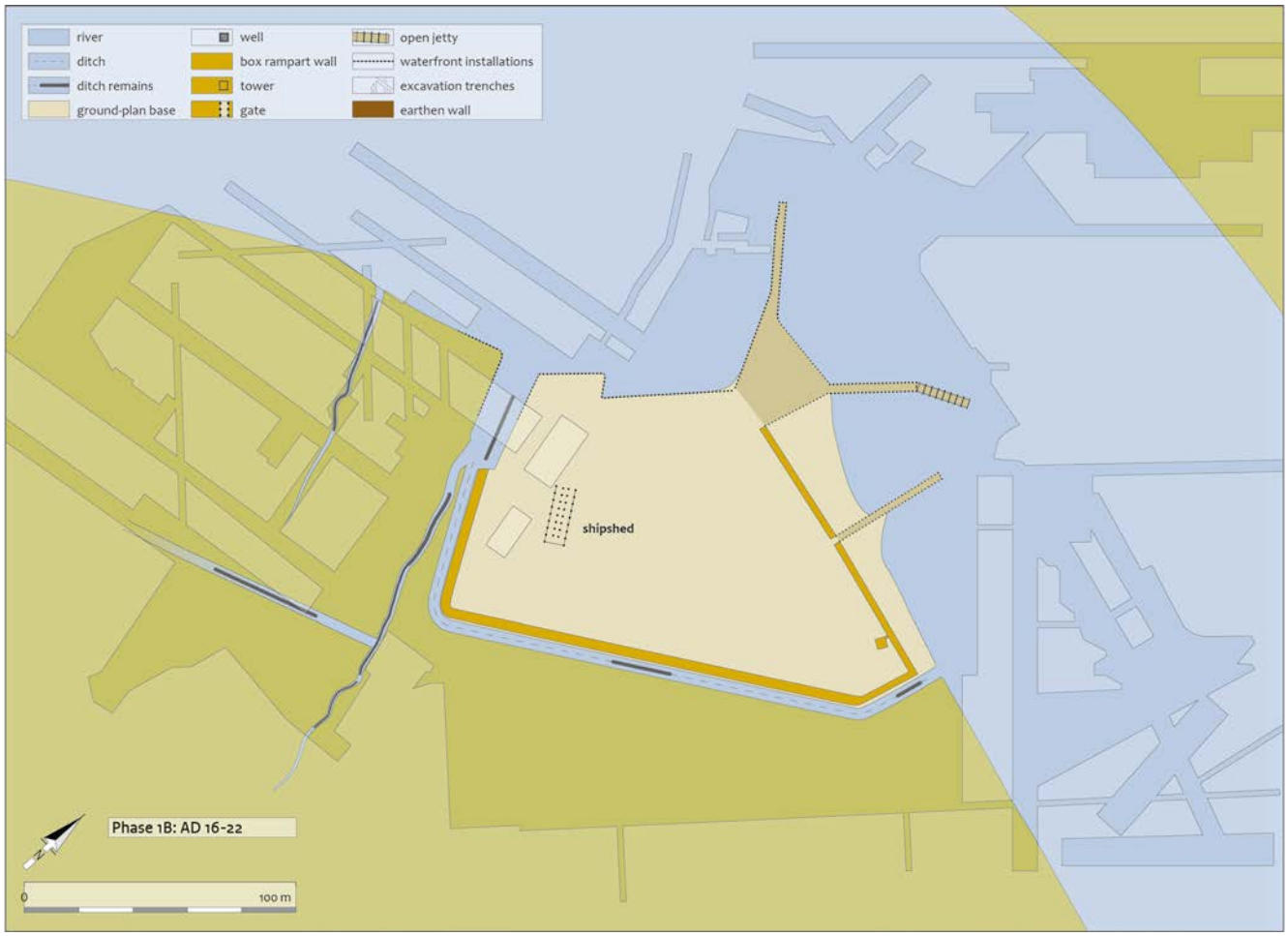

Figure 1.10 Velsen 1. Phase 1B of the fort surrounded by a single ditch and a three-metre-wide box rampart wall between AD 16-22 (Driessen 2014, Fig. 2a, 211).

piling. The moles and the piling were most probably constructed to protect the artificial waterfront from the abrasive effects of the Oer-IJ. The fort itself - measuring approximately 1 hectare - is surrounded by a single ditch and a three-metre-wide box rampart wall. A 22 x 6 m structure has been interpreted as a ship shed.

The second phase (AD 25-28) can be divided into a preparatory phase and a final use phase.[19] In this phase, the fort was surrounded by three ditches, and no rampart wall was erected on the waterfront side (phase 2B; Fig. 1.11). New embankments were, however, constructed, most probably to protect the site, and subsequent dredging operations took place to keep the Oer-IJ navigable. The sediment that was dredged from a higher level, including the finds, was moved to the deepest part of the gully.[20] The top of the western ditch was transformed into a forty-metre-long basin with revetted embankments which was connected to the Oer-IJ. Outside the fort, a remarkable transformation took place by constructing open jetties. The hypothesis is that the quay moles of the earlier phases caused too much turbulence, erosion, and deposition and were accordingly partly replaced by more open versions. Outside the perimeters of the fort, a 3 x 3 m well was constructed which was connected to the harbour by means of an aqueduct. It is assumed that this was created to supply ships with drinking water, as no branch was found leading inside the fort.

Finally, there is a third phase with an extension of the fort on the western side with two additional gateways and four towers (phase 3, dating to after AD 28; Fig. 1.12). This part of the fort was fortified by means of a box rampart wall and a double ditch system. The fort, now

19 Morel 1988a; Bosman 1997, 10-12; Driessen 2014, 210-213.
20 Bosman 1997, 35-36.

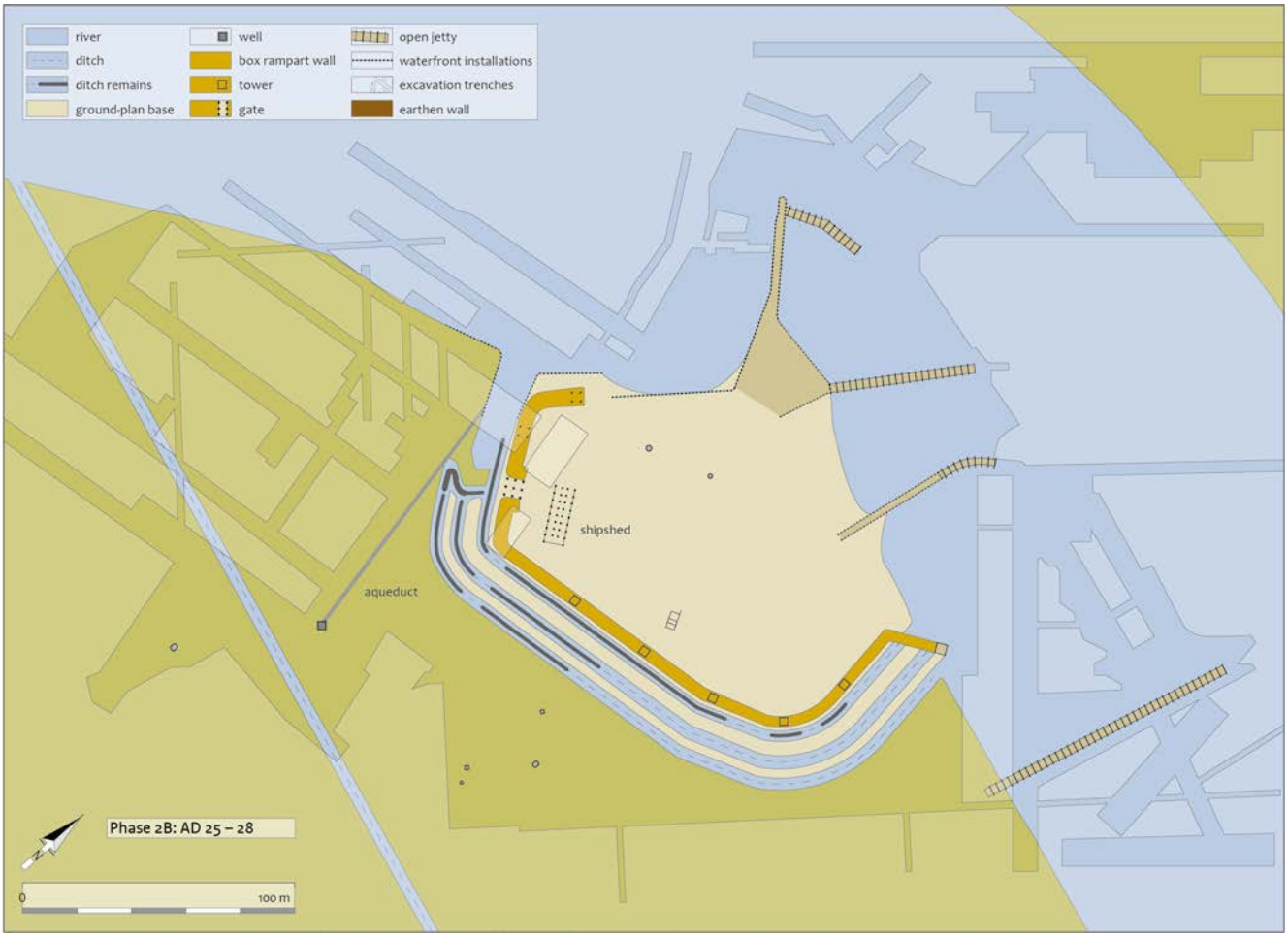

Figure 1.11 Velsen 1. Phase 2B of the fort and harbour between AD 25-28 (Driessen 2014; Fig. 2b; 212).

measuring 2.5 hectares, housed a structure interpreted as a granary and a 30 x 12 m building which is considered to be another ship shed. Archaeological features indicating other buildings within the fort, such as barracks, are - as a result of erosion in later times - almost entirely lacking. A large corpus of construction wood fragments from the harbour basin and elaborate burnt wattle and daub wall fragments retrieved in wells are, however, indications of buildings in the fort. Depending on the season, many of the soldiers will also have been housed in tents, as a large number of tent pegs have been found.

Based on the construction of the jetties, Morel mentions the multifunctional significance of the harbour.[21] To the western side of the platform, there was a shallow section of the channel which served as a natural harbour and from where ships could be pulled ashore for maintenance. The many casting residues of lead that had congealed in the water and which were found here were probably related to the hull sheathing and caulking of ships.[22] The area between the western mole and the eastern mole was the outer harbour, designed for the mooring of ships with a length of more than 20 m, or a number of smaller vessels. The inner harbour was to the east of the platform. Unlike the other two harbour installations, the eastern jetty as part of the inner harbour did not give direct access to the fort during phase 1. Because of its defensive character, Morel argues that it was here where the trans-shipment of goods with the indigenous population took place.[23] The northern jetty built in phase 2 far outside the harbour took over the function of the initial trans-shipment function of the eastern jetty. Morel suggests that relations between the

21 Morel 1988a, 309-310.
22 Meffert 1998, 18-25; Bosman 1997, 41-43.
23 Morel 1988a, 310.

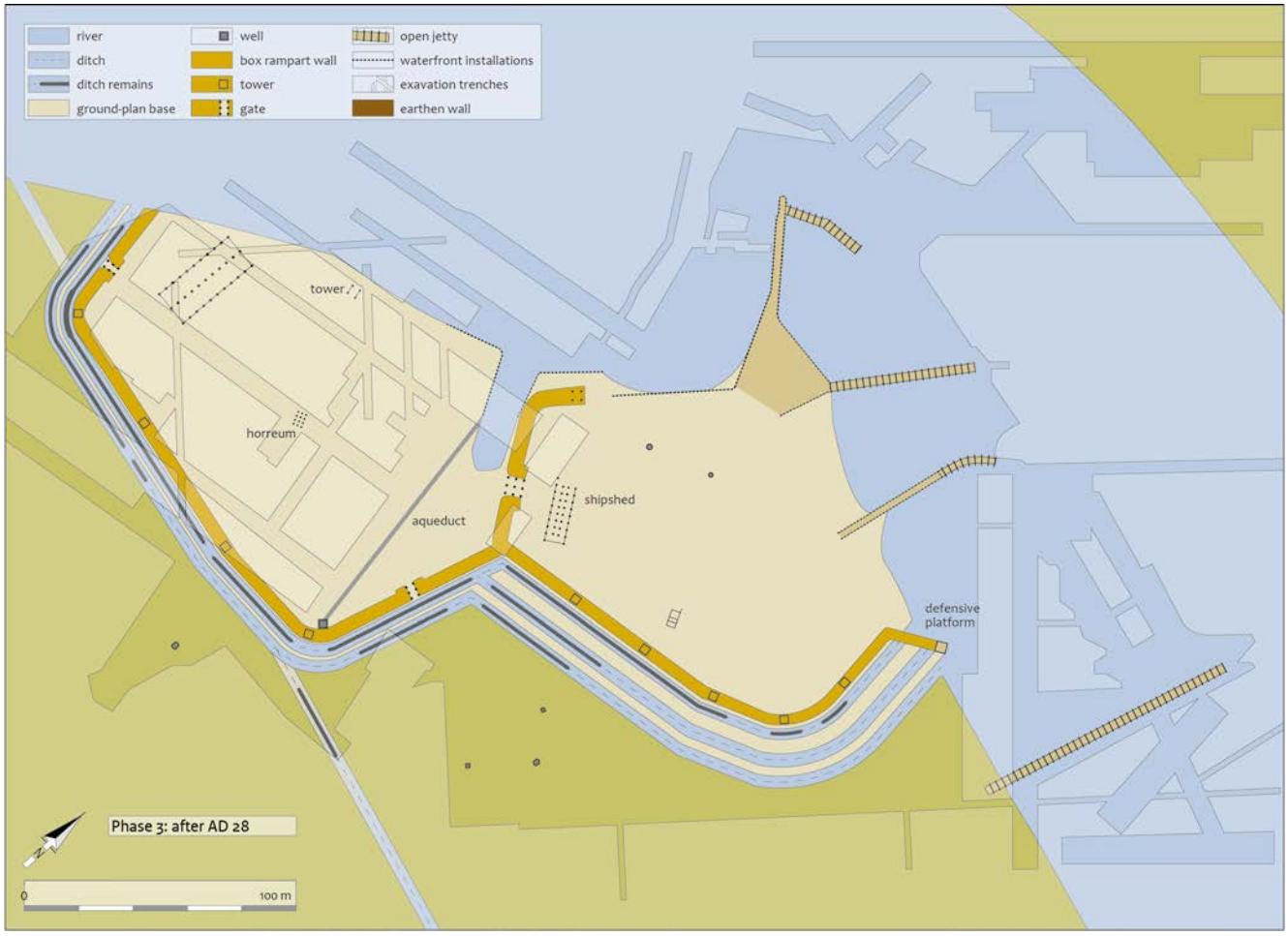

Figure 1.12 Velsen 1. Phase 3 of the fort (after AD 28) with an extension of the fort on the western side and with two additional gateways and four towers (after Driessen 2014; Fig. 2c; 213).

Romans and the local population deteriorated, and that, therefore the construction of a pier outside the fortress was considered necessary.[24]

1.4 The harbour basin

The layers in the harbour basin were largely eroded by floods in the Middle Ages. Two exceptions were the deeper part of the channel and the pile holes of the moles. Here the stratification of the layers was still largely intact. The eroded material is known as the *Dirty sands*. It is a mixture of layers that have subsequently been sedimented as one layer. The heaviest material was deposited first, in many cases the find material. Therefore, it consists of material from the period of the Roman occupation, but also from before and after. Where a differentiation could be made, two find layers were distinguished: the Dredging layer and the Roman layer. Based on the stratigraphy of the layers, the Dredging layer is older than the Roman layer. The Dredging layer consisted of the natural subsoil, the tidal flat, and the first Roman layer on the bottom of the harbour. The Roman layer, sediment from the channel consisting of fine sand and particles of humus, was deposited during calm conditions.[25] Archaeological finds occur in both layers. One exception is the human bone material found entirely on the top of the waste package, and which thus belongs to the very last phase.[26]

[24] Morel 1988a, 318.
[25] Bosman 1997, 35-36.
[26] Bosman 1997, 52.

2 Research History

2.1 Research history of the site and handling of the wooden artefacts

The discovery of the Roman fort dates to the last century, at the end of World War II. In 1945, finds of Roman military origin were discovered near the current Velsertunnel. In 1972, another archaeological site was added southeast of the earlier findings. In view of the older dating of these finds, the second site was called Velsen 1 and the earlier discovered site became Velsen 2.[27] From 1972 until 1990, and in 1994, various excavation campaigns were carried out, in which the members of the National Society of Volunteers in Archaeology (AWN), and later, the Archaeological Working Group Velsen (Archeologische Werkgroep Velsen, AWV) played an important role.[28] In 1974, the research took place as a collaborative project between the AWN and the former Institute of Prae- and Protohistory of the University of Amsterdam (IPP) under the direction of de Weerd[29] and, from 1978 onwards, directed by Morel.[30] In 1988, Beerenhout took over the excavation temporarily.[31] The last campaign took place in 1994 and was directed by Bosman.[32]

The research history of Velsen 2 goes back to the year 1945. It was then that the first Roman finds were discovered on the spoil heaps beside a German anti-tank ditch. Between 1952 and the opening of the Velsertunnel in 1957, small-scale surveys were carried out regularly by local amateur archaeologists and members of the State Service for Archaeological Investigations in the Netherlands (Rijksdienst voor het Oudheidkundig Bodemonderzoek, ROB) and of the National Geological Survey (Rijks Geologische Dienst). In 1982 and 1996, the then town archaeologist of Velsen, W. Bosman, found remains of the fort's defensive belt during trial trenching. It was not until 1997, during the construction of a water main, that the first excavation took place.

As can be expected from excavations in the Holocene coastal area with the potential for waterlogged organic artefacts, large quantities of wood came to light during each campaign. Most of the construction timber was described in the field, and samples of each were taken for wood identification and dendrochronological research (Fig. 2.1).[33] Due to the enormous amount of timber, drawings and photographs of individual pieces of construction timber were generally not made. A different approach was applied to the small wooden finds: these were collected and drawn shortly after excavation. Partly with financial help from the executive agency of the Ministry of Infrastructure and Water Management (Rijkswaterstaat), a freeze dryer was purchased for the conservation of organic finds from Velsen. Spruijt used it to conserve several wooden objects from bulk samples. The treatment was not always successful, as some objects fell apart at the slightest touch. In the meantime, the IPP moved from the Singel in the centre of Amsterdam to the Nieuwe Prinsengracht on Roeterseiland and, shortly after, the institute changed its name to Amsterdam Archaeological Centre (AAC). Here, the wooden objects from Velsen were placed in a large water tank in the Ecological Laboratory of the AAC. In addition to the small wooden objects, two of the three fish traps which were found and excavated in block lifting in 1988 and in 1989 were also brought to the new location of the AAC. Eventually, they ended up in the study room of archaeologist and ichthyo-archaeological specialist Beerenhout from the IPP. He took care of the fish traps after the relocation to prevent them from being lost.

Certain events were disastrous for the preservation of the wooden artefacts. During the excavation in 1987, a container with archaeological equipment and finds was deliberately set on fire by vandals (Fig. 2.2). In the process, part of the find material from the 1987 campaign was destroyed.[34] Moreover, some years later, a power failure in the cooling system of the AAC caused a number of finds which were stored in the refrigerator to become mouldy.

In the mid-1990s, van Rijn took over the care of the wooden artefacts and succeeded in obtaining funds for the conservation of a number of finds. Within the framework of the conservation project, she selected 597 wooden objects based on informative value, rarity, and representativeness. Prior to the conservation project, she identified the species and noted the dimensions of the wooden artefacts from the selected group. At that time, van Rijn also

27 Bosman 1997, 8-9.
28 The research history up to 1974 has been comprehensively published in an article for the Festschrift for the then chairman of the Archaeological Working Group of the Netherlands (AWN), H.J. Calkoen (Vons 1974, 59-69).
29 De Weerd 1976, 250-252.
30 Morel 1980, 243-245, 252-253; Morel 1981, 216-218, 224-225; Morel 1982, 208-210, 216-217; Morel 1983, 216-217, 220-222; Morel 1987, 300; Morel 1988b, 293-296; Morel 1989, 43-44; Morel & Bosman 1990, 311-314; Morel & Bosman 1991, 311-312.
31 Personal communication A. Bosman, 20 February 2021.
32 Bosman 1995, 335-336.
33 I. Stuijts identified the wood species of the timbers of the harbour constructions (Morel 1988a).
34 Newspaper article from 19 June 1987.

Figure 2.1 The cleaning and describing of the timber was done on site, here seen being carried out by members of the archaeological working group during an excavation of a well in the seventies (source: archive of the Archaeological Working Group Velsen, AWV).

'Vernielingen en brand pure sabotage'

SPAARWOUDE/AMSTERDAM — „Wetenschappelijk gezien is dit een ramp. Scherven, botten, houten tentharingen en leer van schoeisel die tweeduizend jaar onder de grond hebben gezeten, zijn allemaal vernietigd. Materiaal dat niet te vervangen is. We zijn er diep door geschokt. Want al is m'n werk geen kind van me, ik doe het toch met liefde..."

De reactie van Jaap Morel, 'toegevoegd onderzoeker' van het Instituut voor Pre- en Protohistorie (IPP) en wetenschappelijk leider van de archeologische opgravingen die bekend staan als 'Velsen 1', houdt het midden tussen razernij, bedroefheid en verbazing. „Welke idioot - en dat woord mag je gerust laten staan - haalt het nu in z'n hoofd om opgravingen met benzine te overgieten en in brand te steken?"

Tien weken werk, opgravingsmateriaal van onschatbare waarde, gereedschap en - hoewel niet uitgesproken - ongetwijfeld ook heel wat illusies zijn in het afgelopen weekeinde 'aan scherven' gegaan. Toch zal de lafhartige daad voor de medewerkers van het IPP niet geheel onverwacht zijn gekomen, want het is zeker niet de eerste maal dat het opgravingsproject 'Velsen 1' getroffen wordt vandalisme of sabotage. Dit keer zijn de gevolgen echter wel het meest desastreus gebleken.

Geknoei met pomp

Morel, die in januari hoopt te promoveren op een studie van de vindplaats: „Vorig jaar is de ellende al begonnen. We waren op dat ogenblik bezig een havenbekken van het fort leeg te pompen. De omringende dam werd lekgestoken, waardoor de kavel weer onder water liep. We hebben de dam verbreed en de zaak opnieuw leeggepompt. Saboteurs, want dat zijn het waarschijnlijk, hebben de machine omgezet, zodat deze de havenbekken volpompte in plaats van leeg. Vervolgens is de dam wederom verbreed, maar toch slaagde men er voor de tweede keer in een doorbraak te bewerkstelligen. Ze moeten uren hebben staan spitten om een gat te maken! Wij hebben gereageerd door de kavel met tussendammetjes te verdelen in kleinere oppervlakken, waarna de pomp compleet aan puin werd geslagen: aandrijfriemen, elektriciteitskabels, het carter, de brandstoftank, alles werd vernield..."

Zoals gezegd, volgens de wetenschappelijk onderzoeker is er niet 'slechts' sprake van vandalisme. „Vermoedelijk ziet men onze werkzaamheden als voorbereiding op de bouw van de Wijkertunnel. Tegenstanders van die tunnel willen de voortgang van het werk kennelijk belemmeren. Maar dit is geen bouwput, het gaat hier om archeologische werkzaamheden!" Ook zijn er volgens Morel niet 'zo maar wat dieven' aan het werk geweest. „Oh, daar hebben we veel mee te maken gehad. Machines werden gestolen waardoor we gedwongen werden een container te huren. Deze werd opengebroken, waarna we de bak van een graafmachine voor de container plaatsten. Die werd met veel kracht weggesleept, waarop wij weer reageerden door de hele graver er voor te zetten. Daarop trok men de complete container gewoon naar achteren toe. Kortom: het zijn professionele mensen. Maar zij lieten de opgravingen altijd met rust. Ze werkten bijna netjes..."

'Mens achter de scherf'

Morel stelt dat het werk van de laatste tweeëneenhalve maand niet geheel zinloos is geworden, maar er treden wel hiaten op in de opgedane kennis. „Het betreft hier een fort dat tussen 16 en 28 na Chr. werd gebruikt door de Romeinen. Waarschijnlijk waren er pakweg 450 soldaten gelegerd, werden er 'schattingen' (belastingen, red.) geïnd en gebruikte men het fort als overslagplaats. Er is natuursteen uit het Midden-Rijngebied gevonden dat vermoedelijk als ballast voor schepen werd gebruikt. Met andere woorden, de Romeinen hebben vanuit deze nederzetting materiaal getransporteerd tot in Duitsland aan toe. Samenvattend: de opgravingen vertellen ons iets over het gedrag van de vroegere bewoners van deze streek. Het gaat niet alleen om het materiaal dat we vinden, ook 'de mens achter de scherf' verdient de aandacht. Dat werk wordt door deze acties gesaboteerd en gefrustreerd, maar we geven het niet op", aldus de onderzoeker.

Morel besluit: „Eigenlijk was ik niet erg happig op publiciteit. Aan de andere kant hoop ik dat de dader van de brandstichting dit leest. Misschien lacht hij erom, maar wellicht beseft hij de draagwijdte van z'n daad. Wij zijn geen verlengstuk van de tunnelwerkzaamheden. We graven alleen omdat de bouw van de Wijkertunnel het doen van archeologische vondsten in de toekomst uitsluit."

● JURRIAAN GELDERMANS

Medewerkers trachten verbrande botresten opnieuw te rubriceren.
(Foto: Kees Blokker)

Figure 2.2. Archaeologists try to rescue what can be saved after a fire in the storage container (source: Kennemer Dagblad/Nieuwsblad Kennemerland. J. Geldermans, 19 June 1987).

deselected objects which were in an advanced state of decay. The conservation of the artefacts consisted of a combination of polyethylene glycol (PEG) treatment and freeze-drying and was carried out by the conservation company Archeoplan in Delft. In consultation with Morel, fifteen staves of wine barrels were treated with PEG at the Netherlands Institute of Ship Archaeology (Nederlands Instituut voor Scheepsarcheologie, NISA).[35]

Thanks to the efforts of the AWV, former curator Tineke Spruijt, Jaap Morel, Loes van Wijngaarden-Bakker, Arjen Bosman, and Pauline van Rijn, approximately 1,600 of the estimated 2,500 excavated wooden artefacts were eventually preserved.

The number of wooden finds from Velsen 2 is small in comparison to the number from Velsen 1. The most promising finds in 1964 and 1970 were brought to the IPP for further research and conservation. Due to the high costs, only a small portion of the total amount was conserved. A comprehensive study of all of the finds of Velsen 2, including the organic objects, was recently completed.[36]

2.2 Location of the wooden artefacts

Almost all of the objects are now in the possession of the National Museum of Antiquities in Leiden (RMO).[37] One wooden artefact from Velsen 1 and six from Velsen 2 can

35 The Netherlands Institute of Ship Archaeology (NISA) was dissolved in 1997. J. Morel was the director of the institute until its closure.

36 Bosman 2021.

37 One stave of Velsen 1 is housed in the Dutch Wine Museum Arnhem (personal communication A. Bosman, 22 February 2021).

Figure 2.3. Hilde Vermast and Joost Vink, both members of the AWV, standing next to a conserved stave with a height of approximately 2 meters from well 1977-2.

be found in the Archaeological Depot of the Province of Noord-Holland (ADNH) in Castricum,[38] and one single object from Velsen 1 is held by the AWV (Fig. 2.3). The other finds did not survive the prolonged storage or were not preserved due to other causes, such as the fire in the storage field container in 1987. Of these objects, often only a drawing remains.[39]

2.3 Numbering of the finds

In the past, the wooden artefacts, and other find categories as well, were registered in different ways and by different authorities. Objects were seldom given find numbers during the excavations. The location of the find was indicated by notating the grid square number and the stratigraphic layer on the drawings: in the case of the deposition layers in the harbour basin this concerns either the Roman or the Dredging layer. All of the information (square number, layer) was noted on the drawing. The finds themselves were not marked, however, nor were the find bags provided with a find number. In other words, the drawing number served as the find number. If drawings were made of more than one object on the same sheet of paper, each object was given an extension of the sheet number by adding a separate sub-number (Fig. 2.4). During the process of preparing the wooden artefacts for conservation, it proved difficult to link the drawings to the individual objects. When the artefact could not be linked to a drawing, the find was renumbered by van Rijn (starting with find number 3001). The old find numbers (which were the same as the drawing numbers) and the new find numbers were then processed in a database. During the current study, numerous duplications were discovered. For this reason, all of the surviving wooden objects were re-examined and often redrawn.

The unnumbered finds that came to light during the present study have been given a number compliant with the registration method of the RMO. An example of this is g.2006/1982-4012a. The g stands for the province of Noord-Holland, 2006 is the year in which the finds were transferred to the RMO depot, and 1982 is the year of excavation. The last number, here 4012a, is the unique find number. A lower-case letter following the unique find number means that the object belonged to a find number that was given to several artefacts. The numbering of the newly discovered finds starts with 4000. In order to save space in the layout of the catalogue, the RMO find location code has been omitted in the catalogue but is included in the database; instead of g.2006/1988-4012a, only the unique find number (here 4012a) is shown.[40]

Artefacts that are in the archaeological depot of Noord-Holland have been given a unique site code, followed by a unique find number. For Velsen 1, the depot uses the site code 0214, and for Velsen 2, 0490. The inventory

[38] The artefacts are also part of the digital collection and the information on the artefacts is freely accessible via the website of the depot.

[39] The wooden objects of Velsen 1 in the collection of the National Museum of Antiquities are divided in two groups. One group is stored in the Raamsteeg depot in Leiden; the other, more exceptional artefacts, are part of the museum's collection and housed in the Papengracht depot in Leiden.

[40] Moreover, the information about the year of excavation of unnumbered finds was rarely traceable.

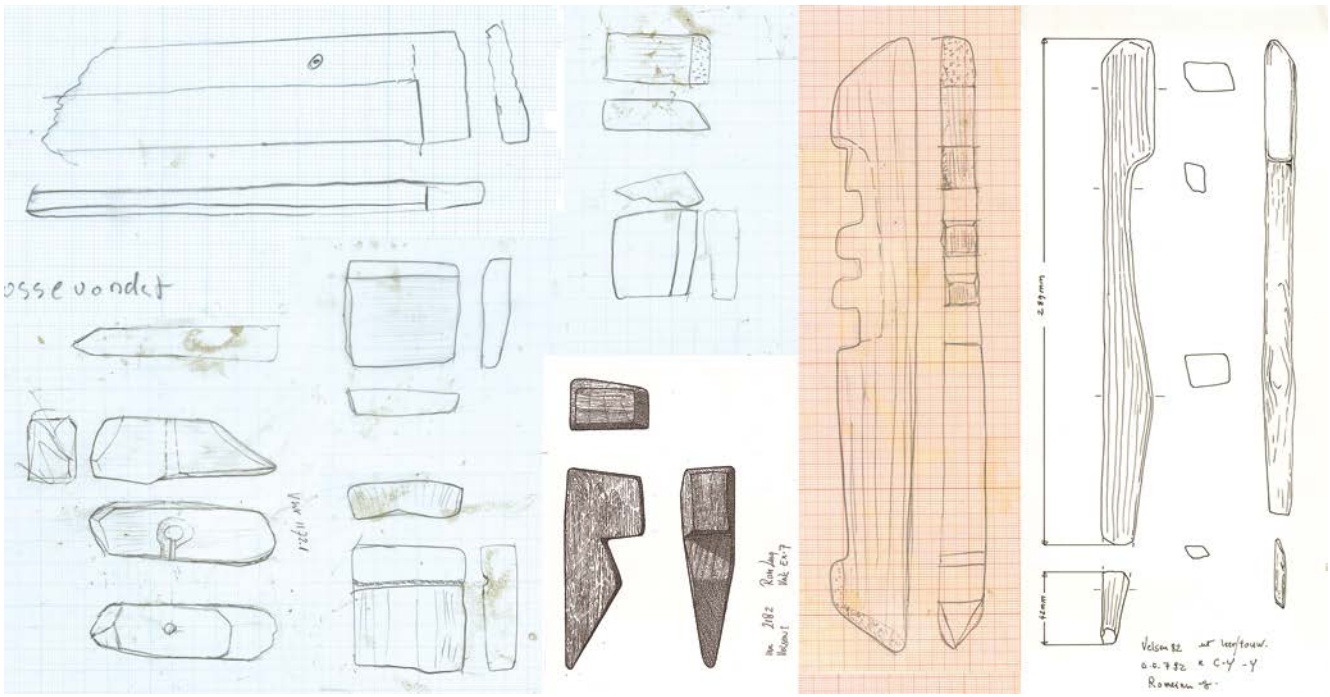

Figure 2.4. Examples of sketches by R. van Silfhout.

number of the depot of Noord-Holland consists of a box number and a find number, for example 5099-103 (5099 is the number of the box, 103 is the find number).

The provenance of 1,041 objects could not be retraced because finds could no longer be linked to drawings and to the information on the drawings. This relates in particular to the bulk samples found in the Raamsteeg depot of the Museum of National Antiquities.

Each find has been given a unique WOODAN-id number. In the text, in the descriptions of the objects, and for the illustrations in the catalogue, the most recently edited find number is used. The ten-digit WOODAN number has also been included next to the find number in the catalogue, but, due to its length, this was not suitable for inclusion in the current text and the illustrations.

2.4 Illustrations

There are more than 3000 simple sketches of the wooden artefacts, mostly done by R. van Silfhout (IPP). Most of these sketches were not elaborated. A few publication drawings in ink have been made of several important objects, including parts of the grip of an early Roman sword (*gladius*), a furniture leg, two almost complete bowls, and several tent pegs. These drawings in ink were made by van Silfhout, Morel, and Bosman. Moreover, Bus and van Dam, members of the AWV, made several drawings. More sketches may have been worked up, but these could not be traced in the depots of the National Museum of Antiquities, the Archaeological Depot of the Province of Noord-Holland, the University of Amsterdam, or in the archive of the AWV.

Selected artefacts were photographed by IJdo (IPP) immediately after their conservation in 1996 and 1997. The photo negatives are part of the collection of the RMO and were digitalised in the context of the present study. During the excavation campaigns, photographs were made by Morel, Bosman, and Beerenhout (IPP), and by members of the AWN, especially by Vons and Schimmer. Throughout the present study it soon became clear that it was more convenient to have the objects redrawn for the presentation in the catalogue. In addition, the better sketches of several objects which do not longer exist were elaborated for the catalogue. These new

Figure 2.5 Raf Timmermans at work, drawing a wooden artefact.

drawings were made by Timmermans (Fig. 2.5), Kaarsemaker, and Assië.

2.5 Conservation

In 1988, Spruijt started pre-treating and preserving wooden objects using a polyethylene glycol (PEG) solution and subsequently freeze-drying them. As an experiment, some wooden finds were only freeze-dried. During examination in the framework of the current project, the artefacts that had been pre-treated with PEG and then freeze-dried were found to be well preserved, while the wooden objects that were only freeze-dried were completely dry, extremely light and crumbly, and fell apart at the slightest touch. In cooperation with Casparie from the former Biological Archaeological Institute of the University of Groningen, members of the AWV had also tried to conserve several wooden objects by using Sorbitol. After treatment, these finds are light, extremely hard, and show a whitish, icing-sugar-like rash. It should be stressed that the knowledge then about the conservation of wooden finds is not comparable to what we now know about the conservation of waterlogged wood (Fig. 2.6). The experiments with freeze-drying were conducted on processing waste and small construction elements. The remaining wooden artefacts - objects whose function had been determined - were kept in the water tank at the University of Amsterdam (UvA) for years, waiting for the next step to be taken.

Figure 2.6 Artefacts from Velsen 1 in various conditions: 1. untreated and stored in plastic, 2. untreated and naturally dried, 3. freeze-dried without pre-treatment, and 4. treated with Sorbitol. Photos: BIAX *Consult*

This finally happened when van Rijn selected 597 artefacts for permanent conservation. Her selection was based on the condition of the wood, the fragmentation of the object, its museum value, and its historical importance.[41] Conservation was carried out between 1995 and 1997 by two restoration agencies. The wooden utensils were treated by Archeoplan in Delft. The treatment included pre-treatment with PEG, freeze-drying, and post-treatment. In the final step, fragments were glued and fragile objects were additionally hardened with PEG. Most of the artefacts that have been treated in this way are now in need of post-treatment.

Fifteen staves from wine barrels were preserved by the former Netherlands Institute of Ship Archaeology (NISA) in Ketelhaven. Here, the treatment consisted of impregnating the staves with PEG, without freeze-drying. Fragmented parts were glued after preservation and small cracks were filled with beeswax. The filled parts were coloured with earth pigment. The objects treated at the NISA in Ketelhaven are still in good condition.

41 The conservation was made possible by contributions from the Mondriaan Foundation, the Guarantee Fund of the University of Amsterdam, Foundation Utopa, Dr. Hendrik Muller's Vaderlandsch Fund, and Foundation and Museum Beekesteijn (municipality of Velsen).

3 The Project: Aim and Scope

3.1 Framework

The research took place within the 'pre-Malta onderzoek project' that falls under the programme Knowledge for Archaeology. The goal of the project is to obtain datasets from (not yet elaborated) excavation data prior to the introduction of the Valetta convention in 2007 (known as the pre-Malta studies) in order to study these to 'monetise' old investments in the form of substantial new knowledge of the past.

The purpose of the assignment of the present study focuses on describing, studying, and unlocking the approximately 2,500 wooden artefacts from the Roman fort Velsen 1. Timbers of buildings and ships fell outside the scope of the study. However, wooden objects that belong to ship inventory are included, as well as barrels reused for well-linings.[42]

The study of the wooden artefacts is being conducted concurrently with the Velsen 1 investigation which Driessen and van Driel-Murray are leading. Velsen 1 is being reviewed as part of the Odyssey project, in order to complement the image of the northernmost Roman fort on the mainland with increased insights and new research techniques.[43]

The significance of the wooden finds for the interpretation of the living conditions in the fort and the function within the Roman Empire was recognised at an early stage of the investigation. In the annual excavation summary over 1989, researchers Morel and Bosman describe the wooden finds as 'very important' and mention large quantities of wooden tent pegs, parts of timber constructions, wooden vessels, and domestic wooden objects from the harbour basin. This fragile material, for example, wooden bungs, and stoppers and lids, appears to occur in larger quantities than the less vulnerable lids of earthenware.[44]

To understand the potential interactions between the fort and the local groups, similarities in the use and design of wooden utensils from contemporaneous sites in the region were examined. These include a military outpost fenced off by a palisade at Krommenie-'t Hain,[45] an indigenous site at Heemskerk-Broekpolder,[46] and an indigenous settlement with Roman objects at Uitgeest-Dorregeest.[47] From later periods, especially from the second and third centuries, the sites of Castricum-Oosterbuurt,[48] Heiloo-Zuiderloo[49] and, again, Uitgeest-Dorregeest can be mentioned.[50] These sites have yielded some interesting wooden objects of probable Roman provenance.

Other sites with wooden artefacts in the lower Rhine delta are Vechten,[51] Alphen aan den Rijn,[52] and Valkenburg (Zuid-Holland). The construction of the Velsen 1 fort took place during the campaigns of Germanicus in AD 15.[53] Vechten (Fectio) was presumably built in the reign of Augustus in AD 4/5 and was the nearest supply base for the period for Velsen. The fort was connected through the Vecht river to Lake Flevo and thus formed the route to the Frisians homelands.[54] The earliest phases of the *castella* Praetorium Agrippinae (Valkenburg) and of Albaniana (Alphen aan den Rijn) were probably founded by the Emperor Caligula in the winter of AD 39/40 and around AD 41 or 42, respectively.[55]

Another site with a large number of wooden artefacts is the Roman harbour town at Voorburg-Arentsburg (Forum Hadriani). However, the site is more than a century younger than Velsen 1.[56] Due to the location of Velsen 1 on a side arm of the Rhine, which served as a transport route through Germany to Switzerland, it is also interesting to look at the wooden find assemblages of Colonia Claudia Ara Agrippinensium (Cologne, Germany),[57] Vitudurum (Oberwinterthur, Switzerland),[58] Vindonissa (Windisch, Switzerland),[59] and Tasgetium (Eschenz, Switzerland).[60] Wooden assemblages of the sites along Hadrian's Wall in Great Britain, such as Vindolanda (Bardon Mill, Great Britain), Luguvalium (Carlisle, Great Britain), London, and Ribchester are also compared with those of Velsen 1 (Table 3.1).[61] These are large assemblages limited to wetland sites in Northwestern and Central Europe. From the Mediterranean region, almost the only wooden artefacts which have survived are from the shipwrecks Nemi[62] and Comacchio,[63] and from the Roman cities Pompeii and Herculaneum.[64]

42 Request for quotation RCE-MO-HJ-IUCN19010013, 9.
43 This project is funded by the Netherlands Organisation for Scientific Research. Driessen & Van Driel-Murray, forthcoming.
44 Morel & Bosman 1990, 313-314.
45 De Koning 2017; Lange, forthcoming.
46 Therkorn 2009.
47 De Koning 2016.
48 Hagers & Sier 1999.
49 Lange 2017a, 2020.
50 De Koning 2016.
51 Polak & Wynia 1991; Polak 2014.
52 Polak, Kloosterman & Niemeijer 2004; Polak, Niemeijer & Van der Linden 2012.
53 Lendering & Bosman 2010, 104.
54 Polak & Kooistra 2013, 419; Polak 2014, 93.
55 Polak, Niemeijer & Van der Linden 2012, 268-269.
56 Driessen & Besselsen 2014.
57 Tegtmeier 2016.
58 Jedinger & Leuzinger 2002; Jauch, Zollinger & Bleicher 2010, 2-13.
59 Fellmann 2009.
60 Leuzinger 2012.
61 Pugsley 2003.
62 Ucelli 1950.
63 Berti 1990, 53-64.
64 Mols 1994; 1999; 2008.

Table 3.1 Overview of sites from the Roman period with the wooden objects mentioned in this study.

Site	Roman name	Type of site	Period
Alpen aan den Rijn (NL)	*Albaniana*	military base, fort	AD 41/42- c. 270
Bodegraven (NL)	-	military base, fort (?)	first century AD
De Meern I (NL)	*Fletione (?)*	shipwreck	AD 148 ± 6
Heiloo-Zuiderloo (NL)	-	indigenous dwelling	second/third century
Krommenie-'t Hain (NL)	-	military, trans-shipment site	2 BC- AD 130
Uitgeest-Dorregeest (NL)	-	indigenous dwelling	from first century AD onwards
Valkenburg-Marktveld (NL)	*Praetoria Agrippinae*	military base, fort	AD 39/40-c. 275
Vechten (NL)	*Fectio*	military base, fort	AD 6-c. 275
Velsen 1	*Flevum*	fort, harbour	AD 15-47
Velsen 2	*Flevum*	fort, harbour	AD 39-c. 50
Voorburg-Arentsburg (NL)	*Forum Hadriani*	town, harbour	AD 121-AD 270
Cologne (D)	*Colonia Claudia Ara Agrippinensium*	Capital of the Roman province of Germania Inferior	after AD 50
Eschenz (CH)	*Tasgetium*	military base, fort	AD 300/301-early sixth century
Oberwinterthur (CH)	*Vitudurum*	vicus, and from AD 294 onwards, castellum	first century BC-AD 400
Windisch (CH)	*Vindonissa*	military base, fort and vicus; after AD 101 only civilian	BC 15-AD 101; AD 270-fifth century AD
Bardon Mill (UK)	*Vindolanda*	military base, auxiliary fort	AD 85- AD 370
Carlisle (UK)	*Luguvalium*	town	c. AD 72-early fifth century
London (UK)	*Londinium*	town	c. AD 47-early fifth century
Ribchester (UK)	*Bremetennacum*	military base, fort	c. AD 72/73-early fifth century
Comacchio (I)	-	shipwreck	BC 19-12
Herculaneum (I)	-	town	fourth century BC-AD 79
Nemi (I)	-	shipwrecks	c. AD 40
Pompeii (I)	-	town	fifth century BC-AD 79

4 Research Questions

4.1 Research questions

The present study focuses on the wooden artefacts of Velsen 1. Several wooden objects of Velsen 2 have been included because of their ensemble value. Construction wood and ship timbers fall outside the scope of the investigation. However, ship timbers are mentioned in the overview of wooden artefacts (Section 6.3). The study concerns questions about wood use and production techniques, as well as questions about the supply of goods and the degree of interaction with the local population. The research provides information that helps to answer three questions from the National Archaeological Research Agenda of the Netherlands about the mutual cultural effects of the interaction between the Roman Netherlands and the area north of the Rhine, and about the organisation of the Roman military presence along the Rhine and the North Sea coast, as well as about the nature and significance of objects made of organic material within the context of material culture.[65] More specifically, in relation to the wooden artefacts from Velsen 1, the following questions have been put forward:

- What are the applied wood species, where has the wood grown, what are the qualities for the different purposes of the wood species?
- To what extent are there relationships between the functions of the utensils and the specific wood species which were used?
- What kinds of objects have been found and what are the functions of the objects?
- Which technologies have been used in the manufacture of the various wooden utensils?
- If imported from elsewhere: where does the wood or where do the objects come from?
- Are there any known parallels for the objects? If so, have they been found in similar contexts?
- Are objects suitable for dendrochronological research, and if so, to what extent do the recent dendrochronological dates fit in with earlier phases of the site?
- What knowledge do the wooden utensils provide about timber supply, provisioning, and exchange networks of the Roman fort Velsen 1? Based on the objects, what can be said about contacts (local and regional) and relations with the local population?
- How does the spectrum of wooden utensils fit in with the repertoire of wooden utensils in other (early) forts?
- What new knowledge does the spectrum of wooden artefacts provide about the material culture of early Roman forts?
- How does the spectrum of wooden utensils fit into the repertoire of objects made of other materials and found within the context of the Roman fort Velsen 1?
- What conclusions can be drawn from the composition of the find assemblage? Which objects are missing?
- What significance does this research into wooden utensils have for our image of material culture within Roman fortifications in the first century AD?
- Which research questions can be asked with regard to future research and additions to the National Archaeological Research Agenda of the Netherlands (NOaA)?

[65] National Archaeological Research Agenda of the Netherlands, questions 60, 63 and 114.

5 Methodology

5.1 Phased implementation

The research was conducted in four phases. The first phase consisted of making an inventory of all available data, including the wood species, the type of the wooden artefacts, the dimensions, the interpretations of the objects, and the available photographs and drawings. For this, the depots of the National Museum of Antiquities, the AWV, and the Archaeological Depot of the province of Noord-Holland were visited. The wooden utensils that were found during these visits were described and the species were identified, and the data was added to the database.

In addition, the conserved objects in the National Museum of Antiquities were re-examined to determine the current state of conservation and, if necessary, to reinterpret the function initially assigned by van Rijn. In the case of wooden objects that had not yet been examined, an attempt was made to identify the species. Objects of which no drawing existed yet (or only a sketch) were drawn by Timmermans.

To determine the suitability for dendrochronological research, artefacts made of oak, ash, elm, and coniferous wood were analysed for the number of annual growth rings. To qualify for this research an object should have at least seventy growth rings, the minimal number required for reliable dating and provenance determination.[66] Optimally, the last growth ring would be present, to trace the absolute year of the felling of the tree.

For a systematic overview, the objects were categorized by function. Each category with subcategory or subcategories falls under a theme. The theme is therefore the main category and determines the composition of the catalogue and the synthesis (Section 6.3, Table 6.2).

As mentioned earlier, an additional almost one thousand wooden finds unexpectedly came to light during the inventory, of which the wood species had not been determined and a description was lacking. These were analysed in addition to the original assignment.

In the second phase, using the research questions to form the guidelines, the data were analysed and the catalogue compiled. Included in the analysis of the data are, whenever available, descriptions of similar objects from other Roman sites such as Valkenburg,[67] Alphen aan den Rijn,[68] Voorburg-Arentsburg,[69] Cologne,[70] Vindonissa,[71] Tasgetium,[72] Vitudurum,[73] Vindolanda,[74] Luguvalium,[75] London and Ribchester,[76] Pompeii and Herculaneum[77] (Table 3.1).

The third phase was comprised of the creating of a synthesis to place the results in a regional and supra-regional framework. In this way, new knowledge was generated, and knowledge gaps became visible. The study concludes with an additional set of questions for the next NOaA and advice for future research.

Finally, the fourth and last phase focused on making the data available to professionals as well as to a wider public. Objects from the assemblage of Velsen that are not included in the catalogue can be viewed online: all of the data and existing images have been added to the international online database WOODAN.org. This open access and online database is managed by the WOODAN Foundation.

The project was carried out by Silke Lange, with the support of Laura Kooistra and Kirsti Hänninen of BIAX *Consult*. The input of the data in WOODAN was done by Stephan Nicolaij and Jelte van der Laan. Almost all of the drawings were made by Raf Timmermans, and some by Jos Kaarsemaker, René van Silfhout, Jaap Morel, and Chantal Assië.

The supervisory committee consisted of Carol van Driel-Murray, Laura Kooistra, and Mark Driessen. The manuscript has also been submitted to Arjen Bosman, who provided corrections and additional information. Laura Kooistra authorised the manuscript.

5.2 Sources and references

Initially, the study was based on the preliminary data and unpublished notes from van Rijn. Van Rijn had identified almost six hundred wooden

66 Haneca 2017, 20.
67 Van Rijn 1993, 146-216.
68 Van Rijn 2004, 216-237.
69 Lange 2014, 833-864.
70 Tegtmeier 2016.
71 Fellmann 2009.
72 Hedinger & Leuzinger 2002; Leuzinger 2012.
73 Hedinger & Leuzinger 2002.
74 Birley 1994; Birley 1997; Birley 1999; Birley 2003; Birley 2009; Birley 2013, 85-104; Birley 2018, 189-196.
75 Caruana 1992, 68-79; Caruana unpublished; Pugsley 2003.
76 Pugsley 2003.
77 Mols 1994; Mols 1999; Mols 2008.

artefacts. These artefacts are conserved and can be found in the RMO in Leiden. During the current project, another thirty-six boxes with unanalysed wooden objects came to light in the RMO's depot. As these objects complemented the existing data, they were also described, and the species identified. This additional research on 996 objects was carried out by the author. For the understanding of the site, the dissertations on the harbour site Velsen 1 from Morel (1988) and Bosman (1997) were essential, as are the new insights gained during the Odyssey projects on Velsen 1 and Velsen 2.[78] Significant in the study were the original drawings by van Silfhout and Morel, as well as the numerous photographs made by IJdo. In general, the original sketches of the wooden artefacts were present. However, all of the elaborated and inked drawings were missing. Two important sources were the archives of Velsen 1 and the knowledge about the various excavation campaigns present at the AWV. Extensive use has been made of the field reports, notes and visual material from the field campaign in 1988 in the archive of Beerenhout.

5.3 Iconography

Frescoes and grave steles provide an additional source of information for the interpretation of wooden furniture, tools, and domestic items. An example of this is the sarcophagus from Simpelveld as a source for the appearance of Roman furniture (Section 24.1).[79] Furthermore, representations on Trajan's column provide insights into the use of tents, the layout of temporary camps, and the transport of all kinds of goods to supply the Roman army, including wine in wooden barrels.[80]

5.4 Wood identification

The identification of wood species was carried out using a transmitted light microscope with magnifications up to 500x. Following common practice, the identification is based on the anatomical observation of three sections (transversal, longitudinal tangential, longitudinal radial). For the wood identification, the determination key and publications of Schweingruber and Schoch *et al.* were used.[81] Van Rijn identified the species before conservation in 1996. The identification of the other wooden finds was done after conservation in 2020. Both investigations were conducted in the BIAX laboratory in Amsterdam.[82]

From several wood species, only the genus of the wood can be identified. This is the case with, for example, alder, birch, oak, and popular. Therefore, the abbreviation spp. (plural) for 'several species' is given after the name of the genus. In some cases, the differentiation of *Larix* and *Picea* by wood anatomical features is not possible. When this is the case, both are mentioned. The same applies to the differentiation between Sycamore maple and Norway maple, and Maloideae, type apple/hawthorn/pear.[83]

5.5 Dendrochronology

In general, the objects were too small and contained too few annual growth rings to be considered for dendrochronological research. Two large oak tent pegs split radially from trunks were found to contain just under sixty annual growth rings, so an attempt was made to have these dendrochronologically examined. However, this did not yield any results. Due to the treatment with PEG, the cells were clogged and no longer clearly visible, so the growth ring boundaries could not be distinguished. One of the aims was additional dendrochronological research to date well 1977-2, well 20, and well 1989-S190. However, the staves of those barrels were in such poor condition that dendrochronological examination was not possible.[84]

5.6 Analysis of tool marks

To gain insight into the use of wood species and processing techniques, the part of the tree from which the object was made has been examined, and tool marks were analysed. However, due to the lengthy period before conservation and through the conservation itself, traces of processing and tool marks proved to be barely visible.

78 Driessen 2014; Bosman 2021.
79 Zinn 1997, 135-158; Galestin 2001, 63-76.
80 Coarelli 2000.
81 Schweingruber 1990; Schoch *et al.* 2004.
82 In 2001, BIAX *Consult* moved to Zaandam. Before that, BIAX *Consult* was located on the Roetersstraat in Amsterdam.
83 Schoch *et al.* 2004.
84 Earlier dendrochronological research was done on some staves of silver fir with find numbers 3201, 3205, 3208 and 3212 (well 1989-S180), 3296 (DS-17) and 3281 (CP-4/5) (Jansma 1985; Bosman 1997, 27-28).

5.7 Catalogue

Objects have been selected for the catalogue that are representative of a specific category in terms of appearance, use of wood, and/or manufacturing. The structure of the catalogue follows the classification of the wooden objects into themes and categories. For the listing in the catalogue, the most recent find number of the object has been chosen. If the find location and/or the layer are unknown, 'square unknown (layer unknown)' is written. The descriptions include function, wood species, dimensions, and as far as possible, which part of the tree was used, how the object was manufactured, and whether there are visible traces of use and wear.

During the inventory it became clear that some objects, which in van Rijn's dataset had only been noted as objects with certain functions, were now missing and that there were no existing drawings. Nevertheless, these objects have been included in the analysis of function and wood use (if the wood species was known).

It was not possible to depict all the objects of Velsen 1 in the catalogue. Those not included can be viewed on the online database WOODAN.org.

6 The Assemblage of the Wooden Artefacts from Velsen

6.1 Inventory

As a result of the inventory, 1,593 objects were found to be physically preserved. Compared to the numbers in the dataset of van Rijn, which is based on the sketches of the artefacts made shortly after excavation, 867 objects are missing.

The inventory led to a database with 2,468 artefacts (Table 6.1). However, the information on each artefact varies. There are objects that are missing and for which there is no information other than a cursory sketch with a drawing number, and also missing objects that have been identified and described, but of which no drawing or photo has been made. An example for the latter are the hoops of wine barrels: eleven pieces were described and the wood species identified. Nevertheless, there is no drawing or photo made and the objects themselves are missing. Therefore, the hoops are not depicted in the catalogue, but the information is included in chapter 10, in the description of the wine barrels. This also explains the difference between the number of artefacts listed in the database and the number ultimately displayed in the catalogue (Section 6.3, Table 6.2).

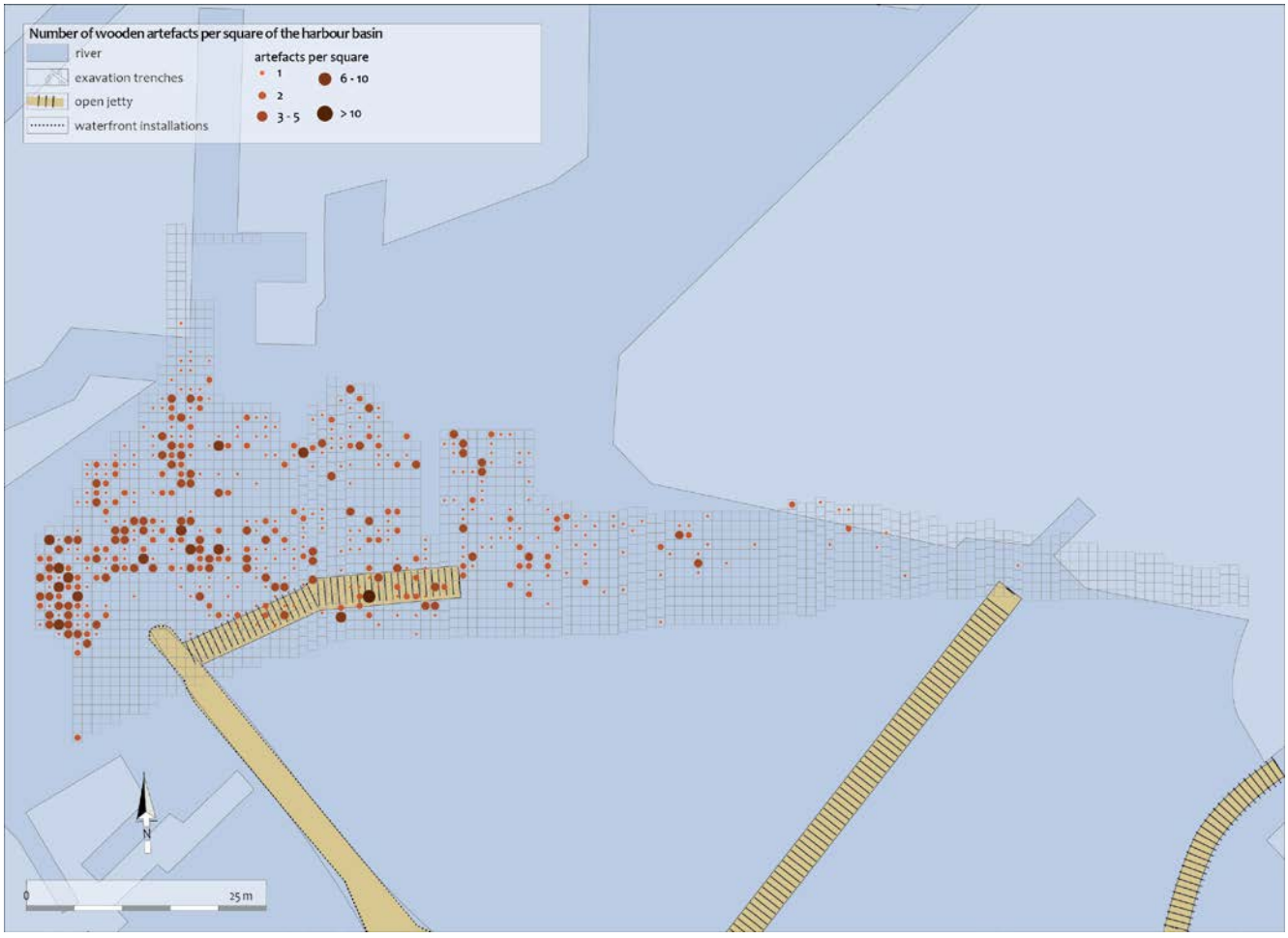

Figure 6.1 The distribution of the wooden artefacts in the harbour basin (illustration: H. de Weerd).

Table 6.1 Results of the inventory of the wooden artefacts.

Wooden artefacts	N
Artefacts conserved in 1995-1996 (RMO/location Papengracht)	597
Artefacts from bulk samples, both conserved and unconserved (RMO/location Raamsteeg)	996
Artefacts in Archaeological Depot of Noord-Holland (ADNH) from Velsen 1	1
Artefacts in Archaeological Depot of Noord-Holland (ADNH) from Velsen 2	6
Artefact in depot of Archaeological Working Group Velsen	1
Missing artefacts (of which the wood species is known for 180)	867
Total	2468

6.2 Distribution of the wooden artefacts

The wooden artefacts were found mainly in the harbour basin (Fig. 6.1). The plotting of the find numbers and find data did not lead to the detection of activity zones or to a differentiation between the functions of the artefacts from the Roman layer and the Dredging layer. The function-related find categories do not form clusters within the harbour basin. The dredging of the harbour basin will have influenced the distribution of finds. However, it can be noticed that most objects are located on the western side of the harbour basin, a possible dump location. Moreover, the distribution could have been caused by the flow of the Oer-IJ channel. In addition to the finds in the harbour basin, a smaller quantity was recovered from the wells both inside and outside the fort.

The assemblage is highly diverse, particularly regarding the objects from the harbour basin. Some wooden tools, two possible tar brushes, and pulleys can be linked to ship maintenance and may have been lost during work on ships. The appearance of other objects, often parts of composite objects, will have ended in the harbour basin as waste products. These include parts of furniture, kitchen utensils (Fig. 6.2), *pyxides*, tent pegs, stoppers, bungs, and wedges. In a relatively open landscape with little woodland, one would expect that discarded wooden objects would have been used as fuel instead of being thrown away. On the other hand, once an army unit had departed or been replaced, the harbour basin could have served as a dumping place for discarded objects and other waste.[85]

Four almost complete fish traps were found in the harbour basin (Fig. 6.3). Due to time pressure during the excavation, only three of the four traps were excavated and only two of these were analysed. No drawings or descriptions of the other two traps exist.

The wooden objects found in the wells were primarily discarded wine barrels that were used as well-lining. The bungs of the bungholes were often found inside these cask wells. In one of the wells a corpse of a Roman soldier was dumped, with his dagger and belt. Other wells also contained human remains.[86] Another well (1989-221) was rendered unusable by throwing the cadaver of a horse into it. Higher up in the same well, a human arm was also found.[87]

The majority of the wooden artefacts from Velsen 2 were recovered in 1964 and 1970. Within the framework of the Odyssey project, the research results from Velsen 2 were elaborated and published by Bosman.[88] The wooden artefacts from Velsen 2 were found in a harbour basin with a jetty.[89] Among other objects mentioned by Bosman are a tent peg, a bobbin-style toggle, and a writing tablet (Fig. 6.4).[90] In 1970, a complete plane was found in the harbour basin of Velsen 2. A second one would later come to light during the excavations at Velsen 1.[91]

Figure 6.2 A bowl in situ found upside down in the harbour basin of Velsen 1 (source: archive of the Archaeological Working Group Velsen, AWV).

85 Bosman has not identified a dump either inside or outside the fort, but he considers the possibility that originally there was one present, as is known from other military complexes. According to him, it is quite possible that a shallow dumpsite has been completely cleared up by post-depositional processes, and that the presence of waste in the harbour basin can be interpreted as being incidental (Bosman 1997, 18).
86 Bosman 1997, 52-53.
87 Bosman 1997, 53; Driessen & Van Driel, forthcoming.
88 Bosman 2021.
89 Bosman 1997, 278.
90 Bosman 1997, 279.
91 Bosman 1997, 281.

Figure 6.3 A fish trap was salvaged in the harbour basin of Velsen 1. In the foreground right, archaeologist B. Beerenhout, who led the excavation campaign in 1988 (source: archive of B. Beerenhout).

Figure 6.4 Complete tent peg found in the sediment of the Oer-IJ gully of the site Velsen 2 (source: archive of the Archaeological Working Group Velsen, AWV).

Table 6.2 Classification of the objects in the assemblage of Velsen 1, and some of Velsen 2, into themes and categories, and with the number of items included in the database and catalogue.

Theme	Category	Database	Catalogue
Military Equipment	swords	3	3*
	arrow	1	1
	obstacles	2	2
	spear or javelin	1	0
	military *signa*	2	2
	(tent) pegs	419	84
Ship Inventory	paddles/oars	3	1
	tools for ship maintenance	5	4
	rigging tools	26	14
Communication	writing tablets	76	60
	styli	15	9
	other writing implements	2	2
Provisioning	wine barrels (staves)	128	19
	hoops	11	0
	bungs and stoppers	99	34
Fastening and Securing	bolts and catches	15	6
	locks	1	1
	deadbolt	1	1
	latch lifters	17	14
	seal locks	4	3
Lightweight Constructions	stakes	199	8
	boards	174	11
	battens	190	11
	slats	80	5
	two battens of frameworks with remains of transverse connection	2	2
Furniture	furniture legs and spindles	51	27
	end pieces	5	3
	cornices and mouldings	26	11
	ornamental slats	3	2
	stretchers at ground level	5	4
	battens with a notch	5	4
	base of a wicker chair (?)	1	1
	parts of small boxes	3	3
	plank of a chest	1	1
	boards of seats and of a lid or a door	3	3
	wall hooks	2	2
	interior boards or boards from cupboard doors or hatch covers	23	10
Roofing and Fenestration	shingles	1	0
	muntin bars	3	3

Theme	Category	Database	Catalogue
Domestic Utensils	carved bowls	11	6
	trough	1	0
	lathe-turned bowls	14	5
	pyxides	4	2
	discs and lids	19	12
	spoons	9	5
	spatulas (*spatulae*)	12	8
	knives	4	3
	bases of stave bucket and of a lath-walled box	2	2
	stamper	1	0
Basketry	coiled basket	3	1
	basket	1	0
	base of wickerwork	1	1
Personal Belongings	wood-soled footwear	5	5
	comb	1	1
Entertainment	panpipe (syrinx)	1	1
	gaming pieces	22	13
Fishing and Fowling	fish traps	3	2
	other fishing gear	6	4
	throwing stick or boomerang	1	1
Woodworking	planes	2	2
	mallets	3	3
	tool-rest support	1	1
	pegs (with head and without head)	131	15
	dowels	3	0
	wedges and wedge-shaped objects	48	7
	processing waste (sawn-off pieces, cut-off pieces and turning waste)	249	28
	roughouts and raw material	3	1
Other Tools	spade	1	1
	handles	76	28
Textile-processing Implements	spindle, pin-beaters, weft bobbin	6	5
	thread winder, toggle	4	4
	needle/netting tool	1	1
	whorl	1	1
	weaving sword	1	1
Miscellaneous	unidentified objects	209	31
Total		2468	572

(* two parts from a *gladius* with different find numbers are listed as one object, Plate I.1).

6.3 Object types and categories

To gain insight into the use and intended purpose of certain wood species, a function-based classification was necessary. This resulted in the definition of seventeen themes, covering 77 categories (Table 6.2). The themes are related to the layout of the fort and the harbour, weaponry, food supply, craft activities, fowling, fishing, personal belongings, and exchange and trade contacts. For example, the theme 'Provisioning' includes containers for the transport of food and wine, such as barrels, stoppers, and bungs of barrels and amphorae, whereas the theme 'Communication' includes writing tablets and other writing implements. Objects related to the fastening of doors and cabinets, and to the sealed storage and transport of goods, are included in the theme 'Fastening and Securing': bolts and catches, locks and keys, for example. Kitchenware and small containers for storage purposes belong to the theme 'Domestic Utensils'. All these objects reflect the different facets of life in the fort: on the one hand, the military aspect and, on the other, the daily preparation of food, the furnishing of barracks, and the use of free time.

Several objects cannot unequivocally be placed under a specific theme because they probably had more than one function. For example, the knives that may have been used to cut food or rope to size may also have been used as weapons. In this study, they have been classified under 'Domestic Utensils' because of their multifunctionality. The theme 'Lightweight Constructions' includes timbers such as narrow battens, slats, stakes and boards, and other building elements that could have belonged to lightweight structures, such as frameworks for tents or furniture. Building timber for heavy constructions such as harbour installations, jetties, and moles, fall outside the scope of the study.[92]

The artefacts are discussed per theme and category in chapters 7-23. Certainly, when it comes to parts of composite objects, the interpretation of function is not always unambiguous. The same applies to objects with a multifunctional form and application. Wedges, for example, may have been used to secure shelves in a rack, but could also have been used to secure interchangeable parts in tools.

Among the wooden artefacts in the RMO, there is one piece of ship timber. This is part of a knee with holes for mortise and tenon joinery. The dataset mentions another plank which van Rijn interpreted as a ship timber. No drawing of this plank is available and the object itself has not been preserved. The description of the oak knee with photo is included in WOODAN.[93]

92 See Morel 1988a for the timbers of the harbour installations.

93 Find number 3329, WOODAN-id 23483000.

7 Military Equipment

7.1 Swords

Two wooden pieces of the hilt of a sword were found in the harbour basin (find number 3064, Plate I. 1): a pommel and a handguard of a *gladius* (Fig. 7.1). The pommel at the end of the hilt served as a counterweight to keep the sword in balance and the handguard prevented the sword from slipping out of the hand during a fight. Both the pommel and the guard were made of boxwood and turned on a lathe. The bulbous pommel has a decorative incised pattern, consisting of narrow leaf-shaped facets that end in points, with two turned decorative lines in the middle of the pommel. The pommel is made from the entire diameter of a small log of boxwood, and the handguard from half (Fig. 7.2). The curvature of the annual rings can be clearly seen from the side. The guard has the same pattern as the pommel and, within, it had a metal remnant of the tang of the blade.[94] On the underside of the guard some incised lines can be recognised. After excavation they were interpreted as incised letters and they have not

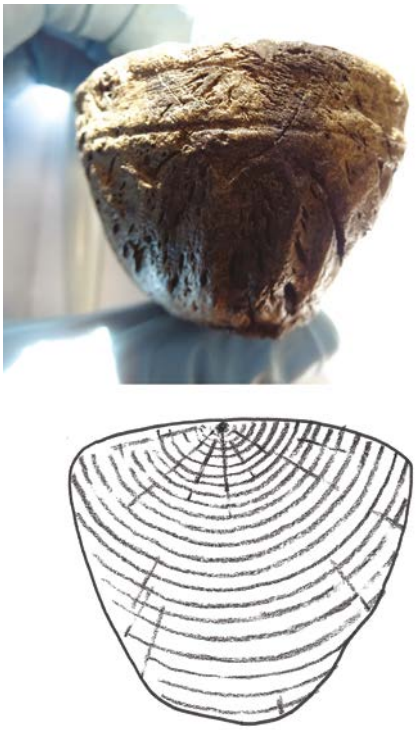

Figure 7.2 The pith and the curvature of the annual growth rings are clearly visible when seen from the side of the handguard.

[94] What has happened with the metal remnant is unknown.

Figure 7.1 Pommel (above) and handguard (below) of the hilt of a *gladius* from Velsen 1. Left, after salvage (photo: B. Beerenhout, Archaeo-Zoo), and right, after cleaning shortly after the excavation.

Figure 7.3 The present condition of the pommel and the handguard of the hilt of a *gladius* (photos: BIAX *Consult*).

Figure 7.4 Grip with raised octagonal-shaped ridges, found in a well, find number 3034 (photo: M. IJdo).

Figure 7.5 Relief of a column depicting two legionaries, the one in front attacking with a *gladius* in his right hand. Second half of the first century (source: Mainz State Museum, Inv. No. S 341).

yet been deciphered. On closer examination, these lines could also be of natural origin and could have been caused by post-depositional processes. The part between the pommel and the guard, the grip, is not preserved. Initially, the pommel was hemispherical, but, due to drying, the object deformed into an oval. The object has continued to dry after conservation and shows wide cracks in its growth direction (Fig. 7.3). Another part of a gladius was found in a well. This object, divided into sections by raised octagonal-shaped ridges, is also made from boxwood and will probably have been the grip

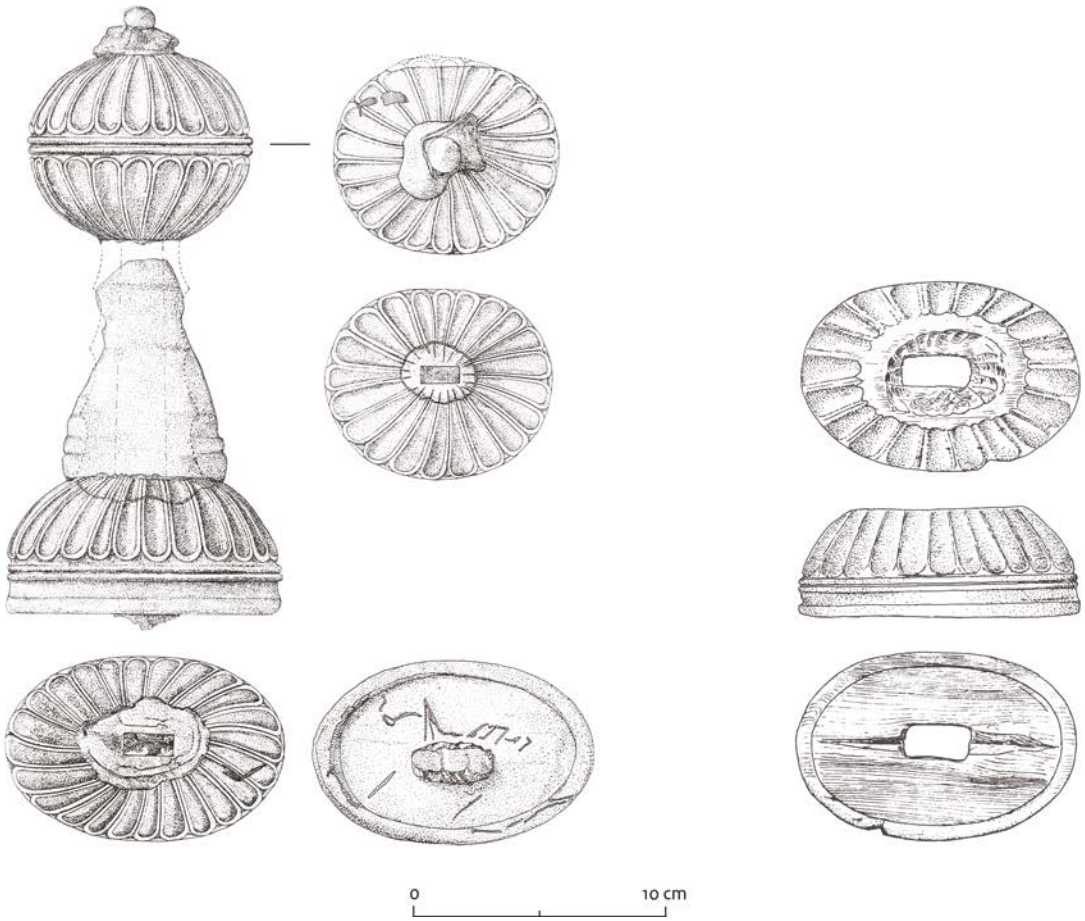

Figure 7.6 (Left) pommel and handguard of the hilt of a *gladius* from Velsen 1 (drawing: J. Morel) and (right) a handguard from Vindonissa (source: Archaeology of the Canton of Aargau/Ettlinger & Von Gonzenbach 1952, 38, Fig. 18, and 39, Fig. 19)

of a *gladius* (find number 3034, Plate II.2; Fig. 7.4).

This type of sword is known as the Mainz type, derived from the *gladius Hispaniensis*, and was a common sword type throughout the first half of the first century (Fig. 7.5).[95] The *gladius* was mainly used by the infantry in close combat.[96] Examples of the Mainz type were found in Vindonissa, Rheingönheim, Newstead, Hod Hill, Camelon, and Rottweil.[97] The handguard from Vindonissa was made from boxwood and decorated with a pattern similar to those from Velsen 1 (Fig. 7.6).[98]

7.2 Arrow

This fragment of an arrow with a trilobate, tanged iron arrowhead comes from an unknown context at Velsen 2 (find number 5099-101a, Plate II.3).[99] The shaft is made from the split stem wood of cornel. The arrowhead matches the shape and dimensions of the iron arrowhead found in a well of Velsen 1 (well 1989-S221). Similar arrowheads are known from Kesteren-De Woerd, Oosterhout-Boetzelaerstraat, Burnswark, and Bar Hill.[100]

7.3 Spear or javelin

In addition to the iron spearhead from the harbour basin, an iron socketed spear or javelin was recovered from a water well (find number h5383). In the iron socket there was a remnant of the wooden shaft which was identified as ash.[101] This find is not listed in the catalogue because, apart from the remnant in the spearhead, the actual shaft was not preserved.

95 Bishop & Coulston 2006, 78; Nicolay 2007, 35.
96 Bossio *et al.* 2018.
97 Bishop & Coulston 2006, 79.
98 Ettlinger & von Gonzenbach 1952; Fellmann 2009, 98-99, 175.
99 Bosman 2016, 79. Thanks to L. van der Feijst, ADC ArcheoProjecten, for the identification of the arrowhead.
100 Sier & Koot 2001, 192; Nicolay 2007, 32-33; Bishop & Coulston 2006, 134, 136.
101 The identification of the wood species was done by B. van Hoorn-Berkel, wood specialist at the former IPP of the University of Amsterdam; Bosman 1997, 64.

Figure 7.7 *Pilum murale* from Velsen *in situ*, in the harbour basin (find number 2530; photo: J. Morel).

7.4 Obstacles

Two exceptionally well-preserved obstacles with waisted middle sections were found in horizontal position in the harbour basin (find numbers 2529 and 2530, Plates III.4-5).[102] They were made of cleaved oak from trees with relatively wide annual rings, which indicates an open landscape and favourable growing conditions. The length of the longer of the two was 174 cm (find number 2529), and the shorter one was 119 cm in length (find number 2530; Fig. 7.7).[103] Remarkably, the sapwood had not been removed during manufacture.[104]

In the literature, these objects are mostly called *pila muralia* (wall spears), due to the narrowed midsection which was interpreted as a grip. Initially, three or four of these pointed stakes were tied together to form an obstacle known from Roman sources as an *ericius* (hedgehog; Fig. 7.8).[105] They could also be inserted into the ground or into a ditch to serve as a fence with protrusions, sometimes covered by branches for a surprise effect.[106] Their primary use was for the protection of the fort and the rampart from attacks.[107] Bishop and Coulston have chosen to call them obstacles because of their defensive function and also to clarify the difference between the obstacle and the *pilum*, which is a throwing spear with an iron point.[108]

Finds of obstacles are known from Alphen aan den Rijn,[109] Valkenburg,[110] Krommenie-'t Hain,[111]

Figure 7.8 Reconstructed oak hedgehogs at the Archaeological Open Air Museum Archeon, Alphen aan den Rijn.

102 According to Morel, this indicates calm circumstances during deposition.
103 In an article, Morel mentioned dimensions of 185 and 125 cm (Morel 1989). Both objects have been preserved and have shrunk. The original dimensions can no longer be verified. In the text and catalogue, the dimensions are used which were taken from the drawings made of both objects prior to conservation.
104 The sapwood is the part of the wood between the heartwood and the bark through which the upward sap flow takes place. The moisture content in the sapwood is higher than in the heartwood, and it is more sensitive to insects and fungi. The presence of sapwood could lead to cracks.
105 Bishop & Coulston 2006, 117.
106 Lange, forthcoming.
107 Bishop 2017, 79.
108 Bishop & Coulston 2006, 116.
109 Bogaers & Haalebos 1987, 49-50.
110 Van Veen 1987, 47-48.
111 Lange, forthcoming.

Figure 7.9 *Pila muralia:* from Velsen (1-2, oak; drawings: R. Timmermans), from Valkenburg (3, alder; source: van Veen 1987), and from Welzheim (4-7, oak; source: Archäologisches Landesmuseum Baden-Württemberg/M. Hoffmann).

Bodegraven,[112] Saalburg (D),[113] Remagen (D), Haltern (D),[114] Oberaden (D),[115] Welzheim (D), and Castlehow (UK).[116] While the shape is consistent, the dimensions and the wood species can vary. The obstacles are usually made of oak, but other types of wood are also used: one from Alphen aan den Rijn is made of ash and one from Valkenburg is made of alder (Fig. 7.9).[117]

7.5 Military signa

A remarkable occurrence is the presence of two pieces of wood of the common grape vine (find numbers 2526 and 3014, Plate IV.6-7). Following conservation, one branch is 5 cm long and has a diameter of 1.3-2.6 cm, the other is 6 cm long and has a diameter of 1.1-2.3 cm.[118] The tops of both pieces are carefully carved in the form of a knob. Grape seeds found in the harbour context reveal that grapes were eaten in the Roman fort.[119] But these sticks are too large and too woody to have come from bunches of dried grapes (Fig. 7.10). More convincing is an interpretation supported by both written sources and

Figure 7.10 One of the two pieces of common grape, with a carefully carved top; find number 3014.

112 Vos, Lanzing & Siemons 2016, 58.
113 Jacobi 1927, 156-157.
114 Kropatschek 1909, 79-93.
115 Kühlborn 1991, 129-140.
116 Beeser 1979, 133-142.
117 Van Veen 987, 47-48
118 One of the vine rods is found in the RMO depot, the other is missing.
119 Van den Berg 1985, 5.

Figure 7.11 Tombstone of centurion Marcus Favonius Facilis, mid-first century (source: Colchester and Essex Museum).

surviving depictions of soldiers: specifically, that it is the equipment belonging to a centurion.[120] In his book *Naturalis Historia*, Pliny mentions the vine rod (*vitis*) as an emblem of military authority: ´In addition to these particulars, need I make mention of the fact that the vine has been introduced into the camp and placed in the centurion's hand for the preservation of the supreme authority and command? That this is the high reward which summons the lagging ranks to the eagles raised aloft, and that even in chastisement for faults it tends to reflect honour upon the punishment?'.[121]

The vine stick, or *vitis*, was a *signum*, a symbol of the authority of a centurion, as was a muscle cuirass for a senior officer and a long staff, the *optio*, for a standard-bearer.[122] The centurion had the right and the duty to reward or discipline his men. Therefore, it was not just symbolic, but was actually used to carry out punishments. In his *Annales*, Tacitus recalls the character of the deceased centurion Lucilius, who was known to frequently use the vine stick: ´Camp humourists had surnamed him 'Fetch-Another', from his habit, as one cane broke over a private's back, of calling at the top of his voice for a second, and ultimately a third'.[123]

There are numerous epigraphic examples of tombstones emphasising military status. The display of the *vitis* is part of this tradition. Keppie describes it as a first-century custom to depict the deceased in full military dress in accordance with his rank.[124] An example is the gravestone of Marcus Favonius Facilis, centurion of the Legion XX. He is depicted with his right hand resting on his *gladius* and his left hand holding a rather thin stick, the *vitis*. The tombstone is from Colchester and dates to the mid-first century (Fig. 7.11). Another well-known epigraphic source is the tombstone of centurion Marcus Caelius of the Legion XVIII, who died during the Battle of the Teutoburg Forest in AD 9. On the stone, the soldier is shown with his military decorations, his torques and *phalerae*, attached to his breastplate. In his right hand he holds the *vitis* which highlights his military rank (Fig. 7.12).[125]

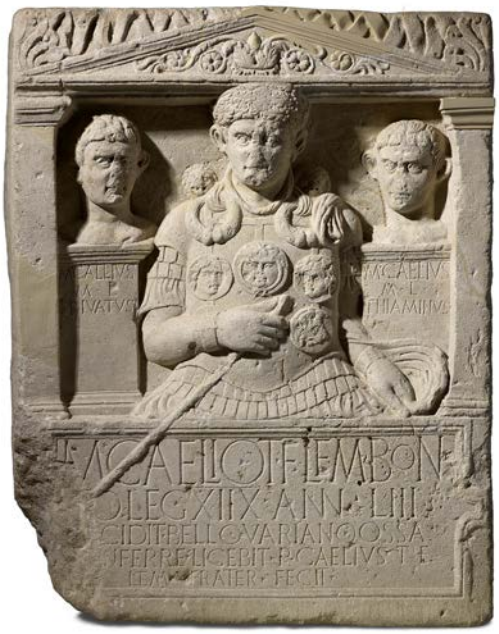

Figure 7.12: Tombstone of Marcus Caelius, holding a *vitis* in his right hand (source: LVR-Rheinland, LandesMuseum Bonn/photo: J. Vogel).

[120] Webster 1969, 132; Bruun & Edmondson 2014, 321.
[121] Pliny the Elder, *Naturalis Historia* 14.3.
[122] Bishop & Coulston 2006, 10.
[123] Tacitus, *Annales*, I.23.
[124] Keppie 1991, 81-82.
[125] Bishop & Coulston 2006, 10.

Figure 7.13 Various tent pegs with different shapes and sizes from Velsen 1 (photo: BIAX *Consult*).

7.6 (Tent) Pegs

A large part of the wooden find assemblage of Velsen 1 consists of tent pegs: complete specimens, ends, and heads. While 419 were recorded in the dataset, the number of tent pegs observed during the excavations was many times higher. Morel mentions a number of 1,500, of which approximately one thousand were found in ditches. These pegs were mostly in such poor condition that they were not collected.[126] The catalogue contains 84 examples, with the selection criteria based on differences in the shapes and sizes of the pegs, to give a representative picture of the varieties (Plates V.8-XXV.91; Fig. 7.13).

The shape of the Roman tent pegs resembles modern wooden examples. Each has a head, a notch, and a pointed end. Between the notch and the tip, the pegs have a convex central part. This belly-shaped widening prevents the rope from sliding down. The pegs are characterised by a wide variety of sizes, degrees of curvature of the bellies, and shapes of the heads, mainly trapezoidal, triangular, rectangular, or square. The pegs were made from relatively young logs or from larger branches. This can be clearly seen from the degree of curvature of the annual rings in the cross-sections of the woods used for the tent pegs (Fig. 7.14).

The wood species of 223 of the 419 pegs have been identified, but the wood species of the 196 missing pegs are not known. However, sketchy drawings of the missing tent pegs, with information about the find locations, were found. This ensures knowledge of the shape and distribution of those tent pegs. No fewer than 148 of the tent pegs from Velsen 1 were made of

Figure 7.14 The head of a tent peg of ash in cross-section, with curved annual growth rings (photo: BIAX *Consult*).

[126] Morel & Bosman 1989, 18; Bosman 1997, 11, 129.

Table 7.1 Overview of the wood species of the tent pegs.

Wood species	Number
Alder	16
Ash	148
Beech	1
Oak	55
Silver fir	2
Coniferous wood	2
Spruce	1
not analysed	194
Total	419

ash. Oak, alder, silver fir, and spruce were used to a lesser extent (Table 7.1). A single specimen was made from beech. The pegs from silver fir, two from other coniferous wood (which could not be specified on taxus), and one from oak were made of secondarily used wood from staves. The form of the stave was thereby efficiently used in the processing: the end with the croze groove was used for the head and the notch, and the tip was made by cutting the stave diagonally downwards, as can be seen with the two small tent pegs made from recycled staves of oak and silver fir (find numbers 2071 and 3307; Fig. 7.15). The variations in the shape and dimensions suggest that more recycled wood, possibly also from processing waste, was used for tent pegs.

Figure 7.15 Two tent pegs made of recycled wood of oak and silver fir; find numbers 2071 and 3309 (photo: BIAX *Consult*).

The smallest completely preserved peg is 9.5 cm long, the largest 56.7 cm. The small sizes of several pegs makes it questionable whether these objects were still suitable as traditional tent pegs. Of the 223 pegs of which the wood species is known, 87 are complete or almost complete. Almost complete means that only a small tip of the underside is missing, so that the original length could be reconstructed. The pegs of alder have lengths between 15.5-c. 25 cm (with one outlier of more than 36 cm), those of ash between 10.5-38 cm, and those of oak between 9.5-56.7 cm. In addition, there is a

Table 7.2 The lengths and the wood species of the tent pegs. Explanation of abbreviations: < smaller than, > larger than.

Wood Species	Group 1	Group2	Group 3	Group 4	Unknown
	<16-16 cm	>16-27 cm	>27 cm-36 cm	>36 cm	length
Alder	1	2	-	1	12
Beech	-	1	-	-	-
Ash	15	30	40	2	61
Oak	8	16	10	4	17
Silver fir	1	-	-	-	1
Spruce	-	1	-	-	-
Coniferous wood	1	1	-	-	-
Unidentified	3	40	15	1	135
Total	29	91	65	8	226

fragment of a peg of beech with a remaining length of 18.3 cm. The tent pegs from recycled staves are quite short: two pegs with lengths between 10.6-23 cm made of coniferous wood, one of silver fir with a length of 14.6 cm, one of spruce with a length of 23 cm, and one of oak with a length of c. 11 cm. Based on these dimensions, four groups can be distinguished (Table 7.2):

1. small pegs with lengths up to 16 cm
2. medium sized pegs with lengths from 16 cm to 27 cm
3. large pegs with lengths from 27 cm to 36 cm
4. exceptionally large pegs with a maximum length of c. 57 cm

The tent pegs made of alder mostly fall into groups 1 and 2, those of ash and of oak into groups 1, 2, 3, and 4. The ash pegs generally have lengths between 27-34 cm. It is possible that the tent pegs from the strongest wood species (ash and oak) wore out less quickly and that the original length of these tent pegs are, therefore, still found relatively often, while those of alder wore out more quickly and are generally found with shorter lengths.

The heads of the pegs are rectangular, square, triangular, or trapezoidal (Fig. 7.16). Although there are also divergent types, most of them can be classified into one of these four groups. Pegs with rectangular and square heads have two straight sides and a flat top, while the square type has a head as high as it is wide. The pegs with trapezoidal heads have one straight and one sloping side and are also flat at the top.

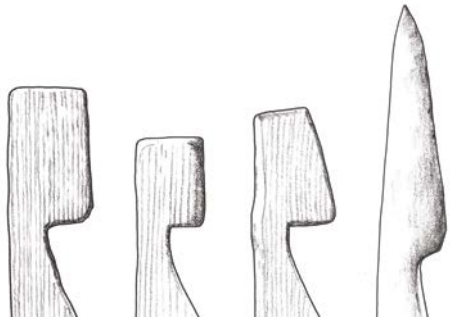

Figure 7.16 Overview of the rectangular, square, triangular, and trapezoidal shapes of peg heads from Velsen 1 (drawing: R. Timmermans).

The tops of the triangular pegs, however, are pointed. Finally, there are pegs with an atypical head, as is the case with tent pegs made from recycled staves or other reused wood. For the overview, pegs with an atypical head are included in the column *Different* (Table 7.3). For more than one third of the pegs, only the end has been preserved. This group is listed in the column *Ends*. There are 58 pegs that were collected and documented in the find lists, but for which there are no drawings or descriptions. These have been placed in the column *Unknown*. Based on the distribution of the different types, it can be concluded that pegs with a rectangular head dominate, followed by pegs with a trapezoidal head. Pegs with square heads were less common and pointy pegs are rare. It is possible that some of the rectangular and square pegs are unfinished products, and that it was initially the intention to trim the heads in a following processing phase.

Table 7.3 The shapes and the wood species of the pegs.

Wood species	Rectangular	Trapezoidal	Square	Triangular	Different	Ends	Unknown	N
Alder	1	2	1	2	1	7	2	16
Beech	-	-	-	-	-	1	-	1
Ash	39	23	16	1	6	45	18	148
Oak	12	12	3	3	8	11	6	55
Coniferous wood	-	-	-	-	-	-	2	2
Silver fir	-	-	-	-	1	-	1	2
Spruce	-	-	-	-	1	-	1	2
Unidentified	25	18	16	3	9	66	57	194
Total	77	55	36	9	26	130	86	419

Figure 7.17 Tent pegs from Bodegraven (source: Archaeological Depot of Zuid-Holland).

When the tip of a peg had broken off, it would often be repointed. This can clearly be seen in tent pegs with disproportionately large heads in relation to relatively short ends. Remarkably, the heads themselves and the notches show little or no wear, while the tips are regularly missing or repointed. The heads are not damaged and the wooden surface is not densified, as one would expect from hammering the tent pegs into the ground.[127] Moreover, hardly any incisions are noticed which could have been caused by the tensile force of ropes. These observations were also made on tent pegs from Carlisle, Melandra Castle, and Newstead.[128] One explanation could be that these apparently unused tent pegs come from discarded stock. Another explanation could be that the tent pegs were not placed directly in the ground, but in a wooden framework (see discussion in section 7.6.1).

The presence of tent pegs in both the Dredging layer and in the Roman layer makes it likely that tents were in use throughout the entire period of occupation.[129] Tent pegs were also found in a ditch from the later period, phase 3. Bosman suggests that this was related to the abandonment of the fort and leaving unnecessary equipment behind.[130] This argument is questionable: an army in transit would need a sufficient number of tent pegs. Moreover, wooden tent pegs are quite light in weight and must have been part of the standard equipment. In fact, the mobility of an army unit requires tents and their associated equipment and it would be illogical to throw away tent pegs at the time of departure. The occurrence of large quantities of tent pegs in the ditches of phase 3 could be associated with the activities related to the construction of Velsen 2. Those tent pegs could have been used to pitch tents within Velsen 1, used as a temporary camp outside the new fort to the east. At Velsen 2, only one tent peg was found (Fig. 6.4).[131] It is a peg with a length of 38 cm and a trapezoidal head. Compared to the standard tent pegs from Velsen 1, this one is rather thick, approximately 3.5 cm. It also lacks the characteristic curved belly part that is so typical for the Velsen 1 tent pegs. The wood species of the Velsen 2 tent peg is not known and the object has been lost. Only a few photos have been recovered. Because there is no drawing, this tent peg is not included in the catalogue.

Pegs are an integral part of military equipment and are commonly found in fort ditches. Finds of pegs are known from Alphen aan den Rijn and from Bodegraven.[132] In Alphen aan den Rijn, five complete tent pegs and fragments of five more, all made of ash, were found in a pre-Flavian ditch from the castellum.[133] Excavations in Bodegraven yielded tent pegs from a disrupted area within an accumulation of wood debris, possibly material from the early first-century occupation of the fort (Fig. 7.17).[134] Of the sixty tent pegs, 44 were made of ash, nine of alder, six of oak, and one of field maple.[135]

127 Caruana 1992, 72.
128 Caruana 1992, 72.
129 Bosman 1997, 37.
130 Bosman 1997, 37.
131 Bosman 2021, 472, 475.
132 Van Rijn 2004, 231; Van der Kooij, Sprey & Postma 2013, 87; Vos, Lanzing & Siemons 2016, 50, 67-68, 76-77, 94, 98.
133 Van Rijn 2004, 231.
134 Vos, Lanzing & Siemons 2016, 67.
135 Van der Kooij, Sprey & Postma 2013, 87.

Figure 7.18 Tent pegs from Vindolanda (source: Vindolanda Trust/photos: R. Sands).

Furthermore, at the Saalburg, three tent pegs were found in a well.[136] Ash also appears to have been the most commonly used wood species for tent pegs in Vindolanda (Fig. 7.18).[137] At different sites in Carlisle tent pegs have been found, including nine almost complete pegs and eight fragments of oak, mostly of the type with a pointed (triangular) top.[138] Eighteen tent pegs are known from the excavation at Annetwell Street

Figure 7.20 Iron tent peg from Vechten (photo: National Museum of Antiquities, RMO, Leiden)

in Carlisle (Fig. 7.19). They were divided into two groups according to shape: the first group contains short tent pegs with a flat, trapezoidal top, and the second group includes the triangular, pointed heads.[139]

Iron pegs, such as those known from Vechten (Fig. 7.20),[140] Haltern (D),[141] Künzing (D),[142] and Xanten (D)[143] were not found at Velsen. Harnecker mentions iron pegs with lengths between 11-26 cm as functional for tents and for securing horses, with the remark that the shorter ones were not suitable for securing in the ground but were probably used as fastening devices in wooden beams in a stable.[144] The iron pegs were often provided with an iron ring. The ring must have served as a turning mechanism, a function that cannot be explained from the tent construction. Other interpretations are possible. For example, these iron pegs may have been used to tether horses so that they still had some freedom of movement due to the ring function. If the soil or weather conditions allowed it, wooden pegs would probably have been preferred because they were much lighter to carry than the iron ones. There is another important aspect of the pegs, whether made of

136 Jacobi 1934, 22, Plate III.
137 Personal communication with Dr. R. Sands, University of Dublin.
138 Caruana 1992, 70.
139 Caruana 1992, 70.
140 Stuart 1986, 148.
141 Harnecker 1997, 19-20.
142 Herrmann 1972, 10, Fig.30.
143 Gaitzsch 1993, 98-99.
144 Harnecker 1997, 19.

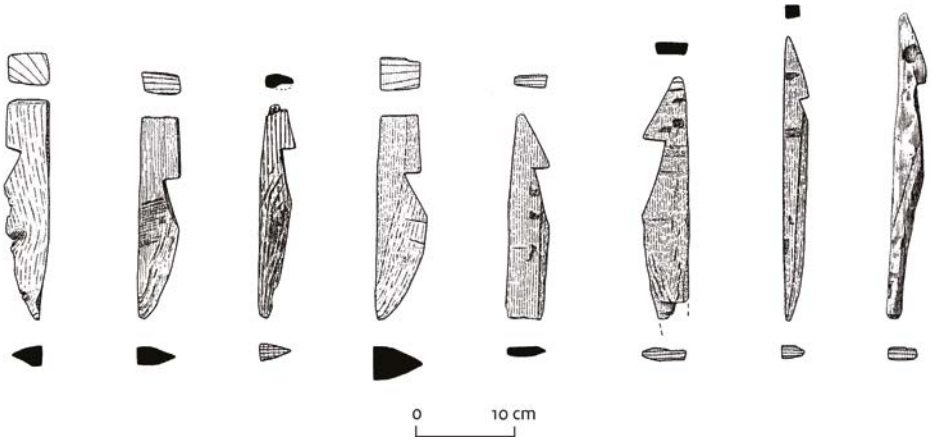

Figure 7.19 Tent pegs from Carlisle (source: Caruana & Allnutt unpublished, 281, Figs. 199-203, 210-214).

Figure 7.21 Replica of the leather tent from Vindolanda, made by the Ermine Street Guard (photo: C. van Driel-Murray).

wood or iron, namely that of their multi-functionality, which makes a wide range of applications conceivable. Caruana and Allnutt therefore point to a possible additional function of pegs as binding tools.[145]

7.6.1 Tents (with a contribution from Carol van Driel-Murray)

Most of the medium-size and smaller pegs will indeed have been used to secure the guy ropes of the leather tents used by the Roman army. Although little tent leather has been recovered from Velsen 1 and Velsen 2,[146] the shape and size of soldiers' tents has been reconstructed from the material found in Valkenburg (mid-first century) and, especially, in Vindolanda (UK, later first-early second century).[147] Details of the construction have also been tested by the replicas made and used by the Ermine Street Guard. Earlier reconstructions assumed that the guy ropes held the tent upright,[148] but the almost complete tents found at Vindolanda revealed that a wooden frame was necessary to support a tent with a gable height of almost 2 metres and a wall of 95-100 cm.[149] The guy ropes serve to hold the tent leather in place and do not, therefore, have to be driven very deeply into the ground. The replicas employed by the Ermine Street Guard confirm the stability of the structure, and the need for fewer, and shorter, guy ropes than suggested previously. Each tent wall has five guy ropes with additional ropes at the corners: the pegs for these may have been more robust. There is no evidence for securing the wall foot with loops or pegs, and though there is no real need for guy ropes to support the gable ends, they may sometimes have been used for additional stability. Theoretically, therefore, each tent would require ten small/medium pegs with either four robust pegs or six to eight medium pegs for the corners if the ropes were doubled (Fig. 7.21).

For the internal support, a roundwood ridge pole c. 3 m long, two gable end poles, each 2 m long, and 4 corner posts of about one metre with the connecting wall plate would also be required. To reduce wear on the leather panels, roundwood would be preferable for these constructions. The weight of the leather stabilises the wooden frame, so that the posts do not need to be earth-set, and a detachable wooden footplate would suffice. The ridgepole requires a strong pole, to judge from the traces on the leather, about 10-15 cm in diameter and

145 Caruana & Allnutt unpublished, 50.
146 Most of the leather finds found in Velsen 2 are fragments of protective covers made for the wooden shields. However, five pieces of leather seem to belong to tents (Bosman 2021, II, 457-459).
147 Groenman-van Waateringe 1967.
148 Groenman-van Waateringe 1967, Fig. 32.
149 Van Driel-Murray 1990, 2017, Figs. 10-11.

about 3 m in length. The wall posts could be made up from shorter, thinner posts.

As mentioned earlier, leather remnants from tents were rarely preserved, either at Velsen 1 or Velsen 2. At Valkenburg-Marktveld, a decorated piece of goat skin from the top flap of a tent roof,[150] and in the Roman fort Bar Hill (Scotland), a piece of a tent was found in a ditch or trash pit (AD 142-180).[151] The remains of two tents and an almost complete specimen of a third are known from the Roman site of Vindolanda and were extensively researched by van Driel-Murray.[152] Van Driel-Murray calculated that approximately 75 rectangle-shaped cut goat skins were needed for a *contubernium* (a tent for eight soldiers). The size of this common tent-type was more or less standard, but the quality and the number of skins that were used could vary.[153]

It is quite possible that some of the battens and slats in the assemblage of Velsen 1 may have belonged to the frames of tents, especially those with smooth and carefully finished, splinter-free surfaces (Chapter 12). Battens made of beech, elder and ash, rectangular in cross-section and with widths of 3-4 cm and thicknesses of 2-3 cm, have been retrieved, as well as oval-shaped, cylindrical fragments (tent poles?) with widths varying from 4-6 cm and thicknesses of 3-4 cm. For wooden frames, more standardised sizes are to be expected and the variation is likely to lie in the choice of wood species.

[150] Groenman-van Waateringe 1967, 221pp.
[151] Douglas 2015, 167-181.
[152] Van Driel-Murray 2017.
[153] Van Driel-Murray 2017, 4.

8 Ship Inventory

8.1 Paddles/oars

This category includes the blades of two paddles or oars and a fragment of a shaft from the harbour basin from Velsen 1, and one fragment of a blade of an oar or paddle from Velsen 2.[154] Of these finds, only the blade from one paddle or oar is preserved; the other finds are missing and no drawings exist. This is why just one paddle or oar is included in the catalogue (find number 3371, Plate XXVI.92). It is made of oak and consists of a part of a long, narrow blade with the beginning of the shaft. The 76 cm-long blade with a width of 8-11 cm and a thickness of 2-4 cm has a rib-shaped thickening in the middle of both sides and narrows towards the top, where the shaft begins. The lower end of the blade is broken. From a second paddle, a small fragment of ash from the blade was registered (find number 1524), probably the upper part of the blade near the throat towards the shaft. The width of the fragment is 12 cm, the length 7.5 cm, and the thickness 1.5 cm. A fragment of the shaft of a paddle made of beech was also found (find number 1763). The fragment is 10 cm long and 5.5 cm in diameter.[155] The fragment from Velsen 2 of an oar or a paddle which was excavated by members of the AWV in 1964 is only known from archive photos.[156] The length was c. 15 cm and the width c. 10 cm; it was thicker in the middle and tapered symmetrically at both sides. The type of wood of the lost object is not known. Based on the photos, it was probably made of beech wood.[157]

Ash, oak, and beech are the wood species most commonly used for paddles or oars, as finds from Valkenburg and Voorburg-Arentsburg suggest (Fig. 8.1). From Valkenburg, blades of three different paddle types have been documented: one with a straight end, one with a double-sided chamfered end, and one with a rounded end. All three types are trapezoidal. The width of the blades varies between 9-15 cm, the thickness between 0.9-2.5 cm. Sixteen of the blades are made from ash, three from alder.[158] Here, the broken paddles were often reused as building material for riverbank reinforcements.[159] From Voorburg-Arentsburg there is a narrow paddle blade made of beech with a preserved length of 67 cm and a width of 11.5 cm. The maximum thickness of this paddle is 2.5 cm. In addition, two fragments of handles of ash have been found in Voorburg-Arentsburg; both have a maximum preserved length of 37 cm and a diameter of 3.5 cm.[160] One of the fragments has a knob-like top and can therefore be interpreted as the handle of an oar that was initially

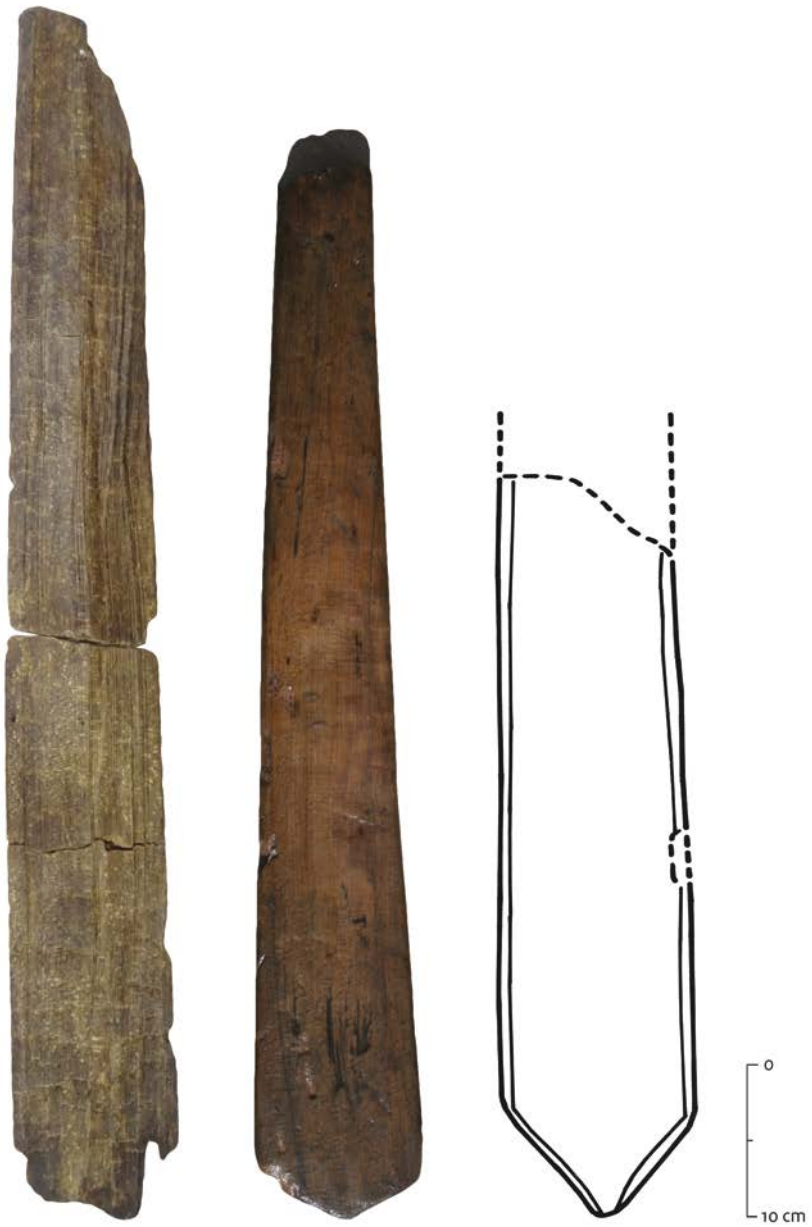

Figure 8.1 From left to right: blades from paddles or oars from Velsen 1 (find number 3371; photo: BIAX *Consult*), Voorburg-Arentsburg (find number 3757, beech; photo: BIAX *Consult*), and Valkenburg-Marktveld (find number 41.0986, ash; source: van Dierendonck *et al.* 1993, 172-173, fig. 20).

154 Bosman 2021, II, 495-496.
155 The find numbers 1524 and 1763 have not been preserved. There is also no drawing of find number 1763 and only a sketch of find number 1524. Therefore, these finds are not included in the catalogue.
156 Found in trench E/C, square 2c.
157 Bosman 2021.
158 Van Rijn 1993, 167-175.
159 Van Veen 1987, 47.
160 Lange 2012, 857, 858, Fig. II-14.26.

fastened to a vessel. Both ends of the other fragment are broken, which makes it impossible to determine whether it is a shaft from a paddle or from an oar.

8.2 Tools for ship maintenance

From the harbour basin comes an alder branch with a preserved length of 16 cm and a diameter of 2 cm. There are fine cutting marks on the wooden surface of the object, probably from a knife with which the bark was removed - except for a small piece of bark that was overlooked. On one end the stick is wrapped with textile which is bound with string (find number 3282.1, Plate XXVII.93; Fig. 8.2). The textile is tar-soaked. Another rod with a tar-soaked wrapping, also from the harbour basin, with a remaining length of 5 cm and a diameter of 2 cm, is missing and the wood species is not known. The same is true for a similar object with tar-soaked textile from

Figure 8.2 Alder branch wrapped with tar-soaked cloth on the end (find number 3282.1; photo: M. IJdo).

Figure 8.3 Stick of unknown wood species with remains of textile and tar on the end, from Velsen 2 (no find number; source: archive of the Archaeological Working Group Velsen, AWV).

Velsen 2 (Fig. 8.3).[161] The wood species of the specimen from Velsen 2 is not known and the find has been lost. It is, therefore, not included in the catalogue. Both objects have been interpreted as tar brushes for ship maintenance.[162] Pliny advised the use of tar for coating ships as it was known to make ship timbers longer lasting and a wooden surface waterproof. [163] It was also used with caulking material (moss, sheep's wool, reed fluff, etc.) to seal the seams between the boards of ships.[164] Other functions are conceivable, however, precisely because tar was so widely used. It is quite possible that the cloth-wrapped sticks could have served as torches, as was common until the late Middle Ages and of which there are also archaeological examples remarkably similar to those from Velsen.

The function of three angular-shaped objects may be related to the caulking of planks (find numbers 3062, 3415, 3423, Plate XXVIII.94-96). A possibility is that these objects could have been used to temporarily clamp caulk onto boards. Two are made of ash and one of beech. Similar artefacts have also been found in other harbour contexts, including Voorburg-Arentsburg (Fig. 8.4).[165]

[161] Excavated in 1970 in trench G. The exact find location is unknown (Bosman 2021).
[162] Bosman 1997, 41-42, 2021, II, 480.
[163] Pliny the Elder, *Naturalis Historia*, 22.11.
[164] Besides its use in shipbuilding, it is used to treat, for example, barrels. Another use of tar is for fire arrows in battle. The military engineer Vegetius (AD 390) advised to use 'sulphur, resin, tar, and hemp soaked in oil ' for flaming arrows. But in the case of the object here, the finishing of the handle has not been carried out with great care – even the bark has not completely been removed. As an arrow, this stick would not be fully accurate in the air; fire arrows are quite small and light (Vegetius Renatus, *De Rei Militaris*, book II).
[165] Lange, 2021a.

Figure 8.4 Angular-shaped objects from Velsen 1 (left; find number 3062, ash; find number 3415, beech; find number 3423, ash), and from Voorburg-Arentsburg (right; find number 2709.27, oak) (photos: BIAX *Consult*).

8.3 Rigging tools

In addition to their use on ships, rigging tools can also be used in trade and construction activities for the lifting of goods or building materials with a rope winch, or to fasten goods. Because of the multi-functionality of such objects, an unambiguous functional assignment is not always possible.[166] Indications for the use of a toggle are the durability of the type of wood used and the size and shape of the object. For use on a ship, strong, durable wood species are required that are sufficiently water-resistant.

The category of rigging tools from Velsen 1 includes five sheaves and four wheels belonging to pulleys, two toggles or rope runners, two bobbin-style toggles and a pin-like spill toggle, all varying in shapes and sizes (Fig. 8.5). They are all included in the catalogue (Plate XXIX.97-103, XXX.104-110). Another three rigging tools were retrieved from Velsen 2 in 1964 and 1970, but were lost during the long storage period after excavation. Some photos of these lost objects are available and there is a sketchy note in the excavator's diary. There are no drawings, only some blurred photos.

Figure 8.5 Overview of rigging tools from Velsen (from left to right: find number 3311, beech; find number 3137, bird cherry; find number 451, field maple; find number 3360, elm; photos: M. IJdo/BIAX *Consult*).

Five sheaves from rigging-blocks were found, but no shells or axles. One of the sheaves is made of beech and has a reconstructed diameter of 6.8 cm, a thickness of 3 cm, and a hole in the middle of which the diameter is 3.5 cm (find number 4196, Plate XXIX.97). Two decorative lines are incised around the hole. The outside of the sheave has been grooved. Considering the width of the groove, the sheave would have taken a rope strop with a diameter up to 3 cm. From another sheave made of elm, one half has been recovered (find number 3360, Plate XXIX.98). The object is quite decayed and was deformed before conservation. The diameter of the sheave was originally 7.5 cm and the diameter of the hole was 3.5 cm. The edged groove offered a capacity for a rope with a thickness of 3 cm. Another sheave has a diameter of 7 cm and a thickness of 2.9 cm; the wood species has not been identified. The diameter of the hole in the middle is 2.6 cm and the width of the groove is 2.5 cm (find number 517, Plate XXIX.99). A fourth sheave is complete but decayed at the edges (find number 184, Plate XXIX.100). The diameter is 3.7 cm, the thickness is 3 cm, the diameter of the hole measures 0.6 cm, and the width of the groove with raised edges is 1.1 cm. The wood species is not identified.

The assemblage includes two elongated, symmetrically shaped toggles, both waisted in the middle. One of these is a carved toggle made from pine with a length of 21.5 cm and a diameter of 4 cm; there are traces of wear on the grooved centre part (find number 3076, Plate XXIX.101). The other toggle is made of field maple and was spindle-turned on a lathe (find

[166] Whitewright 2007, 282-292.

Figure 8.6 Two waisted wheels of pulleys from Velsen 1 (left: find number 3300, middle: find number 4002f, photos: BIAX *Consult*) and a similar one from Velsen 2 (right: no find number; source: archive of the Archaeological Working Group Velsen, AWV).

number 451.1, Plate XXIX.102). It has a length of 7.8 cm and a diameter between 2.2-3.7 cm.

Further, a small spoon-like object made of ash, with a thin shaft and an oval, perforated blade, is interpreted as a spill-toggle (find number 2528, Plate XXIX.103).

Amidst the assemblage of rigging tools are two bobbin-style toggles with hemispherical ends decorated with a groove at the bases. Both are lathe-turned. The function of these bobbin-style toggles is associated with both sailing ships and the fastening of garments.[167] The shape is often asymmetrical because of wear due to opposite stresses during use. One of these artefacts was found in a well and has a quite symmetrical shape (find number 3035, Plate XXX.104). It was lathe-turned and made of ash. The length is 9 cm, the diameters of the hemispherical ends are 8 cm, and the diameter of the neck is 2.8 cm. The other one is a completely recovered specimen from the harbour basin and is made of boxwood (find number 1448.1, Plate XXX.105). It has a height of 4 cm and a diameter of 6.5-6.7 cm; the neck is 2.4 cm in diameter.

Another type of toggle is an hour-glass-shaped wheel of a pulley made of beech, with a diameter of 6 cm and a thickness of 3.8 cm (find number 3311, Plate XXX.106). The hole in the middle is 2.5 cm.

Remarkable are two waisted wheels of pulleys with a tenon on both sides. One is made of oak and has a length of 6.5 cm and an original diameter of 6.5 cm (find number 4002f, Plate XXX.107). The wood species of the other one, 4.5 cm long and 3.6 cm in diameter, was not identified (find number 3300, Plate XXX.108). A similar object was found at Velsen 2. The wood species has not been identified and the object is not preserved (Fig. 8.6).

The wood species of a cylindrical wheel of a pulley has not been identified (find number 1138, Plate XXX.109). This example has a height of 5.2 cm and a diameter of 4.9 cm and a central hole of 2 cm in diameter. There are traces of wear through the friction of a rope on the wood.

A delicately-turned sheave made from bird cherry, with a diameter of 2.5 cm, was found at Velsen 2 (find number 3137, Plate XXX.110). A decorative circle is incised around the hole in the middle. The diameter of the hole itself is 0.4 cm and the groove, probably for a string made of leather or textile, is 0.3 cm wide. Because of the small dimensions, this sheave will probably not have been used on a ship.

An exceptional sheave with a diameter of 8 cm and a thickness of c. 2 cm was found at Velsen 2. The outside is grooved. There are no protrusions for housing on the flat top and bottom, nor is the disc pierced. It is possible that the object was part of a machine with a driving belt (Fig. 8.7).

According to Polzer, spill-toggles might have been used for temporary fastening, whereby the spill-toggles were inserted into a knot to connect ropes or sails (Fig. 8.8).[168] Parallel

[167] Polzer 2008, 232-233.
[168] Polzer 2008, 240.

Figure 8.7 A carefully-worked sheave from Velsen 2 with a groove on the outside (source: archive of the Archaeological Working Group Velsen, AWV).

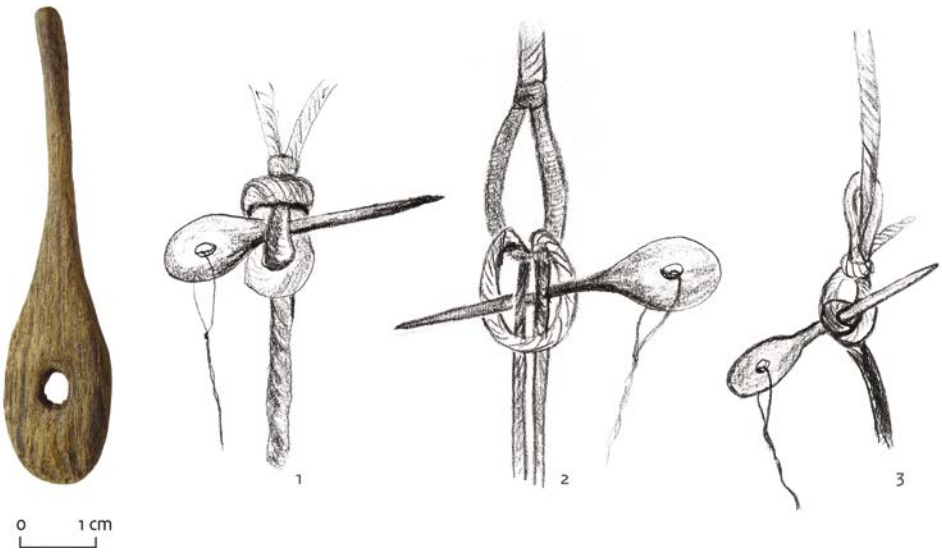

Figure 8.8 Spill-toggle from Velsen 1 (left: find number 2528, ash; photo: BIAX *Consult*) and examples, according to Polzer, of temporary fastenings using spill-toggles: 1. 'eye to eye' for attaching sheet to claw, 2. 'toggled bight' to hoist sail and, if necessary, to cast off quickly , 3. toggle and eye or two eyes toggled, for supporting heavy weight (drawing: S. Lange, after Polzer 2008, 240, Fig. 17).

finds of these small objects are known from the Tantura B shipwreck, from Settle Giggleswick,[169] and Wharfedale Caves.[170] The latter two have been interpreted as being of Gallo-Roman provenance and as being characteristic of the first and second centuries AD.[171] In addition to wood, spill-toggles were also made of metal, antler, and ivory.

Parallel finds of the elongated toggles are known from Cologne[172] and from the shipwrecks Comacchio[173] and Zaton,[174] as well as from early medieval sites at Leeuwarden[175] and Haithabu.[176] On a ninth-century shipwreck in the Tantura Lagoon (Israel), the toggles were found *in situ* with rope still attached to them (Fig. 8.9).[177] The length of the toggles from the shipwreck Tantura B varies between 14.2-19.5 cm.[178] Sheaves were found in the Red Sea port of Myos Hormos.[179] Parallel finds of bobbin-style toggles are mainly known from harbour contexts, such as those from Voorburg-Arentsburg (Fig. 8.10)[180] and Cologne.[181]

Figure 8.9 Toggle with remains of a rope still tied to its neck found on the shipwreck Tantura B, Israel (photo: S. Wachsmann).

8.10 Bobbin-style toggles made from boxwood from Velsen 1 (left) and from Voorburg-Arentsburg (right) (photos: BIAX *Consult*).

169 Dearne & Lord 1998, 97.
170 Lord & Howard 2013, 247, Fig. 16.18.
171 Dearne & Lord 1998, 97.
172 Tegtmeier 2016, 318, Pl.116, 480.
173 Cassai 1990, 286.
174 Brusic & Domjan 1985, 80.
175 Roller 2002, 50-54.
176 Westphal 2006, 75-77, 193.
177 Polzer 2008, 225-252.
178 Polzer 2008, 227.
179 Whitewright 2007.
180 Lange 2014, 857, 859.
181 Tegtmeier 2016.

9 Communication

9.1 Writing tablets

The find assemblage from Velsen contains sixty-six fragments of writing tablets (*tabulae*) and seven almost complete examples; sixty are included in the catalogue (Plate XXXI.111- Plate XL.170) (Fig. 9.1). In total, thirty-nine writing tablets or fragments are still present. The others have been lost in the course of time.[182] According to Bosman, four writing tablets were found in the Dredging layer and forty-three in the Roman layer from the harbour basin, another in a ditch of phase 2 and one in a well of phase 1.[183]

Most of the writing tablets were found in the harbour basin. Furthermore, one almost complete writing tablet has been documented from Velsen 2 (find number 3073). A second one from Velsen 2 is lost; only some photos remain of the find. This is particularly unfortunate because, based on the wood grain and the colour of the wood, as can be seen from a photo, this writing tablet was, contrary to the most common usage, probably not made of a coniferous wood.

All of these finds are examples of *stylus* or wax tablets (*tabulae ceratae*).[184] These are rectangular panels of wood with raised edges that frame a surface with one or more sunken compartments. In the recessed area, a layer of beeswax was applied that was darkened with charcoal or soot and, in some cases, with pigments of red or dark green. A text could be scratched in the wax layer with a *stylus* made of metal, ivory, bone, or wood. By scratching into the wax down to the surface of the naturally light-coloured wood of the tablet, the writing appears light in contrast to the dark-coloured wax. That the *stylus* scratched the wood, itself, was not actually intended; it was more accidental, either because the *stylus* was pressed too deeply or because the wax layer was too thin. By removing the wax of a written surface from the sunken part and refilling the compartment, a tablet could be used several times. Depending on the number of panels bundled together to form a wooden book (*codex*), one can distinguish two-part (*diptych* or

[182] Nine of the thirty-nine finds, two of which contained an almost complete writing tablet, have completely dried out and shrunk.
[183] Bosman 1997, 131, 295.
[184] The Latin word for beeswax is *cera*, hence the name for this type of writing board: *Tabula cerata* = wax tablets.

Figure 9.1 Overview of writing utensils from Velsen 1, including an iron *stylus* and a bronze seal box (photo: BIAX *Consult*).

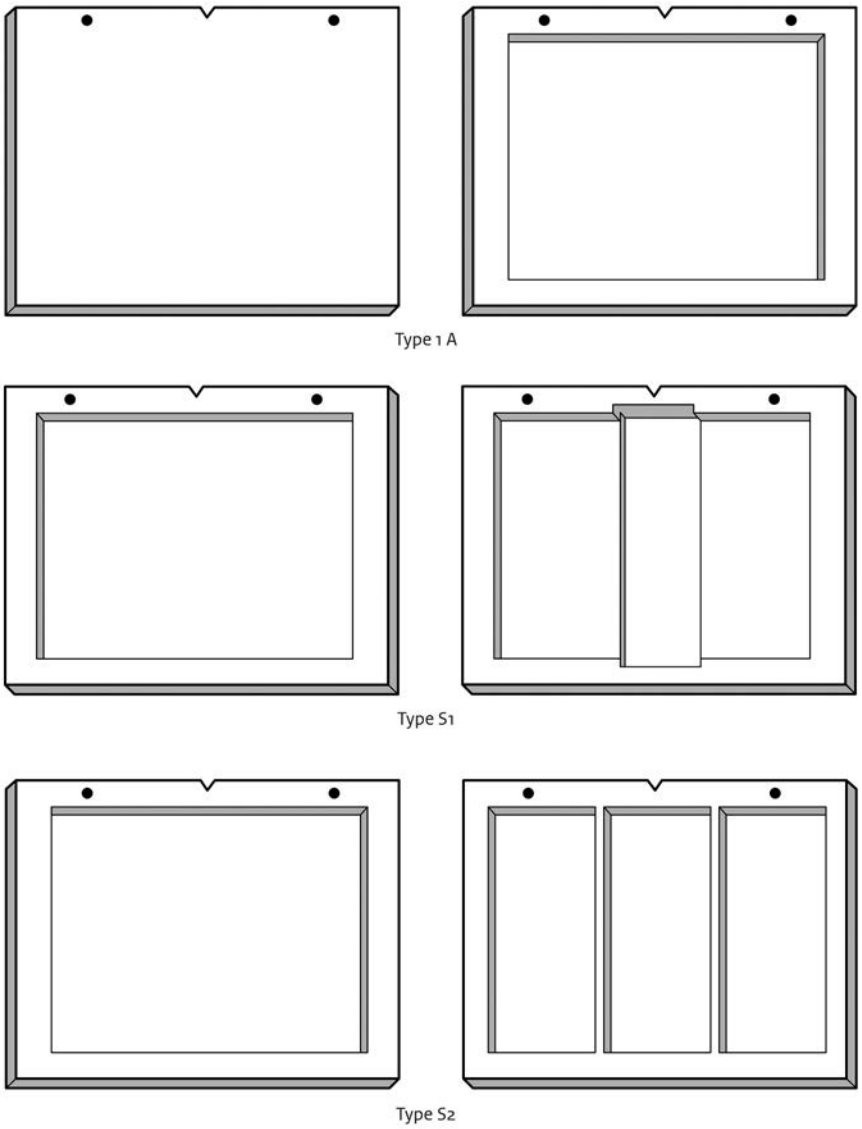

Figure 9.2 Differentiation of writing tablets according to Speidel 1996. From above to below: type A1 with plain (outer) face and recessed (inner) face; type S1 with recessed (outer) face and recessed (inner) face with seal-groove; and type S2, the same as type S1 except that the seal-groove is framed on both sides with a raised bar (after Speidel 1996, 24-25).

diptychon), three-part (*triptych* or *triptychon*), or multi-part (multi-part, *polyptych* or *polytychon*) *codices*. The most basic type was the *diptych,* which consisted of two panels, each panel having a plain (outer) face and a recessed (inner) face for filling with wax. Some panels had a compartment between the two writing parts for placing one or more seals. Noteworthy in this context are sixty-five engraved gemstones (*intaglio)* found at Velsen 1, and two from Velsen 2.[185] The gems were mounted in rings in order to be used for sealing. In a *triptych,* the seal-panel was covered on each side with a plain (outer) face and a recessed (inner) face. A *polyptych* contained more than one seal-panel. The seal-panels were bundled together with the inner faces with seal-grooves turned towards each other and closed with panels that were plain on the outside and had a recessed face on the inside.

In the description of the writing tablets from Velsen 1, the typological classification of Speidel was used, based on the physical characteristics of the panels.[186] Speidel also distinguishes between narrow (rectangular) and wide (almost square) panels. The assemblage from Velsen 1 includes three different types of writing tablets: type A1, type S1, and type S2 (Fig. 9.2). The writing tablets from Velsen are mostly rectangular; the wide, almost square type has been documented only once (find number 3427, Plate XXXI.113).

None of the writing tablets from Velsen has complete, preserved dimensions. Nevertheless, twenty-one tablets are complete in width. The average width of the tablets is 12.6 cm, with a minimum of 11.4 cm and a maximum of 14 cm. Of the two tablets which are almost complete but missing part of the edge, the original height of the tablet can be reconstructed to have been between 7 cm (find number 3073, Plate XXXV.128) and 8 cm (find number 3277, Plate XXXVI.132). In terms of the dimensions, the tablets are similar to those of other sites.

The assemblage contains a total of thirty-eight panels of type A1 (with a plain outer face and a recessed inner face), of which one is an almost completely preserved specimen (find number 3370, Plate XXXII.115). There are twenty-six panels of type S1; of these, however, five small fragments cannot with certainty be labelled as type S1. Finally, there is one fragment of a middle part of a seal-panel with a raised ridge on either side of the seal groove.[187] According to the classification of Speidel it belongs to type S2 (find number 914, Plate XXXIV.123).

The seal-panels had a V-shaped notch at the top between the two binding holes. Over this notch, called a *sulcus*, the cord was connected with seals and the binding was secured with wax. In this way, the codex was protected against unauthorized viewing of the document by anyone other than the addressee. In AD 61, under Emperor Nero, a Senate decision was made that required an additional binding and sealing with wax in the middle part of legal documents (*testationes*).[188] None of the tablets from Velsen 1 have holes in the middle part of the inner panels which would correspond to that kind of binding. The reason for the absence of these holes in the middle lies, of course, in the fact that Velsen 1 is older than the decree of Nero, and in the lack of indications of Roman occupation after AD 50. One writing tablet of type S1 has a thin groove in the seal-groove. This groove does not directly follow the notch in the edge but is somewhat off-centre. A cord was probably placed in this thin groove before it was secured with wax and the seals were pressed on top of it.

The panels with a seal-groove are considered to have been a part of legal documents (*testationes*) such as trade contracts, wills, letters of intent, or oaths.[189] The communication by means of writing tablets was not limited to the recording of official agreements or military messaging. They were used for jottings and notes. Soldiers are depicted with a wooden tablet tucked into their belts. The tablets were widespread pieces of equipment in a military context. Only special specimens - those with seals - are likely to have been used for permanent messages or legal documents.

The panels were connected with a cord drawn through two holes on the long side, with or without a metal hinge through which the thin cord could be guided. The cord must have been from linen, hemp, leather or a piece of tendon from an animal, but none of the bindings of the

185 Bosman 1997, 271-274.
186 Speidel 1996.
187 Find number 1229.1.
188 Suetonius Tranquillus, Nero, 17; Tacitus, *Annales* XIV.40.
189 According to Meyer, the multiple codices for longer texts have often been used for declarations of intent (Meyer 2004).

9.3 Writing tablets from Velsen 1 (above: find number 3139; photo: M. IJdo) and from Velsen 2 (below: find number 3073) (source: National Museum of Antiquities, RMO).

tablets from Velsen have survived.[190] Coniferous wood, mainly silver fir, was used almost exclusively for the *stylus* tablets, but examples of beech are known in the Netherlands, as well as from Cologne[191] and Vindonissa.[192] Other wood species, such as maple, were rarely used and were probably reserved for special occasions.

The number of wooden tablets from Velsen illustrates the fact that communication was general and not confined to official documents. Through intensive research into the written sources from Vindolanda, much knowledge about the content of such texts has been gained. In terms of dating and occupation, the two forts are different. Nevertheless, from the data from Vindolanda it became clear that the texts contained extensive lists of goods as well as simple notes and personal letters to family and friends.[193] The latter included wish lists, invitations, and personal messages that give a picture of the intensive exchange among various

190 In addition to wax tablets, very thin wooden sheets which were written on with ink were also used as writing surfaces. In contrast to the wooden tablets found at Velsen, mainly written leaves were found at Vindolanda, which were almost all made of alder (Birley, Birley & Birley 1993; Bowman & Thomas 1994).

191 Tegtmeier 2016, 21-63.

192 Speidel 1996.

193 In contrast to the writing tablets found at Velsen, mainly written leaves were found in Vindolanda (Bowman 2004).

social tendrils over various geographical distances.[194] In the case of Vindolanda, this testifies to a well-functioning trade network and a secure, stable infrastructure.

As far as the content of the texts on the writing tablets from Velsen 1 is concerned, not much is known to date. Due to the long period of time between excavation and actual conservation, the wood appears to have deteriorated considerably, as a result of which the writing has faded and, in some cases, is no longer visible. Nine of the tablets had dried naturally and were, therefore, completely deformed.[195] However, several writing tablets do still show vague traces of inscriptions, even after conservation. A fragment of a writing tablet of which eight lines of the inscription have been preserved has been edited and interpreted by Zeinstra (find number 3139, Plate XXXIII.117; Fig. 9.3). According to him, the tablet contains a testimony of the confiscation of goods.[196]

In the framework of the present study, it was not possible to decipher the writing tablets from Velsen with the naked eye. Other more advanced techniques, such as Reflectance Transformation Imaging (RTI) have not yet been applied to interpret these finds.[197] This would be of great value for the interpretation of the site and its relationships within the Roman military network.

9.1.1 Manufacture

The production of the writing tablets required both the knowledge and experience of the maker for his craft. It is the craft of a *pugillarius*, a maker and trader of writing tablets.[198] Based on the course of the growth rings in the cross-sections of the tablets, two different production techniques were probably utilised in the manufacture of the panels.[199] The first technique takes into account the direction in which the wood naturally splits. In this case, the panels were split with an axe in a radial direction from the outer side towards the heart of the trunk. These planks are triangular in cross-section and are thicker on one edge than on the other. The annual rings are at right angles to the working side. If, on the other hand, the annual rings are oblique in the cross-section of the panel, Tegtmeier suggests that it would be likely that a saw was used to make the planks because the oblique curving of the annual rings is not due to the natural splitting direction of the wood.[200] It should be noted that the planks that can be regarded as semi-finished products for the tablets have many similarities with wooden roofing shingles, as can be seen in shingles still being made by hand for the roofing of historical buildings or for demonstrations of traditional crafts.[201] This does not involve a saw, but a shingle froe, an axe-like tool with a handle at a right angle to the cutting edge, with which the shingle-maker cleaves the log in thin, equal pieces. After the panels have been produced in one of these two ways, the width of the border for the writing area to be filled with wax was marked. This was probably done with routine and speed - and was thus not always so accurate, as the marking lines often continue into the corners of the edges. This can be seen on fragments of seventeen writing tablets from Velsen 1. Tegtmeier was able to convincingly demonstrate the process of manufacturing writing tablets in Cologne on the basis of finds of semi-finished products and processing waste.[202]

9.1.2 Recycling

Research by Goodburn into processing waste from the Bloomberg site in London has shown that the discarded staves of casks and wine barrels of coniferous wood were often used to make writing tablets.[203] At Velsen, too, there is evidence of recycling, such as the discarded coniferous wine barrels that were used as well-lining. Furthermore, sawn offcuts from staves and thin wood chips from conifers were found as woodworking debris. The recycling of the staves of barrels appears to have been common practice at Velsen as well as in London and Cologne.[204] Goodburn calculates that a maximum of twenty-four writing tablets with a≈maximum width of 140 mm could be obtained from a stave with an average length of about 196 cm, a width of 17 cm, and a thickness of 3 cm, split lengthwise (Fig. 9.4).[205]

194 Bowman 1994; Bowman & Thomas 1994; Bowman, Thomas & Tomlin 2010.
195 These are find numbers 101.1, 514.1, 542.1, 203/2501, 1229.1, 1576.1, 2102.1, 3072 and 3427.
196 Zeinstra 2010a.
197 Terras 2006; Mytum & Peterson 2018; MacDonald *et al.* 2019.
198 An inscription from a grave of a *pugillariarius* from Rome: CiL Vi 9841: C(ai) Volcaci C(ai) l(iberti) Aniceti/dedit/ M(arco) Caecilio Hilaro/pugillariario (Caruso 2012).
199 Tegtmeier 2016, 63-77.
200 Tegtmeier 2016, 67.
201 Vernimmen 2020, 86-88.
202 Tegtmeier 2016, 75-77, 215.
203 Goodburn 2016, 8-15.
204 Personal communication with D. Goodburn in 2018.
205 Goodburn 2016, 9.

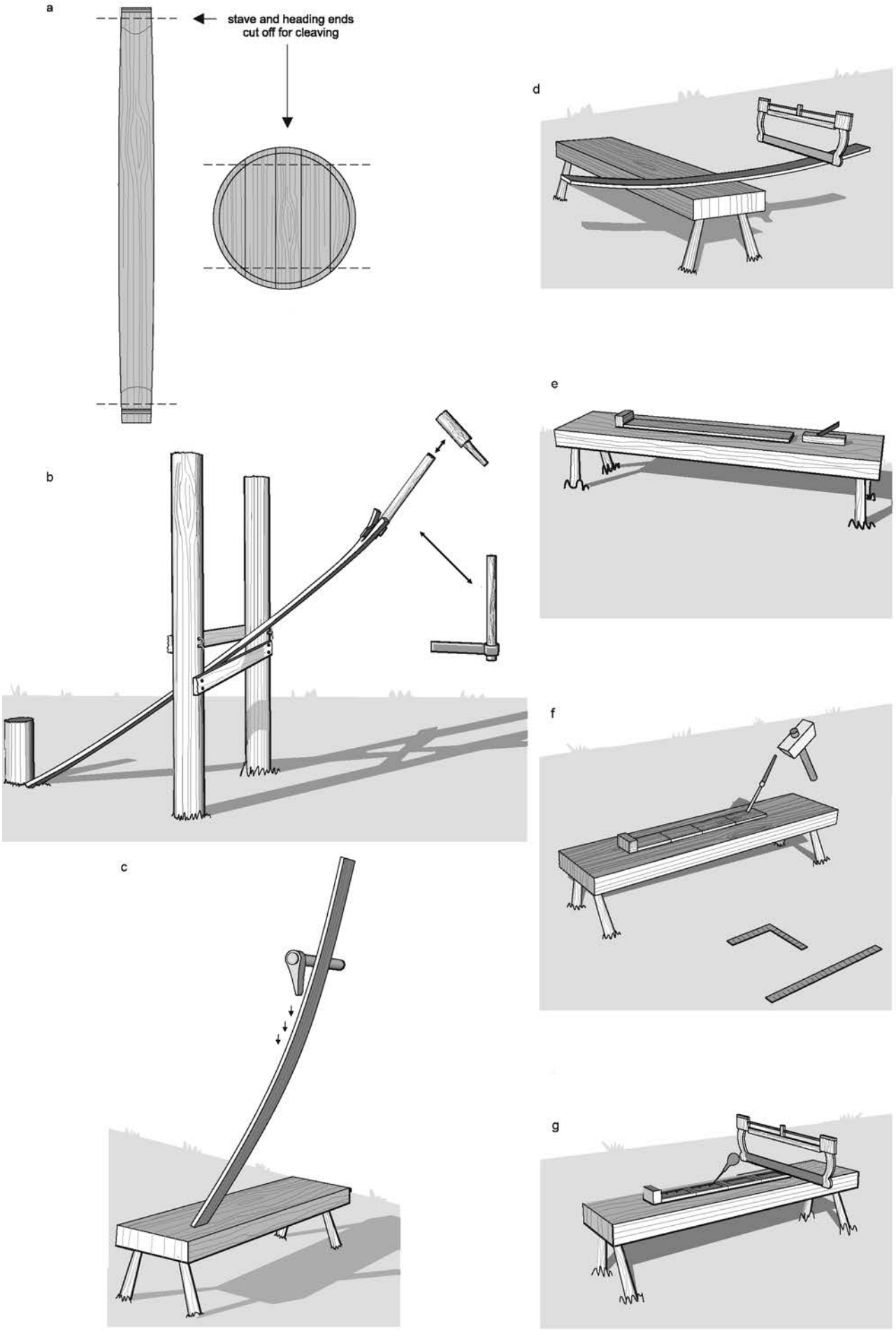

Figure 9.4 The different stages of making a *stylus* tablet from recycled wine cask timber (source: Goodburn, in Tomlin 2016, 11).

9.1.3 Distribution of Roman writing tablets in the Netherlands and elsewhere

Writing tablets from Dutch contexts have been found in Roman military sites at Alphen aan den Rijn,[206] Valkenburg-Marktveld,[207] and Vechten (Table 9.1).[208] They have also been found in rural settlements located south of the Rhine, including sites in Utrecht-Terweide,[209] Houten-Castellum,[210] Naaldwijk-Hoogwerf,[211] Nijmegen-Oosterhout,[212] Midden-Delfland,[213] Tiel-Medel,[214] and De Steendert.[215] The most northern site on the northern side of the Rhine is located in the Frisian Tolsum,[216] halfway between Velsen and the German Bentumersiel at the mouth of the Ems river.

The largest number of writing tablets in the Netherlands so far was discovered in Vechten. Archaeological volunteers salvaged approximately one hundred writing tablets from a fossilised side-arm of the Rhine near Vechten during construction works.[217] For many years, the writing tablets were stored in the homes of the finders. Eventually, the province of Utrecht bought the writing tablets and had them conserved. They were studied and described by Derks and Vos. However, the inscriptions on the tablets have not yet been deciphered and, according to Derks and Vos, because of the fragmentation and the lengthy storage time, the hope of decryption is small.[218]

Larger numbers of writing tablets are known from Vindonissa,[219] Vindolanda,[220] Carlisle,[221] Cologne,[222] and London.[223] In Cologne, no fewer than 689 finds of writing tablets have come to light during excavations as part of the

206 Van Rijn 2004, 230-231.
207 Glasbergen 1967, 67-72; Bogaers 1972, 52-54, 67-76; Van Rijn 1993; De Hingh & Vos 2005.
208 Van Rijn 2004, 221; Vos 2014; Derks & Vos 2015.
209 Den Hartog 2009, 99, 101, 132-133.
210 Kooistra 2015, 44-45.
211 De Bruin 2008; Reigersman-van Lith de Jeude 2015.
212 Van den Broeke 2009, 67-82.
213 De Bruin 2019, 202.
214 Lange 2019, 48-51.
215 Roymans, Derks & Heeren 2007, 25, 133, 135; Zeinstra 2010b, 1-32.
216 Kramer 1995; Zeinstra 2010b, 33-76; Galestin 2010, 9-26.
217 Derks & Vos 2015.
218 Derks & Vos 2015.
219 Speidel 1996.
220 Bowman, Thomas & Tomlin 2010, 187-224.
221 Caruana 1992, 68-70.
222 Tegtmeier 2016, 21-77.
223 Tomlin 2016.

Table 9.1 Overview of writing tablets from different sites in the Netherlands.

Site	N	Dating	Context	Wood species	Publication
Alphen aan den Rijn	3	AD 70-270	moat	silver fir	Van Rijn 2004, 221
De Steendert	1	AD 83	well	silver fir	Roymans, Derks & Heeren 2007, 25, 133, 135; Zeinstra 2010, 1-32
Houten-Castellum	1	AD 70-270	ditch	beech	Kooistra 2015
Leiden-Roomburg	1	AD 70-260	ditch	silver fir	Brandenburgh 2006, 167; De Bruin 2017, 147
Midden-Delfland	1	2nd/3rd century AD	ditch	silver fir	De Bruin 2019, 202
Nijmegen-Oosterhout	3	2nd century AD	well	silver fir, spruce/larch	Derks & Roymans 2002, 98; van den Broeke 2009
Schiedam-Polderweg	1	2nd/3rd century AD	ditch	silver fir	De Bruin 2019, 202
Tiel-Medel	1	first half 1st century AD	gully	silver fir	Lange 2019, 48-51
Tolsum	1	AD 22	terp (wierde)	silver fir	Kramer 1995; Zeinstra 2010, 1-32
Utrecht-Terweide	2	AD 20-50	gully	silver fir	Den Hartog 2009, 133
Valkenburg	21	AD 42-69	castellum-layer 1 and 2	silver fir	Glasbergen 1967; De Hingh & Vos 2005 ; van Rijn 1993, 180
Valkenburg-Marktveld	2	Roman period	ditch, layer	silver fir	Bogaers 1972, 70-72
Vechten	102	AD 0-52 and after AD 61	gully	silver fir, spruce/larch	Vos 2014; Dercks & Vos 2015
Vechten	1	Roman period	unknown	silver fir	unpublished (from excavation of van Giffen in 1946/1947)
Velsen 1	64	AD 15-c.30	harbour, well, ditch	silver fir	Bosman 1996; Zeinstra 2016; Lange this publication
Velsen 2	2	after AD 30	harbour	silver fir	Bosman 1996; Lange this publication
Woerden-Molenstraat	1	Roman period	ditch	unknown	Haalebos & Vos 1999
Naaldwijk-Mars	1	AD 150-250	ditch	unknown	Leijnse, de Boer & Verhelst 2015, 188-189
Ophemert-De Steendert	1	Flavian	well	silver fir	Derks & Roymans 2002, 97-98
Total	210				

construction of the City subway.[224] The excavation at the Bloomberg site in London revealed 405 writing tablets, of which the texts of ninety-five tablets have been deciphered. Most of these tablets date from the period AD 50-80.[225]

9.2 *Styli* and other writing implements

Fifteen wooden *styli* are known from Velsen; nine of these are included in the catalogue (Plate XLI.171-179). The wood of elder was clearly preferred above other species. No less than six specimens were carved from elder, of which five are listed in the catalogue (find number 3063, Plate XLI.173; find numbers 2143.1, 1577.1, 22.1, and 3039, Plate XLI.175-178). Three others were made of maple (find numbers 1654 and 4285, Plate XLI.171; find number 513.1, Plate XLI.174), and one of the *styli* was carved from the wood of wild cherry (the object is missing; find number 53.1). The wood species of four *styli* remain unidentified; the catalogue includes one of those (find number 76, Plate XLI.179).

The wooden *styli* from Velsen are simple in form and finish and look very much alike. They have a cylindrical handle that narrows in the direction of the tip, the actual writing point. However, the length of the writing points varies. This is probably due to the use of the *stylus* and the occasional re-sharpening of the tip. The preserved lengths of the *styli* vary between 12.2-20.5 cm. A mark of the owner has been engraved on the handles of two *styli*: on one, an X (find number 1654, Plate XLI.171) and, on the other, an X with an oblique slash next to it (which looks like damage after excavation) (find number 513.1, Plate XLI.174).

The appearance and material of *styli* vary enormously. They can be made of silver, bronze, iron, ivory, bone or wood, finished decoratively or consist of nothing more than a simple pointed stick.[226] In general, *styli* have a widened, spatula-like upper end, which can be used to easily remove errors in the writing in the wax. None of the wooden *styli* from Velsen has this characteristic, spatula-like end, which makes identification as a *stylus* in some cases questionable, especially when considering that this type of pointed, wooden object could have had different purposes, serving as a spindle, for example. Similar objects from Vindonissa have been interpreted as arrow shafts. This interpretation may apply to six objects from Velsen 1. The arrow shafts from Vindonissa are made of cherry wood, with lengths between 14.6-23.5 cm.[227] The Velsen objects, however, may not be interpretable as arrow shafts because they are finished at the top and do not have a groove for securing a bow string.

In addition to the wooden *styli*, an iron *stylus* complete with a bone case was found at Velsen 1, as well as two bronze *stylus* fragments and two bronze and two iron seal boxes. Furthermore, sixteen lead stamps were discovered during the years of excavations. The identification of four objects of metal as *styli* is not certain.[228]

Figure 9.5 A spatula with a leather thong wrapped around the shaft, used for scraping wax from the surface of a writing tablet (find number 181.1, elder; photo: M. IJdo).

[224] These writing tablets have been documented and described in detail by Tegtmeier together with 29 old finds. See Tegtmeier 2016, 21-77.
[225] Tomlin 2016.
[226] Schaltenbrand Obrecht 2012.
[227] Unz & Deschler-Erb 1997, 23, Plate 21, Fig. 388-398.
[228] Bosman 1997, 148.

9.2.1 Spatula

A delicately carved, spatula-shaped object with a chamfered blade can probably be seen as a spatula, with which the wax of a writing tablet was smoothed (find number 181.1, Plate XLI.180; Fig. 9.5). The object is made of elder, as are several of the *styli*. A remarkable detail is a leather thong wrapped around the shaft. The width of the blade is between 3-4.4 cm, and the preserved height is 6.1 cm (including the length of the remnant of the shaft, 2.2 cm). The choice for elder will have been made because of the hardness and density of the wood. Because of these properties, elder was also used for making flutes and, in more recent time, for tobacco pipes. Above all, it will have been abundantly available on the dunes.

More commonly used for scraping the wax were metal spatulas with a broad end. Examples of such spatulas have been found at Velsen 2,[229] Vechten,[230] Vindonissa,[231] and Badenheim.[232]

9.2.2 Bark

A piece of bark with straight marks which were probably characters, from the harbour basin of Velsen 1, makes it clear that other materials could also have served as a writing base (find number 1388.1, Plate XLII.181). The writing has not yet been deciphered. The piece of bark is birch, has a length of 5 cm, a width of 3.5 cm, and a thickness between 0.4-0.8 cm (Fig. 9.6).

Figure 9.6 A piece of birch bark from Velsen 1 with marks (characters?) on it (find number 1388.1; photo: M. IJdo).

[229] Bosman 2021, II, 411.
[230] Derks & Vos 2015, 17.
[231] Feugère 1995, 325.
[232] Böhme-Schönberger 2010, 195-202.

10 Provisioning

10.1 Wine barrels

All of the barrels from Velsen 1 have been found in wells where they functioned as well-linings; one individual stave from a barrel was found in the harbour basin. According to Morel and Bosman forty wells were excavated between 1976 and 1990, of which seventeen contained one or more barrels.[233] One of the most striking cask-wells excavated was well 1977-2, which consisted of two completely preserved barrels and traces of a third one above them. In the upper preserved barrel, the complete skeleton of a man and a dagger with a richly decorated sheath were found (Fig. 10.1).[234]

For easier storage, the staves were sawn in pieces after excavation, with half of the length of a barrel as the maximum length. From all of the excavated barrels, only two staves were completely conserved in length.[235] The staves of the barrels were not described individually (notes and other documentations on them are missing) and, except for staves from well 1989-S186, only short pieces of c. 30-40 cm are preserved (Fig. 10.2). Most of the pieces were not conserved, and many stamps and graffiti are no longer visible. Within the framework of the present study, the wood species of these pieces were identified, forming a valuable addition to the database. However, at the RMO-depot at the Papenburg location, several staves of different barrels were found in good condition (Fig. 10.3). Photos of the stamps were taken and, from these, drawings were made. Nevertheless, only a few of the staves survived the long storage after excavation and before the final conveyance to the National Museum of Antiquities. As to the information about the graffiti and stamps, this is mostly limited to Bosman's descriptions (though without drawings and photographs) and a few articles from Schimmer and Bogaers in the magazine *Westerheem* of the AWN.[236] For the catalogue, the lengths of the staves of well 1989-182 were reconstructed by using the drawings of the AWN.

According to Bosman, most of the barrels from Velsen 1 had an original height of 200 cm and a maximum belly diameter of 100 cm. On average, they consisted of nineteen staves and were held together with wooden hoops.[237] Based on these measurements, a barrel could hold about 1,000 litres of wine.

233 Morel 1988a, 227-228; Bosman 1997, 32.
234 This 'cold case' is currently being further investigated by Driessen and van Driel-Murray, together with students from Leiden University.
235 As mentioned earlier, another stave, probably conserved, is housed at the Dutch Wine Museum Arnhem (personal communication, A. Bosman, 21 February 2021). There is no information here about this stave because the museum is closed due to the COVID-19 pandemic.
236 Schimmer 1977, 224-229; Schimmer 1979, 109-118; Bogaers 1978, 8-12; Bosman 1997, 84-85.
237 Bosman 1997, 32.

Figure 10.1 Excavation of well 1977-2, in which three barrels initially were used as well-lining. A skeleton was found in the upper barrel (source: archive of the Archaeological Working Group Velsen, AWV).

Figure 10.2 The current state of unconserved fragments of staves from different barrels, as found in the depot of the RMO-depot at the Raamsteeg location (photo: BIAX *Consult*).

Figure 10.3 Several conserved staves in the depot of the National Museum of Antiquities at the Papenburg location were found in good condition with stamps and graffiti which are still readable (photo: BIAX *Consult*).

Initially, the wood species of 155 staves were analysed. Of these, 128 are present in the depot of the National Museum of Antiquities in Leiden. They are registered in the database, together with eleven fragments of hoops (from the initial twenty-six that were collected). During the inventory, it became apparent that several staves did not have a find number, so the allocation to a specific context remains unknown (N=18).

Of the 155 examined staves, eighty-eight are made of silver fir, nine of spruce, forty-four of spruce or larch, five of oak, one of pine, and one of ash (Table 10.1); the wood species of seven staves were not identified. Considering that not all of the barrels were analysed for wood species, it is quite possible that there were more barrels of oak. This idea is supported by the presence of recycled oak staves for, among other things, tent pegs. Remarkable is a stave made of ash, complete with a croze groove (find number 4014b), as this is not a common wood species for barrels.

The staves were held together with hoops. In the case of cask-wells, the hoops of the barrels which were reused as well-lining sometimes remained in the well after the barrel

Table 10.1 Wood species of the staves of barrels from barrel-lined wells from Velsen 1; in parentheses: incomplete number of staves from a barrel.

		Staves:									Hoops:				
Well		ash	oak	pine	silver fir	spruce	spruce/larch	not analysed	N staves	present	ash	beech	hazel	indet	N hoops
1976-1		-	-	-	14	1	4	-	19	2	-	-	-	-	-
1977-2	(upper barrel)	-	-	-	1	5	-	-	(6)	1	-	-	16	-	16
1977-2	(lower barrel)	-	-	-	-	5	-	-	(5)	0	-	-	-	-	-
1982-1		-	-	1	14	-	5	-	20	20	-	-	-	-	-
1982-2		-	-	-	8	3	-	-	(11)	11	-	-	-	-	-
1989-S180		-	2	-	5	-	7	-	(14)	14	-	1	2	2	5
1989-S181		-	2	-	3	-	-	-	(5)	5	1	-	-	-	1
1989-S182		-	-	-	-	-	2	-	(2)	2	-	-	1	-	1
1989-S186		-	-	-	10	-	10	-	20	20	-	-	2	1	3
1989-S188		-	1	-	-	-	-	-	(1)	1	-	-	-	-	-
1989-S196		-	-	-	-	-	1	-	(1)	1	-	-	-	-	-
1989-S470		-	-	-	17	-	1	1	19	19	-	-	-	-	-
1989-S480		-	-	-	9	2	3	-	(14)	14	-	-	-	-	-
unknown		1	-	-	7	3	1	6	18	18	-	-	-	-	-
Total		1	5	1	88	19	34	7	155	128	1	1	21	3	26

was later removed. Four of the barrels had been provided with hoops made of split branches of hazel, while one of the barrels had hoops of split branches of ash. Striking is the presence of a hoop fragment of beech as this is generally not a wood species chosen for such purposes. It is therefore questionable whether this is a hoop fragment or if it is a fragment of a slat from, for example, a piece of furniture, which has accidentally ended up in the well.

The catalogue contains nineteen staves with stamps, brands and/or graffiti (find numbers 182.2, 182.3, 182.6, Plate XLIII.182-184; find numbers 182.10-182.13, Plate XLIV.185-188; find number 182.4, Plate XLV.189; find number 3160, Plate XLVI.190; find number 3213, Plate XLVII.191; find number 4637, Plate XLVIII.192; find number 4638, Plate XLIX.193; find number 4639, Plate L.194; find number 4640, Plate LI.195 and find numbers 3172, 3188, 3190, 3191, and 3193, Plate LII.196-200).

On the inner side of some of the staves was a hard, rust-coloured layer (Fig. 10.4). In order to find out what this resinous substance was, a small sample from one of the staves from well 1989-S470 (find number 934) was sent to the RCE laboratory in Amsterdam. Here, the sample was analysed by Megens with thermally assisted hydrolysis and methylation-gas chromatography-mass spectrometry (TMH-py-GCMS). The results show that the substance is a resin from a tree species of the Pinaceae family, mixed with tar or pitch. It was probably used to seal the barrel.[238]

[238] Megens 2021.

Figure 10.4 Fragment of a stave from well 1989-S470 with a hard, resinous substance on the inner side (right; detail of the substance). The substance is a resin from a species of the Pinaceae family, mixed with tar or pitch (photo: BIAX *Consult*).

10.1.1 Stamps and graffiti

Roman wine barrels are often marked with brands or punched stamps. The brands are mainly on the outside of the barrels and the punched stamps are mostly on the inside.[239] Hartmann argues that punched stamps on the inside originate from the cooper.[240] Frequently, graffiti in the form of incised lines are found. The engraved graffiti are probably also related to the name of the cooper, while the brands on the outer side could have belonged to the owner of the vineyard, a merchant, or the owner of the barrel.[241] In general, the visibility of the stamps and graffiti on the staves from Velsen 1 has deteriorated since salvage.

Bosman describes seventeen different brands and punched stamps, as well as graffiti on several barrels (Table 10.2). Two previously undocumented punched stamps were discovered during the current project (in wells 1989-S180 and 1989-S186). Some of the staves with stamps and graffiti from wells 1976-1, 1977-2 (upper and lower barrels), 1989-S180, 1989-S182, and 1989-S186 were found in the depot of the RMO; the staves with graffiti from wells 1978-8, 1980-6, and 1989-S480 are all missing.

Graffiti on staves from a barrel from well 1989-S182

This barrel was discovered to be completely scratched with letters on the inner side of the staves.[242] There is also a bunghole in the barrel, drilled across two staves. Over the bunghole, a brand is present, of which the letters RV [...] IVN and NN remain.[243] The graffiti on the staves are not all clearly readable, such as the one with dotted marks and some indistinct graffiti (find number 182.2, Plate XLIII.182). Several staves show cross-like marks (find number 182.6, Plate XLIII.184, find numbers 182.10-182.13, Plate XLIV.185-188) and on one stave, the letters ABCDE are incised (find number 182.3, Plate XLIII.183). Hardly recognisable are the last letters of the alphabet QR T X on another stave; other characters have been scratched over them (find number 182.6, Plate XLIII.184).[244]

On two staves, the almost complete alphabet is incised (find number 182.11, Plate XLIV.186 and find number 182.4, Plate XLV.189). Interestingly, on one of these staves the alphabet is written twice. At one end, the letters ABDEFGHIKLMNOPQRST are incised, and this appears to have been repeated, but in a sloppier style and omitting some letters: ABDEGHIKLMNO STV (find number 182.4, Plate XLV.189). Because of the differences in writing styles, it was assumed that the wood surface was used to practise on. However, this

239 Bosman 1997, 84.
240 Hartmann 2012, 273.
241 Tamerl 2010, 40-43.
242 Bosman 1997, 84-85.
243 Bosman 1997, 85.
244 Bosman 1997, 84-85.

interpretation is not convincing: as the letters are on the inside of the barrel, this would be a rather peculiar place to practise writing. Another explanation would be that the letters were a kind of incantation. It was probably hoped that this could have a favourable effect on the quality and storage of the wine.[245]

Even though there are parallels of alphabets on other materials, such as on pottery, the alphabet found at Velsen is, so far, the oldest in the Netherlands.[246] The collection of the Museum Valkhof includes a hypocaust tile with parts of the alphabet. The tile was found on the terrain of a Roman stone and pottery workshop, currently known as the Holdeurn in Berg en Dal.[247] The idea of warding off calamity with the help of a spell in the form of letters from the alphabet has also been suggested.[248]

A stamp on a stave from a barrel from well 1989-S180

On one conserved stave from this barrel there is a punched stamp on the inner side (find number 3213, Plate XLVI.190).[249] The stamp contains the letters PACIDI or LACIDI. This stamp has not yet been deciphered. On the outside, a cross has been carved over the entire width of the stave.

Stamps on staves from a barrel from well 1976-1

This well contained a barrel that was marked with two different stamps (find number 4637, Plate XLVIII.191).[250] One stave was branded on the outside, across a bunghole. The original bung of the bunghole has, apparently, been replaced with an unstamped bung, so the brand is not complete; it shows the letters LISE [...] MARI, with the M halved (Fig. 10.5). According to Bogaers, it says Lisei Mari of L(ucius) Ise(i)us Marus and is interpreted as Lisei(?)marus, which could have been the name of the producer or supplier of the wine, or of a merchant.[251] Another possible explanation would be that this was the name of the *negotiator vinarius* who, after the barrel had been filled, placed his name over the bung of the bunghole. The name ACESTIS, which is read as A(ulus) Cestius S, is stamped on the inner side of the stave with the bunghole and on three other staves of the same barrel.[252] The name is accorded to the cooper because the stamps are all on the inside.[253]

Bogaers has argued that L(ucius) Ise(i)us Marus and A(ulus) Cestius S are not typical Latin names. According to him, names of Roman citizens consisted of three names: a first name, a surname, and a third name (or nickname). In the early Roman period, a third name (nickname) was not commonly used. Bogaers therefore argues that Mari is probably a Celtic suffix, from *marus*, as in grand and respectable. As examples of Celtic names he mentions Atepomarus, Leitomarus, Viridomarus, and others. Approaching the interpretation this way, what is stamped here could be the Celtic personal name Liseimarus or Liseniomarus.[254]

Table 10.2 Overview of brands, punched stamps, and graffiti on barrel staves (source: Bosman 1997, 84-85 and new data from the present study).

Well	Punched stamps on the inner side	Brands on the outer side	Scratched graffiti
1976-1	A. CESTIS	LISE [...] MARI	-
1977-2 (upper barrel)	-	ITER [...] AVTI or TTER [...] AVTI, C.C [...] A	X
1977-2 (lower barrel)	OICORC	CIA [...], IVIIIVAII, [...] NA	
1978-8	L I , O	-	-
1980-6	ES I	SCOB	OVERO
1989-S180	-	LACIDI (or: PACIDI)	X
1989-S182	-	RV [...] IVN, NN	ABDEFGHIKLMNOPQRST, ABCDEGHIKLMNO STV, ABCDE, IXI, II, XII, QR T X
1989-S186	P.V.P, OOOOO, P VALERI	-	-
1989-S480	RECEPTI	-	-

245 Bosman 1997, 85.
246 Bosman 1997, 85.
247 With thanks to M. Driessen, who informed me about the hypocaust tile.
248 Bogaers 1971, 105.
249 Thirteen short pieces of the barrel are not conserved but are still present.
250 Bosman 1997, 84.
251 Bogaers 1978, 10.
252 While Bosman lists three staves with ACESTIS, Bogaers mentions four staves with this stamp (Bogaers 1978, 9).
253 Schimmer 1977, 228.
254 Bogaers 1978, 9.

Figure 10.5 Current state of the stave from barrel 1976-1 with a brand punched across the bunghole. The original bung seems to have been replaced and some of the letters are missing. Still recognisable are the letters LISE [...] MARI (photo: BIAX *Consult*).

Cestius appears to have been a well-known Roman surname, while the S is probably the abbreviation of the name *Severus* or *Silvanus* and thus concerns a slave or freed person of the *Cestius* family.[255] Hoewever, it is also possible that this was the name of the manufacturer of the barrel, who employed a certain S. as a cooper.[256]

Stamp on a stave from a barrel from well 1977-2

In this well there were two barrels stacked on top of each other, and there were traces of a third barrel above them (Fig. 10.1). The upper preserved barrel had a height of 200 cm and a diameter of 96 cm and consisted of nineteen staves. The lower barrel was smaller, measuring 180 cm in length and 65 cm in diameter, and was made of fourteen staves.[257] Stamps were found on both surviving barrels. There is a stamp branded upside down across the bunghole of the upper barrel which shows the letters T T [...] A or IT [...] A (find number 4638, Plate XLVIII.192). The diameter of this bunghole is 6.5 cm. Perpendicular to this stamp, the letters C.C [...] A were branded. Above the bunghole there is a venting hole with a diameter of 1 cm, and above the venting hole another, smaller, bunghole or venting hole with a diameter of 3 cm which was drilled in the stave. Across this one, the letters TTER [...] AVTI were branded; the last letters turned out to be a ligature. The stamp was interpreted by the excavator as TITI TERENTIEE AVITI.[258] Bosman reads it as ITER [...] AVTI, but gives no interpretation of the name.[259]

From the lower barrel, the letters T.T [...] from a brand across the bunghole could be recognised. Around the bunghole, parts of a brand with the letters CNAEI [...] remained. Above the bunghole, next to a venting hole, the punched letters [...] NA were registered (find number 4639, Plate XLIX.193) and on the inner side of another stave from the lower barrel, a stamp with the letters OICORC was punched (find number 4640, Plate L.194). The O following the first C is in the letter C.

On the inside of one stave there are two circles, one under the other, and on the outside, one circle. The diameters of the punched circles are 3.5 cm. Bosman mentions a stave on which a stamp has been applied lengthwise next to a venting hole. The stamp, which proved difficult to read during salvage, could have been read as I V I I I V A I I.[260] Because this stave was also sawn after excavation, taking only a short section with the venting hole, it will no longer be possible to clarify the question of what was written there.[261]

Stamps on staves from a barrel from well 1989-S186

On the inner side of six staves from the barrel from well 1989-186, two different stamps are documented (find numbers 3160, Plate LI.195; find numbers 3172, 3188, 3190, 3191 and 3193, Plate LII.196-200; Fig. 10.6). On some of these staves, parts of a stamp were recognised, such as VAL or VALER. The most complete stamp shows the letters P.VALER, while shortly after excavation, there was also an I identified after VALER. Since then, the letters have diminished in

255 Bogaers 1978, 9.
256 Bogaers 1978, 10.
257 Schimmer 1977, 109-111.
258 The information is from a note in the journal of P. Vos, written in 1977, and is present in the archive of the AWV.
259 Bosman 1997, 84.
260 Bosman 1997, 84.
261 Bosman 1997, 84.

Figure 10.6 Stamps of P.VALERI and P.V.P on the inner side of staves from the barrel from well 1989-S186 (photo: BIAX *Consult*).

visibility. Bosman considered the P to be a C and reconstructed the name as C VALERI, but recent re-examination confirms that the character is a P. In addition, the abbreviation P.V.P has also been observed on this barrel; the P of P.V.P supports the interpretation as P.VALERI. On one stave, two overlapping circles (find number 3160, Plate LI.195), and on another, five circles were punched below each other. Between the rim and the croze groove is a hole, used for a dowel to secure the base of the cask.

Barrels with stamps have been found in, among other sites, Vechten,[262] Nijmegen,[263] Rijswijk-De Bult,[264] Valkenburg (Z-H),[265] Leidsche Rijn,[266] and Voorburg-Arentsburg. So far, no stamps from Velsen 1 matching with those from other locations are known.

10.2 Bungs and stoppers

The assemblage includes 99 bungs and stoppers, of which thirty-four are included in the catalogue. The spectrum of wood species in this category is quite diverse. Twelve objects are of silver fir, three of spruce, seven of spruce or larch, two of pine; four others could be identified as being of coniferous wood, but not of which species. In addition, maple has been identified twice, alder three times, beech, ash and oak each six times, and juniper once. The wood species of half of the objects is not identified. The spectrum includes flat bungs with straight sides (find numbers 3037, 3021, 4115, 1089.1, 3404, 3408, 3405 and 1306, Plate LIII.201-202, 206,

262 Breuer 1918, 249.
263 Breuer 1920, 207.
264 Bloemers 1969, 42; Bloemers 1970, 37; Bloemers 1978, 89-106.
265 Groenman-van Waateringe 1974, Plate 11.5; Haalebos 1977, 284.
266 Lange 2010, 292-294.

209, 211 and 217) and some with tapering sides (find numbers 3422, 3043, 4275, 3061, 3040, 4001n, 3392, 1900.1, 463.1 and 3417, Plate LIII.203-205, 207, 208, 210, 212, 215, 216, 218). Moreover, there are long stoppers, often conical with a flat finished top, (find numbers 4303, 3091, 3056, 3049, 1251.1, 4370 and 3054, Plate LIV.219-225), or conical with an accentuated head (find number 1883.2, Plate LIV-227), and some with a straight shaft and an accentuated head (find numbers 3375, 3117 and 3098, Plate LIV.226, 228 and 229). Most of the bungs and stoppers are spindle-turned on a lathe. In addition, there are also specimens which are carved (find numbers 4275 and 3091, Plate LIII.205, Plate LIV.220). Brands have been recorded on some of the flat bungs; these are brands that were placed over the bungholes of wine barrels (find numbers 1630, 2035.1, 2035.1, 3038 and 3071, Plate LIV.230-234).

Three bungs are pierced in the middle. The holes are slightly conical (find numbers 463.1, 1306, and 3417; Plate LIII.216-218). Tegtmeier argues that these perforations could have been related to the monitoring of the fermentation process of the wine in the barrel. It is assumed that this process would have been observed regularly with the help of these small openings. After examination, the holes were closed with a small wooden pin.[267]

The shape and thickness may reveal whether a bung was used to close a stave, or an amphora or jug. Considering the practice of branding the bungholes after filling the barrel, the thickness of a bung used to close the bunghole would correspond to the thickness of the stave. A flat surface would have been necessary for sealing the bunghole with a brand or punched stamp. The most commonly listed thickness of the staves from the barrels from Velsen 1 is 3 cm. This would have been the thickness of the primary bung, too. The diameter of the bungholes varies between 6-7 cm and is quite standard. This means that bungs with a diameter of c. 6-7 cm and a thickness of c. 3 cm will have been used for sealing the bungholes. Longer bungs, which are often tapered, will have been used after opening the barrel and for closing it temporarily. These bungs, therefore, will have no stamps and, because of their tapered shape they can easily be inserted into and removed from the bunghole. Because this type of bung has, on one end, a larger diameter than the bunghole, the bung will not accidentally end up in the barrel (find number 4001n, Plate LIII.210). This is not the case with the primary bung with straight sides, that offers no grip to pull it out of the hole. It is therefore likely that the bung was pushed through the bunghole, during the opening of the barrel. The bung could have been poked out with a tool and would probably have been damaged in the process.

Interesting in this matter is the bung that was found in the bunghole of the barrel in well 1976-2. It had bevelled sides and was fitted with a narrow groove all around. It may have had a string around it, with the end hanging out of the bunghole, so that the bung could easily be pulled out of the hole (Fig. 10.7).[268]

Amphorae were also closed with bungs. Depending on the size of the amphorae, the bungs will vary in diameter (Fig. 10.8). Unlike with barrels, after opening the sealed amphorae

Figure 10.7 Bung with grooved side from the barrel in well 1976-1 (source: archive of the Archaeological Working Group Velsen, AWV).

[267] Tegtmeier 2016, 137-139.
[268] The object is missing.

Figure 10.8 Amphorae from Velsen 1 with wooden bungs. The bungs were found in the harbour basin, but are not the original bungs from the amphorae as these were found without bungs (photo: M. IJdo).

or jugs, the bungs could still be used to close them. Moreover, primary bungs from barrels could have been recycled to close an amphora or jug. In the case of the branded bungs from Velsen, two are undamaged and each of the other two has one half missing. Based on the dimensions, two of the stamped bungs were probably too small for a standard-sized barrel (find numbers 2035.1 and 2035.2, Plate LIV.231-232). That leaves three stamped bungs that may have sealed a bunghole at some point. One of the three is tapered. This makes it less suitable as a primary bung for a barrel, as the sides will not connect well to the edges of the bunghole. This is probably a bung from a large amphora. The two others are damaged and the original thickness is unknown. In terms of diameter and because of the straight sides, these could have been bungs from barrels. The long, conical stoppers will have been used for narrow openings, in amphorae, jugs, or glassware. They could also have been used with skin waterbags. Among the bungs and stoppers there is a deviant type (find number 3375, Plate LIV.226). This is a specimen with a straight shank and an accentuated head; the shank is pierced at the bottom. The object is reminiscent of a spigot.

For sealing amphorae and jugs, bungs from the bark of the cork oak (*Quercus sorbur*) were also used, but none occur in the wood spectrum of Velsen 1.

11 Fastening and Securing

11.1 Bolts and catches

The assemblage from Velsen 1 includes thirteen bolts and two catches; six of these objects are listed in the catalogue (find numbers 3127, 3366, 3132, 122.1, 3044 and 3347, Plate LV.235-240). The bolts have a shaft and, usually, a triangular head. The catches have a bevelled part and a protruding part with a kind of ledge on which the bolt can rest. To fasten a door, the bolt was attached to a door and, during closing, the shaft was placed in a catch on the door post (Fig. 11.1). This closing mechanism is still in use today for barn doors and garden fences.

Three bolts are made of alder, two of oak, one of ash, one of hornbeam, one of beech, and one of maple. Two catches, both with a remnant of a nail in the chamfered ends to fix them on door posts, were made of ash.

Figure 11.1 Catch from Velsen 1 (left: find number 3044, ash) and fastening mechanism with a bolt and catch on an old farmhouse door (Bokrijk Open Air Musem, Belgium) (photos: BIAX *Consult*).

11.2 Locks and latch lifters

From the harbour basin, a tumbler lock component of ash that initially housed a deadbolt and two or more tumbler pins were recovered (find number 1918.1; Plate LVI.241; Fig. 11.2). With this type of lock, doors of buildings and cabinets could be secured. The bottom part of the lock was the recess for a deadbolt to slide into and out of when locking or unlocking (Fig. 11.3). The long, narrow channel at the centre was for a restraining pin for a dual-use tumbler lock that required the user to pull the pin back while using the key to properly move the deadbolt. The imprints on the back of the component are likely from mounting pins or brackets used to fit the component into a door jamb or the inside of a chest.[269] One batten made

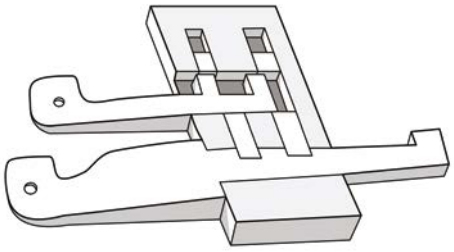

Figure 11.3 Schematic depiction of the mechanism of a tumbler lock (after Birley 2002, Fig. 39).

[269] Personal communication T. Pace (Principal Investigator and Project Director at Afendras Archaeology).

Figure 11.2 The tumbler lock (left; find number 1918.1, ash) and the deadbolt (middle; find number 3323, ash) from Velsen 1, next to a reconstruction of the wooden tumbler lock with dead bolt and latch lifter (right).

Figure 11.4 Four latch lifters from Velsen 1 and a reconstruction (upper specimen, photo: M. IJdo).

of ash, and with a broken end, is interpreted as a deadbolt (find number 3323, Plate LVI.242). At one side are three sunken parts for the tumblers of the lock. In one of the compartments a tumbler pin of oak is still present.

The pins in the deadbolt were pushed up with keys of the latch lifter-type. Usually, the latch lifters have a straight back and have two to a maximum of four tines. The grip is mostly rounded and pierced. The latch lifters from Velsen 1 measure up to 20 cm in length and are approximately 1 cm in both width and thickness. They are more likely to have belonged to a lock of a cabinet than to a door of a building which was provided with heavier locks and stronger keys (Fig. 11.4). The keys are made of split wood and the grip was carved but the tines were sawn, as can be seen on a key where the saw has gone a little too far (find number 1032.1, Plate LVII.251). Seventeen latch lifters were found at Velsen; fourteen are listed in the catalogue (find numbers 1803, 1553.1, 923, 1165.1, 1004, 1774.1, 3299, 1291.1, 1032.1, 466, 1249.1, 1987.1, 3356, 3066, Plate LVII.243-256). Ash appears to have been often used for the latch lifters. In addition, one latch lifter is made of maple (unspecified taxon), one of Sycamore maple, one of apple or pear, and one of beech; the wood species of six other latch lifters remain unknown.

Locks are common items, occurring in both military and civilian contexts. Similar finds of locks and latch lifters are known, for example, from Vindonissa,[270] Homburg-Saalburg,[271] Tasgetium, and Vindolanda.[272] Three rectangular locks from the *vicus* Tasgetium are made of beech and one of ash. However, the pins of the locks were made of iron, as was the key that pushed the pins up.[273] A tumbler lock from Vindolanda and one from Homburg-Saalburg are more similar to the one from Velsen. Both were used with wooden tumblers lifted by wooden latch lifters. From Vindonissa, several latch lifters made from a wide variety of wood species are known. In addition to oak, beech, and alder, the use of yew, pine, silver fir, and sweet cherry is notable.[274]

At Velsen 1, keys made of metal, bone, and antler were also found. Those made of bone and antler are also of the latch lifter-type, while an iron one can be specified as a slide key by the position of the section with tines (Fig. 11.5).

Figure 11.5 Iron slide key from Velsen 1 (source: archive of the Archaeological Working Group Velsen, AWV).

11.3 Seal locks (with a contribution from Tommas Pace)

For secure shipping or for the storage of goods in baskets (and possibly other light containers), wooden seal locks were used. Parts of three seal locks were found at Velsen 1. These are rectangular blocks, one of which is made of maple (find

270 Leuzinger 2012, 87-88.
271 Jacobi 1897, 462-480.
272 Birley 1997 (revised 2002).
273 Leuzinger 2012, 88.
274 Fellmann 2009, 39-40, Plate 148.

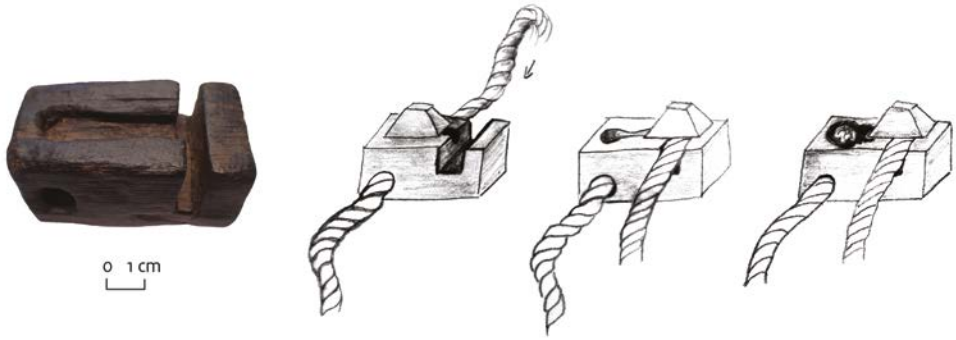

Figure 11.6 Seal lock from Velsen 1 (left: find number 1567, maple; photo: BIAX *Consult*) and explanation of the mechanism of a seal lock (after Feugère 2001, Fig. 1b).

number 1567, Plate LVIII.257); the species of the other two blocks have not been identified (find numbers 1031 and 422, Plate LVIII.258-259). The blocks have a vertical and a horizontal groove. The vertical groove is not visible from the outside. Via the horizontal groove - and in find number 1567, via the hole through the block - a rope could be drawn to fix the seal on a container. One of the blocks, of which half has been preserved, has nail holes at the corners. This seal lock might have been attached to a box (find number 422).

From all three seal locks, the sliding mechanisms, which initially were attached at the top to lock a cord or a rope in place, are missing. The sliding mechanism would be placed into the lock and moved to the right. The cord or rope would then be placed inside, and the sliding mechanism would be moved over it. The last step of sealing occurs at the end, when the owner would pour hot wax to the right of the sliding mechanism and mark it with a stamp seal. The wax would prevent the sliding mechanism from unlocking in transit and also let the owner know if anyone had tampered with the contents if the seal was broken (Fig. 11.6).

Securing goods and documents was not exclusive to military organisations. Private individuals and merchants also secured their valuables. Vikan mentions the sealing of cabinets, doors, wine jugs, and grain sacks, and refers to a letter from Roman Egypt in which someone wrote: 'Among my baggage is a measure of dates from Ombos and twenty-five pomegranates, under seal'.[275]

Seal locks were found in Cologne,[276] Vindonissa (Fig. 11.7),[277] in the shipwreck near Comacchio,[278] in Nimes,[279] and in Vindolanda.[280] In addition to seal locks made of wood, there are

[275] Vikan 1980, 10.
[276] Tegtmeier 2016, 168-172.
[277] Fellmann 2009, 109, Plate 39, 1193, 1193.1.
[278] Berti 1990, 266, Plate 72, 240-241, 239-242.
[279] Mille *et al.* 2018.
[280] Sands, forthcoming.

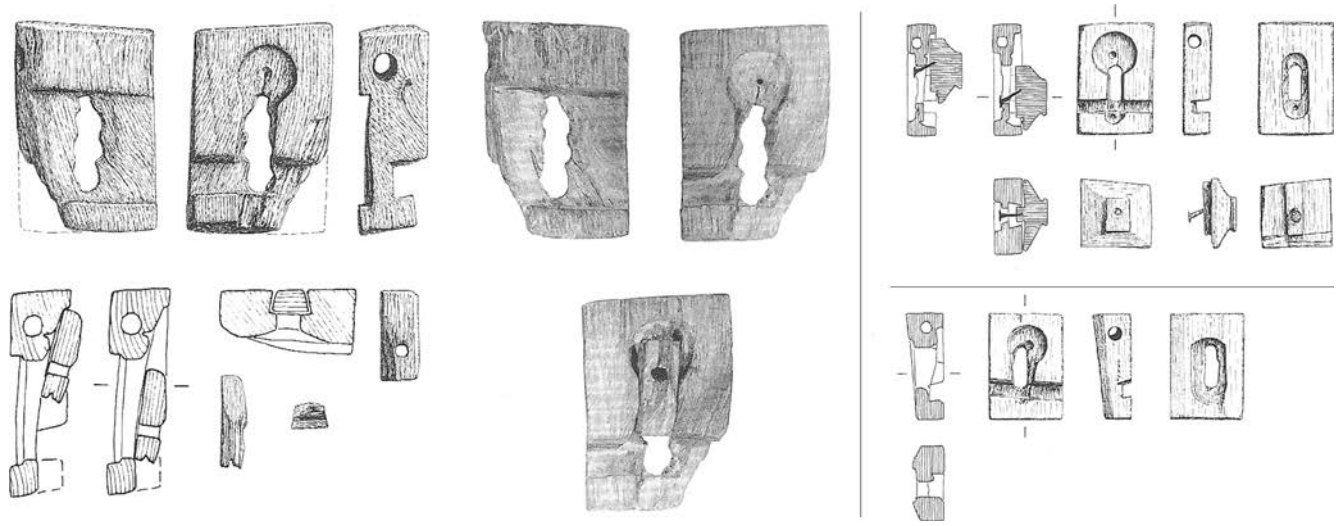

Figure 11.7 Seal lock from Vindonissa (source: Fellmann 2009, Plate 39, 1139).

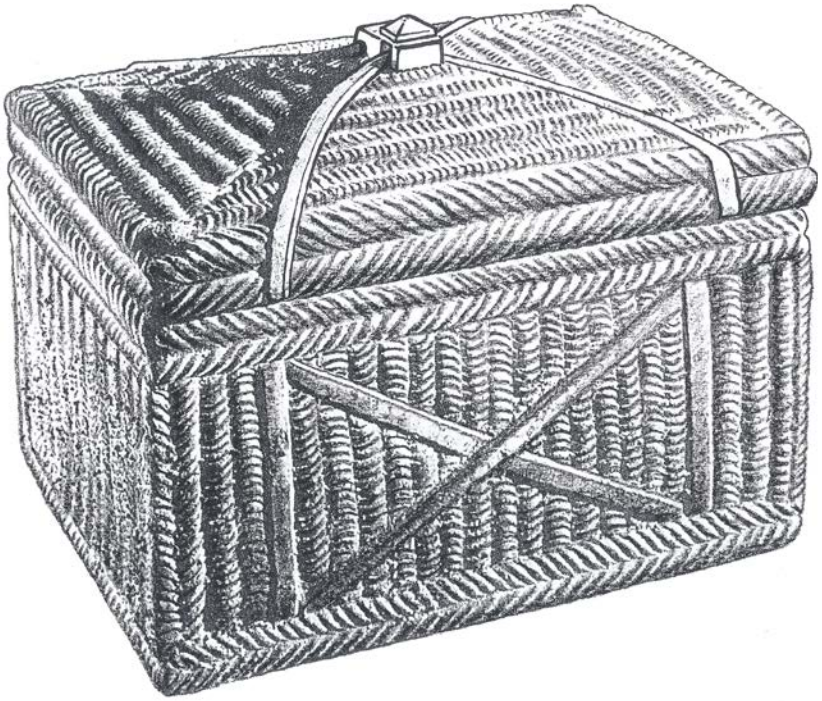

Figure 11.8 Depiction of a seal lock on a marble urn in the shape of a basket, find location unknown (drawing: R. Timmermans, after Ciarallo 2001, photo 122).

also specimens known to be made of bone.[281] A well-known example of the locking mechanism is an urn in the form of a basket with a seal lock closure (Fig. 11.8).

In this context, it is interesting to mention a small maple bowl filled to the brim with bitumen. Bitumen was used for various purposes, including caulking ship planks and attaching gemstones or glass in jewellery.[282] Connan refers to the natural petroleum as 'the adhesive of antiquity'.[283] Considering the bowl in

Figure 11.9 Delicate turned bowl filled with bitumen (photo: M. IJdo).

which the bitumen was found, it may have been used here for sealing (find number 1572.1, Plate XC.377; Fig. 11.9).

281 Tegtmeier 2016, 169.
282 Connan 1999, 33-50; Schwartz 2016, 1.
283 Connan 1999, 35.

12 Lightweight Constructions

12.1 Stakes, boards, battens, and slats

A total of 645 pieces of timbers with small dimensions have been found. Many of these small timbers were parts of lightweight constructions. These include stakes, boards, slats and battens, which were possibly fragments of wooden uprights of tents, furniture frames, or other installations with wooden elements. Some pieces have joints, such as mortise and tenon joints and half lap joints. The functional interpretation of individual parts of constructions, which are, moreover, often not complete in length, cannot be given with certainty. This requires a frame of reference that is currently lacking for these kinds of timbers. However, it is precisely these inconspicuous fragments that can shed more light on questions about the construction of tents or the interior design of barracks. Because of the informational value of these parts, it was decided to include thirty-seven of these items in the catalogue (Plates LVIX.260-LXVII.296).

The wood species of 493 pieces of lightweight construction timbers were identified (Table 12.1). The spectrum of wood species is dominated in the first place by ash and in the second by alder, followed by oak. Present, but to a lesser extent, are construction elements of beech. Moreover, some of the coniferous elements were made from recycled staves, and those from pine could have come from the woodland of the dune area. The other wood species occur sporadically, sometimes only once. The presence of a small amount of willow is remarkable. Willow certainly grew in the area but was seldom used for light constructions.

The vast majority of the small construction timbers are stakes made of split wood, often triangular and rectangular in cross-section, and measuring up to 4 cm in width (occasionally up to 7 cm). The shape and size of the stakes

Table 12.1 Velsen 1. Distribution of the wood species of the different categories of the small construction timbers.

Wood species	Battens	Boards	Slats	Stakes	N
Alder	44	41	15	50	150
Ash	45	30	26	71	172
Beech	9	2	1	12	24
Hazel	-	-	-	2	2
Juniper	-	-	-	3	3
Lime tree	-	1	-	-	1
Maple	-	-	-	3	3
Field maple	1	4	-	-	5
Norway maple	-	1	-	-	1
Oak	21	35	15	34	105
Spindle tree	2	-	1	1	4
Willow	-	-	-	2	2
Coniferous wood	-	1	-	-	1
Pine	7	2	-	2	11
Silver fir	-	2	4	1	7
Spruce	1	-	-	1	2
Spruce/Larch	-	-	-	-	0
Unidentified	62	55	18	17	152
Total	192	174	80	199	645

resemble wattles from historical wattle constructions, which were often, but not always, daubed with clay. The use of unsplit wood is less common. One of the few stakes of unsplit wood is a perforated roundwood made from ash with a diameter of 6.5 cm (find number 2601, Plate LVIX.264). In addition, a large number of battens with rectangular cross-sections and with dimensions between 2-7 cm were documented, with some outliers having widths up to 8 cm. The thickness of the battens varies between 2 and a maximum of 5 cm, with an average of 2.5 cm. The range of the dimensions of widths and thicknesses of the boards is also limited. These are boards with widths of approximately 7-11 cm, and thicknesses of 1-3 cm. A number of boards made of the recycled staves of casks have larger widths, namely between 11-19.5 cm, and thicknesses between 2-3.4 cm. The boards and battens are usually obtained from radially split wood, and a few are sawn tangentially.[284] Some of the ends of boards and battens have been preserved intact. When studying those ends, it is noteworthy to see that they often have a tenon. These elements were part of mortise and tenon joints, both in the horizontal and vertical planes.[285]

The relatively large number of slats is striking. These are narrow and thin pieces of split or sawn wood with widths up to approximately 3 cm and thicknesses up to approximately 2 cm. The slats could have served as a decorative finish but may also have been used to seal seams in roofs or planking (Table 12.2).

12.2 Parts from frameworks

In general, carefully finished specimens with a smooth surface were probably used in frameworks for furniture. Examples include a batten of alder with a perforated rectangular tenon for a pegged mortise and tenon joint (find number 3045, Plate LX.267) and a batten made from ash, with a mitred bridle joint (find number 3419, Plate LXV.293). The mitred bridle joint contains one element with a mortise (a slot) and another with a matching tenon, just as the common mortise and tenon joint has. The joint was strengthened by mitre-sawing the shoulders of both pieces. Such a wood connection is applied in the frames for tables, couches, and beds. Another piece of joinery is a block with protruding parts on three sides, to secure a veneer, for example, for a cabinet (find number 439; Plate LXV.290).[286] Furthermore, a board of alder was recovered, with rectangular recessed parts on two sides, probably for a lap joint, also for a piece of furniture (find number 408.1, Plate LXV.289).

Apart from boards and battens with a tenon at the end, there are some with one or more mortises distributed over the surface. The holes often contain remnants of wooden dowels or pegs, which indicates that these boards were connected to another wooden element. Examples for the application of this type of joinery are doors, chests, and hatches, made by

Table 12.2. Velsen 1. Overview of small timbers and documented woodworking joints.

Wood species	Battens	Blocks	Boards	Slats	Stakes	N
Mortise and tenon	45	3	30	-	-	75
Perforated	-	-	-	7	-	7
Half lap	7	-	3	-	-	10
Mitred corner bridle joint	1	-	-	-	-	1
Mitred butt	-	-	1	-	-	1
Dove tail	1	-	-	-	-	1
Nailed	9	-	9	3	3	24
Profiled	15	3	20	2	-	37
Pointed	-	-	-	-	37	37
Other	114	11	111	68	159	452
Total	192	17	174	80	199	645

[284] Most of them have not been described by van Rijn as far as the part of the tree that was used and the way they were removed from the tree are concerned. Moreover, most of the planks no longer exist. Therefore, an analysis according to the distribution of processing must be omitted.

[285] A functional interpretation of the small timbers would have been easier if the lengths of some timbers had been completely preserved. For example, as the height of Roman tents was approximately 200 cm, poles or stakes with corresponding lengths would be expected as uprights. Unfortunately, in all cases, the parts which would fit because of their dimensions in cross-section were all fragments.

[286] Personal communication from F. Heijting, archaeologist and passionate woodworker.

placing boards side by side and securing them with a transverse board, batten, or slat, with a mortise and tenon.

Within the assemblage of small construction timbers, one group stands out: those boards and battens with a groove on one edge (find number 2160.1, Plate LX.270; find numbers 3363.5, 3361.4, 3361.1 and 1514.1, Plate LXI.271-274;) or on both edges (find number 1211, Plate LX.269; find numbers 3361.2 and 2155, Plate LXI.275-276). These construction elements also formed parts of frameworks, as evidenced by the find of a mitred sawn batten of ash with a groove on the inner narrow side (find number 2160.1; Plate LX.270). There were probably boards - either horizontal or vertical - in the grooves to create a flat wooden surface, appropriate for doors, lids, or panel walls of cabinets. Using thicker construction timber, this could also have been a technique for building interior walls.

12.2.1 Two battens of frameworks with remains of transverse connections

In addition to the rather short pieces from frameworks, longer fragments of two battens from pine, almost square in cross-section, have been preserved (find number 3142, Plate LXVII.295 and find number 418.1, Plate LXVII.296). One of the fragments, find number 3142, was found by Bosman during a field survey in the construction pit of the Wijkertunnel (located at the most western part of the harbour of Velsen 1). This fragment has two rectangular mortises and a remaining length of 33 cm. In the mortises are the ends of the tenons of boards, made of oak, that were placed at right angles to the batten. These tenons were initially pegged, as can be deduced from the holes which were drilled from the sidewall through the mortises. Moreover, wedges from oak were used to secure the joint. One end of the batten is broken, the other is mitred sawn. Interesting is the use of two types of wood for the construction: pine for the framework and oak for the cross planks between the battens. The use of two different species may be explained from a functional point of view. It is possible that the durable oak was chosen to increase the strength and load-bearing capacity of the construction. However, it is possible that the choice was also based on aesthetic preferences and that the light wood of pine was consciously chosen for the visible elements. Based on the dimensions of the batten, one might think that it was part of a framework for a bed or a couch. The second batten, find number 418.1, is 78 cm long and two of the initially four mortises are preserved. No remains of tenons were found in the mortises, and both ends are broken. This object, too, will have belonged to a framework.

13 Furniture

13.1 Furniture components

A variety of furniture parts was collected from the Roman layer of the harbour basin. Of the total of 137 recorded pieces, the seventy-one still present in the collection of the National Museum of Antiquities or represented by a well-defined drawing are included in the catalogue (Plates LXVIII.297- LXXXIII.367). Some were decorated with ornamental lines and some remained undecorated. Most of them were carefully finished. Attachments, such as cornices, and decoratively profiled slats and mouldings were used to embellish the construction parts. An overview of the furniture components and their presumed allocation to a piece of furniture is given in Table 13.1. It may be that some parts cannot be allocated to a specific furniture item. In this case, all of the possible options are listed.

13.2 Wood species

Of the total of 137 recognisable furniture parts, the wood species of 108 items have been identified. Oak, beech, alder, ash, and Maloideae, type apple/hawthorn/pear are the most commonly used species for furniture, followed by various maple species. Boxwood and silver fir each occur four times. Ash appears to have been used for widespread purposes: for furniture legs and for construction elements in frameworks (Chapter 12), as well as for finishing with decorative elements. Spindles are made of alder, apple or pear, beech, and the wood of the spindle tree. Thin boards, probably used for panels and doors for cabinets and for hatch covers, were mainly made of oak (Table 13.2). The furniture appears to have been largely made from wood species that could be found in the immediate vicinity of the fort.

Table 13.1 Velsen 1. Furniture components and their possible uses.

Furniture part	Number	Type of furniture
Furniture legs, turned	21	bed/couch, chair, stool
Furniture legs, carved	14	bench, chair, stool
Furniture legs, carved/turned	7	bed/couch, chair
Possible furniture legs	3	footstool
Turned and pierced parts of furniture legs	3	chair
Turned spindles (stretchers)	4	chair
Ornamental slats	3	cabinet, rack, chest
End pieces (finials)	5	bed/couch, chair
Cornices	6	cabinet, rack
Mouldings	20	cabinet, rack, bed/couch, house shrine
Stretchers at ground level	5	bed/couch
Battens with a notch	5	from framework (?)
Boards (seats)	2	stool
Boards, battens, and slats	11	chest
Plank with leather trim and nails	1	chest
Hooks	2	hanging hooks
Board with two rows of holes (base for wicker work)	1	wicker chair
Boards, insert and partition	2	small box
Boards, thin	22	interior door, cabinet door, hatch cover
Total	137	

In historical sources, particularly Pliny's *Naturalis Historia*, the suitability and aesthetic values of different woods for furniture are discussed in detail. Among others, wood species such as citrus wood, boxwood, olive, chestnut, cedar, and cypress, all trees of the Mediterranean, were recommended in written sources. Citrus wood clearly has a high status and will have been accessible mainly to the richer classes of the population.[287] Pliny explicitly mentions maple as furniture wood, and in particular the use of burrs because of their special pattern due to a deformed growth, with small, tightly packed knots and distorted grain.[288]

The furniture from Herculaneum appears to have been primarily manufactured from silver fir, a tree that grew on the nearby flanks of the mountain area.[289] Availability will surely have played a major role in the choice of wood for furniture, despite aesthetic preferences and trends.

Of the four species that dominate the furniture spectrum from Velsen (oak, beech, alder, and ash), only beech and alder are mentioned by Pliny. According to him, beech is easy to work and also to bend, a quality that was especially useful for lath-wall boxes and book-boxes.[290] Alder, on the other hand, was desired as

[287] Pliny the Elder, *Naturalis Historia*, 13.96-13.97.
[288] Pliny the Elder, *Naturalis Historia*, 16.66-16.68, 16.85.
[289] Mols 1994.
[290] Pliny the Elder, *Naturalis Historia*, 16.84-229.

Table 13.2 Velsen 1. Overview of wood species used for furniture.

Furniture part	Alder	Apple/Hawthorn/Pear	Ash	Beech	Boxwood	Elder	Juniper	Maple	Field maple	Sycamore maple	Oak	Spindle tree	Coniferous wood	Pine	Silver fir	Unidentified	N
Furniture legs, turned	1	2	3	5	-	-	-	-	3	-	1	-	-	-	-	6	21
Furniture legs, carved	3	1	1	4	-	-	-	-	1	-	3	-	-	-	-	1	14
Furniture legs, carved/turned	-	-	-	3	-	-	-	-	1	-	1	-	-	-	1	1	7
Possible furniture legs	-	1	-	-	1	-	-	-	-	1	-	-	-	-	-	-	3
Turned and pierced parts of furniture legs	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3
Spindles (stretchers)	1	1	-	1	-	-	-	-	-	-	-	1	-	-	-	-	4
Ornamental slats	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	3
End pieces (finials)	-	1	-	1	-	-	-	-	-	-	1	-	-	-	-	2	5
Cornices	-	-	3	2	-	-	-	-	-	-	1	-	-	-	-	-	7
Mouldings	4	-	2	2	-	-	-	-	-	-	1	-	-	-	-	11	19
Stretchers at ground level	3	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	5
Battens with a notch	2	-	1	-	-	-	-	-	-	-	-	-	1	-	-	1	5
Boards from seats	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	2
Boards, battens, and slats from chests	3	-	-	1	1	-	-	1	-	-	-	-	-	1	2	2	11
Plank from a chest	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Hooks	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	2
Board from a wicker chair (?)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Boards from small boxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2
Thin boards	-	-	1	-	-	-	-	-	-	-	19	-	-	-	-	2	22
Total	17	8	13	22	4	1	1	1	5	1	28	1	1	1	4	29	137

Figure 13.1 Overview of furniture items from Velsen 1 (photo: P. van Rijn).

veneer, and is listed for this application together with maple, dark terebinth, boxwood, and palm.[291] It is therefore questionable whether the Roman woodworker in the fort at Velsen would have had such a low regard for alder that contemporary researchers attribute to the use of this species. Perhaps the choice for alder when it came to the decoratively turned bed leg (find number 994.1, Plate LXVIII.299) was therefore not a choice made out of necessity, but a deliberate choice for this light wood with a satin sheen.

Ash and oak are not mentioned by Pliny for their specific use as wood for furniture. But, as Croom argues, oak will certainly have been used frequently, if only because of the strength and durability of the wood.[292] In this regard, ash may not have had the same properties as oak, but it would have been a particularly suitable material for frameworks, as it is easy to split and turn and was widely available in the region of Velsen. Ash is lighter in weight than oak, a property that may have been used purposefully, for example, in the case of portable constructions.

13.3 Furniture legs and spindles

Both carved and lathe-turned furniture parts are present in the Velsen assemblage, though these may differ in their finish (Fig. 13.1). For example, there are ingeniously turned furniture legs and spindles contrasting with simple cylindrically turned specimens. Moreover, there are carefully carved specimens with detailed finishes, as well as simple chair legs made of roundwood with a carved tenon at the top. For a number of the missing furniture legs, it was not possible to determine from the drawing whether the object was lathe-turned or cut. These are three legs of beech (find numbers 4634, 4604, and 4600), one of oak (find number 4617), one of field maple (find number 1930.1), one of silver fir (find number 1644.1), and a leg of which the wood species has not been identified (find number 135). From these objects, only vague drawings exist.

13.3.1 Decoratively turned furniture legs

Among the most remarkable pieces of furniture from of Velsen 1 are three well-preserved legs with a delicate design (find numbers 3033, 3314 and 994.1, Plate LXVIII.297-299). One furniture leg, made of ash and probably a chair leg or a leg of a stool, has an alternating pattern of beads and grooves and a preserved length of 26.5 cm (find number 3033, Plate LXVIII.297). Another leg, turned from a piece of alder, with alternating rings and coves from the top towards the wider base, has a length of 23.1 cm and probably belonged to a bed (find number 994.1, Plate LXIII.298). An example of a bed or couch with turned legs is depicted on the tombstone from the end of the first century AD of Caius Iulius Cai Galeria Baccus, a soldier of the first Thracian cohort, which was formed in what is now Bulgaria, and who was for some time stationed in Bonn (Fig. 13.2). A slightly tapering leg of ash, with decorative lines incised in three places and with an accentuated base, differs in design from the lavishly turned furniture legs because of its

[291] Pliny the Elder, *Naturalis Historia*, 16.84-231.
[292] Croom 2007, 22.

Figure 13.2 Depiction of a bed or couch with decoratively turned legs on the tombstone of Caius Iulius Cai Galeria Baccus from the end of the first century AD (source: Romano-Germanic Museum Cologne/photo: BIAX *Consult*).

relative simplicity (find number 3314, Plate LXVIII.298). At its top there is a rectangular tenon with the remains of a round dowel or peg. This leg, with a length of 23.2 cm, was initially attached to a pegged mortise and tenon joint of a chair or a stool.

13.3.2 Decoratively turned spindles

These items are spindle-turned on a lathe and have a tenon at both ends so that the piece could be placed between two wooden elements, for example, as a stretcher between two furniture legs. The assemblage of Velsen 1 includes four spindles (Fig. 13.3). The first of these is a delicately turned spindle with a length of 18.7 cm. The spindle is made from the wood of the spindle tree and has a rectangular tenon on both ends (find number 1015.1, Plate LXIX.300). By way of comparison, three similarly shaped spindles of field maple and one of ash have been found from the shipwreck De Meern I.[293] The second is a spindle made of beech and fitted with a perforated tenon at each end. The tenons are not centred, but slightly

Figure 13.3 Overview of spindles from Velsen 1 (from left to right: find number 55.1, Maloideae, apple/hawthorn/pear; find number 922.1, beech; find number 1015.1, spindle tree; find number 3058, alder).

offset from the middle. The spindle is completely preserved and has a length of 19.3 cm (find number 922.1, Plate LXIX.301). A third spindle, less completely preserved, is

[293] Mols 2007, 185; Mols does not specify to which piece of furniture the spindles could have belonged.

made of Maloideae, type apple/hawthorn/pear, and has a length of 25.3 cm. At one end, the remnant of a tenon can still be recognised; the other end is broken (find number 55.1, Plate LXIX.302). The tops of the spindles of find numbers 922.1 and 55.1 are remarkably similar to each other in terms of finish. Below the tenon, they both have a turned ring with an incised decorative line on the edge. It cannot be ruled out that they came from the same piece of furniture. Of course, it could also be possible that this was a stylistic feature of a particular region or workshop. A fourth spindle is tapered and made of alder. It has a decoratively turned finish at the top which has a perforated pen for a pegged mortise and tenon joint. The preserved length is 16.1 cm; the lower part of the spindle is broken (find number 3058, Plate LXIX.303).

Figure 13.4 Overview of undecorated furniture legs from Velsen 1.

13.3.3 Undecorated turned furniture legs

Lathe-turned, but different in design, is a leg of a stool made of Maloideae, type apple/hawthorn/pear, with a cylindrical top and with a remnant of a tenon (find number 1902.1, Plate LXX.306). Halfway down the leg a curved outward section ends in a claw-like foot. The finish of the foot is no longer visible due to the weathering of the wood. The foot was possibly carved in the shape of a dog's foot or the claw of a lion. This furniture leg has an unusual element, namely a rounded notch just above the curved part. This is probably post-depositional damage, and not the result of functional processing. Another chair leg from oak tapers from the top towards the bottom and has a remnant of a tenon at the top (find number 3303, Plate LXX.308). Several lathe-turned, undecorated objects were interpreted as furniture legs, eight of which are listed in the catalogue: four of beech (find numbers 3350 and 3136, Plate LXXI.310-311; find numbers 3315 and 3109, Plate LXXI.314-315), two of field maple (find numbers 112.1 and 3382, Plate LXXI.312-313), one of ash (find number 133.1, Plate LXXI.316) and one of Maloideae, type apple/hawthorn/pear (find number 3119, Plate LXXI.317). Those legs are mostly straight or slightly tapered from the top towards the bottom (Fig. 13.4). The preserved lengths of the legs vary between 16-20.5 cm, but as none is intact, it is difficult to say to which kind of furniture they belonged, whether to beds, couches, chairs, or tables. Simple furniture legs of this kind also functioned as support legs for a bed frame, for example, while the furniture legs at the corners could have been finished decoratively. Examples of this are known from Herculaneum (Fig. 13.5). Nonetheless, it cannot be ruled out that fragments of handles, poles, or stoppers are present among these artefacts which have been interpreted as furniture legs.

Figure 13.5 Bedframe from Herculaneum with decoratively turned furniture legs at the corners and simple legs (here replaced by modern iron ones) for supporting the framework (source: Mols 1994, Fig. 26).

13.3.4 Carved furniture legs

There are twelve, possibly even thirteen, carved furniture legs.[294] These include carefully carved legs of maple and ash, as well as quite simple

[294] Due to weathering, it is not possible to decide with certainty if find number 112.1 was carved or lathe-turned.

stool legs of ash, oak, and alder (find number 79.1, Plate LXXI.309),

An example of the first group is a field maple leg with a tenon-like protuberance at the top; it is slightly curved at the ankle, where it terminates in a claw-like base (find number 394.1, Plate LXXII.318). The top, just below the tenon, is accentuated by a straight ledge. Towards the lower part, the leg continues with rounded edges. One side of the furniture leg is simpler and lacking a ledge, so we can conclude that it is for the back side. Because the ankle bends outwards to the left, the leg will have been on the left side of a piece of furniture. Based on the length of the leg, 25 cm, this furniture leg will initially have belonged to a low table. An oak leg of a stool has a tenon at the top that once was inserted into a wooden plank. Considering the length of the tenon, the plank must have been quite thick (find number 75.1, Plate LXXII.319). Another chair leg is made of oak, with a tapered end, changing from an angular to a round cross-section towards the end. There was, presumably, a tenon at the top end, which has broken off (find number 2112.1, Plate LXX.307). Further, a tapered, outwardly curving furniture leg carved from a piece of alder was recovered (Fig. 13.6). The preserved length is 33 cm; both ends are broken. This leg probably belonged to a round table with three legs such as the one found in Herculaneum (find number 4132, Plate LXXIII.320, and Fig. 13.7).

Figure 13.6 Table leg from Velsen 1 (find number 4132, alder; photo: BIAX *Consult*).

Figure 13.7 Table leg from Herculaneum. This type of leg was used for round tables with three legs, such as the one found at Herculaneum (source: Mols 1994, Fig. 116)

13.3.5 Turned and pierced parts of furniture legs

Bulbous, disc-shaped, or cylindrical objects with a perforation were probably parts of composite furniture legs with an iron rod in the middle, the so-called soul (Fig. 13.8). This type of furniture leg is known from Herculaneum.[295] Two specimens from Velsen 1 could have belonged to this type of furniture leg. One is half of a cylindrically turned piece with a ledge at the top and a decorative, incised line on the edge of the ledge, made of Maloideae, type apple/hawthorn/pear (find number 3253, Plate LXIX.305). The wood species of a second specimen could not be identified after conservation. At the upper part of this object there are two turned rings widening upwards towards the flared top (find number 3398, Plate LXIX.304; Fig. 13.9).

13.3.6 Possible furniture legs

In three cases, the interpretation as a furniture leg is not quite certain (Fig. 13.10). This includes an asymmetrically shaped object with a knob-like base, made of Maloideae, type apple/hawthorn/pear. With a length of 11.5 cm, this object could have been part of a footstool (find

[295] Mols 1994, 101, Plate 27.

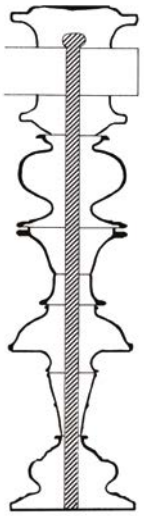

Figure 13.8 Schematic depiction of a composite furniture leg (Mols 1994 , Fig 27).

Figure 13.9 Possible part of a composite furniture leg from Velsen 1, find number 3398 (photo: BIAX *Consult*).

Figure 13.10 Possible furniture legs from Velsen 1 (from left to right: find numbers 1360.1, 1826.1, and 3128; photo: BIAX *Consult*).

number 1360.1, Plate LXXIV.321). The second item is a small, turned object of boxwood with a preserved length of 5.9 cm. From a cylindrical shape at the top, the object narrows towards the other end and terminates in a rounded base (find number 1826.1, Plate LXXIV.322). The third object (find number 3128, Plate LXXIV.323), which could have been the foot of a chair or part of a house altar, is turned from Sycamore maple and has a preserved length of 4.1 cm.

13.4 End pieces

Of the seven objects that have been interpreted as end pieces or finials, three have been included in the catalogue (Fig. 13.11).[296] One was turned on a lathe and made of Maloideae, type apple/hawthorn/pear, with a preserved length of 4.1 cm (find number 1854, Plate LXXIV.324). This object was probably used to extend and embellish the corner post of a bed or chair. It has a concave, turned knob and a tenon-like shaft that could have been inserted into a hole at the top of a bedpost or other vertical element of wood. Two rectangular objects with sloping surfaces and a hole in the middle could have functioned as a decorative finish for the corners of a cupboard or a rack. One object is a complete rectangular end piece, made of oak (find number 1467.1, Plate LXXIV.325), and the other is made of beech and is only half preserved (find number 1074.1, Plate LXXIV.326).

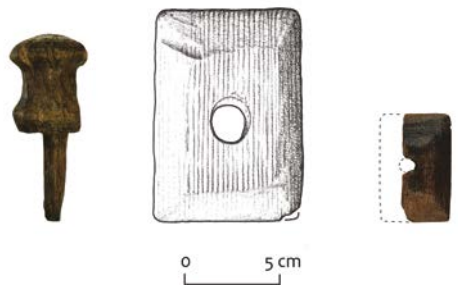

Figure 13.11 End pieces of furniture from Velsen 1 (from left to right: find number 1360.1, Maloideae, type apple/hawthorn/pear; find number 1467.1, oak; find number 1074.1, beech).

[296] The other four were not found in the depot and may be considered to be lost. No drawings of these have been found.

13.5 Cornices and mouldings

The assemblage of Velsen 1 comprises six cornices which are all included in the catalogue: three of common ash (find number 1407.1, Plate LXXV.330; find numbers 4253 and 4205, Plate LXXVI.333-334), two of beech (find numbers 3068 and 1206.1, Plate LXXV.327-328), and one of oak (find number 4166, Plate LXXVI.332; Fig. 13.12). Cornices were placed on the corners of cabinets and racks for decoration. Most of the fronts of the cornices are decorated from the top to the bottom with step-like ledges. Only one cornice has a relatively flat finish with a vertical ledge in the middle (find number 3068). Another cornice is pierced through the narrow side, with the remains of an ash dowel preserved in the hole (find number 4205). In addition to the cornices, the assemblage also contains twenty mouldings; five are included in the catalogue, the other fifteen are missing. Mouldings are profiled slats and boards that can be used to cover a transition between wooden surfaces (Fig. 13.13). A profiled board with three decorative grooves was probably used for this purpose (find number 607, Plate LXXVI.337; wood species not analysed), as well as a profiled slat made of beech, with one edge recessed lengthwise (find number 1928.1, Plate LXXVI.335). A piece of an oak moulding, sawn off on both sides, is probably leftover wood that fell off while the moulding was being cut to size. It is, therefore, evidence of local furniture manufacture (find number 4020t, Plate LXXV.329). Remarkable is a piece of a moulding made of alder which is identified by Mols as part of the rim of the pediment of a house altar or shrine (*aedicula*) (find number 3367, Plate LXXV.331).[297]

13.6 Ornamental slats

Of the seven slats in the assemblage, two narrow specimens have been interpreted as a decorative finish for furniture (Fig. 13.14). One is a slat of ash with one broken end. This slat has a decorative pattern consisting of vertical grooves and crosses that divide the slat into sections. Furthermore, the wood appears to have been painted or stained a dark colour. In the deep parts of the grooves, where the pigment has not adhered well, the original lighter colour of the wood shines through (find number 1710.1, Plate LXXVII.338). The other slat, made of boxwood, is decorated with three longitudinal grooves. On the same side as the grooves, imprints of three

[297] Personal communication with S. Mols, 9 March 2021.

Figure 13.12 Cornices and mouldings from Velsen 1 (from left to right: find number 1407.1, ash; find number 3367, alder; photos: BIAX *Consult*).

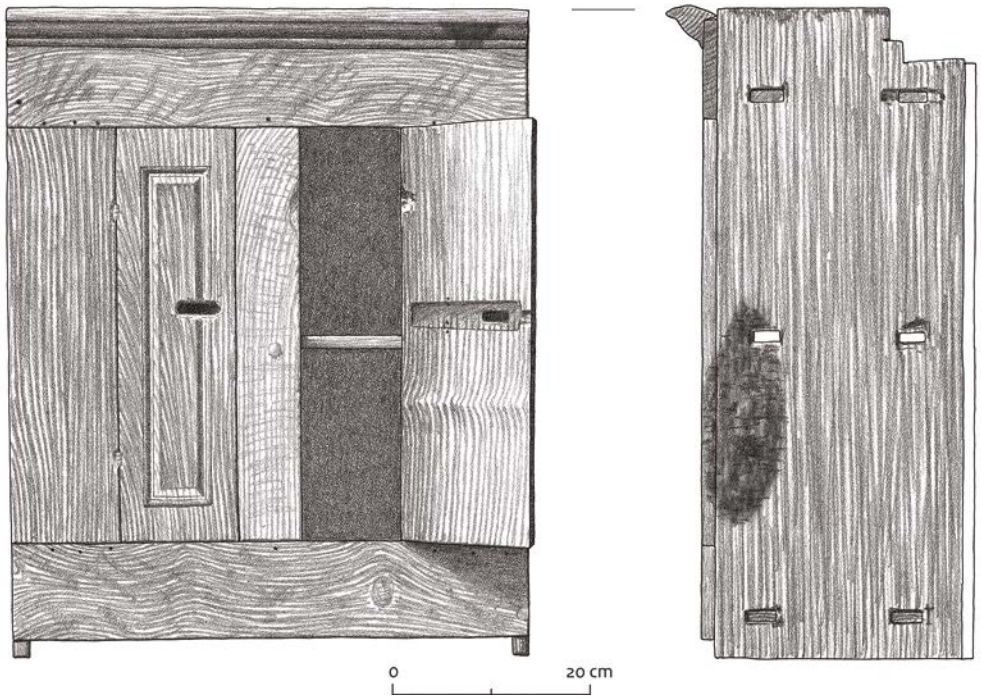

Figure 13.13 Cabinet with moulding from the shipwreck De Meern I (drawing: R. Timmermans).

decorative nails with round heads are visible. The surface of the slat is considerably weathered and the grooves have also worn away. Saw marks can be seen on the unfinished back of the slat. It is not clear whether the ends have been broken or whether this is in fact a complete object (find number 3032, LXXVII.339).

Figure 13.14 Ornamental slats of furniture from Velsen 1, find numbers 1710.1 and 3032 (photos: BIAX *Consult*).

13.7 Stretchers at ground level

Five fragments of boards with an impression were interpreted as stretchers at ground level; four of them are included in the catalogue (find numbers 4018g, 3401, 1815.1, 1815.2, Plate LXXVIII.340-343). Three of these are from alder, one from beech, and one from ash. The impressions on the boards were probably caused by the weight and pressure of an upright, such as an upright of a tent, or by a furniture leg (Fig. 13.15). An example of a stretcher at ground level is depicted on a wall fresco with an erotic scene from Lupanar in Pompeii (Fig. 13.16).

Figure 13.15 Impression on a fragment of a board, possibly caused by pressure of an upright or a furniture leg; find number 4018g (photo: BIAX *Consult*).

Figure 13.16 An example of a bedframe with stretchers at ground level. Depiction on a wall fresco with an erotic scene from Lupanar, Pompeii (photo: C. Raddato).

13.8 Battens with a notch

The function of five objects with a rectangular or triangular notch and a pointed end is not clear, and the objects might just as well have been placed in the category Miscellaneous. Four of the five objects are listed in the catalogue; a fifth one is missing. Two are made of alder (find numbers 4013q, Plate LXXVIII.345; and find number 1525.1, Plate LXXVIII.347), one of ash (find number 78.1, Plate LXXVIII.344), one of coniferous wood of an unidentified taxus (find number 1167.1, Plate LXXVIII.346), and one of wood of which the species is unknown (find number 721). None of the objects has been completely preserved in length. The longest piece measures 14.7 cm (find number 78.1). To the extent that the ends have been preserved, they appear to be pointed. These objects could possibly have been used to clamp a piece of wood or textile; the notch suggests that this object may have been combined with a piece of rope. Objects of this kind are regularly found in Roman contexts. They are also known from Valkenburg and Carlisle (Fig. 13.17).

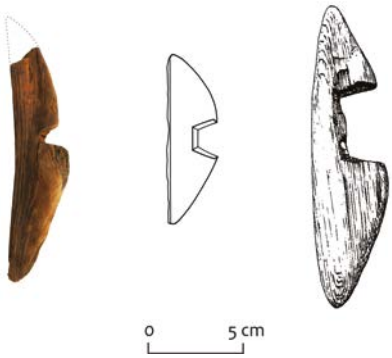

Figure 13.17 Battens with a notch from Velsen 1 (left; find number 4013q, alder; photo: BIAX *Consult*), from Valkenburg (middle; find number 041.0740, ash; source: Van Rijn 1993, 208, Fig. 110), and from Carlisle (right; find number C73-46, oak; source: Caruana & Allnutt, unpublished, Fig. 289).

13.9 Base of a wicker chair (?)

The find of a narrow board of ash with two rows of holes has been interpreted in various ways since its discovery (find number 3024, Plate LXXIX.348; Fig. 13.18). It is 38 cm long, 4 cm wide, and 2 cm thick. One row has fourteen large holes

Figure 13.18 Possible base of a wicker chair from Velsen 1, find number 3024 (photo: BIAX *Consult*).

with a diameter of 0.8 cm, and the other has twenty-two small holes with a diameter of 0.4 cm. The distances between the large holes are 2.7-3 cm and between the small holes, 1.6 cm. A closer look at the board reveals net-like discolouration between the holes (Fig. 13.19). Initially, it was thought to be a musical instrument, part of a hydraulic pipe organ with metal pipes assumed to have been inserted into the holes. This interpretation was declared an unrealistic one by Willberg.[298] The function of the object is still not fully clarified. Perhaps it was part of a wicker chair, with the thicker stakes for the wicker for the seat and the finer ones for the back of the chair. In a chamber grave in Cologne-Weiden, two armchairs made of limestone were found. These chairs are an imitation of wicker armchairs (Fig. 13.20).

If the discolouration or imprints cannot be linked to wickerwork, then it is also possible that they are the imprints of intersecting bands of leather or textile or of ropes of the binding of the bed base. Examples of beds with such a binding are known from Herculaneum.[299]

13.10 Parts of small boxes

Two short, carefully finished slats, both pierced at the ends, were probably parts of small pieces of furniture, such as wooden boxes (find numbers 1084.1 and 3325, Plate LXXIX.349-350). One is made of alder (find number 1084.1), the other of boxwood (find number 3325). The 23 cm-long slat made of alder has straight sides, whereas the 13.3 cm-long slat made of boxwood has one side that is slanted and profiled with three grooves. Moreover, the holes at the ends of the alder slat are square, while those of the boxwood slat are round.

The assemblage of Velsen 1 also includes a rectangular insert with a length of 15 cm for a box. Both narrow ends are fitted on one corner with a tenon for a hinged mechanism. The insert includes both a smaller and a larger compartment. Unfortunately, the object has not been preserved and it is not known from which wood species it was made (find number 296.1, Plate LXXXI.357; Fig. 13.21).

[298] Willberg is specialised in music of the Greek and Roman period and plays different instruments, such as the aulos, the cithara, and the Roman hydraulic organ. In this capacity, he is involved in the European Music Archaeology Project (EMAP).

[299] Mols 1994, 36.

Figure 13.19: Detail of the narrow board with holes and with a pattern of discolouration between the holes (photo: BIAX *Consult*).

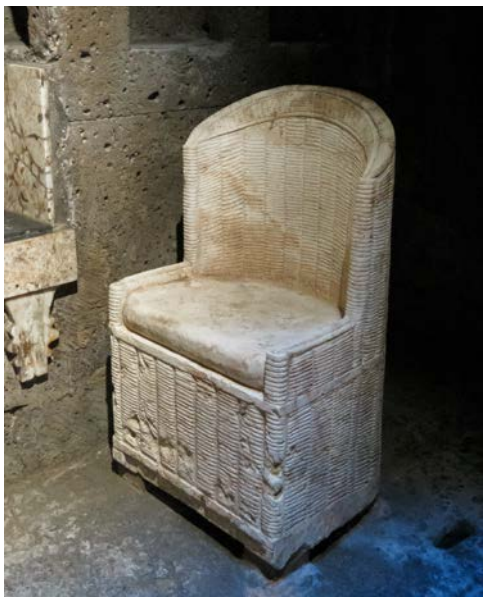

Figure 13.20 A chair made of stone in the form of a wicker chair that was found in a grave tomb at Cologne-Weiden (photo: T. Kopf, Cologne).

Few finds of small boxes are known. One of these is a medicine box from a grave of a *medicus*, unearthed in Nijmegen in 1840.[300] The delicate box from this grave is divided into four separate compartments, each with its own lid. The length of the box is 30 cm; the wood species is unknown (Fig. 13.22).

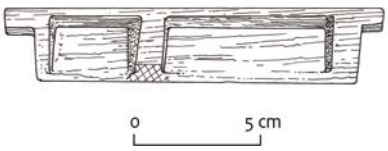

Figure 13.21 A rectangular insert for a box from Velsen 1, find number 296.1 (drawing: J. Kaarsemaker).

[300] Stuart 1986, 47.

13.11 Plank of a chest

An oak plank with a preserved length of 56 cm must have been part of a chest. The plank, with a width of c. 9.5 cm and a maximum thickness of 3.4 cm, has one slanted and one broken end. After salvage, remains of nails, leather, and an iron sheet were documented. None of these can be seen on the conserved object, except for a relatively dense pattern of nail holes. (find number 936, Plate LXXX.352; Fig. 13.23). No conclusions can be drawn about the dimensions of the chest because the ends have not remained intact. The thickness of the plank, however,

Figure 13.22 A medicine box from Nijmegen with original and reconstructed parts. The length of the box is 30 cm (source: National Museum of Antiquities, RMO, Leiden).

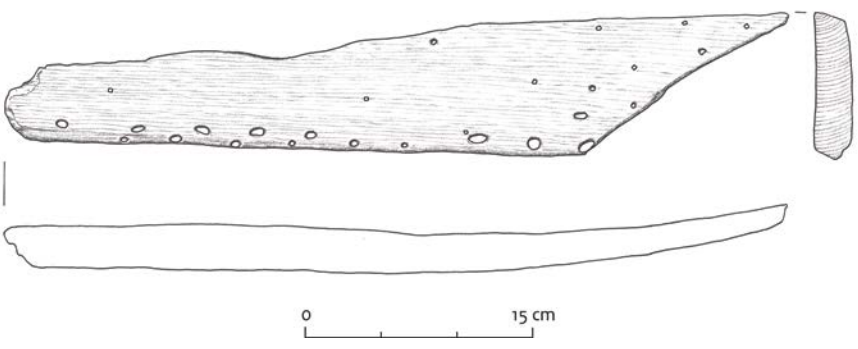

Figure 13.23 The current state of a plank of a chest with nails, find number 936 (drawing: R. Timmermans).

suggests a large item. Mols mentions chests as pieces of storage furniture that were commonly used in the Mediterranean region. Moreover, chests could be closed with a lock and it is likely that chests also played an important role at Velsen for the storage and transport of goods.

13.12 Boards of seats and of a lid or a door

This category includes a beech wood board with one rounded and one slanted end. It may have been a board that belonged to the seat of a stool (find number 3364, Plate LXXXI.353). Another board is made of silver fir, probably from a discarded barrel. It has a rectangular, slightly tapered hole; one end is broken (find number 3151, Plate LXXXI.354). It is thought to be part of the seat of a stool or bench. There is also a fragment of a plank of alder with a knob-like protrusion on the front which probably served as a handle (find number 3135, Plate LXXXI.355). On the back of the fragment, two crossing lines are incised which meet at the height of the knob on the front. These will have been marking lines to determine the position of the knob. This is probably a fragment which belonged to a chest lid or a door. With the knob-like protrusion, the lid, or door, could have been opened.

13.13 Wall hooks

Two right-angle hooks, one made from elder (find number 3107, Plate LXXXI.356) and the other from juniper (find number 3359, Plate LXXXI.357), were probably simple storage devices. Both objects are approximately equal in size, with the length of the arms being about 26 cm. On the surfaces, the cutting marks of a knife are preserved as narrow facets. The hooks could be fixed at one end, perhaps to a wall, and the other end could have served for hanging clothes, a sword, or other personal belongings. This type of hangers is known from all periods and can still be found in the stable areas and storage rooms of old farmhouses (Fig. 13.24).

13.14 Interior boards or boards from cupboard doors or hatch covers

Numerous fragments of thin boards have been excavated in the harbour basin; complete specimens have not been found. These boards are almost all made of radially split oak, with widths between 5 and a maximum of 10 cm (Plates LXXXII.358-363, LXXXIII.3640367). After excavation, they have often broken into many

Figure 13.24 One of the wall hooks from Velsen 1 (right; find number 3359), and a wall hook in a farmhouse in the Open-Air Museum of Lithuania in Rumsiskes (left) (photos: BIAX *Consult*).

Figure 13.25 Some of the many thin boards of radially split oak from Velsen 1. Right: detail of the remnant of a nail and the impression of the nail head around the nail hole (photos: BIAX *Consult*).

pieces, as was the case with find number 4459. One board contains two nail holes with circular imprints of what were, initially, decorative nails (4001a, Plate LXXXII.363; Fig. 13.25).

Considering the thickness between 0.2-0.5 cm, the boards were not used as veneer; they are too thick. The veneer found on furniture in Herculaneum had a thickness between 0.15-0.2.[301] Furthermore, except for holm-oak, oak was not one of the favoured species for veneering.[302] For shingles, on the other hand, the fragments seem too thin. It is more likely that they were parts of wooden doors of cupboards or inner doors, or the lids of chests. The finds of thin boards from Velsen 1 resemble three finds from Roman contexts in Alphen aan den Rijn, Leidsche Rijn, and Voorburg-Arentsburg.[303] There is, for example, a piece of furniture found in Alphen aan den Rijn, consisting of a framework made of ash slats, with thin oak boards on top. Diagonally over the boards a batten of beech was present. On one of the battens of the framework, remnants of metal were recognised. Based on the limited thickness of the boards of oak, this construction was interpreted as a possible inner door of a barrack.[304] The imprints of decorative nails on some of the boards from Velsen 1 are reminiscent of a door with ornamental brass knobs from a site in Leidsche Rijn, made of thin radially split boards of silver fir and assumed to be a door of a cupboard (Fig. 13.26). An interesting detail of this find is that the boards were fastened at the back with small slats and dowels; in terms of dimensions, these are similar to many in the assemblage of Velsen 1. In addition, there are holes on one side for a hinge (Fig. 13.27).[305] Another example is from Voorburg-Arentsburg, found in the harbour basin, and also consisting of radially split boards (Fig. 13.28).[306] Boards with shorter lengths could have been parts of panels of the doors of cabinets, such as those from the shipwreck De Meern 1 (Fig. 13.29),[307] and from Herculaneum.[308]

13.15 Hinges

During the inventory within this project, three pieces of bone were found in the depot of the National Museum of Antiquities which had been described in the field documentation as bone processing waste. However, these turned out to be parts of piano hinges or continuous hinges (Fig. 13.30). Even if the three pieces are made of bone, they have to be mentioned in the category of wooden furniture. With these hinges, the doors of cupboards and lids of chests will have been enabled to open or close. The piano hinges initially consisted of these cylindrical elements of bone and a wooden core or pit. However, nothing at all of the wooden core of the cylinders has

301 Mols 1999, 97.
302 Pliny the Elder, *Naturalis Historia*, 16.84-231, 16.84, 16.76, 16.82.
303 Lange 2014, 856.
304 Van Rijn 2004, 230-231.
305 Lange 2013, 4-9.
306 Lange 2014, 856-858.
307 Mols 2007, 175-176; Lange 2017a, 211.
308 Mols 1994, 65-66, figs.143, 144, 158 and 159.

Figure 13.26 Boards of a door of a cupboard from Leidsche Rijn (source: Lange 2013, Fig. 2, 5; photo: BIAX *Consult*/ drawing: R. Timmermans).

Figure 13.27: Detail of the back of the door from Leidsche Rijn with battens and dowels connecting the boards (photo: BIAX *Consult*).

Figure 13.28 A hatch cover from Voorburg-Arentsburg (source: Lange 2014, Fig. II-14.29, 858).

Figure 13.29 A door from the cabin of the shipwreck De Meern 1 (source: Jansma & Morel 2007, 497, Plate 36).

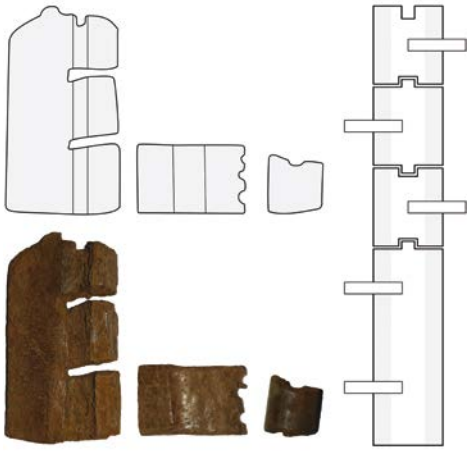

Figure 13.30 Three fragments of bone cylinders of piano hinges from Velsen 1, and a schematic diagram showing the mechanism of a piano hinge (right) (photos: BIAX *Consult*).

been preserved. The cylinders themselves were provided with a hole on each side for a dowel with which the hinge could be fixed to the frame of a door or a chest. From Nijmegen, a find from the 1980s is known from the research that took place at the location of the *Oppidum Batavorum*.[309] It consists of six cylinders, the longest being 5 cm and the shortest 2.5 cm.[310] The diameter of the pieces is c. 2.5 cm. They were cut from the metatarsal bones of a cow, which are hollow by nature, and drilled at right angles to the axis. The original length of the piano hinge from Nijmegen is estimated at c. 22 cm and was probably intended for a small chest or cabinet.[311] Other finds of piano hinges are known from Herculaneum, among other sites.[312]

309 Willems, Greving & Zoetbrood 1984; Van Enckevort & Heirbaut 2010.
310 Lauwerier 2020, 145-151.
311 Lauwerier 2020, 151.
312 Mols 1994, 112, Fig. 170.

14 Roofing and Fenestration

14.1 Shingles

The assemblage includes various fragments of radially cleaved oak boards. Of these, the fragments of thin and narrow boards were interpreted as furniture parts or parts of interior doors. Fragments with a thickness between 1-2 cm may derive from wooden roofing, namely from shingles. In general, shingles are thinly cleaved planks of coniferous wood or oak that have been nailed to the roof battens of a building. Pliny said that the best wood for shingles comes from oak.[313] For a waterproof and windproof roof, the shingles were fastened in overlapping rows. Shingles, such as those found at Voorburg-Arentsburg,[314] Leidsche Rijn,[315] and Houten,[316] are made of split oak, with a thickness between 1-2 cm. One board from Velsen 1 qualifies as a shingle on the basis of its shape and dimensions (find number 61). However, only a sketch of it has been found, the object itself is missing, and the wood species is unknown. As determined from the sketch, this was a radially split board with a length of 93 cm, a width of 9.5 cm and a thickness of 1 cm. However, the board has no nail holes, which means that its interpretation as a shingle is called into question.[317]

There are a few more finds from Velsen that provide more insight into the roofing of the buildings in the fort. Some roof tile fragments have been found in the redeposited context of the harbour basin, including one fragment of an *imbrex* stamped *Classis Germanica pia fidelis* (CGPF).[318]

14.2 Muntin bars

Three fragments of slats which are grooved on both narrow sides have been interpreted as muntin bars for fine joinery, especially for windows (find numbers 1956, 3030, 4558, Plate LXXXIV.368-370; Fig. 14.1). One was made of a piece of split wood of ash, one of silver fir, and the wood species of the third (discarded specimen) is not identified.[319] The preserved length of the largest fragment is 12.2 cm, the width of the three slats between 2-2.4 cm, and the thickness lies between 1.3-1.4 cm. From Cologne, muntin bars with lengths up to 15.6 cm were recovered; these had dimensions in cross-section of a minimum of 1.5-1.4 cm, a maximum width of 2 cm, and a thickness of 1.4 cm.[320] Because of the fragility of these slats, it is quite possible that more muntin bars were among the many slats classified in the category of light constructions, and that they were not recognised because they were too damaged.

After conservation, the finish of the ends of the muntin bars of Velsen 1 is unclear. It seems that one muntin bar has one intact and straight finished end (find number 3030) and that the other end is broken. Both ends of another muntin bar appear to have been broken (find number 1956). A third specimen was deformed by shrinkage before conservation; neither of the ends is intact.

As far as the shape of the ends is concerned, the best reference is the study of wooden artefacts from Cologne, which includes muntin bars.[321] Tegtmeier was able to distinguish three different types of ends of the muntin bars: one type with V-shaped incised ends, a second type with a V-shaped cut tenon, and a third type with one straight and one pointed end. In addition to these three types, Tegtmeier also mentioned variants, such as muntin bars with straight ends, pointed ends, and ends with a rectangular tenon.[322] The muntin bars from Velsen 1 are elliptical in cross-section. This form is known from Vindonissa and from Saalburg.[323] The muntin bars from Cologne are generally octagonal in cross-section.[324] Other variants of muntin bars are rectangular, hexagonal, or with one rounded and one triangular edge in cross-section.[325] The ends were probably carved according to one of the techniques described by Tegtmeier.[326]

Not included in the catalogue of Velsen 1 is a muntin bar excavated by the AWV which originates from the Roman layer of the harbour basin. This was a completely preserved slat with a length of 12.5 cm, a width of 2.5 cm and a thickness of 1.3 cm. The narrow sides were chamfered and provided with a groove 0.2 cm wide and 0.3 cm deep. The wood species of this muntin bar is unknown.[327]

313 Pliny the Elder, *Naturalis Historia*, 16.15.
314 Lange 2014, 854-856.
315 Lange 2017b, 109-111.
316 Vernimmen 2020, 86-92.
317 This board is not found in the collection of the RMO and therefore the wood species could not be identified. The dimensions were taken from a drawing. The board is not listed in the catalogue.
318 Bosman considers that only two fragments are certainly Roman. The other fragments may also relate to medieval activities (Bosman 1997, 37).
319 This find is not found in the collection of the RMO. It was probably discarded.
320 Tegtmeier 2016, 177.
321 Tegtmeier 2016.
322 Tegtmeier 2016, 178-179.
323 Jacobi 1927, Plate 9, 23-25; Fellmann 2009, 94, 173.
324 Tegtmeier 2016, 182.
325 For an extended overview of types and variants of muntin bars, see Tegtmeier 2016, 177-186.
326 Idem.
327 Bosman 1997, 40, 131. This bar was not found in the collection of the National Museum of Antiquities.

The existence of muntin bars implies the presence of buildings with muntin windows at Velsen 1.[328] This assumption is supported by the finding of a piece of window glass in the harbour basin.[329] The use of muntin windows has functional benefits. In addition to the advantage that smaller glass surfaces can be joined together to form larger ones, the slats also provide extra sturdiness. Moreover, in the event of damage, only part of the window needs to be replaced. In general, Roman muntin bars were made of silver fir and, in lesser amounts, of spruce. Since silver fir was not an indigenous tree species, prefabricated muntin bars will have been supplied from elsewhere. Moreover, discarded wine barrels may also have been used to make such items. It is difficult to tell the difference between muntin bars made of primary or recycled wood, especially if the object has already been conserved. This makes the presence of a muntin bar made of ash from Velsen 1 special. It is quite possible that, for repair work and in the absence of muntin bars from storage, native wood was used.

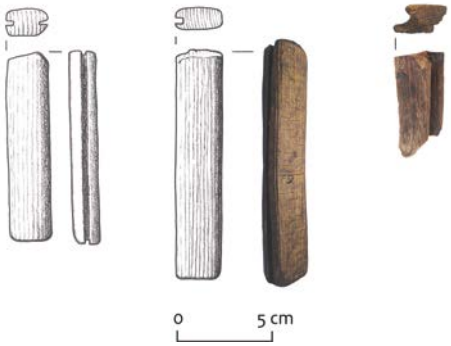

Figure 14.1 Fragments of muntin bars from Velsen 1 (from left to right: find number 1956, wood species indeterminable; find number 3030, silver fir; find number 4558, ash; photo: BIAX *Consult*/drawing: R. Timmermans).

[328] Bosman 1997, 131.
[329] Idem.

15 Domestic Utensils

15.1 Household utensils

Wooden household utensils include cooking and eating utensils and large and small containers for the storage of food and liquids. Wooden utensils have some advantages over those of other materials: they are light and, above all, less fragile than, for example, pottery. Many a wooden bowl will have lasted for years as a personal item. The idea that eating utensils were personal property is confirmed by the appearance of terra sigillata bowls with graffiti from the owner.[330] In addition to the simple kitchen utensils, there are wide wooden bowls and even imitations of bowls of pottery and metal. Wooden kitchenware was probably more common than the surviving finds would suggest.

15.2 Carved bowls

The assemblage of Velsen 1 includes fragments of eleven carved bowls, six of which are listed in the catalogue. Seven bowls are made of alder, two of maple, probably of Sycamore maple (find number 1128.1), and the wood species of two are not identified (find numbers 688 and 1061.2). None of the bowls is complete, though in most cases it was possible to reconstruct the shape and size. They are oval in shape and have a length of a minimum of 20 cm and an estimated maximum of 40 cm; the width is approximately two thirds of the length and the height varies between 6 and 9.6 cm.

The bowls are of a simple design. One of the maple bowls has a subtle decoration in the shape of a rib under the preserved part with a handle (find numbers 1128.1, Plate LXXXIX.376). As the bowls were all symmetrically worked, there will also have been a corresponding handle with a rib underneath it on the other side of find number 1128.1.

At the ends of the long sides, all of the bowls will have had a handle, sometimes simply semi-circular, find number 3343, LXXXVII.374) and, in one case, ornamentally carved (find number 4470, LXXXVI.373). The shape of find number 4470 resembles terra sigillata bowls from legionary ware, such as found at Nijmegen-Holdeurn.[331] Interestingly, these earthenware bowls were, in turn, imitating bronze and glass vessels (Figs. 15.1 and 15.2).[332] From one bowl of alder, only the beginning of a handle remains at the level of the rim. This bowl also has a hole in the middle of the long side, just below the rim, whose function is not quite clear. There may have been a second hole on the other, missing

[330] Bosman 1997, 79-83.
[331] Willems 1990, 56; Kloosterman 2016, 381-388.
[332] Kloosterman 2016, 382.

Figure 15.1 A bowl from Velsen 1 with decorative handles (left; find number 4470; drawing: R. Timmermans), a specimen of bronze from Regensburg (middle; photo: BIAX *Consult*), and a terra sigillata bowl found in the province of Limburg (right) (find location unknown; photo: National Museum of Antiquities, RMO, inventory no. GL231).

Figure 15.2 Detail of the wooden handle of an alder bowl from Velsen 1 (left; find number 4470; photo: BIAX *Consult*) and of a terra sigillata bowl from Nijmegen-Holdeurn (right; source: Holwerda 1944, Plate XI, Fig. 13a).

Figure 15.3 Roughout for a bowl from alder, from the site Tiel-Passewaaij (photos: BIAX *Consult*).

side, so that the bowl could have been covered with a lid or a cloth, attached with a string to the bowl (find number 940.1, Plate LXXXV.371). The relatively small, knob-shaped handles on either side of the bowl of find number 3385 appear to have been of little functional use (find number 3385, Plate LXXXV.372).

The wood for the bowls was cut from a tree trunk in a longitudinal direction. The log would be split in half, roughly shaped with an axe, and hollowed out with an adze. The inside and outside were then finished with a gouge, which would have been used with a wooden mallet. However, for the experienced woodworker, it would also have been possible to finish the bowl using only an adze. A wood carving knife will have been used for the cutting of the handles. Since green wood is needed for this, the wood will have been taken from the surrounding area. This also explains why these bowls are almost exclusively made from alder, which was available in the vicinity of Velsen 1. In addition, alder is easy to work with and it has the property of not cracking easily, even if the wood becomes alternately wet and dry during use.

For this type of bowl, the heartwood is hollowed out, so that the outside of the trunk also forms the outside of the bowl. This has two advantages. First, less material needs to be removed on the outside because the shape is already semi-circular; second, it prevents the bowl from splitting: the heartwood is more prone to splitting than the outside. From Velsen 1 itself, no roughouts of bowls were recovered. Three roughouts for bowls are known from Roman contexts in Houten-Castellum,[333] Tiel-Passewaaij,[334] and Wijster (Fig. 15.3).[335] In all three roughouts, the flat side with the pith and the roughly round-hewn outside are clearly visible. Tool marks on the rim indicate that all three were cut out of a block with an axe, after which deepening with an adze and finishing with a gouge were omitted.

These bowls are frequently found in Roman contexts. Parallels, also of alder, are known from Utrecht-Rijnvliet,[336] Assendelft-Noord,[337] and from castellum Oudenburg (Belgium) (Fig. 15.4).[338] Four bowls are also known from the vicus Tasgetium, three of alder and one of elm,[339] as well as an alder bowl from Vindonissa[340] and one from Avenches-St. Martin (France).[341] In terms of

333 Kooistra 2015, 41-43.
334 Lange 2019, 66-67.
335 Van Es 1967, 133.
336 Lange & van der Meer 2012, 28-29.
337 Depot of the province of Noord-Holland, Inv.no.6166-01, WOODAN-id 2642717100; Besselsen & Therkorn 1998, 328-332.
338 Deforce 2012, 5-9.
339 Leuzinger 2012, 80
340 Fellmann 2009, 55.
341 Jauch 1997, 201.

Figure 15.4 From above left to below right: bowl from Sycamore maple from Velsen 1 (photo: BIAX *Consult*), and alder bowls from Oudenburg (source: Deforce 2012, Fig. 6.5), from Assendelft-Noord (photo: BIAX *Consult*), Utrecht-Rijnvliet (photo: BIAX *Consult*), Velsen 1 (photo: BIAX *Consult*), and from Tasgetium (Office for Archaeology of the Canton of Thurgau/photo: D. Steiner).

size, the alder bowls match each other well. The elm bowl from the *vicus* Tasgetium, on the other hand, is considerably larger, with a length of 52 cm and a width of 28 cm. It is possible that standard dimensions were used, whereby the medium-size bowls were made of alder and the larger bowls from elm. However, lacking a representative number of the large bowls, it is premature to make statements about a specific choice for wood species other than alder when it comes to large formats. This could be a geographical phenomenon applicable to Vindonissa; for Dutch contexts, based on the available data, no difference can be seen between the different sizes of the bowls in relation to the wood species chosen.

15.2.1 Trough

Among the wooden finds from the thirty-six boxes that were unexpectedly found in the depot at the Raamsteeg location of the RMO, there were also a few pieces of a carved vessel without a find number and without information about the location of the find (Fig. 15.5). The fragments, which are from alder, no longer fit together and the shape and size of the object they once belonged to could not be determined. However, one of the photos from Velsen 1 from the archive of amateur archaeologist Vons shows a trough that was found in a well; the fragments may have come from this object.[342] Timmermans made a sketch based on this photo; the length of the object is estimated at c. 80 cm. It is rectangular in shape and probably has two straight handles but it is not possible to tell from the photo whether the corner of the right handle has been broken off or whether this was its original shape (Fig. 15.6).

Figure 15.5 Fragments of alder from a carved vessel, found in one of the boxes at the depot of the National Museum of Antiquities at the Raamsteeg location in Leiden (photo: BIAX *Consult*).

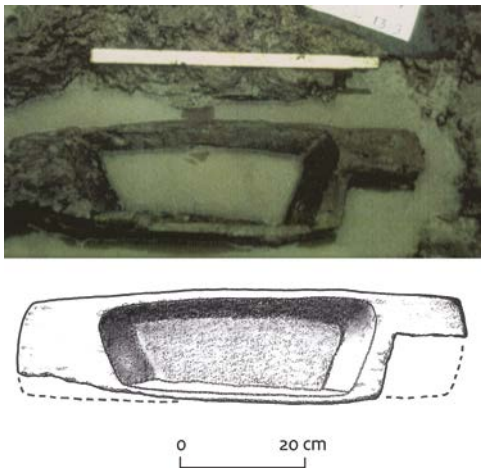

Figure 15.6 Trough, found in a well from Velsen 1 (above, source: archive of the Archaeological Working Group Velsen, AWV/photo: P. Vons; below, drawing: R. Timmermans).

15.3 Lathe-turned bowls

The assemblage of turned objects includes fragments of 14 bowls, of which the wood species of nine were identified: three are from boxwood, two from the wood of the Sycamore or Norway maple, one from a maple species, and three from alder. However, the wood species of five bowls were not identified and the objects are now missing.

The catalogue includes five specimens. One is a bowl that narrows from a flat bottom to the top and is slightly deformed by soil compression (find number 1572.1, Plate XC.377). The bowl is made of maple, either Sycamore or Norway maple, and is filled up to the rim with a hard, blackish material.[343] This is bitumen, a natural petroleum tar, which was widely used for waterproofing, medicinally, and in magic,[344] and which was also a component for sealing wax.[345] A second bowl is also made from Sycamore or Norway maple; it has a foot ring and it widens towards the top (find number 352.1, Plate XCI.378). The diameter is 12 cm and the height is 6.5 cm. Initially, there was a zig-zag pattern made with a copper alloy strip inlaid in the rim; no traces can be recognised after conservation. The bowl's ceramic counterpart is the terra sigillata bowl of the type of Haltern 10 (Fig. 15.7).[346]

342 This photo came to light when the project was in its final phase. Therefore, the object is included in the text but not in the catalogue. In the framework of the present study, the fragments were given a new find number.
343 Based on wood anatomical features, *Acer pseudoplatanus* and *Acer platanoides* can mostly not be differentiated. See Schoch *et al.* 2004.
344 Schwartz & Hollander 2000, 83-84.
345 Schwartz 2016, 1.
346 Löschke 1909; Ettlinger *et al.* 1990, 78-79, Plate 14.

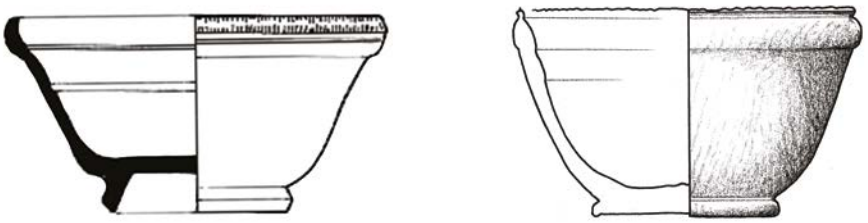

Figure 15.7 Lathe-turned bowl from Sycamore or Norway maple, find number 352.1 (right; drawing R. Timmermans), resembling a terra sigillata cup, type Haltern 10 (left; source: Ettlinger 1990, Plate XIV).

Fragments of two turned bowls of boxwood show similarities in design (find number 1995.1 and 3308, Plate XCII.379-380). Although the fragments of both are damaged at the height of the handle, their original shape is still clearly recognisable. Both have a triangular, knob-like handle that was pierced in the middle. The tips of the handles of both bowls are broken, leaving two shorter knobs on the bowls. The exterior profile of find number 3308 has straight sides to 1.3 cm below the rim, after which the sides gently curve inwards towards a flat base. Find number 1995.1 has a round body and a rounded base. Both bowls resemble ceramic colour-coated cups from Lyon and, especially, from southern Spain. These cups were widely distributed around the western Mediterranean and across the northwest provinces of the Roman empire during the first century AD (Fig. 15.8).[347]

[347] Greene 1979, Fig. 30, 1-4.

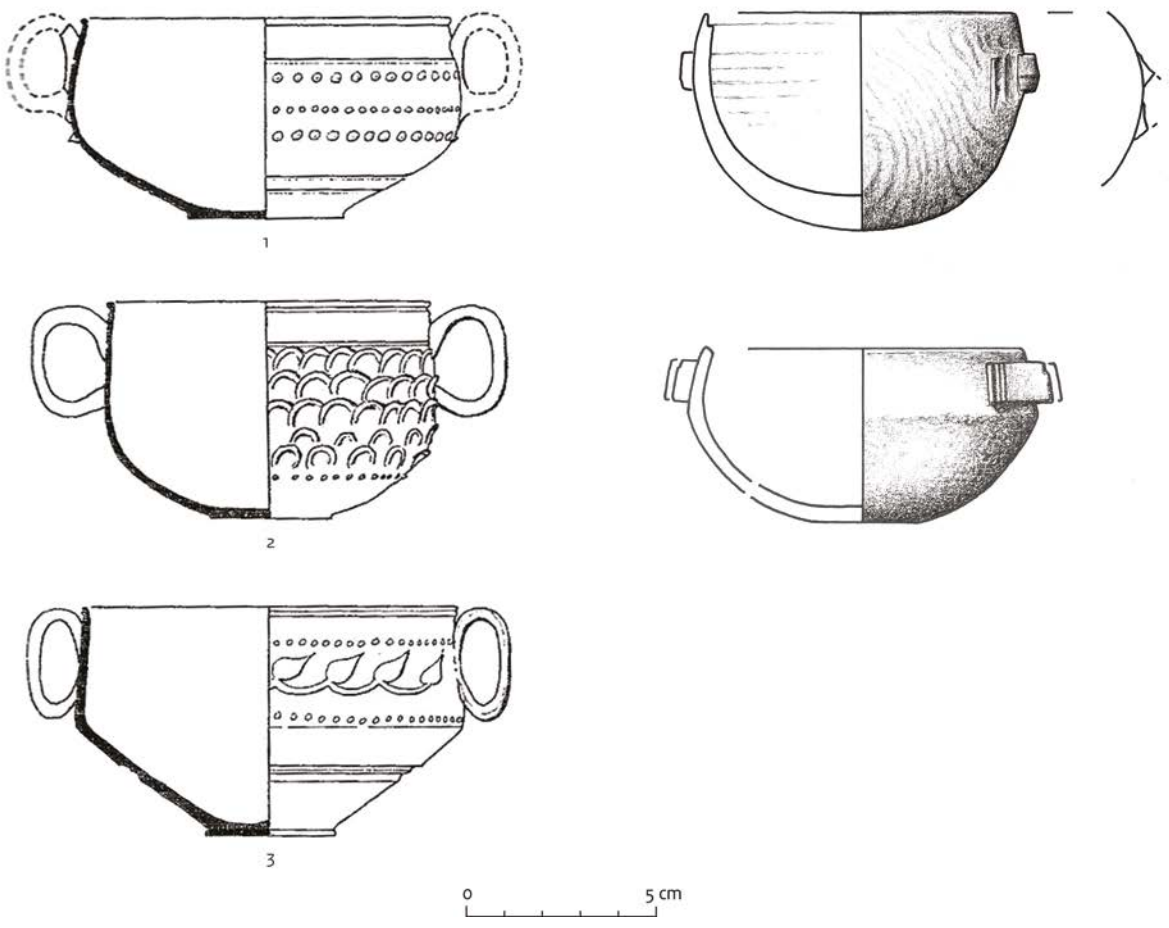

Figure 15.8 Two lathe-turned bowls from Velsen 1 (right) made of boxwood (find numbers 1995.1 and 3308, drawings: R. Timmermans). They resemble Spanish colour-coated ware (left) (source: Greene 1979, Fig. 30, 1-3).

Of a fifth specimen included in the catalogue, only the base was recovered. The wood species was not identified. It is not possible to say anything about the shape of this specimen based only on this fragment (find number 298, Plate XCII.381).

15.4 *Pyxides*

The database records four finds of *pyxides*: one find is almost complete and three consist of parts of *pyxides*. One of the parts is a small fragment of the base of a *pyxis* made of boxwood and one other fragment is missing; neither is included in the catalogue.

A small spherical *pyxis* with a flat base is one of the most striking objects from the assemblage of wooden artefacts from Velsen 1 (find number 3140, Plate XCIII.382). The *pyxis* is turned from a small log of boxwood and the pith is visible on the bottom, slightly offset from the centre of the object. The wood for this *pyxis* was taken from the trunk in an upright position. This use has also been observed with other *pyxides*, including examples from Cuijk, Castricum-De Boogaert, Geldermalsen, and from the shipwreck De Meern I.[348] On the bottom, in the centre, a poppet mark from the tip of the holding device of a lathe is recognisable. The interior profile has a domed base which is set off from the wall by two incised lines. The sides of the interior are ribbed by grooves. Based on the width of the interior grooves, a gouge with a width of 2 mm was used. On the outside, a groove with a fine line both above and below the groove is incised.

A remarkable detail is the thickness of the base. While the wall thickness has a maximum of 0.15 cm, the base has a maximum thickness of 1.8 cm. The thickness of the base gave the *pyxis* more stability (Fig. 15.9).

According to Vons, the *pyxis* could have served as a container for cosmetics, medicinal ointment, or a perfume-like substance.[349] In the *pyxis* from Velsen 1, no original contents have been preserved. However, a small *pyxis* from boxwood with its lid, found in Vindolanda and measuring 6 cm in height and 7.1 cm in diameter, did contain a clump of unknown black material. Unfortunately, a chemical analysis could only prove that it was an organic material.[350]

Initially, the *pyxis* from Velsen could be closed with a lid. The *pyxis* was found by members of the AWN in 1978 and was published by Vons in 1979. Old photographs show that immediately after its discovery there was already a vertical hairline crack present in the wall. In the meantime, this crack has become considerably enlarged.

Finds of small *pyxides*, also made of boxwood, are also known from Vindonissa [351] and Martres-de-Veyre (France).[352] The two from Vindonissa and the one from Martres-de-Veyre are egg-shaped (Fig. 15.10). While the shapes are different from the Velsen *pyxis*, they do correspond well in terms of size.

A flat lid of which three quarters have been preserved probably belonged to a cylindrical *pyxis* (find number 555.1, Plate XCIV.383) such as the one from the shipwreck De Meern I

348 Lange 2017a, 266.
349 Vons 1979, 51-56; Fellmann 2009, 65.
350 Birley 2003, 210.
351 Fellmann 2009, 65-67, Plate 21, 162.
352 Blondel 2014, 138-139.

Figure 15.9 Spherical *pyxis* from boxwood, find number 3140, shortly after the excavation in 1978: view of the base (left) and the *pyxis* seen from above (middle) (source: archive of the Archaeological Working Group Velsen, AWV); drawing: R. Timmermans).

Figure 15.10 Egg-shaped *pyxis* from Martres-de-Veyre (France) (left; photo: F. Blondel), and two from Vindonissa (right; source: Fellmann 2009, 162, Plate 21, Fig. 585 and 586).

(Fig. 15.11). Just as with the small *pyxis*, the wood for the lid was taken from the tree in an upright position and the pith of the trunk is slightly offset from the centre of the object. Moreover, a pair of lines are incised on the top for decoration. Prior to conservation, the lid had dried naturally and had therefore shrunk and become deformed. The drawing in the catalogue is based on a sketch made just after salvage.

Noteworthy are the lids of three boxwood *pyxides* which were also found at Martres-de-Veyre (Fig. 15.12). They have strikingly decorative lids, in contrast to the plain lids of the *pyxides* which are known from Roman contexts in the Netherlands.[353] It is, of course, possible that this type of lid was found but not recognised as the lid of a *pyxis*, as is often the case with loose or damaged parts of composite wooden objects.

[353] A total of five different *pyxides* from grave contexts were recovered at Martres-de-Veyre in the nineteenth century; see Blondel 2014, 138-139.

Figure 15.11 Lid made of boxwood from Velsen 1, find number 555.1 (left) and a boxwood *pyxis* with lid from the shipwreck De Meern 1 (right) (drawing: R. Timmermans/photo: S. Lange).

Figure 15.12 Three *pyxides* from boxwood found at Martres-de-Veyre (France) (photo: photo: P. Bet & B. Dousteyssier).

Ten finds of *pyxides* from Dutch contexts are known from the online database WOODAN.org: two *pyxides* from the shipwreck De Meern I, two from Nistelrode, two from Cuijk, one each from Castricum-De Boogaert, Geldermalsen, Woerden, and Bemmel-Plakse Wei. The two *pyxides* from the shipwreck De Meern I are made of field maple,[354] while the *pyxides* from Castricum-De Boogaert,[355] Nistelrode,[356] Woerden,[357] and Bemmel-Plakse Wei[358] are made of boxwood. The two *pyxides* from Cuijk[359] and the one from Geldermalsen[360] are probably also made of boxwood, but due to their poor preservation the wood species could not be identified with certainty. A lid of a *pyxis* made of maple was found in Valkenburg-Marktveld.[361] This one is very similar to the lid made of boxwood found at Velsen.

With the wooden *pyxides*, too, it is clear that they are imitations of *pyxides* from more luxurious materials such as marble, glass, and terra sigillata. A terra sigillata *pyxis* with straight walls and a lid was found in Voorburg-Arentsburg.[362] Egg-shaped *pyxides* have also been produced in terra sigillata: for example, the south-Gaulish inkwell Ritterling 13.[363]

15.5 Discs and lids

A total of 19 wooden discs have been documented, of which seven have a central hole and one has a knob-like handle. The others are finished flat without perforation. With the exception of one oval specimen, they are all circular. Of all the discs, the wood species of 14 discs is identified: three discs of alder, four of oak, four of ash, one each of elm, beech, and silver fir. Twelve discs are included in the catalogue.

Most of the wooden discs will probably have functioned as lids of earthenware pots and baskets. In general, the perforated discs appear to be larger in diameter than the ones without a hole. The latter vary in diameter between 8.2 and a maximum of 12 cm, while those with holes vary in diameter between 11-18 cm. The catalogue contains four discs without perforation, made of radially split wood, one from alder (find number 4469, Plate XCV.384), and three of oak (find numbers 585.1 and 4011b, Plate XCV.386-387 and find number 4012j, Plate XCVII.392). The discs are usually smoothly carved circles. An exception to this is find number 4011b, whose rim seemed to be roughly cut.

The discs with a large central hole may have served as lids for a mortar, or for dashers used for churns of the plunger-type, where the pestle was pushed through the opening. It is possible that this was the function of a disc made of common ash with an estimated diameter of 18 cm and a hole in the middle with a diameter of 3 cm (find number 2095.1, Plate XCVI.389), of a fragmentary disc made of elm with a diameter of 15 cm and a hole with a diameter of 4 cm (find number 4137, Plate XCVI.388), and of a disc made of ash with a diameter of 11.3 cm and a hole in the middle with a diameter of 3.9 cm (find number 1643.1, Plate XCVI.390).

The assemblage also includes a small round lid of ash with a pierced, knob-shaped handle on

354 Mols 2007, 181-183.
355 Lange 2016.
356 Jansen & Vermeeren 2007, 575.
357 Van Rijn 1998.
358 Van der Laan 2019, 7-8.
359 Lange & Kooistra 2012.
360 Kooistra 2009, 427.
361 Van Veen 1987, 49.
362 Van Kerckhove 2014, 330, Fig. II-1.9.
363 Ritterling 1913, Plate 13.

the top (find number 3326, Plate XCVII.393). Another lid is made of maple, of which approximately three quarters have been preserved. The lid is flat and has a profiled rim. A small hole on the top reveals the location of the spill of a lathe. This object was also dried and deformed before conservation (find number 3019, Plate XCVII.394). An oval lid made of beech with a small hole on both long sides was also found (find number 3028; Plate XCVII.395). A string could have been inserted through these holes to tie the lid to a container or, with a knot in the end, to act as a lifting cord. The container would probably have had matching holes for this purpose. In this context, we refer back to the wooden bowl with a hole under the rim, for which a cover with cloth or lid was also considered (find number 940.1, Plate LXXXV.371). With its width of 6.8 cm, the lid with find number 3028 would have been used to cover a small container. Further, half of a disc of silver fir with a carefully smoothed surface and a hole that is slightly off-centre was recovered. Initially, there would have been a second hole so that a string could be tied through the holes for lifting the lid (find number 3218, Plate XCVII.391). Unlike the other disc-shaped lids, find number 1005 has a thickened rim that presumably fit over a round container. The wood species of this lid has not been identified (find number 1005, Plate XCV.385).

15.6 Spoons

The assemblage comprises nine spoons, of which five are included in the catalogue; the others are missing. Of the nine, two spoons are made of ash, one of alder, one of oak, and one of boxwood. The wood species of the two fragmentary spoons is not identified. The fragments of two handles of beech wood could have belonged to either a spoon or to a spatula.

As they are today, spoons were used for stirring and serving food, and smaller ones were certainly also used for eating. The assemblage includes a spoon of ash with a symmetrical, shallow bowl and with a semi-circular finish. A small part of the handle, which tapers towards the top, was lost following excavation (find number 3316, Plate XCVIII.396). Another specimen is an almost completely preserved spoon. The spoon is carved from a piece of alder and has a teardrop-shaped bowl which is perforated in the middle with a circular opening. After the bowl had been hollowed, the object was not finished by smoothing the surface. Particularly on the inside of the bowl, tool marks of a gouge are still visible. This will not have played a role in the functionality of the spoon. Owing to the presence of the hole, the spoon might have been used to serve solid food from containers or bowls containing wine, oil, or brine. Examples are olives stored in oil, preserved fruit, or seafood in brine (find number 1912.1, Plate XCVIII.397). In addition, there is a rather roughly finished bowl of a larger spoon or small ladle made from an oak roundwood; the handle of this specimen is broken (find number 3272, Plate XCVIII.398). The two fragments of handles, either belonging to a spatula or to a spoon, are carefully rounded and provided with a hole, so that the object could be suspended. Both were made of beech (find numbers 4002e and 468.1, Plate XCVIII.399-400).

15.7 Spatulas (*spatulae*)

Of the twelve recorded spatulas, six are made of ash, three of alder, one of oak and one of silver fir; the species of one has not been identified. Eight spatulas are listed in the catalogue, of which three are interpreted as a possible spatula.

A spatula is a multi-purpose tool useful in food preparation. While the specimens described here are interpreted as kitchen utensils, these types of objects could also conceivably be used in a workshop and for ship maintenance. The spatula with an asymmetrical blade will also have been used for scraping or spreading. The shape of the Roman spatulas is similar to our current pancake flippers. Among the objects that have been interpreted as possible spatulas because of their simple manufacture and the low prolongation of the blade is a specimen with an angular oval shaft ending in a narrow, rectangular blade. The wood species of this spatula is unknown (find number 1359, Plate XCIX.401). Furthermore, a spoon-like spatula of ash with a tray-like end (find number

234.1, Plate XCIX.402) and another one of ash with a somewhat asymmetrical blade with a slight inward curve (find number 3105, Plate XCIX.403) were both interpreted as possible spatulas.

More attention has been paid to the finishing of a spatula made from the wood of silver fir. One side of the blade is broken, making it look as if the blade was asymmetrical. However, given the fractured surface and the finish of the shoulders, the blade initially will have been symmetrical (find number 527.1, Plate C.404). There is also a handle of a spatula made of alder, with sloping shoulders and the beginning of a blade (find number 1936.1, Plate C.405). Two specimens with relatively wide blades could have been used as baking peels. The first specimen is made of oak and is rounded at the level of the shoulders; the end of the blade is straight (find number 933.1, Plate C.406). The other is a spatula made of ash with sloping shoulders and a broad, symmetrically worked blade. The end of the blade had been reworked but the damage to the side of the blade appears to have occurred after excavation (find number 3022, Plate C.407). Neither of the handles of these two spatulas was preserved. A completely preserved specimen made of ash has a slightly curved handle and an asymmetrical, rounded blade (find number 1395.1, Plate C.408).

The spatulas from Velsen are simple in appearance and, except for one, made of local wood. The spatula of silver fir was probably made from the wood of a discarded barrel. From Voorburg-Arentsburg, a boxwood spatula is known that is much more refined in its finish than the spatulas from Velsen.[364] However, this is the more luxurious version for which specific wood species were chosen. Those from Velsen look more as though they were meant for daily use by the ordinary soldier.

15.8 Knives

The assemblage of Velsen contains three knives, all of which are included in the catalogue (find numbers 1372, 3302 and 5099-103, Plate CI.409-411). Two knives are part of the collection of the RMO and the third one, found at Velsen 2, is housed at the archaeological depot of the province of Noord-Holland (inventory number 5099-103) (Fig. 15.13).

One of the knives has not been conserved (find number 1372). The poorly preserved handle from this knife was found during the inventory and was identified as being from Maloideae, type apple/hawthorn/pear. The wood species of a second knife (find number 3302) also remains unknown; after conservation, the wood is extremely hard and it proved impossible to take a sample of the handle for an identification of the species. The knife from Velsen 2 is probably made of maple, but, following conservation, the wood anatomical characteristics are not sufficiently visible to come to a definitive conclusion.

The unconserved handle from find number 1372 is, in its present state, very fragmentary. Therefore, the description and measurements of the knife were deduced from a detailed drawing. Because of the way in which the knife was found, with the blade diagonally upwards, it was initially assumed that this was a folding knife. However, as the handle is solid and there is no groove on either side into which the blade could fall when folded, this interpretation is now considered implausible (find number 1372, Plate CI.409). From a second knife, the handle and a lump of highly corroded iron around the bolster are preserved. The handle is almost round in cross-section and has a hook-like butt at the end and a shallow ledge at the bolster. After conservation, when seen in comparison to a drawing made by the excavator shortly after

Figure 15.13 The two preserved knives from Velsen 1, find number 1372 and find number 3302 (above) and one from Velsen 2 (below), inventory number 5099-103 (source: Archaeological Depot of the province of Noord-Holland/photos: K. Zwaan).

[364] Lange 2014, 856-857, Fig. II.14.31.

salvage, the handle is raised too high in relation to the blade. Moreover, the reconstruction of the blade is far too wide, making the object more similar to a butcher's knife than to a kitchen knife. For that reason, the drawing and description in the catalogue are based on the original sketch of the knife (find number 5099-103, Plate CI.411).[365]

Knives are multifunctional tools that may have served for many activities in ordinary life. For example, they may have been used as eating utensils, to cut meat or bread. In addition, they could have been applied to all kinds of jobs, such as cutting rope or pointing stakes. On the basis of the shape or form of the handles or the knife blades, no functional distinction can be made between the various knives.[366]

15.9 Bases of a stave bucket and of a lath-walled box

Domestic items also include the fragment of a circular base of radially split oak, probably initially belonging to a stave bucket, and a base of a lath-walled box. The bucket will have had an estimated diameter of c. 23 cm (find number 3112, Plate CII.412). The oval bottom of a small lath-walled box was completely preserved. However, the wood species has not been identified and an identification within the framework of the present project was not possible because the object is missing (find number 1508, Plate CII.413).

[365] This information was taken from a report by the AWV. With thanks to H. Vermast (AWV) for making data and images available.
[366] Driessen 2017.

16 Basketry

16.1 Coiled basket

From the harbour basin, a basket has been recovered that has a narrow tip at the bottom and a wide opening at the top (find number 3102, Plate CIII.414). The find was salvaged in fragments and remained in storage for several years, as a result of which it has dried out and shrunk. The five fragments can now no longer be joined together, which is why the catalogue includes a reconstruction drawing in addition to a drawing of the fragments (Fig. 16.1). Based on the fragments, the basket originally had an estimated diameter of 20 cm and a height of 16 cm.

The basket is made of bundles and winders from broom.[367] According to the definition by Wendrich, a coiled or sewed basket is not woven but 'built on a foundation of rods, splints, or straws'.[368] The wrapping of the basket from Velsen consist of two to three stems, each of which was twisted before braiding. The top of the basket is finished with a thickened inwardly curved edge. A fine clay silt covers the basket both on the inside and outside. On the inside there is a black substance which has been analysed and identified as a vegetable colophony, presumably pine tar.

Due to the technique of wrapping, van Rijn thought in terms of a beehive. However, the examination of the inside of the basket did not reveal any insect remains, nor did it show the presence of beeswax or propolis. In addition, upon inquiry it became clear that the dimensions of the basket are far too small for beekeeping.[369]

The manufacture is reminiscent of Roman baskets which were found as mining equipment in the copper and lead mines in Mazarrón (Spain) (Fig. 16.2). Perhaps the basket was used as a container for transporting mining products and in this way reached the fort. An interesting detail of these baskets is the way the wooden reinforcements are attached to the outside with rope. Various laths and battens found in the harbour basin would have been suitable for this purpose.

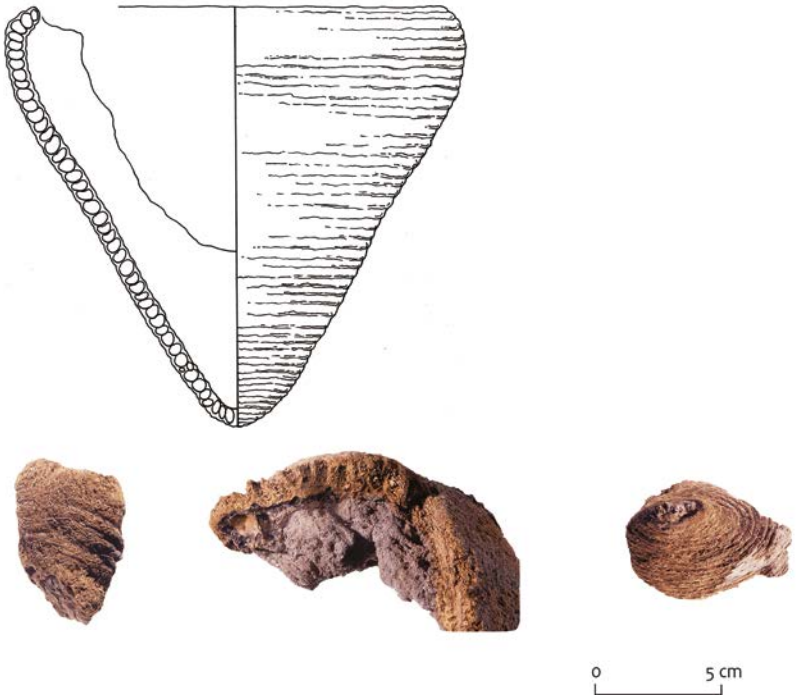

Figure 16.1 Reconstruction drawing of the coiled basket from Velsen 1, find number 3102 (above; drawing: R. Timmermans), based on fragments of the object (below; photos: BIAX *Consult*).

Figure 16.2 Coiled basket from the first century AD, found in Mazarrón, Murcia, Spain (source: National Archaeological Museum, Madrid).

[367] The identification of the material was carried out by Dr. L. Kubiak-Martens (BIAX *Consult*).
[368] Wendrich 1999, 40.
[369] With thanks for the information to R. Jones (International Bee Research Association, Cardiff).

Figure 16.3 Basket with a densely woven structure from the harbour basin, shortly after excavation (left; photo: B. Beerenhout, Archaeo-Zoo) and in its present state (right; photo: BIAX *Consult*).

16.2 Basket

A relatively small basket with a densely woven structure has been found in the harbour basin (find number 4646; not listed in the catalogue). After salvage, the wood species was identified as willow. As part of this project, the totally dried and shrunken remains were studied (Fig. 16.3). The shape and size of the basket were calculated on the basis of a photo taken after the excavation. The estimated diameter of the basket is c. 30 cm, the height c. 40 cm. The diameter of the base is c. 15 cm. The basket widens towards the top. The original height is unknown because the top is missing. The photo shows that the basket had a foot ring. An example of amphorae with basket-packaging can be seen on a tombstone from Neumagen dating to the first century AD (Fig. 16.4). The footring would make it suitable for packaging amphorae for transport (Fig. 16.5).

16.4 Amphorae stored and wrapped in baskets depicted on a tombstone from the first century AD from Neumagen (source: Doctor 1997, Fig. 101, 74).

16.3 Base of wicker work

A rectangular board made of ash with two rectangular sawn notches in the middle comes from Velsen 2. At both sides of the notches, holes have been drilled along the edges, probably intended for wicker stakes. This was possibly the base for a large basket that was reinforced with slats in the middle section (inventory number 6026-18, Plate CIV.415; Fig. 16.6), perhaps for a carrier basket that could be attached to a pack animal or a cart.

Figure 16.5 Mausoleum bas-relief of a Roman boat or river barge loaded with barrels (c. 2nd-3rd centuries AD) and amphorae for wine or other goods, from Vaucluse, France (photo: C. Hellier)

Figure 16.6 Base of wicker work made of ash, possibly from a carrier basket (photo: BIAX *Consult*).

17 Personal Belongings

17.1 Wood-soled footwear

The assemblage includes three complete wooden soles plus two halves of soles, all found in the harbour basin (Fig. 17.1). A roughout, possibly for a wooden sole was also recovered. All of these items are listed in the catalogue (find numbers 3060, Plate CV.416, find numbers 3327, 398, 728 and 1461.1, Plate CVI.417-420, find number 3397, Plate CVII.421). The soles with continuous stilts under the front part come from the oldest layer, the Dredging layer (find numbers 728 and 3060), while the ones with differentiated stilts were found in the Roman layer (find numbers 389 and 1461.1). According to Bosman, this could indicate a typo-chronological variation.[370] Moreover, Bosman interprets them as bath slippers (*sculponiae*) and links them to the presence of a bathhouse. In this context, he mentions the find of a *strigilis*, a skin scraper, and a number of glass and earthenware perfume bottles which, he suggests, may have contained bath oil.[371]

The wooden sole belonged to the patten-type, whereby the sole was attached to the foot by using a toe strap binding (Fig. 17.2). No remains of the leather straps used for this purpose have been preserved but the technique can still be traced on the basis of the holes present in the soles. The assemblage includes a left sole made of beech wood (find number 3060, Plate CV.416). The underside is carved with two straight ledges set transversely, without interruption; these function as stilts. At the front part of the sole, one hole has been drilled at the place next to the big toe, and at the damaged heel part there were initially two holes, one of which has been preserved. With a length of 24.2 cm, this sole will have been worn by someone with a contemporary shoe size of 38/39. A remarkable detail is that the sole shows bite marks of a dog in the middle. At the least, this is an additional indication of the presence of dogs in the fort, as well as a possible explanation of how the owner might have lost one of his shoes.[372]

Another completely preserved sole has a semi-circular stilt under the heel and two triangular-shaped stilts under the front part (find number 398, Plate CVI.418). This, too, is a left foot specimen with three holes for a leather strap to tie the patten to the foot. The length of the sole is 20.2 cm, corresponding to a contemporary size 32. Because of its size, it could have been a woman's shoe. The wood species of this specimen has not been identified.

The third complete specimen is a flat sole from a patten without stilts and with just one hole. This one is for a right foot and made of ash (find number 3060, Plate CV.416). The sole is 18.6 cm long, which corresponds to today's size 27/28. Presumably, this was a child's or a woman's patten.

The front part of a sole for a right foot with a rectangular stilt was also recovered (find number 728, Plate CVI.419). Between the big toe and the second toe, the sole is pierced for tying it to the foot with a leather strap. The front part of another sole also was for a right foot. Under the tread are two narrow, rectangular stilts, and the pointy front is pierced in the middle (find number 1461.1, Plate CVI.420).[373] The wood species was not identified for either of these finds.

A piece of alder wood has been interpreted as a possible roughout for a patten. This suggests that wood-soled footwear was manufactured in the fort itself (find number 3397, Plate CVII.421).

Similar finds of wood-soled footwear have been made in several Roman contexts, such as Vindonissa,[374] Tasgetium,[375] Carlisle,[376] and Vindolanda.[377] The wooden footwear from Vindonissa has a varied spectrum of wood species in which beech, ash, and maple appear to have been preferred, but also the wood of birch, willow, lime, and poplar was used.[378] Fellmann differentiates two groups of pattens, depending on the shape of the stilts under the seat and the tread. According to him, those with a stilt in the shape of an uninterrupted ledge belong to group 1, while those with an open-worked stilt, made by removing material crosswise from the ledge with a saw, fall into group 2. The seven soles found in the *vicus* Tasgetium belong to group 1. In Tasgetium, maple was the most frequently used wood for the pattens, followed by beech and ash.[379] From

370 Bosman 1997, 38.
371 Bosman 1997, 38.
372 Bosman 1997, 124.
373 The descriptions of find numbers 728 and 1461 are deduced from drawings.
374 Fellmann 2009, Plate 23-24, 164-165.
375 Leuzinger 2012, 96.
376 Caruana & Allnutt, unpublished.
377 Pugsley 2003, 48.
378 Fellmann 2009, 73-74.
379 Leuzinger 2012, 96.

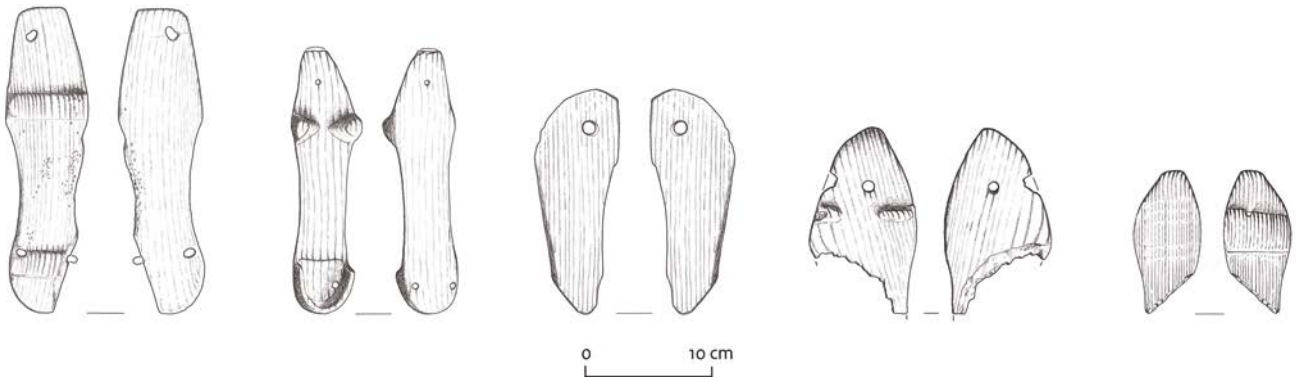

Figure 17.1 Wooden soles from Velsen 1 (drawings: R. Timmermans).

Velsen 1, find numbers 728 and 3060 correspond with group 1. However, the other three specimens from Velsen 1 do not match the parameters given by Fellmann for group 2. Those from Velsen 1 are not pattens with stilts which were shaped by sawing; instead, they have carved, knob-like shapes. Furthermore, the stilt at the heel of find number 389 is rounded, not straight. According to Pugsley, heels with transverse or recessed stilts, such as find numbers 398, 728, 1461.1, and 3060, do not occur after the first century AD.[380]

Pugsley gives an overview of the soles from the various sites and concludes that the most commonly used wood species were ash, followed by beech and maple.[381] According to her, the function of the wood-soled footwear is broader than, for example, the use as bath slippers which were worn to avoid being burned from the hot floor in the bathhouse.[382] She also points out that this type of footwear was widespread and is found in various contexts; it is known from military, urban, and rural settlements, as well as from funerary contexts.

[380] Pugsley 2003, 51.
[381] Pugsley 2003, 42-59.
[382] Pugsley 2003, 42.

Figure 17.2 Reconstruction of Roman pattens at the Archaeological Open Air Museum Archeon, Alphen aan den Rijn (photo: BIAX *Consult*).

Figure 17.3 Comb of boxwood from Velsen 2 (source: archive of the Archaeological Working Group Velsen, AWV).

As for the distribution of the wood-soled footwear, there seemed to have been geographical trends.[383]

17.2 Comb

During excavation work in 1964 by members of the AWV at Velsen 2, a double-sided comb of boxwood was found.[384] The comb, lozenge-shaped in cross-section, is 9.8 cm wide and 5.7 cm high, with a maximum thickness between 0.2-0.7 cm (find number 4645, Plate CVIII.422; Fig. 17.3). On one side there are fine teeth, more tightly packed than on the other side which has fewer and larger teeth. The comb is not preserved intact. The teeth were probably already damaged when the comb was discarded. After salvage and during the long storage period, the object dried out and the wood shrank.[385] Similar specimens are known from, among other sites, Vechten,[386] Vlaardingen,[387] Voorburg-Arentsburg,[388] Cologne,[389] Carlisle,[390] and Vindolanda.[391] The double-sided combs were assumed to be part of the soldier's basic equipment as a necessary hygiene utensil. Head lice must have been a problem, as the discovery of head lice in the comb from Velsen 2 also implies.[392] It is therefore remarkable that no comb was found at Velsen 1.

383 Pugsley 2003, 51.
384 Initially, it was thought that it was a comb of bone. A re-examination in the framework of the present study revealed that it was actually a wooden comb.
385 This object was transferred by the AWV to the Archaeological Depot of the Province of Noord-Holland in December 2020 and then transferred to the conservation company Restaura for post-treatment.
386 Derks & Vos 2010a, 53-77; 2010b, 2-6.
387 Kooistra 2016.
388 Lange 2014, 857, Fig. II-14.24.
389 Tegtmeier 2016, 86-94.
390 Caruana & Allnut, unpublished, 9-10.
391 Birley 2003, 211-212.
392 Derks & Vos 2010a, 63-66; Birley 2018, 189-196.

18 Entertainment

18.1 Panpipe (syrinx)

The fragment of a boxwood board with three pipes drilled at the top originally belonged to a panpipe (find number 3365, Plate CIX/CX.423a/423b; Fig. 18.1). The panpipe is broken diagonally in the direction of the grain. One side of the panpipe is original and has a straight edge with a hole drilled downwards at an oblique angle; there is a pin in the hole. A string was probably attached to the pin, so that the panpipe could be carried around the neck. The fragment has dried naturally and has not been conserved. Moreover, the object was not cleaned completely after salvage and there is still hardened soil in the pipes. Due to shrinkage and deformation the pipes are narrower and shallower than they were initially. The board has been sawn, and the surface smoothly finished. Decoration in the form of incised lines was not found. The preserved measurements of the panpipe are a height of 12 cm and a width of 4 cm. The thickness of the board is 1 cm. After conservation, the length of the preserved pipes are c. 2.6 and c. 3 cm, and the remaining length of the broken pipe is 3.8 cm. The openings of the straight drilled pipes are c. 0.5 cm. The panpipe will originally have had seven or eight pipes and an estimated width between 9 and 10 cm.

Another boxwood panpipe was found at a short distance from Velsen 1, at the site of Uitgeest-Dorregeest, northeast of the fort.[393] In addition to the panpipes from Velsen 1 and Uitgeest-Dorregeest, panpipes have been found in rural settlements such as Nijmegen-Oosterhout,[394] Barbing-Kreuzhof near Regensburg (Germany),[395] Titz-Ameln (Germany),[396] Alisé-Sainte-Reine (France),[397] Loveld-Aalter (Belgium),[398] and London.[399] Furthermore, a well-preserved panpipe was recovered at the *vicus* Tasgetium.[400] All of these panpipes are made of boxwood (Fig. 18.2). Based on these finds, the panpipes originally had six, seven or, at most, eight pipes (Table 18.1).

The panpipes compare closely with each other in terms of the method of manufacture and size, but each has a unique finish that can vary from a simple geometric pattern (Tasgetium, Regensburg-Kreuzhof, Titz-Ameln, and Alisé-Sainte-Reine), to figurative graffiti (Nijmegen-Oosterhout), to a carved sloping side (Uitgeest-Dorregeest). The panpipe from Velsen 1 could also have been decorated, but perhaps the decoration was located on the part now missing. The panpipe must have had mainly symbolic value; after all, the panpipe was not related to the military, where other musical instruments were used. Also, the panpipe must have had little value in terms of material, unless one was able to appreciate boxwood, and the

393 Woltering 1999, 173-185.
394 Van den Broeke 2009, 67-86.
395 Ulbert 1961, 56.
396 Rühling 2007.
397 Bogaers 1975, 162.
398 Alfred 2009, 62-79.
399 Morris 2000, 2354-2355.
400 Brem & Rühling 2012, 116; Leuzinger 2012, 120-122.

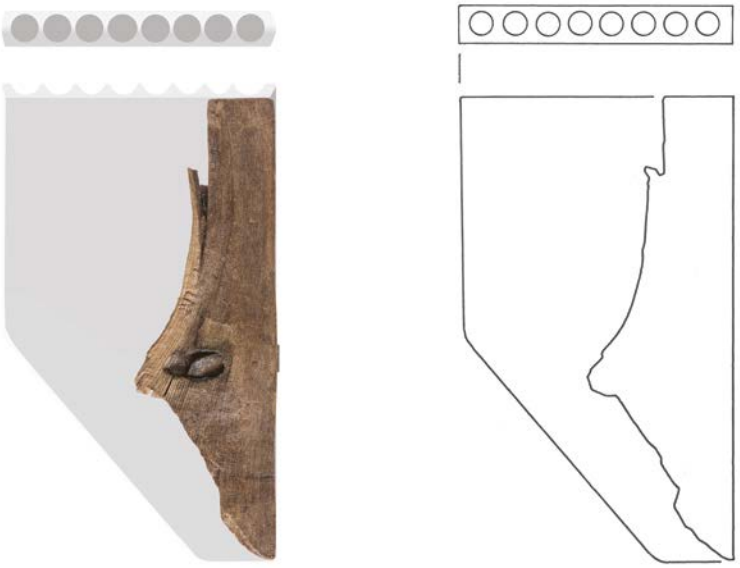

Figure 18.1 Fragment of a panpipe from Velsen 1, find number 3365 (source: National Museum of Antiquities, RMO/photo: R.J. Looman) and the reconstructed shape (reconstruction: J. Ranzijn).

Figure 18.2 Various boxwood panpipes from other Roman sites. From left to right: Tasgetium (source: Office for Archaeology of the Canton of Thurgau/photo: R. Riens), Regensburg-Kreuzhof (source: Historical Museum of Regensburg/photo: M. Preischl), Uitgeest-Dorregeest (Archaeological Depot of the province of Noord-Holland/photo: K. Zwaan), Nijmegen-Oosterhout (Archaeological Services of the Municipality of Nijmegen/photo: R. Mols), Alisé-Saint Reine (source: MuséoParc/photo: J.-C Aubert) and Velsen 1 (source: National Museum of Antiquities, Leiden/Photo: R.J. Looman).

Table 18.1 Panpipes from the Roman period (all measurements in centimetres).

Site	Date	Length	Width	Thickness	Number of pipes	Lengths of pipes	Diameter of Pipes	Decoration
Nijmegen-Oosterhout (NL)	2nd century AD	14.4	>4.5	1.3	>3	9.5/8.7/7.8	0.8-0.9	incised lines, graffiti of a boat and a
Uitgeest-Dorregeest (NL)	second half 2nd century AD/first half 3d century AD	13.3	9.4	1.4	8	9/8.3/7.7/7.1/6.6/6.2/5.9/5.3	0.85	decorative carved grip
Velsen 1 (NL)	AD 15-40	12	>4	1	>3	>3.8/c. 3/c. 2.6	>0.5	none
Alisé-Sainte-Reine (F)	2nd/3d century AD	11.7	>7.7	1.1	8	7.1/6.3/5.5/5.05/4.35/3.9/3.55/3.15	0.9	incised grooves with half-circles in between
Regensburg-Kreuzhof (D)	2nd/3d century AD	>10	>4	0.6-1	>4	6.5/5.7/5.1/4.7	0.85	circles burnt into the surface of one side
Titz-Ameln (D)	2nd/3d century AD	13.4	>6.4	1.1	>4	9.3/8.6/7.6/6.6	0.9	incised lines
London-Thames Exchange site	2nd/3d century AD	11.8	>4.6	1	>5	9/8/7.25/6.4/5.2	0.75-0.8	circle decoration and incised lines
Loveld-Aalter (B)	second half 2nd century AD/first half 3d century AD	11.5	>7.5	0.65-0.75	7	6.4/5.8/5.5/5.5/4.9/4.5/4.1/3.7	0.8	geometric patterns burnt into the wood
Tasgetium (CH)	AD 50-60	11.1	8.4	1.4	7	7.3/6.2/5.32/4.57/4.35/3.85	0.76-0.87	circle decoration and incised lines

panpipe could also not be melted down to produce other products. This instrument belonged in the Roman private sphere and is related to the Roman mythology of the god Pan. It was therefore an extraordinary gift for someone from a different cultural background and world of ideas. Interestingly, this type of panpipe survived at least until the early Middle Ages, as a find from Coppergate suggests.[401]

The panpipe is not the only indication that music was made in the fort. Four flutes made of bone are also known from Velsen 1.[402]

18.2 Gaming pieces

The assemblage includes eighteen gaming pieces: six are of silver fir, one of pine, one of Norway spruce, one of an unknown species of coniferous wood, a further four of alder, one of maple, and one of ash. The wood species of three pieces have not been identified. Thirteen gaming pieces are included in the catalogue (find numbers 1730.1, 3029.1 to 3029.8, 4011L, 4622, 4202 and 4011k, Plate CXI.424-436; Fig. 18.3). They are radially carved and round to oval in shape. It is likely that the coniferous wood gaming pieces were made from the wood of discarded barrels. The size of the gaming pieces varies from 2-3.3 cm, the thickness between 0.4-0.9 cm.

[401] Morris 2000, 2353-2357.
[402] Bosman 1997, 50.

Figure 18.3 Wooden gaming pieces from Velsen 1 (photo: BIAX *Consult*).

Figure 18.4 Gaming pieces from Velsen 1 made from pottery sherds (photo: BIAX *Consult*).

These pieces will have belonged to a board game. Bosman mentions gaming pieces made of clay and reused sherds of pottery (Fig. 18.4), glass, and bone, and a die made of bone as indications for leisure activities in the camp.[403] Gaming pieces made of clay were also found in Alphen-De Hoorn.[404]

[403] Bosman 1997, 48-49.
[404] Excavation in 1996 of the ROB, the former RCE.

19 Fishing and Fowling

19.1 Fish traps

Four fish traps and several pieces of fishing gear were recovered from Velsen 1. One of these traps, found in 1989, was not excavated due to time pressure, and another one was not described after excavation. Therefore, those two are not included in the study. In the end, two of the four fish traps were actually described. Both of these fish traps were of the bell-shaped wickerwork basket model with a fixed internal funnel or throat.

When the traps were found in the harbour basin, the upper sides had already disintegrated but the entrances and throats of both traps had been preserved. Within the traps, stones, such as quartzite and broken grinding stones, were documented as ballast. Near the traps, a stake was found to which one or both of the traps were initially tied. The stake probably also served to mark the location of the traps in the harbour basin.[405]

The larger of the two traps had a length of about 85 cm and a diameter of maximum of 30 cm (1988-1); the smaller trap had an estimated length of 70 cm and will originally have been about 35 cm in diameter (1988-2). The traps were equipped with an interwoven funnel through which a fish could swim into the trap but from which it could not escape (find numbers 1988-1 and 1988-2, Plates CXII.437-438).

An opening at the tail of the trap with a diameter of 9-12 cm could be closed with a prop of moss. One of the traps still had its prop intact and in place when salvaged (find number 1988-2). Based on remains of mussels and bones from cattle found inside the traps, both traps initially had contained bait. To extract the caught fish from the trap, the prop would have been removed from the opening at the tail end.

The traps were both woven in one piece, using unsplit and unpeeled willow (Fig. 19.1).[406] Some of the willow rods have thin side branches that were woven along with the main twigs. The stakes or uprights are part of the passive warp and have diameters between 0.5-0.6 cm, while the rods of the active weft have an average thickness of c. 0.33 cm. The weaving of the basket started with the straight and narrow

[405] With thanks to B. Beerenhout from Archaeo-Zoo for the research data.
[406] The wood identification of the traps was conducted by B. van Hoorn-Berkel, University of Amsterdam.

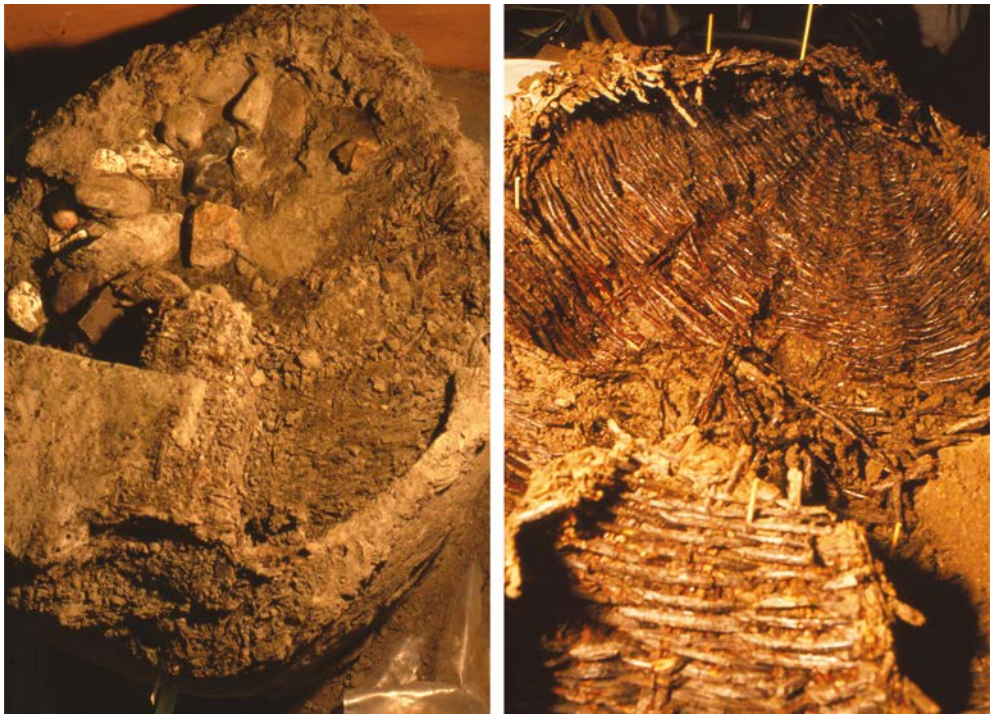

Figure 19.1 Two closely woven, basket-like fish traps from Velsen 1; find number 1988-1 (left; photo: B. Beerenhout), and find number 1988-2 (right; photo: B. Beerenhout)

funnel, the throat of the trap. After a length of c. 35 cm, the uprights were bent backwards to form the entrance of the throat which had a diameter of c. 17 cm. From here, the weft was woven backwards around the throat. By inserting rods, the basket was widened towards the belly and narrowed again by reducing the uprights. Finally, the uprights were bent and twisted to form the rim of the opening at the tail. A handle made from twisted rods of willow is attached to one of the traps (find number 1988-1).

According to Dütting, fish traps are a passive fishing method, and the placement in streams and rivers is dependent on the 'current, tide, water temperature and the behaviour of the particular fish species targeted'.[407] Based on

[407] Dütting 2016, 7.

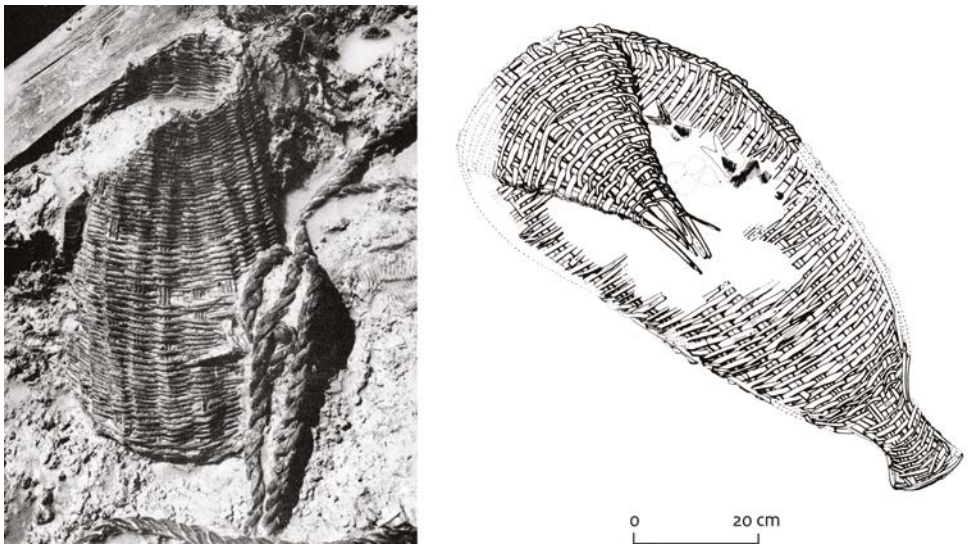

Figure 19.2 Two fish traps from Valkenburg (source: Van Rijn 1993, 154, Fig. 3; 156, Fig. 4).

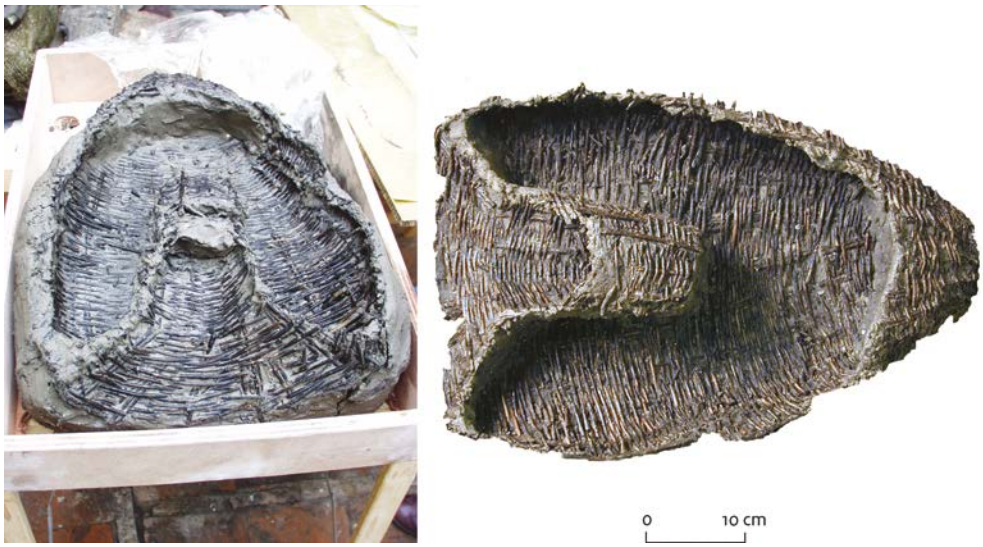

Figure 19.3 Fish trap from Utrecht-Leidsche Rijn, site Hoge Weide (LR42); the trap before conservation (left; photo: BIAX *Consult*) and after (right; photo: Restaura).

the small diameter of the rear throat opening (c. 9-12 cm) and the remains of the bait, this type of fish trap might have been used to catch eel and small fishes such as juvenile white bream and roach. During the Roman habitation, the quality of the water in the harbour basin had deteriorated, creating favourable living conditions for eel. This has also been observed in other Roman sites, such as in Leidsche Rijn.[408]

The type of basket-like fish trap from Velsen 1 is also known from other freshwater contexts near military Roman sites in Valkenburg (Fig. 19.2),[409] Zwammerdam,[410] and Leidsche Rijn (Fig. 19.3).[411] This type of trap was also found at the indigenous site of Uitgeest-terp and had already been manufactured in the Middle Iron Age, as can be deduced from a trap known from the rural site in Houten-Castellum[412] (Table 19.1).[413]

Almost completely preserved and quite comparable with those of Velsen 1 are the traps of Valkenburg-Marktveld and Leidsche Rijn. The fish traps from Valkenburg-Marktveld, with an estimated dating to AD 120-160, varied in length between 80-103 cm. Two of the traps were made of one-year-old unsplit and unpeeled rods of willow and, for a third trap, rods of dogwood of several years' growth were used.[414] Of the nine Roman fish traps from the Leidsche Rijn region, eight were made of willow and one of willow with a small portion of dogwood.[415] The traps from the other sites are all made from willow. The length of the traps from the different sites varies between 60-90 cm, with sizes around 80 cm being the most common.[416]

Little remains of the traps from Velsen 1 after years in storage. The best photos of the traps, taken years after the excavation, have been included in this volume. The poor remains were conserved as far as possible by the restoration company Restaura in 2020 and are now in the archaeological depot of the province of Noord-Holland.

19.2 Other fishing gear

Half of a round disc with a hole in the middle, cut from a piece of poplar or willow bark, served as a net float (find number 4002a, Plate CXIV.439). Moreover, a double-pointed object with a hole in the centre is also interpreted as a net float (find number 1200); the wood species is not identified. This object, with a length of 5.8 cm, a width of 3.6 cm, and a thickness of 1.1 cm, is not included in the catalogue because it is missing.

[408] Beerenhout 2004.
[409] Bult & Haalewas 1990, 14-16; Van Rijn 1993, 149-159.
[410] Beunder 1972, 14-20.
[411] Van Rijn 2009, 129, 131; Dütting 2016, 4, 7; Lange 2021b.
[412] Kooistra 2015, 28-30.
[413] Dütting 2016, 39-40.
[414] Van Rijn 1993, 151.
[415] Van Rijn 2013, 477; Lange 2021b.
[416] Lange 2021b, 20.

Table 19.1 Overview of basket-like fish traps of closely woven wickerwork from the Netherlands (after van Rijn 2016, 135, tab.10.1; updated with new data).

Site	Context	Dating	N	Publication
Utrecht-Achter Clarenburg	Rhine, nearby fort and vicus	AD 77 or 127 ± 35	1	Van Iterson Scholten 1971; Van Regteren Altena & Sarfatij 1973, 70
Valkenburg-Marktveld	vicus, gully	AD 120-160	3	Van Rijn 1993, 149-153
Velsen 1	military, harbour	AD 15-30	4	Spruijt 1990; Beerenhout 2016
Leidsche Rijn-Gemeentewerf	military, watchtower	end 2nd/first half 3rd century	3-4	Van Rijn 2013, 135-145, 217-220
Leidsche Rijn-Waterland	river revetments, limes road	AD 100	1	Lange 1998
Leidsche Rijn-Hoge Weide	rural with Roman connections	first half first century	2	Van Rijn 2013, 135-145
Leidsche Rijn-Kuinderboslaan	rural with Roman connections	AD 50-70	2	Lange 2021b
Leidsche Rijn-Kuinderboslaan	rural with Roman connections	early medieval	9	Lange 2021b
Zwammerdam	unknown	Roman	1	Beunder 1990, 40.
Houten-Castellum	rural, indigenous	Iron Age	1	Kooistra 2015, 43-44
Uitgeest-terp	rural, indigenous	first century AD	1	Van Gijn 1984, 217-218
Total			28-29	

Figure 19.4 Three birch rolls from Velsen 1 which probably served as net floats or floats for a fishing line (from left to right: find numbers 3065.3, 3065.1, and 3065.2; photos: BIAX *Consult*).

The catalogue includes three of the four artefacts made from rolled birch bark that have been interpreted as floats for a fishing line or fishing net (find numbers 3065.1, 3065.2, and 3065.3, Plate CXIV.440-442; Fig. 19.4). They appeared to have dried out considerably in the time between excavation and description and have also loosened and begun to crumble. Based on the amount of crumbling material, the bark rolls must originally have been rolled up tighter and have consisted of more layers. From the fourth specimen, only a drawing exists (find number 762).

Parallel finds of floats made from birch bark are known from a late medieval context from Heemskerk-Broekpolder (Fig. 19.5),[417] from early medieval Elisenhof,[418] and from early medieval Haithabu.[419] The distribution in time and space shows that the use of birch bark rolls was a common tradition, with examples dating back to prehistoric times.[420] They were still widely used in the nineteenth century, as examples of nets with birch bark floats in the open-air museum Gammelgården in Myckelgensjö (Sweden) illustrate (Fig. 19.6).

Remarkably, net floats from Tasgetium are frequently made of poplar, and Leuzinger mentions that this has long been a tradition in the Lake Constance region.[421] From Tasgetium, there are nine net floats of poplar, one of oak, one of beech, and one of ash. They all have a rectangular shape and some are rectangular with pointed ends.[422]

In addition to the wooden fishing gear already mentioned, net weights of stone and

Figure 19.5 Two birch rolls from a medieval context at the Heemskerk-Broekpolder site (source: Lange 2017a).

Figure 19.6 Birch rolls as floats on a fishing net; Gammelgården Museum in Myckelgensjö (Sweden; photo: BIAX *Consult*).

417 Lange 2017a, 85, 179.
418 Szabò, Grenader-Nyberg & Myrdal 1985, 28.
419 Westphal 2006, 62.
420 Olson 2008, 37; Schatte 2009, 17, 31-32.
421 Leuzinger 2012, 108.
422 Leuzinger 2012, 106.

clay, as well as lead sinkers, all of which are related to fishing with nets, have also been found at Velsen 1.[423]

19.3 Throwing stick or boomerang for fowling

Two throwing sticks (boomerangs) are known from Velsen. One belongs to the assemblage of the fort and was found in the harbour basin. The other comes from an indigenous settlement known as the Velsen-Rooswijk site.[424]

The throwing stick or boomerang from Velsen 1 was not conserved and it does not exist anymore. The description is, therefore, based on a drawing and on a photograph taken immediately after the discovery of the artefact (find number 131, Plate CXV.443; Fig. 19.7). The boomerang from the harbour basin is flat, rhombus-shaped in cross-section, and widens towards the ends. The preserved length is 34.5 cm. Assuming that the boomerang was symmetrically shaped, the original length can be estimated at c. 38 cm. While the end of one wing is missing, the intact end from the other wing has a width of 4.2 cm and a thickness of 0.8 cm. In the centre part where the boomerang bends – the elbow – the width is 3.1 cm and the thickness is between 1-1.1 cm. The type of wood has not been identified and, because the object has been lost, the identification could not be carried out within the present study. Based on a photo taken in the field just after the boomerang was discovered, it was cut from a naturally curved branch. The characteristic macroscopic features for oak and common ash are missing. Beyond these observations, no further remarks can be made about the wood species.

In the Netherlands, three boomerangs from Roman contexts are known. These include a specimen made from field maple from Vlaardingen,[425] one of oak from Leidschendam,[426] and the boomerang from Velsen 1. Ter Brugge has experimented to find out whether or not the boomerangs from Vlaardingen and from Velsen 1 are of the returning type. In the case of the boomerang from Velsen, Ter Brugge suggests that it is probably a returning device. Regarding the throwing stick from Vlaardingen, the question remains unanswered.[427]

Figure 19.7 Velsen 1. The throwing stick or boomerang after salvage, lying on the shirt of the archaeologist in charge (photo: B. Beerenhout).

This second boomerang from the Velsen-Rooswijk site dates from the Middle Iron Age, between c. 470-300 BC, and is made of oak. The boomerangs were probably used to catch birds or to hunt small animals. However, the function as a weapon cannot be ruled out. In view of the fact that these objects were already used in prehistoric times, hunting with a throwing stick indicates a local tradition.

[423] Bosman 1997, 42; Dütting 2016.
[424] Calkoen 1963a, 73-75; Calkoen 1963b, 36-37; Calkoen 1964, 35; Galis 1966; Ter Brugge 1996, 321-333.
[425] Ter Brugge 1996, 321-333.
[426] Van Veen 2019, 79-89.
[427] Ter Brugge 1996, 331.

20 Woodworking

20.1 Planes

Two exceptionally well-preserved planes belonging to the assemblage of Velsen are evidence of carpentry activities on location (Fig. 20.1). One of the planes was found at Velsen 1, the other was salvaged from Velsen 2. In terms of form and function, the two planes are remarkably similar. The stock of the plane from Velsen 1 is made of a rectangular block of Norway maple or Sycamore maple and has a length of 32.8 cm (find number 759, Plate CXVI.444). The pitch of the iron in the centre is 13 cm long and has two sloping sides with an angle of 55 degrees. Because of the double-sided pitch, the carpenter could change the direction of planing by choosing a different position of the iron. On each side of the pitch there is an oval opening that functions as a handle. Initially, when the plane was found in 1988, the pitch still contained a cutting iron and a semi-circular piece of wood which held the iron in place. On the outer side, the course of the sloping sides is marked with two incised lines which are barely visible after conservation. The stock has a symmetrical half-round heel at both ends that narrows towards a ledge which then forms the transition to the handgrips and the sole.

The plane from Velsen 2 is also made from maple; a further differentiation of the species was not possible (inventory number 6026-20, Plate CXVII.445). With a length of 33.7 cm, this plane is slightly longer than the one from Velsen 1. The sides of the pitch have an angle of 52 degrees. This plane also has a double-sided pitch in the middle and a handle on each side. Here, too, two incised lines can be seen on the outside, marking the sloping sides of the pitch. There is, however, one addition to the plane from Velsen 2 which is not present in the one from Velsen 1. On either side of the pitch there are rectangular holes filled with lead. The purpose of the lead filling is almost certainly to give the plane more weight, for better contact with the wooden surface. Therefore, the plane would have been used for fine finishing work, which makes this tool a *sweet planer*. Until now, this is the only known Roman specimen with this characteristic.[428]

The two planes from Velsen are most comparable to the four planes found in the tool chest of the shipwreck De Meern I.[429] As with those from Velsen, the wooden stock with a double-sided pitch and the two openings which served as handles have also been preserved in these planes. The four planes from De Meern I are made of field maple, ash (Fig. 20.2), beech, and oak, and were found together with a hand drill, two bowsaws, an adze, a chisel, and other woodworking tools (Fig. 20.3).[430]

A plane with a stock of beech and a length of 38 cm is known from the Saalburg.[431] A specimen of which only the sole and the iron

[428] The information was provided by H. Coolen, chairman of the Association of Crafts & Tools.
[429] Bosman 2007, 223-226.
[430] Jansma & Morel 2007, 404-406; Lange 2017, 135-139, 212, 247-257.
[431] Gaitzsch & Matthäus 1981, 205-247; Wamser, Flügel & Ziegaus 2000, 358 Ill. 104 Cat. no. 84b3.

Figure 20.1 Above: block plane from Velsen 1, made of Sycamore or Norway maple, find number 759. The photo shows the current state of the object (photo: BIAX *Consult*). Below: block plane from Velsen 2, made from maple, find number 6026-20 (source: Archaeological Depot of the province of Noord-Holland/photo: K. Zwaan).

Figure 20.2 One of the block planes made from ash, recovered from the shipwreck De Meern I (photo: BIAX *Consult*).

have been preserved comes from Cologne and has a length of 32.4 cm, which corresponds well to the planes from Velsen 1 and 2.[432] A smaller specimen with a length of 21.3 cm is known from Pompeii. This one consists of a wooden stock with a double-sided pitch, but no handgrips.[433] Until now, it was thought that the plane from Pompeii was the oldest specimen of a plane from an archaeological context ,[434] but those from Velsen 1 and 2 are almost half a century older. Planes, however, already existed before this era, as can be deduced from depictions on coins from the first half of the first century BC.[435] Although no archaeological finds are known, it is quite possible that this carpentry tool has Greek origins, and that the Latin name for planer, *runcina*, is derived from the Greek word *rhycane*.[436] It can be said with certainty that this tool was completely unknown to the indigenous population at the beginning of the first century.

20.2 Mallets

The assemblage includes three mallets, all listed in the catalogue (Fig. 20.4). One mallet is made from a piece of oak and has a handle which is widest in the middle and then narrows towards the elongated, rectangular head (find number 3059, Plate CXVIII.446). Seen from the side, the mallet is slightly curved over the entire length. Because of the flat head, this mallet is also called a maul, and it has been suggested that it might have functioned as a lead beater. Of another mallet, only the head and a piece of the handle have survived, while a drawing from just after the excavation shows the mallet to be completely intact (find number 3322, Plate CXVIII.447). This mallet has a cylindrical head that is pierced in the middle for placing it on its straight handle. Both parts are made of ash. Considering the relatively small dimensions of the head (only 8.7 cm long and a diameter of 6 cm), the mallet will have been used for fine work. Noteworthy is the presence of small, shallow pits on the sides of the head. Their presence is why this mallet is thought of as a shoemaker's tool, used for hitting nails into the sole. However, this type of mallet is multifunctional and may just as well have been used for wickerwork or for use with a gouge and chisel.[437] A similar head of a mallet was found at Velsen 2 (Fig. 20.4). Unfortunately, this specimen has not been preserved. On photos, it can be

[432] Ulrich 2007, 43.
[433] Ulrich 2007, 15.
[434] Ulrich 2007, 43.
[435] Ulrich 2007, 41.
[436] Ulrich 2007, 41.
[437] Mols 1994, 90.

Figure 20.3 Four block planes and two bow saws from a carpenter's tool chest, found in the shipwreck De Meern I (photo: BIAX *Consult*).

Figure 20.4 Three wooden mallets from Velsen 1 (left) and one from Velsen 2 (right, below). From left to right: find numbers 3059 and 1937.1 (photos: BIAX *Consult*) and find number 3322 (photo: M. IJdo); the one from Velsen 2 has no find number (source: archive of the Archaeological Working Group Velsen/photo: P. Vons).

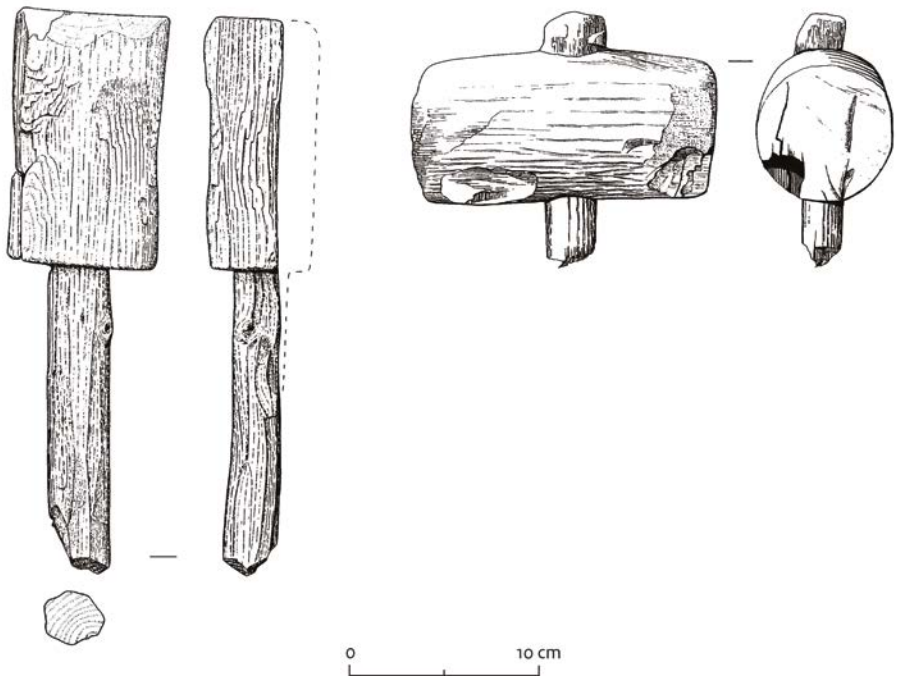

Figure 20.5 Mallet or maul from one piece of ash, and a mallet with an oak head and a handle made from Maloideae, type apple/hawthorn/pear, found in Carlisle, Annetwell Street (source: Caruana & Allnutt, unpublished, 286, Fig. 231 and 287, Fig. 234).

seen that the handle was fastened from above with an iron nail in the head. Judging from the concentric annual rings that can be seen on the photos from the side of the hammer, this hammer head was also made of ash. The cross-section of the head was oval with dimensions of 5.5 x 2.6 cm, the length was c. 6 cm. Another mallet, made of oak, is remarkable for its geometrical pattern consisting of six rows of carved rectangles (find number 1937.1, Plate CXIX.448). As for the function, there are different interpretations, from a mallet used for caulking ship planks to a tool for tenderising meat.

Wooden mallets have also been found in Carlisle, at the Annetwell Street site. Just as those from Velsen 1, these mallets were made either of one piece of wood or of two parts, namely a head and a handle. If the hammer consists of two parts, the head was sometimes made of a different wood species than the handle. An example of this is one of the mallets found in Carlisle, with an oak head and a handle made from Maloideae, type apple/hawthorn/pear (Fig. 20.5).

20.3 Possible tool-rest support

Two oak fragments with three U-shaped grooves and three inwardly-curved hooks may have belonged to a tool-rest support, comparable to a specimen found in early medieval Coppergate (find number 3396, Plate CXX.449).[438] The object from Coppergate has three V-shaped notches and, at the end, a tenon for the connection to a lathe; it has a complete length of 56.2 cm, a width of 7.2 cm, and a thickness of 2 cm. The two fragments from Velsen have a preserved length of 19 cm, a width of 6 cm, and a thickness of 1-2 cm. In its original, complete form, the object from Velsen will have been longer, but the initial length cannot be reconstructed on the basis of the fragments. Moreover, it should be noted that the fragments dried out prior to conservation and that the drawing in the catalogue was made still later. If this is actually a tool-rest support, it would have been used for a pole lathe. Until now, there is no evidence for the existence of this type of lathe. Of the few known images from Roman times that testify to the craft of woodturning, the only one is the depiction of a lathe with a possible wheel in a furniture maker's shop.[439]

20.4 Pegs, wedges, wedge-shaped objects, and dowels

The assemblage includes 131 pegs, 48 wedges, and three dowels. The large number of pegs should not be surprising, given that mortise and tenon joints would probably have been the most commonly used wood joint. The wood species have been identified from 152 pieces, leaving 30 pieces unidentified (Table 20.1). Oak, ash, and alder dominate the spectrum of pegs and wedges; other varieties occur only occasionally.

[438] Morris 2000, 2120.
[439] Ulrich 2007, 344.

Table 20.1 Overview of the pegs with and without a head, wedges, and dowels, and the identified wood species.

Type of peg	Alder	Apple/Hawthorn/Pear	Ash	Beech	Elder	Elm	Field maple	Lime	Hazel	Oak	Spindle tree	Willow	Coniferous wood	Pine	Silver fir	Spruce	Unidentified	N
Peg with head	2	-	4	1	-	-	-	-	-	6	-	-	1	-	1	-	8	23
Peg without head	20	1	26	3	1	-	-	1	2	27	1	2	-	2	-	-	22	108
Wedges	9	2	15	2	-	1	1	-	1	6	-	-	-	-	-	1	10	48
Dowels	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	2	3
Total	31	3	45	6	1	1	1	1	4	39	1	2	1	2	1	1	42	182

One of the three recovered dowels is from hazel; the other two are not identified. At least 15 pegs, of which six with a head (find numbers 3362, 3070, 2182.1, 3387, 1270.1 and 1350.1, Plate CXXI.450-455) and nine without a head (find numbers 3357, 3219, 3352, 3353, 3099, 1537.1, 2013.1, 3310, and 1064.1, Plate CXXII.456-464), are listed in the catalogue. Further, of the 48 wedges, seven are represented in the catalogue (find numbers 1792.1, 1066.1, 699.1, 3254, 3416, 4372, and 4012s, CXXIII.465-471). Even though three dowels are recorded in the database, no drawings of them are available and they can no longer be found in the collection of the RMO. Therefore, no dowel is included in the catalogue.

Some pegs and wedges are distinguished from the others by their wood species and/or careful finishing. Presumably, these will have secured mortise and tenon joints of furniture. A wedge made from the wood of the spindle tree (find number 699.1, CXXIII.467), one from field maple (find number 3254, CXXIII.468), one from ash (find number 3087; not listed in the catalogue), one from alder (find number 1066.1, Plate CXXIII.466), and one from oak (find number 3416, CXXIII.469) are all interpreted as furniture wedges. Moreover, two trapezoidal-shaped wedges, one of ash and the other of oak, are also considered to be wedges for furniture (find numbers 4372 and 4012s, Plate CXXIII.470-471).

20.5 Processing waste

The assemblage includes processing waste from woodworking activities, mainly sawn-off and cut-off pieces from smaller construction parts such as boards with a maximum width of 12 cm, battens, and slats. There are 249 pieces, of which 28 sawn-off and cut-off pieces are included in the catalogue. The present study does not include waste from the processing of the larger building timbers of the bank revetments and the harbour installation. Nevertheless, according to Morel, woodchips, probably from the pointing of poles with larger diameters, were present in large quantities in the harbour basin and at the jetties.[440] Van Rijn mentions some chips from planing, but these finds have not been found in the collection and, because no drawings or photos are available, they are not included in the catalogue.

The sheer number of sawn-off pieces is particularly noteworthy. Three quarters of the processing waste consists of sawn-off ends of radially split boards, most with straight sides, and several mitred sawn or cut-off ends. In general, they are all carefully smoothed (find numbers 4426, 4414, 4361, 4362, 4599, 4352, 4353, 4355, 4354, 4359, 4356, 4360, 4424, 4357, 4415, 4428, 4430, 4014g, 1917.4, 3297.1, 3297.2, 3297.3, 4583, 4079, and 4541, Plate CXXIV.472-489, Plate CXXV.490-496; Table 20.2). In several cases, the waste bears witness to precise work. Examples of this fine woodworking are a 2 cm-long sawn-off piece of a profiled batten (find number 1917.4, CXXV.490) and a small slat, triangular in cross-section (find number 3297.2, Plate CXXV.492).

More than one third of all of the pieces are ash. A smaller amount is from alder and oak. Other types of wood occur occasionally, including maple and beech. This spectrum of wood species differs from that of the bank revetments and harbour installations, where mainly roundwood of alder has been used and, to a lesser extent, oak. This implies that the processing waste is not the result of woodworking related to the construction of the jetties and revetments, but of the manufacturing of lighter constructions such as tent frames, furnishings in buildings, and interior constructions (Chapter 12). One can also think of timber frameworks for wattle and daub walls in buildings. However, in this case more willow, alder, and hazel would be expected, wood species that were present in the area and which would have been most suitable for wattle. Perhaps, for the wattle, those narrow battens from split ash which were found in great numbers in the harbour basin were used instead of twigs from hazel, willow, and alder.

Among the waste products are also the sawn-off and cut-off ends of staves from barrels of coniferous wood (find numbers 4583 and 4541, CXXV.494, 496; Fig. 20.6). Almost all of these are from silver fir, although one is from spruce. The staves of the barrels usually had a length of 200 cm. For reuse, both ends were sawn off just below the croze groove, resulting

[440] Morel 1988a, 251. Only a few samples of processing waste from the large timbers of the harbour installations and jetties have been collected. The wood species of those samples have not yet been identified.

Figure 20.6 Processing waste from recycled staves of coniferous wood (photo: BIAX *Consult*).

in a plank with a length of c. 190 cm. Considering the thickness of the staves, between 2-3 cm, the planks could have been used as construction timbers for various applications. Some planks appear to have been processed into smaller objects, such as pegs, a muntin bar, and various household utensils. From the Velsen assemblage, several tent pegs were made from reused staves. As evidenced from London and Cologne, discarded staves were also used for the production of writing tablets. From London, semi-finished boards, and a large amount of processing waste from the various stages of the manufacture of writing tablets from discarded barrels have been found.[441] It appears that the bases of barrels have also been reused, as well as the staves.[442]

Five objects have been interpreted as turning waste: one from ash, one from boxwood, and three from maple. The catalogue contains three pieces; the other two were initially not recognised as turning waste. One of the pieces of maple is mushroom-shaped with faceted sides and the other pieces are cylindrical. The cylindrical pieces still show tool marks from the turning process (find numbers 4474, 4386 and 3006, Plate CXXV.497-499). At the centre of the pieces there is a poppet mark of a holding device from a lathe.

Finally, two knots of oak and two of ash, a knot of alder, one of pine, and one of which the wood species is not identified, are also part of the assemblage. These are pieces that may have emerged by cutting roundwood.[443]

20.6 Roughouts and raw material

The assemblage includes two, possibly three roughouts. One is a section of an alder log cleft in longitudinal direction that has been chopped roughly into the shape of a sole (find number 3397, Plate CVII.421). Another is a piece of alder, possibly a roughout for a spoon or a spatula; the shape is already indicated but no start has been made to hollow a bowl or finish a blade (find number 1086.1, Plate CXXXII.544). Among the tent pegs, there were some pieces that can be considered semi-finished products, such as five with a notch sawn out, but which are otherwise unfinished (find numbers 4001x, 4012c, 4107, 4337 and 4540; Fig. 20.7).

441 Goodburn 2016, 8-15.
442 Idem.
443 These are not included in the catalogue.

Table 20.2 Spectrum of the wood species of different types of processing waste.

Type of processing waste:	Alder	Apple or Pear	Ash	Beech	Boxwood	Elm	Hazel	Maple	Field maple	Oak	Silver fir	Spindle tree	Pine	Spruce	Spruce or larch	Unidentified	N
Sawn-off	43	1	63	4	-	1	1	2	-	24	-	3	1	-	-	8	151
Cut-off	12	-	15	-	-	-	-	-	3	13	-	-	-	-	-	5	48
Chips of plane cf.	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Turning waste	-	-	1	-	1	-	-	3	-	-	-	-	-	-	-	-	5
Recycled	-	-	-	-	-	-	-	-	-	-	19	-	1	3	1	-	24
Natural leftovers	4	-	6	-	-	-	-	1	-	3	-	-	1	-	-	5	20
Total	59	1	86	4	1	1	1	6	3	40	19	3	3	3	1	18	249

Figure 20.7 Semi-finished tent pegs with a sawn notch (photos: BIAX *Consult*).

Figure 20.8 Beech burr, find number 2111.1, probably intended for woodturning or furniture-making (photo: BIAX *Consult*).

A remarkable find is that of an unworked beech burr with a diameter of c. 7.5 cm (find number 2111.1; not included in the catalogue; Fig. 20.8). A burr is an abnormally shaped growth on a tree trunk, caused by a bacterium or a fungus. A burr can also be the result of a trauma due to frost or injury. Characteristics of a burr are the deformed grain, a distinctive loose structure, and the grow of small, tightly packed knots. In Roman times, burrs, especially from maple trees, were favoured because of their appearance. Pliny mentions the wood of burrs for veneering and they were also highly recommended for turning.[444] Because burr wood also appears on a goods list on a tablet from Vindolanda, it is suggested that there was even a trade in the wood of burrs.[445] The burr from Velsen 1 must also have been intended for woodturning or furniture-making. Apparently, someone who was familiar with the characteristics of a burr was able to obtain a specimen from the dune area where beeches grew. Carved and turned objects made of burrs are known from archaeological contexts.[446] However, until now, no parallel of a burr as raw material has been found.

444 Pliny the Elder, *Naturalis Historia*, 16.68, 16.184.
445 Pugsley 2003, 113; Bowman & Thomas 1994, 286.
446 Pugsley 2003, 113.

21 Other Tools

21.1 Spade

The assemblage also includes a narrow board with a semi-circular end, probably a fragment of a spade. This object was radially cut from a piece of alder log (find number 1401, Plate CXXVI.500). The fragment is 26.4 cm long and 9.1-11.4 cm wide, with a thickness of 1.8-2.7 cm. Another possible interpretation of the function is that this is a fragment of a paddle blade. However, this interpretation seems less likely because of the wood species used and the way the object was cut out of the trunk: paddles and oars were mostly made of tangentially split wood.

21.2 Handles

There are 76 objects that have been interpreted as tool handles; 28 of these have been included in the catalogue. According to the spectrum of wood species, the preferred species for handles was ash (Table 21.1). Other frequently used wood species for handles are oak, beech, and Maloideae, type apple/hawthorn/pear. In addition, two handles are made from staves of silver fir which were recycled for this purpose (find numbers 4388 and 3379, Plate CXXX.525-526). A differentiation can be made between carved handles and handles which are lathe-turned, and between handles with a pierced end intended for a tanged iron tool and those with no perforation. The most simply worked handles without a perforation, cylindrical or sometimes tapered in shape and round or oval in cross-section, were certainly used for a wide range of applications (find numbers 46.1, 3407, 1899, 1917.3, 3321 and 3410, Plate CXXVII.501-506, find numbers 3106 and 4576, Plate CXXVIII.507-508). With such a handle, a hand mill for grinding grain may have been set in motion, while another may have been used as the handle of a bow saw. Whatever the application, in order to prevent injury to the hand from splinters, the wood surface will have been smoothed. Tool marks and traces of the lathe-turning have mostly vanished, either by smoothing during manufacturing or through use. Therefore, it has not always been possible to determine whether these objects were carved or turned, except when poppet marks of the holding device of a lathe remained on one or both ends of the handle. Two handles of maple have probably been lathe-turned (find number 4145, Plate CXXVIII.509, and find number 4185, CXXIX.518), as have two of oak (find numbers 4376 and find number 4399, Plate CXXVIII.510-511). The manufacturing process of several handles is less clear, such as for a cylindrical handle of oak (find number 4576, Plate CXXVIII.508).

The lathe-turned handles are often provided with incised lines. These are not only meant for decoration but also to guarantee a better grip on the tool. The handles that are round in cross-section, and frequently finished with a knob-like or flared end to prevent the tool from slipping out of the hand, were probably from carpentry tools such as drawknives, gouges, or socketed chisels (Fig. 21.1). Examples of these handles are part of the assemblage. These include a beech handle with a remnant of an iron tang (find number 3106, Plate CXXVIII.507), a handle of spindle tree wood (find number 3264, Plate CXXIX.514), and a handle, probably of a socketed chisel, of which the wood species has not been identified (find number 2017.1, Plate CXXIX.515). Some of the turned handles with a flared top have broken ends, so that it cannot be said whether or not they have had a perforation for an iron tang. This applies to a handle of field maple (find number 4036, Plate CXXIX.516), to one of maple with no differentiation of the species (find number 4185, Plate CXXIX.518), and to the top of two turned handles of oak (find numbers 4365 and 4035, Plate CXXIX.519-520). This is also true for the broken handles which are tapered and rectangular or rounded-rectangular in cross-section, such as two of ash and one of alder (find number 4011e, Plate CXXX.523, find numbers 3386 and 4383, Plate CXXX.527-528).

There is also a small group of handles which differ in shape both from those discussed above and from each other. One handle, pierced longitudinally, is made from a branch of an unidentified wood species and has a knot on one side. The opening has a diameter of 0.4 cm, so this object would not have been suitable as a handle with a rope drawn through it to carry a bucket, for example. What it was used for remains unclear (find number 1376, Plate

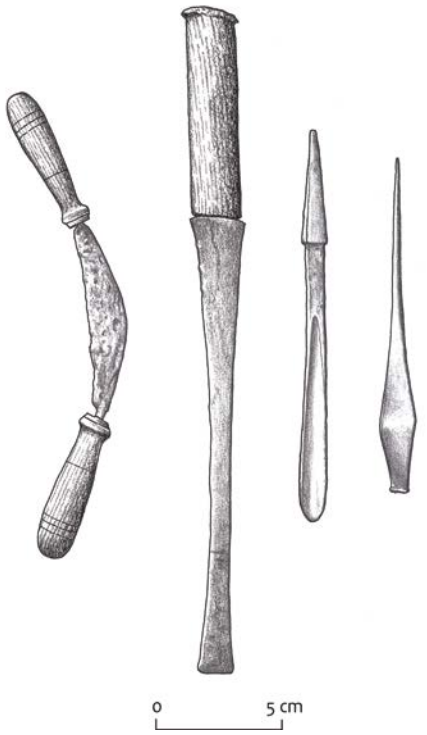

Figure 21.1 Roman tools for woodworking (source: after Ulrich 2007, 21, Fig. 3.10/drawing: R. Timmermans).

CXXX.522). Another example is a turned handle from Maloideae, type apple/hawthorn/pear, with a tenon-like shaft which should have fit into another part of a tool, probably from iron (find number 1770, Plate CXXIX.517). Different from all of the other handles is an object with two angled ends which were originally attached to a flat surface. This handle could have belonged to a float trowel, which is a tool used to flatten walls of loam or mortar (find number 114, Plate CXXX.521). Two float towels, one of oak with a silver fir board and one of a Maloideae-type of wood with an iron plate, are known from the *vici* Vitudurum and Tasgetium (Fig. 21.2).[447]

[447] Leuzinger 2012, 98.

Table 21.1 Spectrum of wood species used for handles.

Wood species	Number
Alder	5
Apple/hawthorn/pear	4
Beech	6
Boxwood	3
Common ash	18
Hazel	1
Hornbeam	1
Maple	4
Field maple	3
Sycamore maple	1
Oak	9
Silver fir	2
Spindle tree	2
Unidentified	17
Total	76

Figure 21.2 Roman float trowel from Tasgetium (source: Office for Archaeology of the Canton of Thurgau, Leuzinger 2012, Fig. 147).

22 Textile-processing Implements

22.1 Spindle

The assemblage includes a double-pointed drop spindle made from ash (find number 1785, Plate CXXXI.529). This spindle has a diameter between 0.4-2 cm and seems rather thick for a hand spindle used with a whorl.

22.2 Thread winder

Three objects have possibly been used to wind fine thread. For this purpose, they have been provided with notches and a waisted mid-section (find numbers 3007, 1059.1 and 3005, Plate CXXXI.530-532). One is made from ash and has two protrusions on either side, one of which is damaged (find number 3007). Two quite similar pieces with a notch on one edge are made from field maple (find number 1059.1) and silver fir (find number 3005) and were also interpreted as thread winders.

22.3 Needle or netting tool

The function of a flat object with a forked end is uncertain. This object, of which the wood species is not identified, could have been a weaving shuttle or a netting tool (find number 866, Plate CXXXI.533). So far, no parallel from another archaeological context has been found.[448]

22.4 Pin-beaters

Two objects were interpreted as pin-beaters. One is a tapered rod from boxwood with a flared end (find number 3328, Plate XXXI.534), and the other a carefully smoothed rod made of elder (find number 690.1, Plate CXXXI.535). The boxwood object is 11.5 cm long, the object from elder is c. 10.6 cm long (one end is broken). Pin-beaters were used to compress the thread after it was inserted into the warp and to separate strands of tangled thread. Parallels of pin-beaters are known from Tasgetium; one is made of oak and the others of boxwood.[449] The lengths of the pin-beaters from Tasgetium vary between 8.6-13.6 cm.[450]

22.5 Weft bobbins

Two objects with a knob-like end and a groove below the head are interpreted as weft bobbins, or tapestry flutes (find numbers 3301 and 3026, Plate CXXXI.536-537). One is made of ash and is 9.8 cm long (find number 3301), the other is from pine and has a length of 7 cm (find number 3026). Both resemble an object from Medieval York which was also listed as a weft bobbin (Fig. 22.1).[451]

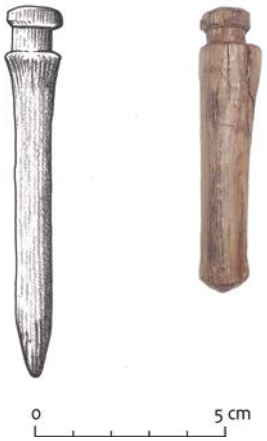

Figure 22.1 One of the two weft bobbins from Velsen 1, find number 3026 (right; photo: BIAX *Consult*), and one from Medieval York (left; drawing: R. Timmermans, after Morris 2000, 2334, Fig. 1148).

22.6 Toggle

A small toggle with an hourglass shape, made of the wood of Maloideae, type apple/hawthorn/pear, shows signs of abrasion in the narrow centre part, probably caused by winding thread (find number 3027, Plate CXXXI.538). This toggle is reminiscent of modern-day toggle-buttons. It could have been used to fasten clothes or as a thread winder.

[448] Thanks to S. Gorobchenko, textile expert and contributor to the online database Nationalclothing.org., for helping to search for parallels.
[449] Leuzinger describes these objects as 'Eintragsstäbe' (Leuzinger 2012, 105).
[450] Leuzinger 2012, 105.
[451] Morris 2000, 2334, Fig.1148, 2335.

Figure 22.2 Whorl from Velsen 1 made of boxwood, find number 1707.1 (photo: BIAX *Consult*).

22.7 Whorl

A flattened, lathe-turned bead of boxwood with a centre perforation is a spindle whorl (find number 1707.1, Plate CXXXI.539; Fig. 22.2). The object with a diameter of 3.2 cm has been carefully smoothed and a decorative groove has been incised on the outside. The central perforation for the spindle has a diameter of 0.4-0.6 cm. One side of the object is damaged; three quarters have been preserved. Two spindle whorls from Tasgetium correspond well with the one from Velsen 1; both are made of boxwood, with diameters of 2.4 cm, respectively 3.6 cm (Fig. 22.3).[452] Textile implements, including whorls, appear in the edict of Emperor Diocletian in AD 301, in which the prices of pin-beaters, weaving combs, spindles, and whorls were specified.[453] Boxwood appears to have been used as the standard wood for textile implements. The price for a boxwood whorl with spindle was 12 *denarii*, cheaper than a whorl with spindle from other wood species for the price of 15 *denarii*.[454]

Although only one wooden whorl has been found at Velsen, there are numerous finds which were made from lead and discarded pottery sherds (Fig. 22.4). This means that there must have been many more wooden spindles than the assemblage suggests. A wooden whorl is much lighter than a whorl made of pottery or lead, for example. Therefore, the wooden whorls were certainly used for the manufacture of fine thread.

Figure 22.3 Boxwood whorl from the *vicus* Tasgetium (Office for Archaeology of the Canton of Thurgau/ photo: D. Steiner).

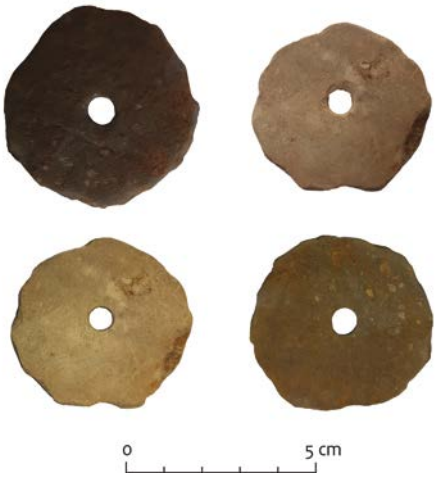

Figure 22.4 Whorls from Velsen 1 made of discarded pottery sherds (photo: BIAX *Consult*).

452 Leuzinger 2012, 106.
453 The Edict of Maximum Prices was part of the reforms of Emperor Diocletian in AD 301; within the framework of the present study, the valuation and use of wood for textile utensils is particularly interesting (Flemestad 2017).
454 Flemestad 2017, 265.

22.8 Weaving sword

A weaving sword with a length of 50.5 cm was used for the beating-up of the weft, produced either on a ground loom or on a vertical two-beam loom (find number 3304, Plate CXXXI.540). The tool is made of a radially split board of oak, has a handle and a long blade that narrows towards the end. A small part of the end of the blade is missing.

A parallel find of a wooden weaving sword from the Roman period is known from Wijster.[455] With its 52.5 cm length, this specimen, also made of oak, corresponds well with the weaving sword from Velsen (Fig. 22.5). The Roman weaving swords are similar to the late medieval ones. Examples of late medieval weaving swords, both of beech, come from Diemen-Ouddiemerlaan[456] and Rotterdam-Blijdorp.[457]

[455] Van Es 1967, 136.
[456] Vanoverbeke, Griffioen & Smeerdijk 2011, 84-87.
[457] Vredenbregt 2010, 82-83.

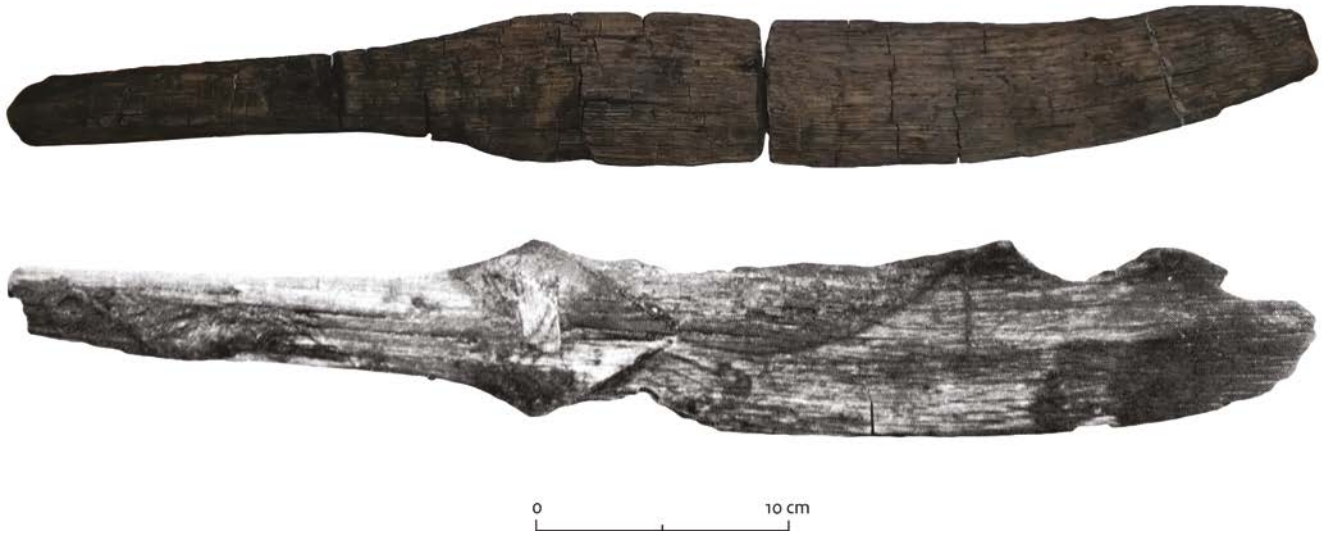

Figure 22.5 Weaving sword from Velsen 1, find number 3304 (above; photo: BIAX *Consult*), and from Wijster (below; source: van Es 1967, 137, Fig. 66).

23 Miscellaneous

23.1 Unidentified function

The function of 209 wooden objects has not yet been determined. Not all of these objects are discussed here or in the catalogue, only those that are more or less complete, and to which a function may possibly be attributed in the future. The wood species of 125 of these objects have been identified: ash, alder, and oak are dominant, beech and maple are common, and wood species including hazel, elm, willow, and pine are rare.

The function of a long alder stick with a pointed end and decoration under the rim of the top with a tenon is unknown. That it might be from a piece of furniture has been considered, but the end would be too pointed for that; with a length of 17.6 cm it would probably be too long for a hairpin (find number 2109.1, Plate CXXXII.541). An oak batten with triangular protuberances on one side and a pyramid-shaped finish at one end might have been a decorative element of a piece of furniture (find number 473.1, Plate CXXXII.542); the function of another batten made of alder with two rounded notches remains unclear (find number 1862.1, Plate CXXXII.543). A piece of alder with a widening end has been thought of as possibly being a roughout (find number 1086.1, Plate CXXXII.544; see also section 20.6). A semi-circular object made of ash and pierced in the centre could have been a whorl - were it not for the hole in the middle (diameter 1.8 cm) which seems too large for a spindle rod (find number 3320.1, Plate CXXXII.545). The function of a narrow beam of ash with a hole is also unknown (find number 716.1, Plate CXXXII.546). Other objects whose function is not known include a fragment of a slat with incised lines made from alder (find number 4523, Plate CXXXIII.547) and a fragment of a slat with a leather strip carefully knotted around it; the wood species of this object has not been identified (find number 3393, Plate CXXXIII.548; Fig. 23.1). The function of a batten made of hornbeam with a perforation at the pointed end remains unclear (find number 3317, Plate CXXXIII.549). The same applies to a rhombus-shaped object from ash; perhaps it is a gaming piece (find number 3051, Plate CXXXIII.550). A flat semi-circular object with a shaft made of alder is probably a flap. However, it is not known for what purpose it was used (find number 1680.1, Plate CXXXIII.551). It is possible that a three-pronged object of elm has been used in textile processing. However, the wood is not smoothly finished and would therefore continually catch on thread or fabric of wool or flax (find number 3057, Plate CXXXIII.552; Fig. 23.2). Also unknown is the function of an elongated boxwood stick with the remains of a rectangular opening on one side. The object was possibly part of a piece of furniture (find number 1197.1, Plate CXXXIII.552).

Figure 23.1 Fragment of a slat with a leather strip, find number 3393; the wood species has not been identified (photo: BIAX *Consult*).

Fig 23.2 Three-pronged object of elm, find number 3057 (photo: BIAX *Consult*).

Two crooked branches, one of ash and one of oak, are each pointed on one end (find numbers 3077 and 4013x, Plates CXXXIV.554, 557). For what purpose the branches have been used is unknown. The branch of ash is charred on the thicker end (find number 3077). The function of two branches of hazel, carefully worked and both with a lateral branch curved outward at the end, is not known. They were found together and possibly belonged to a construction or to a composite object. With diameters between 1.6-2 cm the branches seem to be too thin to be stretcher handles (find numbers 4281a and 4281b, Plates CXXXIV.555-556). The function of a forked branch of hazel with two ends that have not been completely preserved in length is also unknown. The main branch was cut at the beginning of the fork. Therefore, this would not have been a forked stake which was driven into the ground for fastening purposes (find number 3409, Plate CXXXIV.558).

Two tubes are included in the category of unidentified artefacts. One tube tapers towards the pointed end. The wood species of this specimen is not identified (find number 3252, Plate CXXXIV.559). The other tube is cylindrical and made of ash (find number 4259, Plate CXXXIV.560). A hollow boxwood object was initially seen as a tool handle (find number 3031, Plate CXXXV.561; Fig. 23.3). However, the object is perforated through the middle, and the 2 cm wide opening seems to be too wide for a handle, thus casting doubt on this interpretation. The inside of the object has been burnt. It is possible that the perforation was intended to hang the object.

Figure 23.3 Miscellaneous object from boxwood, hollowed and charred inside and with two holes, find number 3031 (photo: BIAX *Consult*).

A small round object with a hollowed inside and two holes next to each other in the middle looks like half of a two-sided seal. A piece of string might have been drawn through the holes, with which this half could be tied to another. Examples of wooden seal buttons are missing, so this function is hypothetical (find number 1574.2, Plate CXXXV.562). Two pyramid-shaped objects resemble the knobs of seal locks with which the sliding mechanism could be set in motion (find numbers 4005b and 4001z, Plates CXXXV.563-564). However, the underside is straight and smooth and therefore lacks the protrusion that would have been necessary for such a function. One of these objects is made of maple (find number 4005b) and the other of Sycamore maple (find number 4001z).

A bird's head carved from alder wood was interpreted by Bosman as a possible decoy.[458] With its long, straight beak, the head most resembles an oystercatcher (find number 1115.1, Plate CXXXVI.565; Fig. 23.4). This is probably a complete object because at the neck there is a shallow ledge with which the head has been attached to another object. Nevertheless, the function remains unclear.

An arc-shaped fragment of elm from which both ends are broken off may have been part of an oval or round object. The curvature is not natural, but sawn. Much attention was paid to smoothing the surface (find number 1569.1, Plate CXXXVII.566; Fig. 23.5). The wood species of a slat with notches is not identified, neither is the function of the object (find number 895, Plate CXXXVIII.567). The function of a rod with metal thread is also unknown (find number 1332.1, Plate CXXXVIII.568) but, remarkably, a stem or branch of honeysuckle has been used for the rod. This wood species only occurs once in the assemblage of Velsen 1. A board of radially split beech wood with a pointed and pierced end probably served as a flap (find number 1178.1,

[458] Bosman 1997, 130.

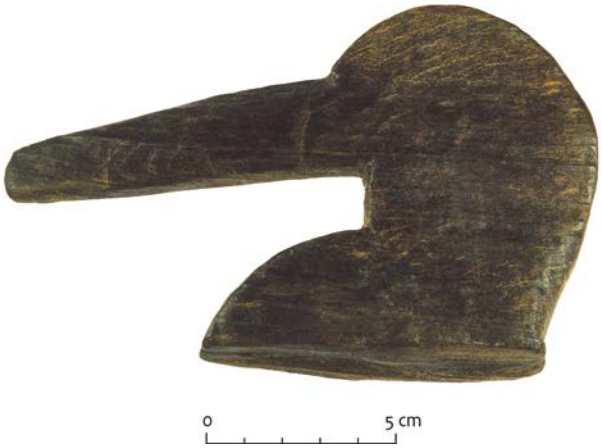

Figure 23.4 Carved bird's head, made of alder, probably the representation of an oystercatcher (find number 1115.1). The function of this object is unknown (photo: BIAX *Consult*).

Plate CXXXVIII.569). A string may have been pulled through the hole, serving as a hinged element. Other possibilities are also conceivable, for example, that the board was part of a mortise and tenon joint. The function of a narrow batten with trimmed corners is also unknown. There are two round holes in the batten, probably for a mortise and tenon joint. The type of wood has not been identified (find number 696, Plate CXXXVIII.570). The function of a roughly rectangular object from ash with two grooves is also unidentified. The object is not complete; only about three quarters have been preserved. On one side there is a straight groove, on the other side there is a diagonal groove. The function of being part of a machine has been considered (find number 1377, Plate CXXXVIII.571). Bosman suggests that it may have been part of a *scorpio* or some other type of Roman artillery.[459] A similar specimen was found in Carlisle (Fig. 23.6).[460] The function of this object is not known, either.[461]

Figure 23.5 Arc-shaped fragment of elm from an unidentified object, find number 1569.1 (photo: BIAX *Consult*).

[459] A. Bosman, personal communication.
[460] Caruana & Allnut, unpublished report.
[461] Caruana & Allnut, unpublished report.

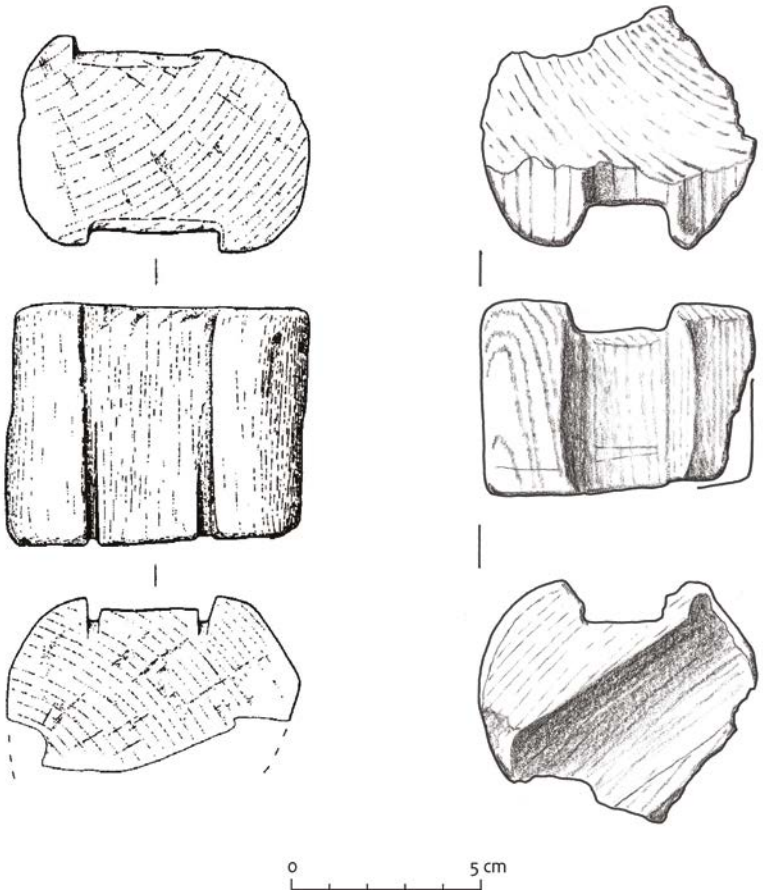

Figure 23.6 Similar, unidentified ash objects from Carlisle (left; source: Caruana & Allnutt, unpublished, Fig. 286) and from Velsen 1 (right; drawing: R. Timmermans).

24 Synthesis

24.1 Themes and categories

The wooden objects from Velsen display a great variety in terms of wood use and function. The composition of the assemblage shows that there were standard products which occurred throughout the entire Roman Empire and, at the same time, other artefacts which, because of their geographical distribution, seem to have been part of a trend. The first category includes writing tables and tent pegs, the second, objects such as the panpipe or the boomerang. In the following section, the conclusions which were drawn from the data obtained regarding wood use, production, and function of the wooden artefacts are discussed.

The assemblage is divided into seventeen themes covering different categories and subcategories (Table 6.2). For some themes, the original amount of wood in the assemblage will have been larger than it appears from the present study. This applies in particular to military equipment and to composite objects, from which the wooden parts have vanished and the iron parts have remained. From the assemblage of metal finds from Velsen 1, an iron spearhead, five iron bolt heads, and seven iron pieces of *pila* initially all had a wooden shaft.[462] Finds of archery equipment include six ear laths from bone and one from an antler, found in the harbour basin, as well as an iron arrowhead without any remains of a shaft, found in a well (1989-S221); there are, however, no remains of wooden bows.[463] From the context of a well (feature 180), a shield boss of the Germanic type was identified; here, also, no wood of the shield itself was preserved.[464] The surviving wooden components of weapons include a pommel and a handguard from a *gladius*, a grip, also from a sword, and an arrow shaft. This theme also includes military signa: such as the fragments of two staffs of centurions.

No site in the entire Roman Empire is known where so many wooden tent pegs have been excavated as at Velsen 1. Tent pegs were part of the standard military equipment.[465] In contrast to the large quantity of tent pegs found at Velsen 1, only a single one was revealed at Velsen 2. According to Bosman, this is an indication that hardly any tents were set up in the fort Velsen 2.[466] Interestingly, the heads and notches of the tent pegs show little wear, while the tips often appear to have been broken and to have been re-pointed. This could mean that mainly the ends were stressed during use. It is also worth noting that the tent pegs which were significantly shorter could still be used. It is possible that the tent pegs were not only anchored in the ground, but also in holes in frames made for this purpose.

Wooden containers confirm the image of a supra-regional supply network. Wine, beer, olive oil, and other foods were transported in barrels over long distances.[467] The Celtic name Liseimarus or Liseniomarus on one of the wine barrels suggests that at least some of the wine was imported from Gaul. In addition, numerous amphorae from Italy and the eastern Mediterranean, as well as from Spain and Gaul, have been found in the harbour basin. Renfrew considers that the best wines were produced in the last century BC and the first century AD and refers to the regions of Lazio and Campagnia. She describes large-scale viticulture as an industrialised business, 'owned by a financier, managed by a steward, and run by slaves'.[468] Discarded barrels without bases were frequently used for well-linings, whereby the barrels were often placed within a plank-lined construction. In many cases, when the well ceased to function, the barrel was pulled out of the pit, and the staves were recycled. This is also an indication for the durability of the oak and coniferous wood species of which the barrels were made.[469]

Most of the flat bungs with straight sides were the primary bungs with which the barrels, amphorae, and jugs were sealed after filling. The long bungs with slightly sloping sides were probably used once a barrel had been opened, as they are generally much longer than the flat bungs, which makes it easier to pull them out of the bungholes. Moreover, no brands have been observed on these longer bungs; the presence of stamps would no longer be necessary after opening for consumption. Smaller long stoppers will have served to close smaller openings, such as those of bottles and small jars.

As the finds from Velsen 1 are all fragmentary and there are no complete items of

462 Bosman 1997, 64.
463 Bosman 1997, 44, 65.
464 Bosman 1997, 67.
465 Tacitus Annales I, 65; Vegetius III, 8; Roth 1999, 77.
466 Bosman 2021.
467 Bevan 2014, 395.
468 Renfrew 2003, 66.
469 This observation should be kept in mind when interpreting the results of dendrochronological dating on barrels. The construction of the wells can be much younger than indicated by the dendrochronological measurements on a recycled, and, therefore, possibly older barrel.

Figure 24.1 Sarcophagus with interior reliefs, from Simpelveld (source: National Museum of Antiquities Leiden, RMO/photo: R.J. Looman).

furniture, the allocation to a particular piece of furniture is not always certain. For an interpretation, we rely on analogous finds and images on wall paintings and funerary monuments (Fig. 24.1). In the Netherlands, finds of furniture parts are known from, Alphen aan den Rijn, Leidsche Rijn, Nijmegen, and Valkenburg-Marktveld, among other sites. Only in exceptional circumstances have entire pieces of furniture survived. This was the case in Herculaneum and Pompeii, where in AD 79 an eruption of Mount Vesuvius buried complete houses with their inhabitants under a layer of ash. The furniture of Herculaneum has been extensively researched and described by Mols.[470] Mols concludes from the variety of manufacturing methods and external features, particularly with regard to structural and decorative details, that Roman furniture will have been manufactured according to the client's individual wishes and was not mass produced.[471] Furniture from Herculaneum is mainly made of silver fir. No fewer than seven beds, two *biclinia*, a stool, a cupboard, and two amphora racks are made of silver fir. Mols suggests that the silver fir came from nearby forests on the slopes of Mount Vesuvius and that it was therefore readily available for local craftsmen.[472] Other species exploited for furniture manufacture at Herculaneum included beech for a leg of a bed, hornbeam and boxwood for the legs of tables, walnut for the top of a table, and maple for the back of a chest. The famous baby cradle of Herculaneum is made of oak.[473] In Herculaneum, as well as in Leidsche Rijn (the shipwreck De Meern I), different wood species were often combined in a single piece of furniture. The framework of the bed from the shipwreck De Meern 1 consisted of a beam of Sycamore maple and bed planks of oak, silver fir, and sweet chestnut. The lathe-turned bed legs were made of beech. In Herculaneum, a turned leg of a bed made from beech is assumed to have belonged to a bedframe or a frame of a *biclinium* of silver fir.[474]

The presence of furniture, in particular that belonging to household furnishings, implies, in turn, the existence of buildings and larger tents at Velsen 1. In Roman times, as today, this includes seating furniture, beds, tables, cupboards, and chests. Mols adds to this list of furniture the house altar, *aeducula*, as an essential element in the Roman interieur.[475] In Herculaneum, no fewer than four wooden house

Figure 24.2 Wooden *aedicula* from Herculaneum (source: S. Mols, 2007/2008, 148, Fig. 6).

470 Mols 1994, 1999.
471 Mols 1994, 67.
472 Mols 1994, 83-84.
473 Mols 1994, 83-84.
474 Mols 1994, 84.
475 Mols 1994, 5.

Figure 24.3 Impression of a house shrine (artist's impression: R. Timmermans).

altars have been found (Fig. 24.2). They could be attached to a wall or placed on a cabinet that was often used for storage purposes.[476] The assemblage of Velsen 1 includes a remarkable fragment of a moulding which is identified as the rim of the pediment of a house altar or shrine. These shrines have the appearance of a miniature temple, complete with *cella*, two columns and a pediment with profiled mouldings. The *cella* provided space for statuettes and figurines of deities (Fig. 24.3).

Characteristic for Roman social life was a couch, the *biclinium*, used for reclining, dining, and conversing.[477] In addition, a differentiation can be made between functional, luxurious, and ceremonial furniture. Based on the assemblage from Velsen 1, it can be deduced that seating furniture such as chairs and stools, as well as reclining furniture (beds and *biclinia*), tables, and storage furniture, were present in the fort. Two table legs can be classified as exclusive furniture (find numbers 394.1 and 4132).[478] They were parts of round tables with three legs, such as are known from Herculaneum. The vast majority of the furniture consisted of undecorated planks of indigenous wood species. More luxurious wood species (boxwood, for example) and elaborated pieces are exceptions. Based on the wood species and the methods of manufacture, the assemblage of Velsen 1 contains predominantly functional items. With the exception of imprints of decorative nails and one plank with metal fittings and leather remnants, no ornamentation was found on the wooden furniture items. However, there may have been ornamentations that were simply not preserved. Also present in the depot of the National Museum of Antiquities

[476] Mols 1994, 59-63.
[477] Mols 1994, 43.
[478] Personal communication, S. Mols.

are three fragments of piano hinges from Velsen 1, made of bone, and there is a strong probability that these belonged to the hinge mechanisms of a cabinet door or a chest. Those cabinets must have been of the type found in both the shipwreck of De Meern I[479] and in Herculaneum, that consists of a framework with panels of thinly split or sawn wood. The shipwreck of De Meern I yielded a cupboard, a bed, and a chest for carpentry tools which included several spindles for reuse. Although the shipwreck is 150 years younger than the fort, all of these provide parallels for the sort of furniture that might have been present at Velsen 1. An interesting detail is the cornice on the cupboard from De Meern I which is similar to the cornices from Velsen.[480] The presence of cornices and mouldings at Velsen 1 indicate that these cabinets were decorated. The most commonly used wood joint for securing furniture legs to frames was the mortise and tenon joint. Where necessary, a pegged mortise and tenon joint was used to give extra sturdiness to the construction. This is in line with the observations of wood joinery from Herculaneum.[481]

Even the common soldier will have had some pieces of furniture in his tent or barrack. Carved furniture legs with a tenon at the top will have come from low stools, probably used by all ranks and, possibly, made locally. These stools could be one, three, or four-legged. The one-legged specimens can be fixed in the ground with the end of the leg, as was done in the past with milking stools. Some of the objects interpreted as legs of stools have a long tenon at the top which makes it plausible that the seating board must have been quite thick. This type of stool possibly resembles a three-legged stool made of beech wood which was found in the *vicus* Tasgetium, and that was completely preserved with a height of c. 30 cm.[482] In their wooden barracks, soldiers will also have kept their equipment in order by stowing it as high as possible. Simple racks and hooks may have been used for this purpose; two hooks were found at Velsen 1.

Domestic objects include carved vessels and lathe-turned bowls, spoons, spatulas, knives, discs and lids, a base of a stave bucket and of a lath-walled box, and *pyxides*. The wooden bowls, both carved and lathe-turned, imitate forms used in terra sigillata and metal. A spherical *pyxis* has little volume and it is likely that it was used for small valuables, such as special herbs, cosmetics, or medicinal ointments. It is made of boxwood and lathe-turned. This was probably a container for cosmetics or a medical ointment and may have reached the fort as a ready-made product.

A coiled basket resembles many baskets from the Spanish Mazarrón, where they were used in Roman times in lead and copper mines. The material from which the basket is made and the way it is manufactured is not known from indigenous contexts. It is likely that a woven basket with a foot ring was used to hold an amphora, as part of provisioning the fort with wine, fish sauce and olives. In terms of the wood species and weaving technique, a possible carrying basket (of which an ash base was found) and two fish traps from willow will have been made in the fort or in an indigenous settlement in the vicinity of the fort.

Personal belongings include the soles of pattens from Velsen 1 (Fig. 24.4) and a comb from Velsen 2. The soles from pattens include small sizes, which imply the presence of women and children in the fort. It is striking that no comb was found at Velsen 1 itself, although this utensil must have been part of every soldier's equipment.

Figure 24.4 Dogs were also present in Velsen 1, as the bite marks on one of the wooden soles indicate (artist's impression: R. Timmermans).

479 Mols 2007, 175-176.
480 Mols 2007, 175-181.
481 Mols 1994, 97, 99, Pl. 29.
482 Leuzinger 2012, 91.

The discovery of a panpipe indicates that music played a role in the fort. Nine of this type of panpipes are known from Roman times, and one from the Middle Ages. No fewer than two have been found within a short distance in Noord-Holland: the one from Velsen 1 and one in Uitgeest-Dorregeest. However, the panpipe from Uitgeest-Dorregeest was found in a context two hundred years younger than the fort. Of course, it cannot be excluded that the panpipe itself is older than the well in which it was found. Given the presence of disc-shaped gaming pieces, board games must have been a favourite leisure activity. The gaming pieces are made not only of wood, but also of potsherds.

Four fish traps, of which three were excavated and only two were analysed, as well as a throwing stick, reveal that local resources were also exploited for food supplies. Fishing was carried out in the channel of the Oer-IJ and fowling also took place in the vicinity of the fort. The belly-shaped fish traps are well known from other military sites, but also occur in indigenous contexts from the late Iron Age onwards. The throwing stick seems to be an indigenous tradition; beside the one that was found in the harbour basin, another was excavated in an indigenous dwelling near by the fort, dating to the Iron Age. However, it is possible that indigenous fishing and fowling techniques were adopted by the Romans.

Tools for woodworking, namely two planes and, possibly, a handle from a socketed chisel, as well as processing waste, indicate woodworking in the fort. Further, pin-beaters, weft bobbins, a spindle, a whorl, and a complete weaving sword reflect the manufacture of yarn and weft. This implies that, apart from the military tasks, other activities were also carried out in the fort, partly by the soldiers themselves (such as woodworking) and partly by people who were temporarily or permanently present in the fort. The latter group included women and children, craftsmen, and traders.

The closing theme is the unidentified objects. For the most part, these are objects made of composite (wooden) materials.

24.2 The wood species or genera used for the wooden objects

Of all the wooden artefacts from Velsen, the species of 1810 surviving objects have been identified. Following conservation, the wood species of twenty objects were indeterminable because the wood structure was no longer recognisable or because, when trying to make a thin slice for a microscopical examination, the material pulverised during cutting.[483]

Thirty-two species were identified (Table 24.1). The most frequently used species by far was ash, followed by alder and oak. Other species occurred in smaller numbers and sometimes only once or twice. The indigenous species found at Velsen 1 are ash, alder, beech, birch, bird cherry, blackthorn, dogwood, elder, elm, field maple, hazel, holly, honeysuckle, hornbeam, juniper, lime tree, oak, pine, poplar, spindle tree, willow, and Maloideae, type apple/hawthorn/pear; these species were all part of the natural vegetation of the dune area and the flood plains.

Willow and alder grew along the flanks of the beach barriers and on the moist ground of the flood plains behind the levees. Characteristic for the peat area in the vicinity of the rivers are alder carrs. Moreover, oak, ash, elm, lime tree, field maple, apple and pear species, and alder were found in the hardwood alluvial woodlands and on embankments.

Seven, possibly eight, wood species have been imported from more southern regions. These are boxwood, Norway maple, silver fir, spruce, larch, wild or sour cherry, and common grape. Norway maple is considered to be a native tree species in Belgium (Flemish-Limburg and Wallonia) and in Germany (North Rhine-Westphalia).[484] This species will not have been present in the western coastal region of the Netherlands in Roman times. Sycamore maple is an indigenous species in Central Europe.[485] However, due to the habitat preferences of Sycamore maple, in Roman times this tree species will not have grown in the immediate vicinity of the fort but could have been part of the hardwood alluvial woodlands along the

[483] This was especially the case for objects that had only been freeze-dried without PEG treatment. It also happened that the wood was so hard that taking a sample was not possible. In many cases, however, conserved wooden objects can be identified microscopically. Objects that have been pre-treated with PEG prior to freeze-drying appear, in practice, to retain their wood anatomical characteristics.

[484] Maes 2013, 85.

[485] Maes 2013, 88.

Table 24.1 The wood species or genera used for the wooden objects of Velsen 1.

Common name	Botanical name	Number
Alder	*Alnus* spp.	342
Ash	*Fraxinus excelsior*	573
Beech	*Fagus sylvatica*	89
Birch	*Betula* spp.	6
Bird cherry	*Prunus padus*	1
Blackthorn	*Prunus spinosa*	1
Boxwood	*Buxus* spp.	24
Broom	*Cytisus* spp.	1
Common grape	*Vitis vinifera*	2
Dogwood	*Cornus* spp.	2
Elder	*Sambucus* spp.	10
Elm	*Ulmus* spp.	7
Hazel	*Corylus avellana*	21
Holly	*Ilex aquifolium*	1
Honeysuckle	*Lonicera periclymenum*	1
Hornbeam	*Carpinus betulus*	3
Juniper	*Juniperus communis*	6
Lime tree	*Tilia* spp.	2
Maple	*Acer* spp.	30
Field maple	*Acer campestre*	23
Norway maple	*Acer platanoides*	1
Sycamore maple	*Acer pseudoplatanus*	3
cf. Sycamore maple	cf. *Acer pseudoplatanus*	4
Sycamore/Norway maple	*Acer pseudoplatanus/platanoides*	3
cf. Maple	cf. *Acer* spp.	1
Pomaceous wood, Apple/Hawthorn/Pear	Maloideae, type *Malus/Crataegus/Pyrus*	17
Norway spruce	*Picea abies*	20
Norway spruce/European larch	*Picea abies/Larix decidua*	40
Coniferous wood	*Coniferae*	10
Oak	*Quercus* spp.	322
Pine	*Pinus spp.*	24
Poplar/Willow	*Populus* spp./*Salix* spp.	1
Silver fir	*Abies alba*	198
Spindle tree	*Euonymus europaeus*	12
Wild cherry	*Prunus avium*	1
Willow	*Salix spp.*	8
Indeterminable	indet	2
Not analysed		657
Total		2469*

* One of the artefacts is a composite object with two different wood species.

Rhine to the east of Velsen. Apart from pine, a species that was native to the dune landscape of Noord-Holland, the coniferous species silver fir, spruce, and larch are not indigenous. The closest sources for these species were the southern part of Germany and the southern Alps region.[486] This is also where the pine will have come from, as this wood species was mainly found as staves from barrels, and the barrels reached the fort as ready-made products.

Boxwood (*Buxus spp*.) comes from further away. There are two species of the genus *Buxus,* namely the species *sempervirens* and *balearica*. The natural occurrence of *Buxus sempervirens* can be found in parts of Italy, France, and Spain; the species *balearica* is native to the Balearic Islands, the southeast coast of Spain, the French island Corsica, the Italian island Sardinia, in Algeria, and in parts of Turkey.[487] In Roman times, boxwood was transported over long distances. The wreckage of a cargo ship from the end of the first century BC, which sank off the Italian coast near Comacchio, carried logs of boxwood in addition to lead staves from Spain and amphorae.[488]

A striking find were the two pieces of the common grape vine. Grape seeds found in the harbour basin illustrate that grapes were eaten as imported raisins.[489] Apart from the fact that the coastal area does not have a suitable climate for growing the common grape (because of unsuitable soil conditions and frost in the winter), there is no archaeological evidence for viticulture in the Roman times in the Netherlands. Initially, the common grape vine was native to the Mediterranean region, the Middle East, and Central Europe. The two woody pieces of vines will therefore have been brought from more southern regions.

Most of the wooden artefacts, especially those made of indigenous wood species, may have been manufactured in the fort. This does not apply to the barrels of coniferous wood, which were containers for wine from elsewhere and reached the fort as ready-made product. However, there are indications of woodturning in the fort, and the use of imported wood such as boxwood for this purpose. Regarding the small amount of processing waste of non-indigenous wood species, imported wood species will not have been used on a large scale but will have occurred sporadically alongside the use of the local wood species.

24.3 Availability of wood in the vicinity of Velsen

When the fort was first established, the surroundings consisted of a coastal dune landscape, alder carrs, and a river with dense bank vegetation. Pollen from freshwater plants with a preference for slow-running water and the presence of freshwater molluscs show that the water in the harbour basin was fresh.[490] In the first century AD, a decrease in alder pollen and an increase in the pollen of herbs can be seen. Presumably, the decrease of alder in the pollen spectrum is related to the clear felling of the alder carrs in the vicinity of the fort. [491]

Palynological research has shown that this marginal landscape was not suitable for the surplus production of grain or other agricultural foods. Also, the provision of the fort with wood from the nearby surroundings will have been limited. [492] To determine the availability of wood in the area, the percentages of tree pollen and the ratio between the herb and tree pollen percentages revealed by pollen research were examined. According to palynological research, juniper, buckthorn, pine, beech, and oak grew in woodland formations in the dune area, mainly alder and willow grew along the edges and in the transition zones to the low-lying parts of the landscape, ash grew on the embankments of the rivers and birch in the adjacent peatland east of the fort as well as on the beach barriers.[493]

The immediate landscape around Velsen must have been more or less treeless in the first half of the first century AD.[494] This image of an open landscape is inconsistent with that found in historical sources. Tacitus described dark forests in the Frisian area where the battle against the rebellious Frisians took place – which would indicate an enormous supply of wood. The location of the Baduhenna forest mentioned by Tacitus is still unknown[495] though some researchers have attempted to determine its location. Beelaerts van Blokland suggested a location north of Castricum, in present-day

[486] Küster 1999, 161.
[487] This species is also known as Giant box tree, Minorca box, and Spanish box.
[488] Berti 1990, 53-64.
[489] Pals 1997, 34.
[490] Van der Straaten 1982.
[491] Morel 1988a, 284; Groenman-van Waateringe 2004.
[492] Pals 1988, 125.
[493] Jelgersma 1970, 93-167; Zagwijn 1971, 180.
[494] Van der Straaten 1982; Van den Berg 1985.
[495] Tacitus describes the battle of the Romans against the Frisians that took place in the forest of the indigenous goddess Baduhenna in AD 28; Tacitus, *Annales* book IV.

Bakkum.[496] No palynological data of this area that could support his assumption are available. Meanwhile, in Heiloo, a village on the beach barrier c. 7 kilometres north of Bakkum and 24 kilometres from Velsen, pollen analysis indicates an open landscape during this era and in the first three centuries since.[497] Here, the dune vegetation consisted of low and tall shrubs and woodland. This image of the landscape in the first centuries AD will be similar to that of Heemskerk, located on the beach embankment adjacent to the Velsen location. This means that, at least in the vicinity of the fort and on the beach barriers to the north, there were no dense forests.[498]

Alder will have been abundantly present in the low-lying parts of the landscape (Fig. 24.5). It is therefore not surprising that alder also had an important share as construction timber.[499] Research in the 1980s has shown that for the construction of the jetties and embankments, mainly alder and, to a lesser extent, ash and oak were used.[500] The lack of elm in the assemblage of the timber from the first phase suggests that the hardwood flood plain forests along the Rhine belt to the east of the area were not exploited for the earliest construction of Velsen 1.[501] Together with the predominant use of alder for the jetties, this indicates that initially it was mainly the trees in the vicinity that were felled. Only later were woodlands from the wider surroundings also exploited, and then especially those from the hardwood forests along the Rhine to the southeast of Velsen. Dendrochronological research of construction timbers also points towards local provenance during the first years of Velsen 1: in AD 21, for the repair of the western jetty, oak was used from a moist, low-lying part of the Velsen area.[502]

As mentioned before, it is plausible to conclude that a large part, if not all, of the alder carrs in the vicinity of the fort were cut down.[503] Although alder is not very durable for the construction of buildings, it survives well in waterlogged conditions and is suitable for waterworks. These characteristics of alder were already known to the Romans.[504]

In the second phase of the fort, the amount of timber of oak and ash used was greater than in the first phase, although still much less than the amount of alder. The increase in oak and ash

496 Beelaerts van Blokland 1943, 485.
497 Van Wijngaarden-Bakker 1988, 170; van der Meer 2020, 33.
498 Lange, van Haaster & van der Meer 2017.
499 Groenman-van Waateringe 1988, 143.
500 The wood identification was done by Ingelise Stuijts from the Biological Archaeological Institute of the University of Groningen (Groenman-van Waateringe 1988, 135).
501 Groenman-van Waateringe 1988, 143.
502 Jansma 1985, 21.
503 Groenman-van Waateringe 2004, 74.
504 Vitruvius prizes the qualities of alder in water-constructions: 'The alder, which grows very near water, is a tender and pliant timber, and is useless for building-work away from water. But it has this wonderful property, that stakes of it fixed into a close framework below water preserve any building erected upon it without fear of harm'(Vitruvius 3.2, see Plommer 1973, 59).

Figure 24.5 Example of an alder carr as it grew in the vicinity of the fort (photo: BIAX *Consult*).

may be an indication that after the first construction of the fort and the consolidation of supply routes, timber was supplied from elsewhere. Ash and oak will have grown on the embankments on a moist, but not too wet, water course habitat. From there, the timber was probably transported by boat to the fort.

Beech, a species that grows in the dunes which do not border directly on the sea, is absent in the spectrum of the construction timbers of the harbourfront. According to Groenman-van Waateringe, there could be two reasons for this: It is possible that the beech woodlands were spared because of the nutritional value of beech for the pigs that were kept in the fort for self-sufficient meat production. In addition, Groenman-van Waateringe suggests that beech was not used because of the symbolic significance it may have had for the indigenous population, and that the Romans took this into account for strategic reasons.[505] More probable is the fact that beech does not provide sustainable construction timber for outdoor or water structures. This will be the reason why beech is seldom found in archaeological contexts as construction timber, apart from reused timbers from indoor structures. Unlike in the finds of timber, beech is well represented in the assemblage of wooden artefacts. This indicates a well-considered choice of wood. Another aspect of beech is its calorific value. Beech has excellent heat value, almost better than oak, and may have been used as fuel. Unfortunately, no charcoal analysis has been carried out, yet, and the relationship between the use of wood for construction purposes, wooden utensils, and firewood remains unknown for the time being.[506]

The need for fuel certainly played an important role in the demand for wood. Therefore, it is conceivable that wood and charcoal have been supplied from elsewhere, not only as fuel for food preparation and heating, but also for artisanal activities. Bosman suspects, for example, that metalworking took place in the fort. It is questionable whether or not such activities could have been carried out exclusively with wood from the vicinity of Velsen, and without importing wood and charcoal.

24.4 Wood use

Wood use was related to the specific properties of the species in relation to the functionality of the object to be made, and to the availability of the wood.[507] In addition to physical-mechanical properties, aesthetic aspects played a role in the choice of wood. The qualities of the different wood species were well known, as evidenced by the writings of Roman scholars such as Vitruvius, who praised the timber of ash because of its pliability and flexibility,[508] and Theophrastus, who wrote that beech is a suitable species for utensils such as for handles, and for all kinds of furniture.[509]

Boxwood grows slowly and has a close grain. The trees usually reach a height of 8 metres and an average diameter of 20 cm. Due to its limited size, boxwood was often used for small, delicate objects. Moreover, the wood was valued for its colour, as can be found in Pliny's *Naturalis Historia*.[510] The dense wood does not split easily, and this makes it most suitable for combs. It is therefore not surprising that almost all of the double-sided combs from Roman contexts, including the one from Velsen 2, are made of boxwood.[511] The same quality applies to tools for the fabrication of textile; boxwood seems to have been commonly used for pin-beaters, whorls, and spindles.[512] A special application of boxwood is mentioned in Ovid. He recommends boxwood for the making of panpipes.[513]

The wood species that appear in the spectrum of Velsen 1 are all named in Pliny's *Naturalis Historia*.[514] He mentions maple for making furniture due to its fine wood grain and light colour; maple, boxwood, holly, and the roots (!) of elder for veneer; ash for handles; different species of willow for wickerwork; and even trees of which the bark is used.[515] How well the species were known is demonstrated in this passage from Vitruvius, highlighting the qualities of alder: 'The alder, which grows close by river banks, and which seems to be altogether useless as building material, has really excellent qualities. It is composed of a very large proportion of air and fire, not much of the earthy, and only a little moisture. Hence, in

505 Groenman-van Waateringe 1988, 144-145. However, Groenman-van Waateringe does not explain the exact ritual meaning that beech might have had for the indigenous people.
506 During the inventory, charcoal samples were discovered in the RMO-depot in Leiden, which may be analysed in the future.
507 Ulrich 2007, 239-260.
508 Vitruvius 2.9.II.
509 Theophrastus *Historia Plantarum* 5.8.3.
510 Pliny the Elder, *Naturalis Historia*, 16.28.
511 Derks & Vos 2010a; Derks & Vos 2010b; Lange 2017a, 138.
512 Flemestad 2017.
513 Ovidius Metamorphoses. 4.30; *https://www.emblems.arts.gla.ac.uk/alciato/emblem.php?id=A50a207*
514 Pliny the Elder, *Naturalis Historia* 12.1-16.8.
515 Pliny the Elder, *Naturalis Historia* 16.8.

swampy places, alder piles driven close together beneath the foundations of buildings take in the water which their own consistence lacks and remain imperishable forever, supporting structures of enormous weight and keeping them from decay. Thus a material which cannot last even a little while above ground, endures for a long time when covered with moisture'.[516]

24.5 Manufacturing

For most of the preserved objects from Velsen 1, traces of their manufacture and wear are no longer recognisable or are difficult to identify. This may have to do with the long period of time between excavation and conservation, as well as with the conservation itself. However, most of the wooden utensils from Velsen 1 are of simple manufacture, whereby no specialised tools were needed. Initially, the producer will have selected a suitable piece of a specific wood species. Based on training and experience, he knew the characteristics and qualifications needed for the specific purpose. The first processing will have consisted of no more than the rough cutting of a basic form. The tool marks of the first processing are, in fact, never visible on the wooden object through the later finishing, but it may be assumed that the rough work - at least in the case of larger objects - was done with an axe or adze. The workpiece was then further processed with a gouge, wood knife, or drawing knife, depending on whether it had to be hollowed out, pointed, or angled. These tools were used both for construction timbers as well as for tent pegs and tenons. In addition to processing waste, the roughouts or semi-manufactured products provide insight into the production methods of wooden objects. Two wooden finds in the assemblage of Velsen were interpreted as roughouts. These include a rhombus-shaped piece of alder for a sole of a patten (find number 3397) and a shovel-shaped block for a spoon or spatula (find number 1086.1). A burr of beech is interpreted as raw material for woodturning or furniture-making (find number 2111.1). Five sawn, but not finished, pegs could be interpreted as semi-finished products (find numbers 4001x, 4012c, 4107, 4337 and 4540). Apart from carved or sawn objects, elongated, symmetrically finished objects such as spindles and furniture legs, as well as bowls and cylindrical containers, including *pyxides*, were mainly turned on a lathe.

To find out how and with which tools wooden objects were made, tool marks on the surface of the wooden objects are examined. If no tool marks are visible, there is always the possibility that processing waste from one or more production steps has been preserved. Processing waste as well as roughouts and semi-finished products are unambiguous evidence of local manufacturing. These may include wood chips from the use of an axe or adze, chips from planing, sawn-off pieces of wood, or turning waste. Processing waste is an often-underestimated archaeological find category in terms of its information value. Without processing waste or semi-finished products, it is almost impossible to say whether the wooden objects have been made locally or were imported from elsewhere.[517]

The amount of processing waste from the harbour basin is quite remarkable. Morel mentions layers with wooden chips and offcuts, originating from the pointing of piles and the cutting of planks and beams to size.[518] Apart from the processing waste from these building activities, a considerable number of sawn-off pieces of battens, slats, and boards from light constructions such as furniture and, possibly, tent frames have been found. The small number of woodworking tools that are part of the assemblage of wooden artefacts from Velsen makes the informational significance of the processing waste even more evident. Based on the straight ends and smooth finished surfaces, sawing and planing were part of the standard carpentry activities. Two woodworking tools have been found, a plane from Velsen 1 (find number 759, Plate CXVI.444) and a second one from Velsen 2 (find number 6026-20, Plate CXVII.445). Planes are known from Pompeii, the Saalburg, Cologne, Verulamium, and Goodmanham.[519] In this context, the tool chest of a carpenter found in the shipwreck De Meern I should not go unmentioned.[520] The rectangular tool chest made of oak planks contained two axes, two bow saws, four block planes, and a hand drill; these are all tools that can be used for larger constructions as well as for making furniture. Remarkably, the wooden stocks of the

[516] Vitruvius, IX.2.10.
[517] A wood find is often only collected if it is a recognisable utensil. Furthermore, processing waste could appear to be unworked wood and could, therefore, easily be overlooked. The risk of fragmentation during excavation is high because the chips of planing, cutting, and hollowing are usually thin and therefore fragile. In general, the chance of finding processing waste is more likely when collecting bulk samples.
[518] Morel 1988a, 253.
[519] Ulrich 2007, 42-44.
[520] Mols 2007, 175-181.

planes from the shipwreck De Meern I were preserved, as were those from Velsen and from the Saalburg. The plane from the Saalburg was made of beech, those from De Meern I and Velsen of maple. Due to unsuitable conditions for preservation, only the iron plane blades or the iron sole from a plane are usually found. Ulrich argued that the stocks of the planes were probably all made from wood.[521] Moreover, the moulding plane certainly belonged to the toolbox of the carpenters working in the fort, considering the numbers of decoratively profiled slats, planks, and battens which were used for all kinds of applications, including the decorative finishing of the tops of doors, cupboards, and wall racks.

Among the handles that are part of the find assemblage, there will certainly be a number that belonged to woodworking tools, such as a cylindrically turned object, possibly a handle of a bowsaw, and a turned handle with a flared top, interpreted as a handle of a socketed chisel (find number 2017.1, Plate CXXIX.515).

In contrast to the large amount of processing waste related to construction work, little has remained from the making of wooden utensils. The occurrence of five pieces of turning waste is important. Waste from woodturning is relatively easy to recognise. These are usually pieces with concentric turning lines and a small hole on the end, a poppet mark, caused by the attachment to a lathe. Waste from woodturning has also been found in Cologne, Vindolanda, and in the early medieval settlement of York.[522]

The presence of turning waste at Velsen suggests that a wood turner was active in the fort. This also means that at least some of the lathe-turned bowls, furniture legs, and handles may have been made locally. The use of local species such as alder, ash, and spindle tree supports this idea. Remarkable is a piece of boxwood turning waste. The wood must have been imported, because boxwood grows in the warm regions of Italy, in the French and Spanish Pyrenees, and in the Baltic area and parts of Turkey. Cologne would have been the nearest trans-shipment place for boxwood. The fact that boxwood was imported to Cologne is known because during excavations in the city centre, the workshop of a comb maker was unearthed, as well as semi-finished products and processing waste from boxwood.[523] Compared to the distance between the Mediterranean area and Cologne, the trans-shipment of raw material such as boxwood in the direction of Velsen seems to be quite manageable. However, there will have been no large-scale imports, but rather a targeted demand from a craftsman for the manufacture of specific articles. After all, relatively few objects of boxwood were found at Velsen 1 and only one piece of processing waste. Finally, an oak object with three rounded hooks, similar to a find from early medieval York, could be a tool-rest support which was used to temporarily store the woodturner's gouges at the lathe during the process of turning and using different gouges (find number 3396, Plate CXX.449).[524] This remains a matter of discussion, however, as a tool-rest support suggests the presence of a pole-lathe, and no evidence of this type of lathe has yet been found for Roman times.

The indications for reuse remain interesting. For Velsen, this applies primarily to the recycling of barrels but can also refer to the reuse of furniture parts: the carpenter's tool chest from the shipwreck De Meern I contained two turned spindles with traces of wear and wood worm.[525]

24.6 Workshops

Even though no workshop structures have been found, there is evidence of woodworking in the fort. Based on the presence of wells outside the fort at Velsen 1, Morel suggests the possibility that craft workshops may have been located here, in particular for the crafts that involve odour, nuisance, or fire hazards, such as animal skin processing and metalworking.[526] While these concerns would not have applied to woodworking activities, perhaps the workshops were kept separate from military activities for logistical reasons, such as the supply of raw materials.

The dominant use of ash, oak, and alder, and the presence of several semi-finished tent pegs, suggests that tent pegs were made on site. Given that tent pegs are standard military equipment, making them will have been

521 Ulrich 2007, 42.
522 Tegtmeier 2016; Morris 2000.
523 Tegtmeier 2016, 213-219.
524 Morris 2000, 2120.
525 Lange 2017a, 219.
526 Morel 1988a, 231.

primarily the work of the common soldier. Interestingly, different techniques have been used in the production of tent pegs. Some specimens have been sawn out of planks and others were cut with an axe from a piece of radially split wood. The wood species does not appear to have played a role in the choice of one or the other of these techniques. More likely, there were woodworking traditions which could have depended on individual skills, which possibly also relied on the ethnic background of the maker. The presence of processing waste from woodturning, and a possible tool rest support from a lathe, are indicative for lathe-turning in the fort. Here, too, native species were evidently used. In contrast, parts of furniture may have been imported. In addition to furniture that is easy to transport, such as folding seats and folding tables, one can think of ready-made parts that only needed to be assembled. In this respect, one of the many letters from Vindolanda is worth mentioning.[527] This letter contains a list with information about goods which were sent from the agency of Saco by someone named Metto to a possible Advectus. It concerns a delivery of, among other goods, prefabricated wooden parts such as hubs, axles for carts, an axle turned on the lathe, spokes (no less than 300!), planks for a bed, seats, boards, and benches. More evidence for the trade of prefabricated furniture parts throughout the Roman Empire was found in the shipwreck of De Meern I, where recycled furniture parts and turned spindles were found.[528] Parts of non-indigenous wood species can be added to locally made furniture to give it a more luxurious look. With this space-saving method, even luxury furniture could be easily transported over long distances and assembled on site. Stationed in the wet and cold landscape of Velsen 1, a high-ranking officer from warmer climes did not have to be denied his luxuries and comfort.

Most craft activities were probably carried out by the soldiers themselves. In addition, craftsmen and traders will have visited the fort regularly.[529] The presence of a tool chest in the shipwreck De Meern 1 suggests that craftsmen were not tied to a fixed workshop but could have travelled around. Even a skill such as woodturning can be done with relatively simple, moveable devices. A depiction of a wood turner working on a vertical lathe is known from an Egyptian stone relief (Fig. 24.6).[530] Opposite the wood turner sits his assistant, who sets the piece of work in motion with a strap.[531] This shows the basic principle of the earliest examples of lathes which were set in motion by foot, with a bow or a strap, so that the workpiece (in between two vertical parts) could be shaped with a gouge. While a strap lathe requires two people, a bow lathe could even be driven by one person, when turning small objects. In North African countries

[527] Tablet Vindolanda II 309 (Bowman 1994, 131-132).
[528] Mols 2007, 184-185.
[529] Zandstra 2019, 309, 349.
[530] King 2008, 255.
[531] Tomb of Petosiris at Tuna el-Gebel, 4th century BC.

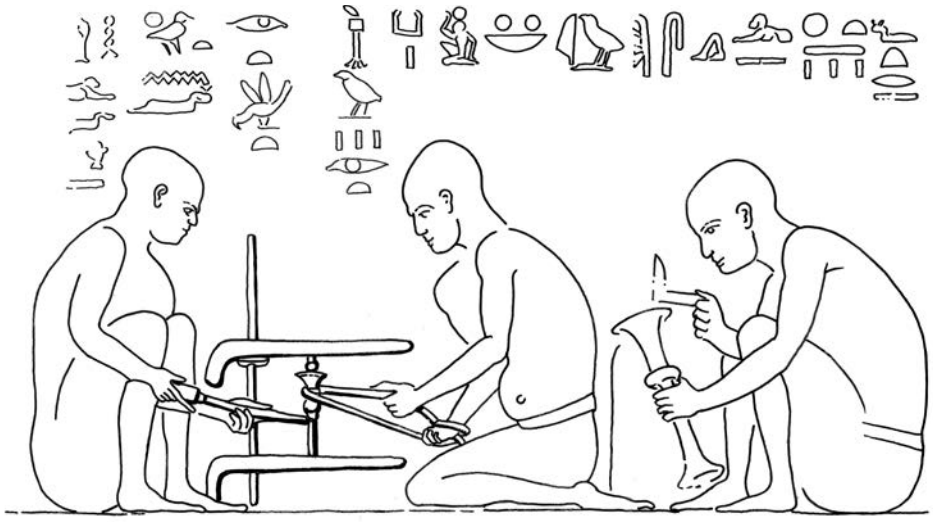

Figure 24.6 Depiction of an Egyptian vertical lathe depicted on a stone relief of the Petosiris tomb of the Ptolemaic era, 300 BC (source: Lefèbvre 1923: Le tombeau de Petosiris, Troisième partie: vocabulaire et planches, Institut Français, Cairo, Pl. X/drawing: R. Timmermans).

Figure 24.7 A craftsmen in Morocco working with a bow lathe (photo: Alamy stock photos).

the use of both lathe types is still quite common (Fig. 24.7).[532] With the bow or strap lathe technique, small and elongated objects could be turned, such as furniture legs and spindles. For larger objects and more intricate shapes, a lathe with a consistent drive would have been required.

24.7 Analogies

In the Netherlands, Velsen 1 is, so far, the only site from the Augustan/Tiberian period with a large quantity of wooden utensils. Apart from Velsen, only Valkenburg qualifies as a site with a significant quantity of wooden objects.[533] The excavations at other forts, such as Alphen aan den Rijn, Vechten, Woerden, Zwammerdam, and Utrecht-Hoge Woerd, yielded few wooden objects.

Most of the wooden artefacts from Valkenburg were found in two gullies and fall predominantly into the categories fishing and boating equipment.[534] Household and personal items were also found, including bowls, *pyxides* and combs. In addition, three obstacles were recovered and an axe, an awl, parts of furniture, pegs and edges, and several miscellaneous objects. The main difference between Valkenburg and Velsen 1 is the number of objects in Valkenburg related to ships. In Valkenburg, twenty-nine artefacts related to boat equipment were identified, including blades and shafts of oars and paddles, and a part of a punting pole.[535] The basket-like, belly-shaped fish traps have been found in both Velsen and Valkenburg, and also at several sites in the Leidsche Rijn.

For almost every wooden artefact from the assemblage of Velsen, a similar object from another Roman site has been found. It is likely that some types of wooden artefacts were made

[532] King 2008, 256.
[533] Van Rijn 1993, 146-216.
[534] Van Rijn 1993, 146, 147.
[535] Van Rijn 1993, 165-168.

in mass production. Double-sided combs, *pyxides*, and pattens were made according to a particular model that was in widespread use at the time. For some products, the use of a certain wood species might have proven itself for a specific purpose, such as boxwood for combs, textile implements, and *pyxides*. Mass production of wooden artefacts will have been conducted in specialised workshops, and from there the objects were traded throughout the Roman Empire. In Cologne, the workshop of a comb maker has been identified through the remains of processing waste and half-products.[536]

Barrels were made of silver fir, and to a lesser extent, of pine, spruce, or spruce/larch. Wood use and measurements resemble other barrels from other sites. So far, no parallels have been found for the stamps on the wine barrels of Velsen.[537]

536 Tegtmeier 2016, 215-216.

537 For a detailed overview of stamps on wine casks in the Roman Empire, see Marlière 2001; Tamerl 2010, 129-135.

25 Research Questions

25.1 Results per research question

The following shows the results per research question (*Section 4*).

What are the used wood species, where has the wood grown, what are the qualities for the manufacture of wooden artefacts of the different wood species?

A total of thirty-two wood species has been determined. Some wood species were only identified once: dogberry, honeysuckle, holly, bird cherry, and blackthorn. The native wood species reflect the vegetation in the vicinity of and in the wider surroundings of the fort. Initially, for the earliest construction of the fort, wood was felled from the alder carrs, the dune area, and the peat lands in the vicinity of Velsen 1. Later, during the consolidation of the fort, common ash, elm, oak, maple, and apple or pear from the hardwood flood plains and the embankments along the Rhine were harvested and transported to the fort.

In addition to these native wood species, some non-indigenous species have been identified. These are boxwood and silver fir, Norway spruce, larch, Norway maple, and common grape. The greatest numbers of artefacts from the non-indigenous wood species were imported as finished products from elsewhere. Based on the find of a piece of boxwood turning waste, a wood turner must have been active in the fort, working mainly with indigenous wood types, but also using boxwood on occasion. Norway spruce is native to the European Alps and the Balkan Mountains, as well as to the Carpathian region. Silver fir is native to southern Germany, the northern Pyrenees, the area east of the Alps, the Carpathian Mountains, Serbia, and southern Italy.[538] The timber for the barrels will have been traded from locations close to areas of wine production for processing by coopers. The two different boxwood species, which are indistinguishable or barely distinguishable from each other on the basis of microscopic characteristics, grow in southern regions. Common box (*Buxus sempervirens* L.) is native to Spain, France, Italy, Turkey, and northern Syria. Balearic boxwood (*Buxus balearica* Lam.) is native to southern Turkey and the region along the northeast coast of the Mediterranean Sea.[539] Pliny mentions boxwood from 'the Pyrenean range, the mountains of Cytorus [ancient Greek town on the northern coast of Asia Minor], and the country about Berecynthus [Phrygia, central part of Anatolia, Turkey]'.[540]

The specific characteristics of trees have been mentioned by several Roman writers.[541] Pliny praised the quality of boxwood, since it will 'never split or crack spontaneously',[542] and said of ash that he found it to be 'found the most pliable wood of all for working; and, indeed, for making spears it is better even than the hazel, being lighter than the cornel, and more pliable than the wood of the service-tree. The Gallic variety is so supple, that it is even employed in the construction of vehicles'.[543]

The assemblage of Velsen 1 demonstrates that knowledge of the wood species has been applied during the making of the artefacts. Ash was used for furniture, frameworks of light constructions, domestic utensils, tools, and pegs. The wood of alder is quite soft, but therefore easy to cut and carve, and has been used for bowls, handles, pegs, and furniture. The third most commonly used wood species is oak. This wood species is known for its durability and hardness. Oak is also easy to work, usually done by radially splitting it lengthwise and then further processing the planks into smaller objects. At Velsen, oak has been used for handles, mallets, a shovel, and for a weaving sword.

To what extent are there relationships between the functions of the utensils and the specific wood species which were used?

Availability played a major role in the choice of wood. This can be clearly seen in the native wood species that dominate the spectrum. Indigenous species such as common ash, alder, and oak dominate and have been used for all kinds of utensils, for household objects as well as for lighter constructions. For turned furniture parts, besides common ash and alder, the wood of maple, beech, or apple or pear was frequently used. Pliny describes both beech and maple as wood species particularly suitable for

538 Schweingruber 2011, 116-117.
539 Akkemik & Yaman 2012, 102-105.
540 Pliny the Elder, *Naturalis Historia* 16.28.
541 Pliny the Elder, *Naturalis Historia* 16.26.
542 Pliny the Elder, *Naturalis Historia* 16.78.
543 Pliny the Elder, *Naturalis Historia* 16.83.

furniture.[544] These wood species have a light colour and a fine grain, and they are excellent for working on a lathe. The spectrum of handles shows knowledge of the qualities of common ash for tools that had to withstand a blow, such as mallets. Ash is a flexible yet strong wood species and therefore very suitable for handles. It is striking that relatively little willow has been used for making objects, with the exception of the manufacture of baskets and fish traps. Apparently, willow branches were appreciated for wickerwork, but the wood was not used for making other domestic utensils. One of the net floats is carved from a piece of poplar or willow bark. Poplar is indigenous to but not common in the vicinity of Velsen 1. In the region around Lake Constance, the use of poplar bark is a tradition that goes back to the Roman period.[545] The net float from Velsen 1 may be an object that was brought along from another fort or an object for which the raw material was collected from further away, from the flood plains, for example. The find may therefore indicate a well-considered choice, based on familiar practices of soldiers from elsewhere.

To what extent do the objects relate to the predefined themes and categories?

The military character of the site emerges in the presence of weapons, including those with preserved wooden parts. These include the pommel and the handguard of a sword, and the grip of a second one. Defensive arms include two obstacles (*pila muralia*). The vast number of pegs can be explained by the many applications within the logistical organisation of the fort, such as pitching tents and tethering horses or other animals. Moreover, many artefacts belong to the theme of domestic utensils, such as implements for food preparation or food storage. Another category within this theme contains parts of furniture, which, in turn, also include some of the furniture legs manufactured on a lathe. Moreover, artefacts associated with craft activities and personal items, such as pattens and a comb, were identified (see section 17.2). A large number of writing tablets has also been unearthed, indicating extensive communication with individuals or groups elsewhere in the Roman Empire. A special object is a panpipe or *syrinx*, which, like the gaming pieces, indicates entertainment and leisure activities.

Which technologies have been used in the manufacture of the various wooden utensils?

Most of the objects have been sawn and carved, and several have been lathe-turned. Based on the appearance of the artefacts, the carpentry shows high-level woodworking technology such as different types of joinery, as well as simple manufacturing whereby no special skills were required. Interesting is the variety of pegs that were probably made on location. The heads of the pegs are trapezoidal, rectangular, square, or pointed. The difference in the shapes of the heads cannot be explained by function. Therefore, it is conceivable that the variety is related to the ethnic background and individual experiences of the woodworker.

Some household artefacts were probably made on location, such as basic furniture, stoppers, and stirring tools, while others, such as eating utensils, might have been in use for a longer period of time and have been part of the personal belongings of soldiers. Based on tool marks and processing waste, axes, adzes, saws, chisels, and gouges were commonly used. In addition, the presence of turning waste suggests that a woodturner was active in the fort. The craftsman may have been employed at the fort for a longer or shorter period of time. Basic woodwork, such as making tent pegs, simple seating furniture, and handles will have been made by the soldiers themselves.

If imported from elsewhere: where does the wood or where do the objects come from?

Artefacts made from boxwood were most likely imported from elsewhere. There is just one piece of boxwood turning waste, and there are too few objects made from this non-indigenous wood. If there was any importation of wood, it will have been on a small scale. It is likely that the boxwood *pyxis* and a lid entered the fort as ready-made products, namely as containers for cosmetics or medicinal ointments. The *pyxides* served as packaging material, and the same applies to the wine barrels. It is likely that some of the furniture, particularly lathe-turned parts, were imported. Furthermore, spindles and legs of dismantled furniture from elsewhere might have been reassembled in the fort.

[544] Pliny the Elder, *Naturalis Historia* 12.1-16.8.
[545] Leuzinger 2012, 108.

Given the small number of objects made from non-indigenous wood species (the *pyxides* of boxwood and the barrels of silver fir), there is no evidence that wood was transported from great distances to the fort as raw material for processing on location. This may be different for the supply of construction timbers. In general, specific workshops have not yet been traced in the Roman Empire, except for a workshop of a comb maker in Cologne.

Given the reuse of staves from wine barrels, objects made of silver fir and spruce were not imported but may have been manufactured in the fort. Recycling of wood was common in the Roman period, as has also been established in London[546] and Cologne.[547]

Are there any known parallels for the objects? If so, have they been found in similar contexts?

While for many of the wooden artefacts from Velsen 1 a parallel has been found from other military or rural site as mentioned in the description of the artefacts, a number of them are unique or, at very least, rare in archaeological contexts. These include the fragments of two vine rods that represent the status symbol of the centurion, and of which so far only images on funerary monuments are known. Also special is the boxwood panpipe, so far one of a total of nine known in the Roman Empire. In terms of wood use and appearance, the panpipe from Velsen 1 corresponds to a specimen found in Uitgeest-Dorregeest and to the panpipe from Nijmegen -Oosterhout. The other panpipes have been found in Tasgetium, Regensburg-Kreuzhof, Titz-Ameln, Alisé-Sainte-Reine, Loveld-Aalter, and London. Moreover, there are parallels from early medieval sites, such as a panpipe from York. The sites where these artefacts have been found are located in the sphere of the influence of Roman culture. A military context seems rather the exception in this case, given that most of the contexts are in rural dwellings or, in the case of Tasgetium, a *vicus*. The find location (feature and layer) of the panpipe from Velsen 1 is unknown, while the panpipes from the other sites were found in wells. Remarkable is also the quantity and quality of the construction parts of lighter constructions, possibly of tents or furniture. These provide insights for the reconstruction of complete furniture and tent frameworks. Even though tent pegs belong to the general find assemblages of (military) sites, the quantities found at Velsen 1 are unprecedented. The well-preserved wood planes are an example of the high standard of woodworking technology in Roman times. This type of plane has remained more or less unchanged. Quite standard in terms of wood use and size are wine barrels, *pyxides*, pattens, combs (one from Velsen 2), pegs, and obstacles (*pila muralia*).

Two bobbin-toggles, one from Velsen 1 and one from Velsen 2, are similar to specimens from different sites both within the Roman Empire and beyond: the ancient Greek shipwreck Kyrenia (fourth century BC), the shipwreck Porticello (415–385 BC), Gallo-Greek and Roman shipwrecks from the Roman port area at Place Jules-Verne in Marseille, and from the Roman harbour basins of Voorburg-Arentsburg. They were also found at the Saalburg, a fort that is not related to ship traffic since the location of the fort is on the main ridge of the Taunus. Nevertheless, since these objects are often found in shipwrecks or port sites, their function will mainly have been related to rigging on ships.[548] According to Polzer, they were in use between 300 BC and c. AD 200.[549]

Obstacles such as those from Velsen 1 were also found in Valkenburg-Marktveld, Krommenie-'t Hain, Aalen, and Haltern. They were usually found in ditches (Alphen aan den Rijn, Valkenburg) and gullies (Krommenie-'t Hain). The same applies to pegs: as at Velsen 1, most pegs were found in ditches of military forts.

What is striking is that only one comb has been found, since toiletries were assumed to be part of each soldier's standard equipment.

Are objects suitable for dendrochronological research, and, if so, to what extent do the dendrochronological dates fit in with earlier phases of the site?

Only the staves of the wine barrels appear to be suitable for dendrochronological research. Some of them have already been examined before this study.[550] Staves from still undated wells were examined during the project. Unfortunately, the

546 Goodburn 2016, 8-13.
547 Personal communication with D. Goodburn, 12 October 2016.
548 Polzer 2008, 237, 239.
549 Polzer 2008, 239.

staves from those wells were either deselected or too decayed to be investigated. Therefore, no dendrochronological study was carried out.

What knowledge do the wooden utensils provide about timber supply, provisioning, and exchange networks of the Roman fort Velsen 1? Based on the objects, what can be said about contacts (local and regional) and relations with the local population?

The assemblage includes many wooden objects characteristic of Roman contexts. These artefacts are found throughout the Roman Empire over a long period of time, in both military and rural contexts. For centuries, the shape and size of some artefacts remained largely unchanged. These include wine casks, *pyxides*, carved bowls with handles, the two-rowed combs, and a type of bobbin that resembles a yoyo. *Pyxides* with a lid, for example, mainly made of boxwood, were standard containers for small luxury items, and they are found throughout the entire Roman Empire. In the Netherlands, they are known from different sites: from Nistelrode,[551] Cuijk,[552] Castricum-De Bogaert,[553] Geldermalsen,[554] Woerden,[555] and from the shipwreck De Meern I.[556]

Lathe-turned artefacts were not manufactured in indigenous settlements in the vicinity of Velsen 1. The Frisians were not familiar with the techniques of woodturning or the use of saws.[557] Certainly, they will have come into contact with new wood technologies through their contacts with the Romans, but, until now, there is no evidence that they themselves applied these techniques. Where lathe-turned objects are found, they will presumably have been received as gifts from the Romans. Until the early medieval period, wooden objects of native provenance were mainly made with the axe, the adze, and the chisel.[558]

A special feature is the presence of wooden textile implements such as spindles, a whorl, and other textile-processing tools. Wild describes spinning as a gender-related activity throughout the entire Roman Empire, especially a woman's activity.[559] Unlike spinning, weaving appears to have been carried out by both men and women.[560] The presence of textile implements, and especially spinning utensils, indicates the presence of women in the fort. They may have been women who had followed their partners in the military, or indigenous women who were held as slaves in the fort. Tacitus mentions Frisian women and children who were handed over to the Romans to pay tribute: 'First it was their herds, next their lands, last, the persons of their wives and children, which they gave up to bondage'.[561] Working with the hand-spindle and making cloth on a loom were craft techniques that belonged to both Roman and indigenous cultures. In this context, the numerous earthenware spinning whorls, usually made from sherds, as well as a lead spinning whorl, should be mentioned. The whorls made from discarded pottery will have been used for spinning wool, while the lighter whorl made from boxwood will have been more suitable for finer threads such as flax.[562]

Traces of mutual influence might be found in the changes in the wood species which were used, the processing techniques, and in the design of wooden artefacts. However, no indications of these have been found.

Nevertheless, there are no indications for wooden artefacts of Roman manufacture in indigenous contexts in the first half of the first century AD. This changes at the end of the second and the beginning of the third centuries AD. In that period, wooden artefacts which will have been considered extraordinary and valuable to the Frisians now occur in indigenous dwellings: the boxwood panpipe from Uitgeest-Dorregeest and a comb made of boxwood from Castricum-Oosterbuurt.[563] These wooden artefacts will have provided a glimpse of Roman culture and lifestyle for the Frisian inhabitants.

In this context, a find of a furniture leg from a site in Schipluiden-Oosterbuurtseweg (AD 20-120) is noteworthy.[564] This furniture leg is carved from a piece of ash in a Roman style with an outwardly curved shape, and initially belonged to a couch or bed. The furniture leg was found in an indigenous dwelling, demonstrating that the indigenous people were familiar with, and probably also were attracted to, the Roman way of life.

550 Bosman 1997, 27-28.
551 Jansen & Vermeeren 2007.
552 Lange & Kooistra 2012.
553 Lange 2016.
554 Kooistra 2009.
555 Van Rijn 1998.
556 Mols 2007, 181-183.
557 Lange 2017a, 134-137.
558 Idem.
559 Wild 2002, 8.
560 Wild 2002, 29.
561 Tacitus *Annales* 4.72.
562 Personal experience of author.
563 Hänninen 1999, 115.
564 Van Londen 2006, 147; Lange 2017a, 218.

How does the spectrum of wooden utensils fit in with the repertoire of wooden utensils in other (early) forts?

From the early forts of Valkenburg, Alphen aan den Rijn, and Vechten, several wooden objects are known which are similar to those from Velsen. At Valkenburg-Marktveld, a paddle has been excavated that resembles the paddle of Velsen; in Alphen aan den Rijn, a lathe-turned furniture leg, possibly from a sofa or bed, and in Vechten, a number of double-sided combs, were recovered. Writing tables have been excavated in all three *castella*; an especially large quantity is known from Vechten. Wooden objects are also known from Voorburg-Arentsburg, some of which were similar to artefacts from Velsen. These include a bobbin-toggle.

What new knowledge does the spectrum of wooden utensils provide about the material culture of early Roman forts?

A number of wooden objects are part of the standard equipment of a fort and remain the same over long periods of time in terms of design and use of wood. In the case of Velsen 1, this applies to pegs and writing tablets, the grip of a sword, and two obstacles (*pila muralia*). The assemblage also shows that there are numerous objects that occur in many different places and that there are many more parallels with other material groups, such as the carved and turned bowls that resemble pottery. Several wooden artefacts can be related to craft activities, such as woodworking and textile processing. Turning waste and a burr that was probably raw material for woodturning (or furniture-making) suggest that artefacts made on a lathe were also manufactured on site. Other artefacts were imported from elsewhere. This is certainly the case with wine barrels and *pyxides*, which were used as containers for transporting goods.

The similarities in the design and use of wood species between the furniture from Herculaneum and the furniture finds from Velsen are more than remarkable. This clearly points to a correlation between the material culture from civilian Italy and the early Roman military settlements at the border of the empire.

How does the spectrum of wooden utensils fit into the repertoire of objects made of other materials and found within the context of the Roman fort Velsen 1?

In addition to wooden keys (so-called latch lifters), keys were also made of iron and bronze. A bronze key is also known from Velsen 1. The oval bowls of alder and maple are reminiscent of the bronze, silver or earthenware bowls. Gaming pieces were cut from potsherds, but also from discarded staves.

Spindles, pin-beaters, weft bobbins, and whorls were also made of other materials, such as bone or antlers. From Velsen 1 come two parts of a spindle of bone, with a decorated head and a pointed end. A similar, completely-preserved specimen was recovered in the Roman *villa dels Antigons* in Reus (Spain).[565]

Particular attention was paid to objects made of bone and metal that might have been part of a composite object which only partly consisted of wood. The assemblage of metal objects contains some iron and bronze pieces that have been interpreted as furniture fittings. These include bronze corner fittings, probably of a chest, and iron fittings and hinges of a large cupboard or door. Three plates of bone with circular protuberances have been recognised as furniture hinges. These are probably hinges from cupboard doors. This type of hinge is known from sites at Nijmegen and Herculaneum.

What conclusions can be drawn from the composition of the find assemblage? Which objects are missing?

All of the typical categories from a military Roman site are represented in the assemblage of wooden objects. In comparison with other military sites, it is striking that only one comb has been found, even though this was part of a Roman soldier's standard equipment. The number of oars and other ship-related items is also small compared with sites such as Valkenburg and Voorburg-Arentsburg. On the other hand, the number of pegs is remarkably high, as is the number of furniture parts. It is also striking that no parts of carts, such as wheels and axles, were found.

[565] Prevosti 2013, 13.

What significance does this research into wooden utensils have for our image of material culture within Roman fortifications in the first century AD?

The research on organic material groups provides insight into the daily activities within a fort that are usually not mentioned in historical sources. These include the furnishing of barracks with stools and racks to increase the comfort level of the soldiers and to keep order in the equipment, or the efficient recycling of barrels and the braiding of traps for fishing in the harbour basin to supplement one's own meal or that of a higher-ranking officer. Research into wooden objects leads to detailed insights into the living circumstances. In addition, the research on organic materials helps to clarify the meaning of written sources, such as the description of Tacitus about the dark forests of Baduhenna in the Frisian homeland: until now, pollen analysis and the research on wood species has led to a different picture than the one Tacitus had described. In addition, the analysis provides information on imported goods as, in the case of Velsen, on the import of wine and small luxury goods transported in containers used for that purpose (*pyxides*). In combination with palaeobotanical research, the research on wood leads to information about the environment and the exploitation possibilities of the surrounding vegetation.

The results support the idea that provisioning was initially based on local resources and that, over time, regional and supra-regional supplies of raw materials increased. Originally, wood from the immediate vicinity will have been exploited for building material and wooden utensils. After the consolidation of the fort, the supply of wood as a raw material would have been limited to ash, oak, and, probably, maple originating from the woodlands of the flood plains and embankments along the Rhine. There are no indications for long-distance transportation of woods to Velsen 1.

The use of natural resources, including wood, shows the degree of adaptability of the Roman army. The knowledge of the properties of native wood species and their qualities is reflected in the choice of species that are easy to work with and for the specific application to certain objects. Most wood species also occur elsewhere in the Roman Empire. For example, oak and common ash species are familiar woods in the Mediterranean region. A Roman woodworker will have only missed the coniferous trees that were not native in the vicinity of Velsen 1, but ideal for making straight, long planks.

Two groups within the Velsen assemblage are striking. They are the group of pegs, of which certainly a large number was actually used to pitch tents, and the large group of furniture parts. The tent pegs suggest temporary camps, possibly the intermediate halts of a military unit on its way to northern and northeastern destinations, or in support of building campaigns or military enterprises. Two historical moments can be mentioned here, namely the revolt of the Frisians in AD 28, and the construction of the second fort at the end of the AD 30s.

With regard to the above question, a difference should be made between the provisioning of the fort in general and providing individuals with supplies based on personal needs. The presence of wooden wine barrels is proof of the long-distance supply of goods. Indications for the origin of the wine might possibly be traced via the branding marks on staves. A brand on one of the barrels indicates a Celtic provenance of the wine trader. However, these stamps have not yet been traced to specific vineyards. Based on the fact that the barrels are made from silver fir and spruce or larch, Gaul and the Upper Rhine area would have been the nearest areas from where the wine could have been transported. As the wine casks will have been transported via the Rhine and Vecht rivers to Velsen, this means that the waterways must have been relatively safe.

Personal items such as luxury products traded in small wooden containers (*pyxides*), pattens, and combs, could have been bought from merchants who travelled together with the army. Apart from heavy construction wood, there will also have been wood as a raw material for tent pegs, furniture, and other light constructions. Wood as a raw material was mainly taken from the immediate vicinity of the

fort. Alder, willow, and poplar could be taken from swamps on the flood plains and the wet parts of the alluvial ridges. Alder could also be cut from the alder carrs in the peat area. The other species (ash, oak, elm, field maple, lime, apple or pear, among others) were probably cut from the beach ridges and dunes, as well as from the dry parts of the alluvial ridges and levees from the Vecht river. Beech could only have been taken from the dry beach barriers and dunes. Except for one piece of boxwood turning waste, there are no indications for a supra-regional transport of timber.

The distribution of wooden artefacts reflects the mobility of people throughout the Roman Empire. While at Velsen objects have been found that were presumably made in workshops in the Upper Rhine region or, at least, were traded there, there are also objects made of European wood species found as far as Israel, where two handles and a box made of the European wood species lime (*Tilia* spp.) were found in the Cave of Letters in Nahal Hever.[566] It is also interesting to note that the same double-sided boxwood combs have been found on sites dating from the Roman period in Israel as the type commonly found elsewhere in the Roman Empire.[567]

From this it can be concluded that some categories of wooden artefacts were mass-produced, and probably imported as ready-to-use products (combs, *pyxides*, most of the writing tablets), and others were made individually and locally manufactured (such as furniture). In addition, certain applications will have required standard sizes, such as for military equipment (*pila muralia*) and for rigging tools on ships (bobbin-toggles, common toggles).

Which research questions can be asked with regard to future research and to additions to the National Archaeological Research Agenda of the Netherlands (NOaA)?

Research on wooden finds can provide information about non-military activities within a Roman fort, as well as the presence of non-military inhabitants, such as women, children, merchants, and craftsmen, within the fort. The following questions may be asked in future research:

- Were women and children staying at the fort and, if so, was it a long-term or temporary residence? Are there tasks that are attributed to women and children? Which wooden artefacts in military contexts, for example, footwear, parts of hand spindles, and tools for textile processing, could indicate the presence of women and children?
- Which handicraft tasks were carried out by the common soldiers and which were performed by specialist craftsmen? As can be seen from the woodwork of the objects, there are differences in the level of skills and in applied wood technologies.
- Wood barrels appear to have been systematically reused as well linings. Moreover, the staves have been reused for various kinds of applications. To what extent is recycling an indication of timber shortage?
- Is it possible to gain insight into the ethnic background of the unit stationed in a fort through the wood utilisation, the processing of structural timber, and the production of objects?

[566] Liphschitz 1998, 88.
[567] Liphschitz 1998, 87-90.

26 Conclusion

26.1 The assemblage

The quantity and quality of the wooden objects from Velsen testify to the good preservation conditions for wooden artefacts at the site of the Roman fort and harbour. Approximately 2,500 wooden artefacts have been salvaged; c. 1,600 of them have been conserved and are part of the collection of the National Museum of Antiquities in Leiden. These include recognisable artefacts, parts of composite objects made of wood, and processing waste; the construction timber of buildings and harbours, and ship timber, are not included. With the current study, the data from the wooden artefacts from Velsen 1 and 2 have been analysed and a representative number of artefacts from different categories is included in the catalogue. Furthermore, drawings and pictures of artefacts not included in the catalogue can be seen in the international database of wooden artefacts, WOODAN.org.

Seventeen themes with different categories have been specified; the classification was based on the function of the artefacts. The themes are military equipment, ship inventory, communication, provisioning, fastening and securing, lightweight constructions, furniture, roofing and fenestration, domestic utensils, basketry, personal belongings, entertainment, fishing and fowling, tools for woodworking and tools for other purposes, textile-processing implements and miscellaneous objects. Different categories fall within each theme, such as writing tablets, styli and other writing utensils under the theme 'communication', and footwear and a comb under the theme 'personal belongings'. The various find categories relate to several aspects of daily life. Weaponry and obstacles (*pila muralia*) bear witness to the military character of the site. Pegs and furniture are related to the layout of the camp, while the barrels, the stoppers, and bungs of barrels and amphoras, wooden seals, and locks are related to provisioning and storage facilities. Contact with the outside world is also reflected in the writing tablets. Bowls, spatulas, and spoons provide insight into the practices of food preparation - of the common soldier in particular. Personal objects, such as pattens, show which trends were fashionable, while the panpipe and gaming pieces illustrate how the inhabitants of the fort spent their leisure time.

26.2 Wood use

The assemblage comprises thirty-two wood taxa; six of the species are non-indigenous. These are silver fir, spruce, larch, boxwood, wild cherry, and Norway maple. As the artefacts made from these non-indigenous wood species have either been coopered (barrels) or manufactured on a lathe (*pyxides*), or because they appear only once in the spectrum (panpipe), they will have reached the fort as finished products. There are no indications that wood was regularly imported as raw material for processing in the fort. An exception is one piece of turning waste of boxwood, which implies that non-indigenous wood may have been supplied on a small scale for specific purposes. Even though it came from the dunes, the presence of a burr also indicates an intentional selection of special wood.

Of the indigenous species, ash, alder, and oak were mostly used. All of the other species that grew in the area occur sporadically. Nevertheless, for some categories there was a clear preference for a certain type of wood. For example, handles were often made of ash; styli of elder; bowls of alder; lathe-turned furniture legs of ash, beech, and maple; battens, slats and boards of furniture and light constructions of ash, baskets and fish traps of willow. As far as the use of wood at Velsen 1 is concerned, ash appears to have been used more often than alder for the making of artefacts, while for the construction of the harbour installations, alder was the most frequently used, followed by ash.

26.3 Woodworking

Artefacts made from local wood species, roughouts, semi-finished products, processing waste, two planes, and possible handles of wood tools (including a handle of a socketed chisel) all indicate on-site woodworking. Tool marks on processing waste reveal that woodworking was mainly carried out with axes,

adzes, planes, gouges, chisels, and saws. Given the number of mouldings, a profile cutter will also have been present. Considering the presence of turning waste and the number of lathe-turned artefacts made from local wood species, the craft of wood turning was also carried out. In this context a possible tool-rest support belonging to a lathe is noteworthy.

Sawn-off ends of staves indicate the recycling of wooden barrels, particularly barrels of silver fir and Norway spruce and, to a lesser extent, of oak. Among other objects, tent pegs and kitchen utensils have been found to be made of staves. This appears to have occurred extensively in Roman contexts, as indicated through research on processing waste of sites in London and Cologne. It also means, however, that in contrast to what has been suggested above for artefacts made from non-indigenous wood, writing tablets might have been made in the fort.

The most remarkable wooden objects from Velsen are the fragments of two vine rods (*vitis*). A *vitis* is a symbol for the rank of a centurion. Apart from its symbolic character, it was actually used to maintain discipline through corporal punishment. Striking are also the many tent pegs, suggesting the importance of encampments and mobility. An almost complete tumbler lock, a deadbolt, latch lifters, and seal locks demonstrate the importance of fastening and security devices for transport and supplies. Personal items, including the wooden soles of footwear with small sizes, show that women and children also lived in the fort. The panpipe is certainly one of the most remarkable finds from Velsen.

26.4 Analogies

The composition of the assemblage of wooden artefacts corresponds well with other sites from the Roman period, both military sites as well as rural dwellings in the Roman sphere of influence. However, for Velsen 1 and Velsen 2, no wooden artefacts of Roman provenance are known from the contemporary, indigenous dwellings in the area, whereas in the second and third centuries AD, they are. The contact between the Romans at the fort and the Frisians was probably limited to that of tax collection and will have been of a different nature than in later periods. Remarkable is the nature of the wooden objects

Fig. 26.1 The curator of Roman Archaeology of The National Museum of Antiquities Leiden, dr. Jasper de Bruin, with one of the wooden soles from Velsen 1. The museum has the intention to present more wooden objects from Velsen 1 to the public (photo: Photography Hielco Kuipers Leiden).

from the second and third centuries, to which the panpipe from Uitgeest-Dorregeest belongs. From this one may conclude that interaction between the indigenous inhabitants who lived north of the Rhine and the Romans certainly did occur after the establishment of the *limes* and that it is quite possible that Velsen still retained some significance in the maintaining of contacts with the inhabitants to the north of the Rhine after the Claudian period, even though this is not directly visible from the archaeological features. The ongoing research by Van Driel-Murray and Driessen will shed more light on this.

The shape and size of a number of objects from Roman times remained the same until the Medieval period. These include writing tablets, double-sided combs, and *pyxides*. Moreover, the type of panpipe made of a board of boxwood still exists after the Roman period. At Medieval York, a panpipe was found that resembles the Roman one. The model of the basket-shaped fish traps, that is also known from a Middle Iron Age site, continued to be used until the Medieval period. Other objects, such as the bobbin-toggles, disappear from the find assemblage at the beginning of the second century AD.

26.5 Future research

The assemblage of wooden artefacts from Velsen 1 reflects the potential for finding wooden artefacts from contexts such as harbour basins, gullies, and river deposits. These contexts should be given special attention, including the development of strategies for dealing with waterlogged wood. The careful recording, salvage, and curation of the wooden finds determines the additional knowledge which we can realise from them. Since the first excavations at Velsen, our knowledge of the possibilities for the conservation of waterlogged wooden artefacts has increased. Awareness of the information value of wood as a cultural material group has also grown. Given the potential of wood in archaeological contexts as one of the core qualities of Dutch archaeology, it will be essential to continue the stimulation of synthesising studies such as the present one.

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Catalogue

Explanation of Terms and Abbreviations Used in the Descriptions of the Objects

The plate number is given as a Roman numeral and is followed by the catalogue number and the find number. For example: Plate III.5, find no. 2530 indicates that this object is depicted on plate III, the catalogue number is 5, and the find number is 2530.

Find no.: Find number of the object. On the plates, the abbreviation of the find number is f. WOODAN-id: The unique number of the object in the online database WOODAN.org.

Find location: Square number. The square number is based on the grid system placed over the harbour basin and refers to the square in which the object was found. After the square number, between parentheses, the specific find layer is given. If an object comes from a different context than the harbour basin, the context is given and, if known, the number of the archaeological feature.

AWN: AWN Society of Volunteers in Archaeology (AWN Vereniging van vrijwilligers in de archeologie, the former Archeologische Werkgemeenschap Nederland).

ADNH: Archaeological Depot of the Province of Noord-Holland (Provinciaal depot voor archeologische bodemvondsten Noord-Holland).

Wood species: The first name is the Latin name, the second the common name of the wood species. In the cases where the identification is uncertain, cf. is added. 'Not identified' indicates that it was not possible to identify the wood species because the object is missing. 'Indeterminable' indicates that the research did not yield an identification because the object was too poorly preserved and wood anatomical features were no longer visible.

IPP: Institute of Prae- and Protohistory of the University of Amsterdam (Instituut voor Prae- en Protohistorie van de Universiteit van Amsterdam).

Measurements: The first dimensions are the overall dimensions of an object. These are sometimes followed by the dimensions of specific parts of the object. All of the dimensions are taken from the original sketches of the unconserved object (unless otherwise noted).

The drawings are based on the sketches made by René Silfhout shortly after the excavations. If sketches were missing, the conserved object was drawn. Where possible, photographs were added to show the current state of the object. The wooden artefacts are depicted on a scale of 1:1, 1:2, and 1:3.

Because the objects shrank due to conservation, the dimensions of the original sketches have been adopted. This has also been done as far as possible for objects that have not been conserved and which are now completely dried out and shrunken.

If no sketches exist from before the conservation, this is mentioned after the dimensions of the description and between brackets.

The drawing of the cross-section of an object with the course of the annual growth rings shows how the object was retrieved from the tree (for example, radially, tangentially, cross-grain aligned, or unmodified roundwood). A cross-section drawing left blank (without a growth ring pattern) means that this is unknown.

All measurements are in centimetres (cm).
D. : Depth
Dia. : Diameter
Ht. : Height
L. : Length
Th. : Thickness
W. : Width
> : Larger than
* : Reconstructed dimensions

For the writing tablets, the type, based on the classification system of Speidel (1996), has been added to the standard description. Three different types can be distinguished among the writing tablets of Velsen:

- A1: one face of the writing tablet is recessed, the other is plain.
- S1: both faces are recessed, one has a sawn midway (the seal-groove).
- S2: both faces are recessed, one has a sawn midway (the seal-groove) which is framed on both sides with a raised bar.

Military Equipment

Swords

Plate I.1 Pommel and handguard of a gladius Find no. 3064 WOODAN-id: 22995000/23466000
Find location: Square BX-10 (Roman layer)
Wood species: *Buxus* spp./Boxwood
Incomplete, preserving two pieces of a grip of a gladius. The pommel and the handguard are hemispheres and oval in cross-section. The pommel has a thin groove which divides it into two parts. Both parts are decorated with the same pattern, but in inverted position. The decoration consists of a rosette of long leaves. The handguard is ornamented with a pattern similar to that of the pommel. The pommel and handguard are complete but dried out and deformed by shrinkage after conservation.
Pommel: L. 8.5 cm x W. 5.5 cm x Th. 3.5 cm; handguard: L. 7 cm x W. 5.5 cm x Th. 5.5 cm

Plate II.2 Grip of a gladius Find no. 3034 WOODAN-id: 22998000
Find location: Square CW-21 (well 1989-S180)
Wood species: *Buxus* spp./Boxwood
Incomplete in length and broken off at the lower end. The grip is round in cross-section and has four complete circular ledges and, at the broken end, a part of a fifth. Between the ledges the shape is concave. Under the incomplete fifth ledge there is a groove with a width and depth of 1 mm. In the centre, the object is pierced along its entire length.
L. 11.4 cm x Dia. 2.1 cm (concave parts) and Dia. 3.4 cm (circular ledges); hole in grip: Dia. 1.63 cm (bottom) and Dia. 1.1 cm (top)

Arrow

Plate II.3 Arrow with an iron head Find no. 5099-1011a WOODAN-id: 23000000
Find location: Velsen 2, harbour basin/gully (Roman layer)
Wood species: *Cornus* spp./Dogwood
Fragment of an arrow with a broken shaft made of split stem wood. The shaft is tapered towards the trilobate, tanged head of iron.
L. >9.8 cm x Dia. 0.9-1.2 cm; iron arrowhead: L. 4 cm

Obstacles

Plate III.4 Obstacle (*pilum muralis*) Find no. 2529 WOODAN-id: 22996000
Find location: Square DX-17 (Roman layer)
Wood species: *Quercus* spp./Oak
Complete, but broken into five pieces which do not fit together after conservation. The obstacle is slightly square in cross-section and narrowed in the central part. Both ends are tapered. The object is made of a young stem and the sapwood has not been entirely removed.
L. 174 cm x W. 6 cm (widest part) and W. 4 cm (central part) x Th. 5 cm

Plate III.5 Obstacle (*pilum muralis*) Find no. 2530 WOODAN-id: 22997000
Find location: Square ED-4/5 (Roman layer)
Wood species: *Quercus* spp./Oak
Complete, but broken into several pieces and deformed after conservation. The parts no longer fit together. Both ends are slightly tapered and the central part is narrowed for use as a handle. The object is made of split, relatively knotty wood of a young stem or large branch, complete with sapwood. In cross-section, wide annual rings are visible, indicating the fast growth of the tree.
L. 119 cm x W. 7.5 cm (widest part) and W. 5 cm (central part) x Th. 5 cm

Military signa

Plate IV.6 *Vitis* Find no. 2526 WOODAN-id: 23449000
Find location: AWN excavation, trench 9-1 (Roman layer)
Wood species: *Vitis vinifera*/Common grape
Piece of a rod with a carved knob-like top. At the attachment there is a remnant of another, broken, branch.
L. 6 cm x Dia. 1.3-2.6 cm

Plate IV.7 *Vitis* Find no. 3014 WOODAN-id: 23450000
Find location: Square DT-1 (Dredging layer)
Wood species: *Vitis vinifera*/Common grape
Piece of a rod with a carved knob-like top, partly charred.
L. 5 cm x Dia. 1.1-2.3 cm

(Tent) Pegs

Plate V.8 (Tent) Peg Find no. 296.2 WOODAN-id: 23004000
Find location: unknown
Wood species: *Fraxinus excelsior*/Ash
Complete peg with a rectangular head. Below the head there is a deep notch with one slightly sloping side and one straight side.
L. 38 cm x W. 4.7 cm x Th. 1.6 cm; head: L. 7.2 cm x W. 3.5 cm x Th. 1.5 cm

Plate V.9 (Tent) Peg Find no. 3345 WOODAN-id: 23073000
Find location: unknown
Wood species: *Fraxinus excelsior*/Ash
Almost complete peg with a small piece missing from the tip. The head has a rectangular shape and the notch below the head has two sloping sides. The peg is dried out and warped after conservation.
L. >35 cm (*36 cm) x W. 4 cm x Th. 2 cm; head: L. 6.2 cm x W. 2.6 cm x Th. 0.8 cm (after conservation)

Plate V.10 (Tent) Peg Find no. 3113 WOODAN-id: 23059000
Find location: Square EG-3 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Almost complete peg with the tip missing. The head is rectangular and the notch has one straight and one sloping side. At the pointed end there is a knot in the wood. Traces of wear are present in and below the notch.
L. >27.5 cm (*31 cm) x W. 3 cm x Th. 1.3 cm; head: L. 8.2 cm x W. 4 cm x Th. 2.5 cm

Plate VI.11 (Tent) Peg Find no. 3016 WOODAN-id: 23050000
Find location: Square DS-16 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Complete peg with a sawn rectangular head and with a notch with one straight and one sloping side. Traces of wear in the notch indicate light use of the peg. The head is slightly deformed on one side due to shrinkage before conservation.
L. 30.5 cm x W. 4.5 cm x Th. 2-2.1 cm; head: L. 9 cm x W. 4.5 cm (bottom) and W. 4 cm (top) x Th. 2.1 cm

Plate VI.12 (Tent) Peg Find no. 920.1 WOODAN-id: 23014000
Find location: Square DG-29 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Almost complete peg except for a small piece of the tip which is missing. The head is rectangular and the notch below has one straight side and one side which begins straight and then becomes a sloping side. The prolonged curvature of the body has the greatest width fairly close to the tip and the tip itself is strikingly short. This suggests that the tip has been repointed.
L. >28.5 cm (*31 cm) x W. 4.8 cm x Th. 2.5 cm; head: L. 3.6 cm x W. 2.2 cm x Th. 0.7-1 cm

Plate VI.13 (Tent) Peg Find no. 3413 WOODAN-id: 23083000
Find location: Square DQ-20 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Complete peg with a rectangular head and a notch which has one straight side and one sloping side. The peg is dried out and warped after conservation.
L. 27.5 cm x W. 2.5 cm x Th. 0.5 cm; head: L. 4.5 cm x W. 2.5 cm x Th. 0.5 cm

Plate VII.14 (Tent) Peg Find no. 3115 WOODAN-id: 23060000
Find location: Square EO-6 (unknown layer)
Wood species: *Fraxinus excelsior*/Ash
Peg with a small piece of the tip missing. The head is damaged at the front side. The shape is reconstructed as rectangular in the drawing but could also have been trapezoidal or triangular. The notch has one straight and one sloping side. In the notch, tool marks of cutting are preserved. Traces of wear are absent.
L. >30 cm (*31 cm) x W. 3.5 cm x Th. 2.5 cm; head: L. 6.2 cm x W. >1.6 cm (*3 cm) x Th. 2.3 cm

Plate VII.15 (Tent) Peg Find no. 452 WOODAN-id: 23008000
Find location: Square CQ-23 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Complete peg with a rectangular head. The head is damaged on one side. The notch below the head is slightly rounded.
L. 25 cm x W. 3.5 cm x Th. 3 cm; head: L. 7.3 cm x W. 3.2 cm x Th. 2.1 cm

Plate VII.16 (Tent) Peg Find no. 1428.1 WOODAN-id: 23028000
Find location: Square DR-20 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Almost complete peg; part of the tip is missing. The peg has a long, slender, rectangular head and a notch with one almost straight and one sloping side. The notch is cut with an axe. Scratches and wear in the notch indicate that the peg was used.
L. >28 cm (*30 cm) x W. 2.6 cm x Th. 2.2 cm; head: L. 9.3 cm x W. 1.4-2.2 cm x Th. 2.2 cm

Plate VIII.17 (Tent) Peg Find no. 2105.1 WOODAN-id: 23045000
Find location: Square EG-3 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Almost complete peg. One side of the top is damaged and one small piece of the tip is missing. The peg has a rectangular, almost square head and a notch which has one straight and one sloping side. The notch ends in the outer kink of the concave-shaped body. From there, the peg is tapered over a length of two thirds of the peg. The notch shows traces of usage.
L. >27.3 cm (*31 cm) x W. 3.5 cm x Th. 1.6 cm; head: L. 5.2 cm x W. 3.4 cm x Th. 1.2 cm

Plate VIII.18 (Tent) Peg Find no. 3307.1 WOODAN-id: 23070000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Complete peg with a rectangular head, slightly deformed by shrinkage. The notch below the head has one straight and one sloping side.
L. 26 cm x W. 3.3 cm x Th. 1 cm; head: L. 6 cm x W. 3.2 cm x Th. 1 cm

Plate VIII.19 (Tent) Peg Find no. 3306 WOODAN-id: 23069000
Find location: Square DD-4 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Incomplete peg whose tip is missing. The rectangular head is damaged and charred at the inner side of the peg. Below the head there is a right-angled notch which continues with a sloping side to a tapered end.
L. >25 cm (*28 cm) x W. 4.3 cm x Th. 2 cm; head: L. 8 cm x W. 3.3 cm x Th. 1.2 cm

Plate VIII.20 (Tent) Peg Find no. 1050.1 WOODAN-id: 23022000
Find location: Square DJ-23 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Almost complete peg; only the tip is missing. The peg has a rectangular head and a notch with two straight sides. One straight side of the notch becomes convex towards the pointy belly.
L. 24 cm x W. 3.5 cm x Th. 1.7 cm; head: L. 7.5 cm x W. 3.5 cm (bottom) and 3 cm (top) x Th. 1.5 cm

Plate IX.21 (Tent) Peg Find no. 3395 WOODAN-id: 23082000
Find location: Square EJ-8 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Almost complete peg. One side of the rectangular head is damaged and a small piece of the tip is missing. The clearness of the cut marks indicates that the peg was probably not used.
L. >25.5 cm (*28 cm) x W. 4 cm x Th. 2.5 cm; head: L. 7.5 cm x W. 4 cm x Th. 3 cm

Plate IX.22 (Tent) Peg Find no. 261.1 WOODAN-id: 23002000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Two fragments of a peg with a rectangular head. Part of the body and of the tip are missing. Below the head is a notch with a straight side.
L. >22.5 cm (*27 cm) x W. >3 cm x Th. 2 cm; head: L. 5.2 cm x W. 3 cm x Th. 2 cm

Plate IX.23 (Tent) Peg Find no. 1737.1 WOODAN-id: 23031000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Fragment of a peg with a broken tip. The head is rectangular and the notch below the head has one straight and one sloping side. Traces of wear are not visible.
L. >29 cm x W. 5 cm x Th. 2.5 cm; head: L. 7.5 cm x W. 5 cm x Th. 2.5 cm

Plate IX.24 (Tent) Peg Find no. 1025 WOODAN-id: 23021000
Find location: Square DY-1 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Small peg with a rectangular head and a rounded notch below the head. The notch shows traces of wear. This contrasts with the clearness of the cut marks on the tip. The tip of the peg was probably repointed after a fracture.
L. 11.4 cm x W. 3.2 cm x Th. 1.5 cm; head: L. 4.8 cm x W. 3.2 cm x Th. 1.5 cm

Plate IX.25 (Tent) Peg Find no. 1743 WOODAN-id: 23032000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Small peg with a rectangular head and a rounded notch. The peg was probably repointed after a fracture.
L. 11.5 cm x W. 2.7 cm x Th. 1.6 cm; head: L. 4.5 cm x W. 3 cm x Th. 1.6 cm

Plate IX.26 (Tent) Peg Find no. 3388 WOODAN-id: 23078000
Find location: Square EA-9 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Complete small peg with a rectangular head. The peg is almost square in cross-section and damaged at one side below the notch. The notch has one straight and one sloping side. Below the notch, the peg is tapered and slightly convex-shaped.
L. 11.3 cm x W. 2 cm x Th. 2 cm; head: L. 4 cm x W. 1.9-2.4 cm x Th. 1.5 cm

Plate IX.27 (Tent) Peg Find no. 3384 WOODAN-id: 23077000
Find location: Square EB-1 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Complete small peg with a rounded rectangular head, damaged at the top. The notch has two sloping sides. The body is slightly convex-shaped.
L. 10 cm x W. 1.5 cm x Th. 1.3 cm; head: L. 3.8 cm x W. 1.7 cm x Th. 1.6 cm

Plate X.28 (Tent) Peg Find no. 3389 WOODAN-id: 23079000
Find location: Square DX-17 (Roman layer)
Wood species: cf. *Fraxinus excelsior*/Ash
Incomplete, strongly weathered, charred peg with a rectangular head and a notch which has one straight side and one sloping side.
L. >22 cm (*24 cm) x W. 3 cm x Th. 2 cm; head: L. 6 cm x W. 3 cm x Th. 1.6 cm

Plate X.29 (Tent) Peg Find no. 876.1 WOODAN-id: 23013000
Find location: Square DF-22 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Almost complete peg; only a small part of the tip is missing. The head is rectangular with a sloping and weathered top, caused by use or erosion. The notch below the head has two sloping sides cut with an axe.
L. 21 cm x W. 4 cm x 2.2 cm; head: L. 5.5-7 cm x W. 3.5 cm (top) and 2.8 cm (bottom) x Th. 1-2.2 cm

Plate X.30 (Tent) Peg Find no. 1602.1 WOODAN-id: 23030000
Find location: Square DV-3 (Roman layer)
Wood species: *Alnus* spp./Alder
Complete peg with a rectangular head and a shallow notch with one straight and one sloping side.
L. 15.5 cm x W. 3.3 cm x Th. 1.3 cm; head: L. 3.5 cm x W. 2.4 cm x Th. 0.5-0.9 cm

Plate X.31 (Tent) Peg Find no. 999.2 WOODAN-id: 23017000
Find location: Square DU-22 (Dredging layer)
Wood species: *Fraxinus excelsior*/Ash
Rectangular head of a peg. Below the head there is a notch with one straight and one sloping side.
L. >14.4 cm x W. 3.9 cm x Th. 2 cm; head: L. 6 cm x W. 3.2 cm x Th. 1.7 cm

Plate X.32 (Tent) Peg Find no. 1820 WOODAN-id: 23036000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Small peg with a rectangular head and a notch. The peg was probably repointed after a fracture.
L. 11.2 cm x W. 2.3 cm x Th. 1.6 cm

Plate X.33 (Tent) Peg Find no. 290 WOODAN-id: 23003000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Rectangular head of a peg. Below the head is a notch with one straight and one sloping side. One corner of the head is chamfered.
L. >12 cm x W. >2 cm x Th. 1.6 cm; head: L. 4 cm x W. 2.5 cm x Th. 1.5 cm

Plate XI.34 (Tent) Peg Find no. 315.2 WOODAN-id: 23006000
Find location: Square CK-4 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Almost complete peg; only a small part of the tip is missing. The head is slightly trapezoidal. Below the head there is a notch with one straight and one sloping side. The clearness of the cut marks indicates that the peg was not used.
L. >34 cm (*37 cm) x W. 4.7 cm x Th. 2.5 cm; head: L. 7.5 cm x W. 3-4 cm x Th. 1.2-2.3 cm

Plate XI.35 (Tent) Peg Find no. 1775.1 WOODAN-id: 23033000
Find location: Square DY-2 (Dredging layer)
Wood species: *Fraxinus excelsior*/Ash
Complete peg with a rectangular head. Below the head is a notch with one straight and one sloping side. The sharp, undamaged edges of the notch and the pointed belly show almost no wear from use.
L. 36 cm x W. 2.3-3.8 cm x Th. 1.1-1.6 cm; head: L. 6.5 cm x W. 3-3.5 cm x Th. 1.6 cm

Plate XI.36 (Tent) Peg Find no. 3017 WOODAN-id: 23051000
Find location: Square DS-17 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Complete peg, entirely triangular in cross-section and with a slightly trapezoidal head. The notch has one almost straight side and one sloping side and was cut with an axe. The freshness of the tool marks indicates that the peg was not used.
L. 31.5 cm x W. 4.5 cm x Th. 1-2.2 cm; head: L. 7.2 cm x W. 3.7-4.5 cm x Th. 1-2.2 cm

Plate XII.37 (Tent) Peg Find no. 1106.1 WOODAN-id: 23025000
Find location: Square DK-26 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Complete peg, although a small piece of the tip is missing. The peg has a rectangular, slightly trapezoidal head and a wide concave-shaped body. The notch below the head has one straight and one sloping side. Fresh saw marks on the top and in the notch indicate that the peg was seldom or never used.
L. >31.5 cm (*33 cm) x W. 6.2 cm x Th. 1.7 cm; head: L. 6.5 cm x W. 4.2-4.8 cm x Th. 0.8-1.5 cm

Plate XII.38 (Tent) Peg Find no. 3374 WOODAN-id: 23074000
Find location: Square EE-4 (Roman layer)
Wood species: *Quercus* spp./Oak
Almost complete, weathered peg. A small part of the tip is missing. Traces of wear are present in and below the notch.
L. >32 cm (*33 cm) x W. 4 cm x Th. 1.5 cm; head: L. 3.5 cm x W. 3 cm x Th. 1.5 cm

Plate XII.39 (Tent) Peg Find no. 1881.1 WOODAN-id: 23040000
Find location: Square EA-0 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Complete peg, triangular in cross-section, with an almost rectangular head. The peg is dried out and warped after conservation.
L. 32 cm x W. 4.1 cm x Th. 2 cm; head: L. 7.2 cm x W. 4-5 cm x Th. 1.8 cm

Plate XIII.40 (Tent) Peg Find no. 1805.1 WOODAN-id: 23034000
Find location: Square DZ-2 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Complete peg with an almost rectangular head. The top of the head seems to have broken off; the head was probably longer. The notch below the head has one straight and one sloping side. The wood is weathered. Indications for use are missing.
L. 29.8 cm (*33 cm) x W. 4.3 cm x Th. 2.5 cm; head: L. 8.5 cm x W. 2.5 cm (top) and W. 4 cm (bottom) x Th. 2.3 cm

Plate XIII.41 (Tent) Peg Find no. 1177.1 WOODAN-id: 23026000
Find location: Square DL-14 (Dredging layer)
Wood species: *Fraxinus excelsior*/Ash
Almost complete peg with a piece of the tip broken off. The head is slightly trapezoidal. Below the head is a notch with one straight and one sloping side. Traces of wear are not visible.
L. >29.8 cm (*31 cm) x W. 4.6 cm x Th. 2 cm; head: L. 6.5 cm x W. 3.5-4 cm x Th. 1.7 cm

Plate XIII.42 (Tent) Peg Find no. 3130 WOODAN-id: 23062000
Find location: Square unknown (feature 168)
Wood species: *Fraxinus excelsior*/Ash
Completely preserved except for a piece of the tip which is missing. This peg has a trapezoidal head and a notch which has one almost straight side and one sloping side. Below the notch, the body broadens widely and then tapers. The head was deformed before conservation due to shrinkage.
L. >32 cm (*34 cm) x W. 4.5 cm x Th. 2.2 cm; head: L. 6.5 cm x W. 2-4 cm x Th. 2 cm

Plate XIV.43 (Tent) Peg Find no. 3305 WOODAN-id: 23068000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Complete peg with a trapezoidal head and a convex-shaped body with a sharp kink. The right-angled notch has two straight sides. The tip is slightly deformed due to shrinkage.
L. 28 cm x W. 4.5 cm x Th. 2 cm; head: L. 8 cm x W. 3-4 cm x Th. 1-1.3 cm

Plate XIV.44 (Tent) Peg Find no. 3084 WOODAN-id: 23055000
Find location: Square DU-6 (Roman layer)
Wood species: *Quercus* spp./Oak
Almost complete peg; the tip is missing. The peg has a slightly trapezoidal head and a body which is slightly curved. The notch has one straight and one sloping side.
L. >27 cm (*28 cm) x W. 4.5 cm x Th. 3.7 cm; head: L. 8 cm x W. 4 cm x Th. 2.7-3 cm

Plate XIV.45 (Tent) Peg Find no. 3020 WOODAN-id: 23052000
Find location: Square DQ-13 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Complete peg, almost square in cross-section, with a slightly trapezoidal head. The notch has one almost straight and one sloping side. The sharp kink at the belly and the freshness of the cut marks in the notch indicate that the peg was never used.
L. 27.5 cm x W. 3 cm x Th. 1.7 cm; head: L. 8 cm x W. 2.3 cm (bottom) and W. 3 cm (top) x Th. 2 cm (after conservation)

Plate XV.46 (Tent) Peg Find no. 3036 WOODAN-id: 23053000
Find location: AWN excavation, trench 9-2 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Incomplete peg; part of the tip is missing. The head is trapezoidal and the notch has two sloping sides, cut with an axe. A few small, damaged patches in the notch show that the peg has been used. The head and part of the body are charred.
L. >24 cm (*29 cm) x W. 2.8 cm x Th. 0.6 -1.1 cm; head: L. 5.7 cm x W. 2.8-4 cm x Th. 1.1 cm

Plate XV.47 (Tent) Peg Find no. 1010 WOODAN-id: 23020000
Find location: Square DI-27 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Fragment of a weathered peg with a slightly trapezoidal head.
L. >22.3 cm x W. 3.8 cm x Th. 1.9 cm; head: L. 8 cm x W. 2.5-3.1 cm x Th. 1.9 cm

Plate XV.48 (Tent) Peg Find no. 1819.1 WOODAN-id: 23035000
Find location: Square EA-7 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Almost complete peg with a trapezoidal head. The shape of the head was originally probably triangular. The top is broken off, as is the tip. The shaft is slightly curved.
L. >20.7 cm (*34 cm) x W. 3 cm x Th. 2.5 cm; head: L. 6 cm x W. 3.5-4.6 cm x Th. 2.1 cm

Plate XVI.49 (Tent) Peg Find no. 1821.1 WOODAN-id: 23037000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Weathered peg with a piece of the tip missing. The head is slightly trapezoidal and the notch below the head has one straight and one sloping side. The peg has a rather flat belly.
L. >21 cm (*27 cm) x W. 3-5 cm x Th. 2.8 cm; head: L. 5.5 cm x W. 2.6-4.5 cm x Th. 2.1 cm

Plate XVI.50 (Tent) Peg Find no. 3083 WOODAN-id: 23054000
Find location: Square DU-6 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Almost complete peg whose tip is missing, with a trapezoidal head and a notch with two straight sides. Below the notch, the body is convex-shaped and tapered towards the end. Fresh saw marks in the notch indicate that the peg was rarely, if ever, used.
L. >22 cm (*26 cm) x W. 4 cm x Th. 2 cm; head: L. 5.5 cm x W. 3-4.2 cm x Th. 1.5 cm

Plate XVI.51 (Tent) Peg Find no. 1879 WOODAN-id: 23039000
Find location: Square unknown (layer unknown)
Wood species: *Alnus* spp./Alder
Fragment of a weathered peg. Part of the head is broken diagonally. The peg has a straight shaft that has been repointed at the end.
L. 19 cm x W. 2.5-3.5 cm x Th. 2 cm; head: L. 7.2 cm x W. 1.6-3.5 cm x Th. 2 cm

Plate XVII.52 (Tent) Peg Find no. 3120 WOODAN-id: 23061000
Find location: Square EG-16 (Roman layer)
Wood species: *Quercus* spp./Oak
Complete peg with a trapezoidal head and a notch with two sloping sides. Below the convex part of the peg there is a short, tapered end. Considering the direction of the sloping side and the different angle of the short tip, the peg was repointed for reutilisation.
L. 16.5 cm x W. 4 cm x Th. 2.8 cm; head: L. 6 cm x W. 2.2-3.2 cm x Th. 1.5 cm

Plate XVII.53 (Tent) Peg Find no. 3390 WOODAN-id: 23080000
Find location: Square EK-3 (Dredging layer)
Wood species: *Quercus* spp./Oak
Complete peg with a trapezoidal head. The peg is dried out and warped after conservation.
L. 16.5 cm x W. 2 cm x Th. 1 cm; head: L. 3.4 cm x W. >1.5 cm x Th. 2.1 cm (after conservation)

Plate XVII.54 (Tent) Peg Find no. 726.1 WOODAN-id: 23010000
Find location: Square DB-25 (Roman layer)
Wood species: *Quercus* spp./Oak
Almost complete peg whose tip is missing. The head has a trapezoidal shape and is round in cross-section at the top. At the notch, which has two sloping sides, the peg becomes rectangular in cross-section and is tapered below the belly. Traces of wear in the notch indicate that the peg was used.
L. >17.5 cm (*19 cm) x W. 4 cm x Th. 2.2 cm; head: L. 5.3 cm x W. 2-3 cm x Dia. 1.8-2.1 cm

Plate XVII.55 (Tent) Peg Find no. 1105.1 WOODAN-id: 23024000
Find location: Square DK-26 (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Incomplete peg with a slightly trapezoidal head. The notch has one straight and one sloping side. The tip is broken off.
L. >16 cm x W. 4.1 cm x Th. 1.2 cm; head: L. 6 cm x W. 4 cm x Th. 2.5 cm

Plate XVII.56 (Tent) Peg Find no. 3265 WOODAN-id: 23063000
Find location: AWN excavation, trench 9-2 (Roman layer)
Wood species: *Quercus* spp./Oak
Complete peg with a trapezoidal head and a half-rounded notch. The peg is tapered below the notch and slightly weathered by water.
L. 13.7 cm x W. 3.8 cm x Th. 2 cm; head: L. 5 cm x W. 2.5-3.6 cm x Th. 1.6-1.9 cm

Plate XVII.57 (Tent) Peg Find no. 2071.1 WOODAN-id: 23043000
Find location: Square EF-4 (Roman layer)
Wood species: *Quercus* spp./Oak
Almost complete peg with a small part of the tip missing. It has a rounded square head, a half-rounded notch, and a pointed end. This peg was probably made from a discarded board.
L. 10 cm (*11 cm) x W. 2.5 cm x Th. 1.5 cm; head: L. 1.8 cm x W. 2.1 cm x Th. 1.2 cm

Plate XVII.58 (Tent) Peg (?) Find no. 3101 WOODAN-id: 23057000
Find location: Square DB-23 (Roman layer)
Wood species: not identified
Almost complete object with a triangular head. A small part of the tip is missing. The peg is unusually flat and dainty. There is an angular notch with no signs of wear.
L. >9.2 cm (*11 cm) x W. 1.2 cm x Th. 0.5 cm; head: L. 2 cm x W. 1.5 cm x Th. 0.2-0.6 cm

Plate XVIII.59 (Tent) Peg Find no. 1104 WOODAN-id: 23023000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Complete peg with an almost square head. The notch below the head has one straight and one sloping side.
L. 34 cm x W. 5 cm x Th. 1.5-2.2 cm; head: L. 6 cm x W. 4.5-5 cm x Th. 1.3-2.2 cm

Plate XVIII.60 (Tent) Peg Find no. 3377 WOODAN-id: 23076000
Find location: Square EC-11 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Almost complete peg with a small piece of the tip missing. The peg has a square head and a notch with one straight and one sloping side. There is a knot in the wood of the convex body.
L. >32 cm (*34 cm) x W. 4.5 cm x Th. 1.6 cm; head: L. 6.8 cm x W. 4-5 cm x Th. 2-2.5 cm

Plate XVIII.61 (Tent) Peg Find no. 1861.1 WOODAN-id: 23038000
Find location: Square EA-12 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Complete peg except for a missing tip. The square head shows traces of saw marks on the top. The notch has one straight and one sloping side. There are no signs of wear.
L. 27 cm (*28 cm) x W. 2.4-4 cm x Th. 2.2 cm; head: L. 4.7 cm x W. 3.6 cm x Th. 1.8 cm

Plate XIX.62 (Tent) Peg Find no. 838 WOODAN-id: 23012000
Find location: Square DE-10 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Small peg with a square head. The tip is missing. The notch below the head is slightly rounded.
L. 13.2 cm (*15 cm) x W. 3.8 cm x Th. 1.2-2 cm; head: L. 3.8 cm x W. 2.7-3.2 cm x Th. 2 cm

Plate XIX.63 (Tent) Peg Find no. 1325.1 WOODAN-id: 23027000
Find location: Square DP-13 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Complete peg with an almost square head. There is a notch with one straight side and one sloping side. There is no evidence that the peg was used.
L. 14.5 cm x W. 2.5-3.7 cm x Th. 1 cm; head: L. 3.7 cm x W. 2.8 cm x Th. 1 cm

Plate XIX.64 (Tent) Peg Find no. 1547.1 WOODAN-id: 23029000
Find location: Square DU-2 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Small peg with a square head. A piece of the tip is missing. The notch below the head has two sloping sides.
L. >10.2 cm (*14 cm) x W. 3.2 cm x Th. 1.5 cm; head: L. 3 cm x W. 2.8 cm x Th. 1.2 cm

Plate XIX.65 (Tent) Peg Find no. 2119.1 WOODAN-id: 23046000
Find location: Square EG-5 (Roman layer)
Wood species: *Alnus* spp./Alder
Complete peg with some damage at the pointed end. It appears that the peg was repointed, but this is uncertain because of the decreased distinctiveness of processing traces after conservation. The head is square and the body is almost square in cross-section and slightly convex-shaped.
L. 25 cm x W. 4 cm x Th. 2 cm; head: L. 5.5 cm x W. 4.5-4.6 cm x Th. 1.9 cm

Plate XIX.66 (Tent) Peg Find no. 818.1 WOODAN-id: 23011000
Find location: Square DD-24 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Complete peg with a square head. There are saw marks on the top and on the straight side of the notch. A small piece of the tip is missing. The notch below the head has one straight and one sloping side. There are no indications that the peg was used.
L. 19 cm x W. 3.8 cm x Th. 2.3 cm; head: L. 4 cm x W. 3.2 cm x Th. 2 cm

Plate XX.67 (Tent) Peg Find no. 3376 WOODAN-id: 23075000
Find location: Square ED-12 (Roman layer)
Wood species: *Quercus* spp./Oak
Almost complete peg. The top of the initially triangular head and the tip are missing. Traces of wear are present in and below the notch. The peg is dried out and warped after conservation.
L. >27 cm (*28 cm) x W. 3 cm x Th. 1.5 cm; head: L. >4.5 cm x W. 1-1.8 cm x Th. >1 cm

Plate XX.68 (Tent) Peg Find no. 2104.1 WOODAN-id: 23044000
Find location: Square unknown (layer unknown)
Wood species: *Alnus* spp./Alder
Pointed head of a weathered peg, broken below the rounded notch. One side of the head was deformed before conservation.
L. >14.8 cm x W. 2.2-2.5 cm x Th. 2 cm; head: L. 9.8 cm x W. 2.5 cm x Th. 2 cm

Plate XX.69 (Tent) Peg Find no. 3391.1 WOODAN-id: 23081000
Find location: Square EG-15 (Dredging layer)
Wood species: *Quercus* spp./Oak
Head of a weathered peg with an elongated, triangular shape, almost square in cross-section. The top of the head is damaged. The notch has one straight and one sloping side.
L. >13.5 cm x W. 3 cm x Th. 2.5 cm; head: L. 8.7 cm x W. 1.8 cm x Th. 0.3-1.3 cm

Plate XXI.70 (Tent) Peg Find no. 3069 WOODAN-id: 23084000
Find location: AWN excavation, trench 9-2 (Roman layer)
Wood species: *Quercus* spp./Oak
Almost complete, large peg with triangular head; part of the tip and the top are missing. The top could have been broken off when the peg was hammered into the ground or into some type of underlying construction: a beam, for example. One side of the notch below the head is quite straight, the other side is sloping. The sapwood was not removed. One quarter of the body is from sapwood. This peg was made from a young stem or branch of oak.
L. >51 cm (*53 cm) x W. 6 cm x Th. 2.4 cm; head: L. 19 cm x W. 2.7-5.5 cm x Th. 1.4-2 cm

Plate XXII.71 (Tent) Peg Find no. 2058.1 WOODAN-id: 23042000
Find location: Square EE-6 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Almost complete peg; a small part of the tip is missing. The head is rectangular and rounded on one side and the notch is slightly curved towards the tapered end.
L. 28 cm (*31 cm) x W. 2.4-4 cm x Th. 2.2 cm; head: L. 7 cm x W. 1-2.2 cm x Th. 1.7 cm

Plate XXII.72 (Tent) Peg Find no. 3104 WOODAN-id: 23058000
Find location: Square CR-26 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Complete peg with a square head. Below the head is a convex notch. Starting from the belly the shaft tapers towards the tip of the peg. The peg has dried out and become deformed before conservation.
L. 20 cm x W. 3 cm x Th. 1.5 cm; head: L. 4 cm x W. 3 cm x Th. 1.2 cm

Plate XXII.73 (Tent) Peg Find no. 3015 WOODAN-id: 23049000
Find location: Square DS-19 (Roman layer)
Wood species: *Alnus* spp./Alder
Incomplete, weathered peg which is damaged on the originally straight side. Part of the tapered body is missing. The peg has no notch; the head with a flat top has a sloping side and is straight towards the shaft. The back side is damaged but seems to have been straight except for the bevelled corner.
L. >16.9 cm x W. 4 cm x Th. 3.3 cm; head: L. 7.5 cm x W. 3.5 cm x Th. 3 cm

Plate XXII.74 (Tent) Peg Find no. 3002 WOODAN-id: 23048000
Find location: Square DS-3 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Almost complete peg with a rectangular head; a small part of the end of the shaft is missing. There is a right-angled notch below the head.
L. >14 cm (*16 cm) x W. 2.5 cm x Th. 1.8 cm; head: L. 3.4 cm x W. 2.1 cm x Th. 1.7-1.8 cm

Plate XXIII.75 (Tent) Peg Find no. 3269 WOODAN-id: 23065000
Find location: Square EA-00 (Roman layer)
Wood species: *Quercus* spp./Oak
Complete peg but damaged at the tip. It has a slightly trapezoidal head and a rounded notch and is unusually thick in cross-section. Fresh cut marks in the notch indicate that the peg was seldom used.
L. 15.7 cm x W. 3 cm x Th. 1.8 cm; head: L. 4.2 cm x W. 2.4-2.8 cm x Th. 1.2-1.8 cm

Plate XXIII.76 (Tent) Peg Find no. 3309 WOODAN-id: 23071000
Find location: Square unknown (layer unknown)
Wood species: *Abies alba*/Silver fir
Complete peg made of a discarded stave from a wine barrel whose croze groove was used to create the notch. For this purpose, the thickness of the stave under the croze groove was reduced and one side was cut with an axe stroke to give the peg a pointed end.
L. 14.6 cm x W. 3 cm x Th. 1.8 cm; head: L. 4.9 cm x W. 2.1-2.9 cm x Th. 1.6 cm

Plate XXIII.77 (Tent) Peg Find no. 3266 WOODAN-id: 23064000
Find location: AWN excavation, trench 9-2 (layer unknown)
Wood species: *Quercus* spp./Oak
Complete peg with a square head and a notch which has two straight sides. The body is slightly curved, runs straight below the notch, and then tapers towards the tip. The head shows the beginning of a misplaced saw cut over a length of 0.8 cm with a width of 0.2 cm and a depth of 0.16 cm.
L. 13 cm x W. 3-3.8 cm x Th. 1.4-1.6 cm; head: L. 4.4 cm x W. 3.1-3.8 cm x Th. 1.6 cm

Plate XXIII.78 (Tent) Peg Find no. 2134.1 WOODAN-id: 23047000
Find location: Square EH-5 (Roman layer)
Wood species: *Quercus* spp./Oak
Complete peg with an unusual shape. Below the rectangular head there is a half-rounded notch, and below the notch the peg is straight to the tip. The peg is chamfered on one side and was cut with an axe to create a sharp tip. It appears as though the peg was made from a discarded board.
L. 12.5 cm x W. 2.6 cm x Th. 2 cm; head: L. 3.5 cm x W. 2.7 cm x Th. 2.1 cm

Plate XXIII.79 (Tent) Peg Find no. 3313 WOODAN-id: 23072000
Find location: Square DD-4 (unknown layer)
Wood species: *Fraxinus excelsior*/Ash
Complete peg with a square head and a deep notch with one straight and one sloping side. The curved body is convex on the front side and concave on the back. A small piece of the tip is missing.
L. 11 cm x W. 4 cm x Th. 2.5 cm; head: L. 3.7 cm x W. 3.5 cm x Th. 2-2.8 cm

Plate XXIII.80 (Tent) Peg Find no. 209.1 WOODAN-id: 23001000
Find location: Square CD-17 (Roman layer)
Wood species: *Quercus* spp./Oak
Complete small peg with an almost rectangular head which has one sloping side. The body is straight and pointed at the end. Signs of wear are not visible.
L. 11 cm x W. 2.5 cm x Th. 2 cm; head: L. 2.8 cm x W. 2 cm x Th. 1.8 cm

Plate XXIII.81 (Tent) Peg Find no. 1946.1 WOODAN-id: 23041000
Find location: Square EC-2 (Dredging layer)
Wood species: *Fraxinus excelsior*/Ash
Almost square head of a peg with a part of the shaft broken at the end. The shaft is rather thin in proportion to the head.
L. >10.5 cm x W. 4.5 cm x Th. 2.8 cm; head: L. 4.3-4.5 cm x W. 3.5 cm x Th. 1-1.5 cm

Plate XXIV.82 (Tent) Peg Find no. 997 WOODAN-id: 23016000
Find location: Square DI-19 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Tip of a peg, almost rectangular in cross-section.
L. >16.6 cm x W. 4.3 cm x Th. 2.4 cm

Plate XXIV.83 (Tent) Peg Find no. 1003 WOODAN-id: 23018000
Find location: Square DI-18 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Tip of a peg, almost rectangular in cross-section.
L. >13.8 cm x W. 3.7 cm x Th. 2.3 cm

Plate XXIV.84 (Tent) Peg Find no. 415.1 WOODAN-id: 23007000
Find location: Square CO-21 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Part of the body of a peg, rectangular in cross-section.
L. >12 cm x W. 3.2 cm x Th. 1.8 cm

Plate XXIV.85 (Tent) Peg Find no. 3097.1 WOODAN-id: 23056000
Find location: Square DL-13 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Part of the tapered end of a peg, rectangular in cross-section.
L. >11 cm x W. 4 cm x Th. 1.8 cm

Plate XXIV.86 (Tent) Peg Find no. 945.1 WOODAN-id: 23015000
Find location: Square DH-27 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Incomplete peg; the head and a piece of the tip are missing. The top is slightly charred.
L. >23 cm x W. 4.2 cm x Th. 1.8 cm

Plate XXIV.87 (Tent) Peg Find no. 3295.3 WOODAN-id: 23066000
Find location: Square DX-9 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Fragment of the pointed end of a peg, rectangular in cross-section.
L. >9 cm x W. 2 cm x Th. 1.5-2 cm

Plate XXIV.88 (Tent) Peg Find no. 3295.2 WOODAN-id: 23067000
Find location: Square DX-9 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Fragment of the pointed end of a peg, rectangular in cross-section.
L. >8.7 cm x W. 2.3 cm x Th. 1.5 cm

Plate XXIV.89 (Tent) Peg Find no. 1008 WOODAN-id: 23019000
Find location: Square DI-27 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Part of the tip of a peg, almost rectangular in cross-section.
L. >7.2 cm x W. 2.4 cm x Th. 1.2 cm

Plate XXV.90 (Tent) Peg Find no. 301a WOODAN-id: 23005000
Find location: Square CI/CJ-9 (Roman layer)
Wood species: *Quercus* spp./Oak
Almost complete, strikingly large peg; the tip of the tapered shaft is missing. The head is an irregularly shaped semi-circle.
L. >56.7 cm x W. 3.5-10 cm x Th. 2.8-3.4 cm; head: L. 13.5 cm x W. 10 cm x Th. 3.6 cm; shaft: L. 44.2 cm x W. 3.4-5.4 cm x Th. 2-2.9 cm

Plate XXV.91 (Tent) Peg Find no. 460.1 WOODAN-id: 23009000
Find location: Square CQ-4 (Roman layer)
Wood species: *Quercus* spp./Oak
Almost complete, strikingly large peg with a piece of the tip missing. The shape of the head is that of a rounded rectangle and the shaft is straight. The object is radially cleaved and has retained its sapwood.
L. >51 cm x W. 5.4-8.5 cm x Th. 3.5-3.6 cm; head: L. 14.2 cm x W. 9.3 cm x Th. 3.4 cm; shaft: L. >37.5 cm x W. 5.4 cm x Th. 3.5 cm

Ship Inventory

Paddles/oars

Plate XXVI.92 Paddle or oar Find no. 3371 WOODAN-id: 23178000
Find location: Square CN-12 (Dredging layer)
Wood species: *Quercus* spp./Oak
Fragment of the blade of a paddle with both ends broken. The thickest part is the rib in the middle. The blade becomes thinner towards the edges. The object is made of radially split stem wood and is rhombus-shaped in cross-section.
L. >76 cm x W. 8-11 cm x Th. 2.4 cm

Tools for ship maintenance

Plate XXVII.93 Tar brush or torch Find no. 3282.1 WOODAN-id: 23177000
Find location: Square unknown (Dredging layer)
Wood species: *Alnus* spp./Alder
An alder stick with a piece of textile drenched in resin or tar wound around the stick. Before the object was conserved, parts of the textile were torn and the binding of the textile around the shaft became visible.
L. 16 cm x Dia. 2 cm (shaft)

Plate XXVIII.94 Angular-shaped object Find no. 3062 WOODAN-id: 23176000
Find location: Square EB-2 (Dredging layer)
Wood species: *Fraxinus excelsior*/Ash
Complete, angular, sawn object. The angle is about 40 degrees on the inside and 45 degrees on the outside. The object has one straight and one rounded outer side and is flat at the top and bottom.
L. 6.2 x W. 6.2 x Th. 4.1 cm

Plate XXVIII.95 Angular-shaped object Find no. 3415 WOODAN-id: 23179000
Find location: Square unknown (layer unknown)
Wood species: *Fagus sylvatica*/Beech
Complete, angular, sawn object. This is either a construction element or a waste piece. The inside angle is 40 degrees. On the outside, the object has a straight side and a rounded side which together form an almost right angle. The object is superficially charred on the inside. It became dried out and compressed during prolonged storage prior to conservation.
L. 6.5 cm and W. 6 cm x Th. 1.5 cm

Plate XXVIII.96 Angular-shaped object Find no. 3423 WOODAN-id: 23180000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Complete, angular, sawn object with an inside angle of 40 degrees. On the outside, the straight side and the curved side are at right angles to each other but bend outwards at an angle of 40 degrees. It is not clear what the function of this object was.
L. 6.5 cm and W. 6.5 cm x Th. 3 cm

Rigging tools

Plate XXIX.97 Sheave of a pulley Find no. 4196 WOODAN-id: 22542000
Find location: unknown
Wood species: *Fagus sylvatica*/Beech
Fragment of a turned sheave or wheel with a perforation in the middle and an edged groove. Two decorative lines are incised around the hole in the middle.
Dia. 6.8 cm x Th. 3 cm; hole: Dia. 3.5 cm; groove: W. 2.2 cm

Plate XXIX.98 Sheave of a pulley Find no. 3360 WOODAN-id: 23194000
Find location: Square DS-2 (Dredging layer)
Wood species: *Ulmus* spp./Elm
Half of a turned sheave or wheel with a hole in the middle and an edged groove. It is deformed due to shrinkage before conservation.
Dia. 7.5 cm x Th. 3.4 cm (*4 cm); hole: Dia. 3.5 cm; groove: W. 3 cm

Plate XXIX.99 Sheave of a pulley Find no. 517 WOODAN-id: 23183000
Find location: Square CU-12 (Roman layer)
Wood species: not identified
Half of a turned sheave or wheel with a hole in the middle and a groove with raised edges on the outside.
Dia. 7 cm x Th. 2.9 cm; hole: Dia. 2.6 cm; groove: W. 2.5 cm

Plate XXIX.100 Sheave of a pulley Find no. 184 WOODAN-id: 23181000
Find location: Square CD-18 (Roman layer)
Wood species: not identified
Complete sheave or wheel with slightly damaged edges. There is a hole in the middle with traces of wear. On the outside, there is a groove with raised edges.
Dia. 3.7 cm x Th. 3 cm; hole: 0.6 cm; groove: W. 1.1 cm

Plate XXIX.101 Toggle Find no. 3076 WOODAN-id: 23189000
Find location: Square E-? (unknown layer)
Wood species: *Pinus* spp./Pine
Almost symmetrically carved toggle with a narrow middle part (the neck) and slightly trimmed at both ends. There are traces of use on the narrow part.
L. 21.5 cm x Dia. 3 cm (neck) and 4 cm (ends)

Plate XXIX.102 Toggle Find no. 451 WOODAN-id: 23182000
Find location: Square CQ-20 (Roman layer)
Wood species: *Acer campestre*/Field maple
Lathe-turned and carefully finished toggle with concave arms which rise and widen towards the neck. The toggle has knob-like ends.
L. 7.8 cm x Dia. 2.2 cm (neck) and 3.7 cm (ends)

Plate XXIX.103 Spill toggle Find no. 2528 WOODAN-id: 23267000
Find location: AWN excavation 1978, trench 9-1 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Small, spoon-like toggle with a thin, cylindrical shaft and a pierced ovoid bowl. The shaft is broken.
L. 7 cm x W. 1.6 cm x Th. 0.4 cm; handle: L. 3.3 cm x W. 0.4 cm x Th. 0.3-0.4 cm; blade: L. 3.7 cm x W. 1.6 cm x Th. 0.2 cm; hole: Dia. 0.5 cm

Plate XXX.104 Bobbin-style toggle Find no. 3035 WOODAN-id: 23188000
Find location: AWN excavation 1977, well 1977-2
Wood species: *Fraxinus excelsior*/Ash
Three quarters of a turned bobbin with two half-spheres almost symmetrically placed on either side of a shaft. Three thin circular incised lines along the edge decorated each half-sphere. The shaft shows signs of wear. The missing part of the bobbin has been burnt; this is indicated by traces of charring on the wood.
L. 9 cm x Dia. 8 cm x Th. 2 cm (both half-spheres); shaft: L. 3.1 cm x Dia. 2.8 cm

Plate XXX.105 Bobbin-style toggle Find no. 1448 WOODAN-id: 23185000
Find location: Square DS-16 (Roman layer)
Wood species: *Buxus* spp./Boxwood
Turned bobbin with two half-spheres which are placed on either side of a shaft. An ornamental line is incised around the edge of one of the half-spheres. It is striking that the object is asymmetrically worn. This is clearly visible on the ornamental line which has partly disappeared due to wear. There was possibly another decorative line on the other half-sphere but, due to wear, this one is no longer visible.
L. 4 cm x Dia. 6.7 cm x Th. 1.3 cm (one half-sphere) and Dia. 6.5 cm x Th. 1.5 cm (the other half-sphere); shaft: Ht. 1.2 cm x Dia. 2.4 cm

Plate XXX.106 Wheel of a pulley Find no. 3311 WOODAN-id: 23193000
Find location: Square CV-9 (Roman layer)
Wood species: *Fagus sylvatica*/Beech
Almost half of a pulley which is narrowed in the middle. The pulley is perforated and has no tenons at the tops of the ends. There are traces of use in the middle part.
L. 3.8 cm x Dia. 6 cm; hole: Dia. 2.5 cm

Plate XXX.107 Wheel of a pulley Find no. 4002f WOODAN-id: 22984000
Find location: Square DS-16 (unknown layer)
Wood species: *Quercus* spp./Oak
Approximately one quarter of a small waisted pulley with protruding tenons for housing on both sides.
L. 6.5 cm x W. >5.2 cm x Th. >2.6 cm (Dia. *6.5 cm); tenons: L. 1.2 cm x Dia. 1.1-1.9 cm and L. 1.4 cm x Dia. 1.2-1.8 cm

Plate XXX.108 Wheel of a pulley Find no. 3300 WOODAN-id: 23191000
Find location: Square CF-7, posthole (Dredging layer)
Wood species: *Fraxinus excelsior*/Ash
Waisted pulley with a tenon on each end so that the pulley could be placed in a housing. It is damaged on one side and in cross-section deformed to an oval.
L. 4.5 cm x Dia. 2.7 cm (middle) and 3.6 cm (outer sides); tenons: L. 0.6 cm x Dia. 1.9 cm and L. 0.8 cm x Dia. 1.8 cm

Plate XXX.109 Wheel of a pulley Find no. 1138 WOODAN-id: 23184000
Find location: Square DL-27 (Roman layer)
Wood species: not identified
One third of a cylindrical wheel with a hole in the middle and traces of wear between 1.8-2.8 cm from one edge.
L. 5.2 cm x Dia. 4.9 cm; hole: Dia. 2 cm

Plate XXX.110 Small sheave of a pulley Find no. 3137 WOODAN-id: 23190000
Find location: Square unknown (layer unknown)
Wood species: *Prunus padus*/Bird cherry
Small turned and carefully finished sheave with a perforation in the middle and a groove on the edge. The object is damaged but complete. Both sides are convex and a decorative circle is incised around the hole.
L. 0.8 cm x Dia. 2.5 cm; hole: Dia. 0.4 cm

Writing tablets

Plate XXXI.111 Writing tablet Find no. 3050 WOODAN-id: 23236000
Find location: Square DJ-13 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of the upper end of a writing tablet with one recessed and one plain face, with both sides preserved. There is a V-shaped notch between two hinge-holes. The notch continues 24 mm further along the plain face. Both rims on the side edges show extended marking lines from the production process. The annual rings are slightly angled in cross-section. On the inner face, unclear text lines are visible.
Ht. >4.1 cm x W. 13 cm x Th. 0.5 cm (face) and Th. 0.7 cm (rim)

Plate XXXI.112 Writing tablet Find no. 3424 WOODAN-id: 23250000
Find location: Square DH-9 (Dredging layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of the upper end of a writing tablet with one recessed and one plain face and with a shallow notch between two hinge-holes. The annual rings are angled in cross-section.
Ht. >2.7 cm x W. 14.2 cm x Th. 0.5 cm (face) and Th. 0.6 cm (rim); notch: W. 0.5 cm and D. 0.1 cm

Plate XXXI.113 Writing tablet Find no. 3427 WOODAN-id: 23251000
Find location: Square CR-24 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Complete writing tablet with one recessed and one plain face and with two hinge-holes at the top. On the inner face, eight lines of an inscription are present. The object has not been conserved and, due to shrinkage, the board is highly deformed. The writing is no longer readable with the naked eye. The photos in the catalogue show the writing tablet just after excavation and in its current unconserved state.
Ht. >8.5 cm x W. >12.8 cm x Th. 0.4 cm (face) and Th. 0.5 cm (rim)

Plate XXXII.114 Writing tablet Find no. 514 WOODAN-id: 23197000
Find location: Square CT-23 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Incomplete, but preserving one end with two hinge-holes. A piece of the rim has broken between the hinge-holes. This find has not been conserved, has dried naturally, and is therefore deformed.
Ht. >5.8 cm x W. 13.6 cm x Th. 0.4 cm (face) and Th. 0.7 cm (rim)

Plate XXXII.115 Writing tablet Find no. 3370 WOODAN-id: 23248000
Find location: Square BC-6 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Writing tablet complete in width but with damaged upper and lower ends. The board has one plain and one recessed face. One hinge-hole at the upper end remains and the other is broken off. Between the hinge-holes is a notch, rounded on the recessed face and V-shaped on the plain face. This board has possibly been reused after the lower part was broken; there is a notch in the middle of the rimless bottom end. This would also explain the different shapes of the sides of the upper notch, which was probably reworked.
Ht. >6.9 cm x W. 13 cm x Th. 0.5 cm (face) and Th. 0.6 cm (rim)

Plate XXXII.116 Writing tablet Find no. 3123 WOODAN-id: 23242000
Find location: Square CY-23 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of a writing tablet, preserving one end with two hinge-holes and part of both sides. One face is recessed and the other is plain.
Ht. >2.4 cm x W.13.1 cm x Th. 0.4 cm (face) and Th. 0.6 cm (rim)

Plate XXXIII.117 Writing tablet Find no. 3139 WOODAN-id: 23243000
Find location: Square unknown (layer unknown)
Wood species: *Abies alba*/Silver fir
Type: S1
Fragment of a writing tablet with an intact top edge and complete width. The board has two recessed faces and two hinge-holes with a saw cut between them. The corners of the board are slightly chamfered. Writing is still visible on both faces.
Ht. >7.9 cm x W. 12.7 cm x Th. 0.8 cm (rim)

Plate XXXIII.118 Writing tablet Find no. 3358 WOODAN-id: 23247000
Find location: Square DT-5 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: S1
Incomplete board with both faces recessed. On one face there are two square hinge-holes on either sides of the seal-groove in the middle. A shallow notch is present in the middle of the seal-groove.
Ht. >3.9 cm x W. 13 cm x Th. 0.7 cm (face) and Th. 0.9 cm (rim); seal-groove: W. 2.9 cm x Th. 0.3 cm

Plate XXXIII.119 Writing tablet Find no. 1574.1 WOODAN-id: 23222000
Find location: Square DU-23 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: S1
Fragment of a board with one recessed face with a seal-groove and one plain face. A V-shaped notch between two hinge-holes runs, starting from the edge, 10 mm into the seal-groove. The growth rings are at right angles in cross-section. The writing tablet has not been conserved and has dried out and shrunk over time.
Ht. >3 cm x W. 13.6 cm x Th. 0.8 cm (face) and Th. 1 cm (rim); seal-groove: W. 2.9 cm x Th. 0.6 cm

Plate XXXIV.120 Writing tablet Find no. 3012 WOODAN-id: 23233000
Find location: Square DS-18 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: S1
Fragment of the upper side of a writing tablet with two hinge-holes and a V-shaped notch between the holes. Both faces are recessed and one has a seal-groove.
Ht. >3.9 cm x W. 13 cm x Th. 0.4 cm (face) and Th. 1 cm (rim); seal-groove: W. 2.8 cm x Th. 0.3 cm

Plate XXXIV.121 Writing tablet Find no. 621 WOODAN-id: 23200000
Find location: Square CY-11 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: S1
Incomplete board with both faces recessed, of which one has a seal-groove between two hinge-holes and a V-shaped notch over the complete height of the rim. The notch is not precisely in the middle of the two holes. In the middle of the seal-groove is a long notch that extends to the break in the middle of the board. There are vague traces of a circular incision over an older incised line in the seal-groove. The annual rings are slightly angled in cross-section. On the recessed outer face, traces of writing are present.
Ht. >5.1 cm x W. 13.9 cm x Th. 0.6 cm (face) and 0.8 cm (rim); seal-groove: W. 3.1 cm x Th. 0.4 cm

Plate XXXIV.122 Writing tablet Find no. 1470 WOODAN-id: 23217000
Find location: Square DS-10 (Dredging layer)
Wood species: *Abies alba*/Silver fir
Type: S1
Fragment of a writing tablet with an intact top edge and complete width. Both faces are recessed; one has a seal-groove. The board is broken in the middle part towards one corner of the upper end. There is a round hinge-hole at each side next to the seal-groove. Traces of text are visible on both faces.
Ht. >3.3 cm x W. 13.7 cm x Th. 0.4 cm (face) and Th. 0.9 cm (rim); seal-groove: W. 2.4 cm x Th. 0.3 cm

Plate XXXIV.123 Writing tablet Find no. 914 WOODAN-id: 23205000
Find location: Square DG-4 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: S2
Fragment of the corner of a writing tablet with both faces recessed. Part of the rim of the seal-groove and one hinge-hole are preserved.
Ht. >1.9 cm x W. >6.7 cm x Th. 0.7 cm (face) and Th. 0.9 cm (rim); seal-groove: W. >1 cm x Th. 0.5 cm

Plate XXXIV.124 Writing tablet Find no. 856 WOODAN-id: 23204000
Find location: Square DE-4 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: S1
Fragment of a corner of a writing tablet with both faces recessed and with part of a seal-groove on one face. One of the two hinge-holes is preserved. The seal-groove extends upwards to 5 mm from the rim.
Ht. >3.8 cm x W. >8.5 cm x Th. 0.5 cm (face) and Th. 0.8 cm (rim); seal-groove: W. >2.2 cm x Th. 0.4 cm

Plate XXXIV.125 Writing tablet Find no. 2102.1 WOODAN-id: 23231000
Find location: Square EG-6 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: S1
Corner fragment of a writing tablet with both faces recessed. One hinge-hole remains, as does part of the seal-groove on the inner face. The corner is worked slightly diagonally.
Ht. >6 cm x W. >7.5 cm x Th. 0.4 cm (face) and Th. 0.8 cm (rim); seal-groove: W. >0.5 cm x Th. 0.3 cm

Plate XXXV.126 Writing tablet Find no. 3312 WOODAN-id: 23245000
Find location: Square unknown (layer unknown)
Wood species: *Abies alba*/Silver fir
Type: S1
Almost complete writing tablet with both faces recessed. The board is broken off diagonally and retains one preserved chamfered corner. On the inner face there is a seal-groove.
Ht. >6.2 cm x W. 12.9 cm x Th. 0.5 cm (face) and Th. 1 cm (rim); seal-groove: W. 2.6 cm x Th. 0.5 cm

Plate XXXV.127 Writing tablet Find no. 1901.1 WOODAN-id: 23228000
Find location: Square EB-5 (Dredging layer)
Wood species: *Abies alba*/Silver fir
Type: S1
Fragment of a middle part and the upper edge of a writing tablet. Both faces are recessed and there is a seal-groove on one face. The board has not been conserved and has become deformed due to shrinkage. Before deformation, there were traces of text on both faces; these are no longer recognisable.
Ht. >3.8 cm x W. 13.6 cm x Th. 0.4 cm (face) and Th. 0.7 cm (rim); seal-groove: W. 2.7 cm x Th. 0.3 cm

Plate XXXV.128 Writing tablet Find no. 3073 WOODAN-id: 23238000
Find location: AWN excavation 1964, Velsen 2 (trench E/square B-16c)
Wood species: *Abies alba*/Silver fir
Type: S1
Almost complete writing tablet with both faces recessed and with a seal-groove on one face. The rim with hinge-holes at one end is missing, as is a part of one of the sides. The seal-groove extends halfway up to the rim. Little square holes in the wood indicate damage by plant roots due to post-depositional processes.
Ht. >5.9 cm x W. >11.4 cm x Th. 0.3 cm (face) and Th. 0.8 cm (rim); seal-groove: W. 2.3 cm x Th. 0.3 cm

Plate XXXVI.129 Writing tablet Find no. 3100 WOODAN-id: 23241000
Find location: Square unknown (layer unknown)
Wood species: *Abies alba*/Silver fir
Type: S1
Middle part of a writing tablet with both faces recessed and with a seal-groove on one of the faces. No ends are preserved. The object has not been conserved and is therefore dried out and deformed. The middle of the seal-groove shows a crack, probably not a notch but naturally caused damage due to shrinkage. No drawing of the object was made before it dried out. The drawing on plate XXXVI, therefore, shows the current state of the writing tablet.
Ht. >4.5 cm x W. 13.8 cm x Th. 0.5 cm (face); seal-groove: W. 3.7 cm x Th. 0.3 cm

Plate XXXVI.130 Writing tablet Find no. 1301.2 WOODAN-id: 23213000
Find location: Square DO-24 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: S1
Middle part of a writing tablet with complete width and both faces recessed, and with a seal-groove on the inner face. On the outer face, damage in the form of a slit is present.
Ht. >2 cm x W. 13 cm x Th. 0.5 cm (face) and Th. 0.8 cm (rim); seal-groove: W. 2.7 cm x Th. 0.4 cm

Plate XXXVI.131 Writing tablet Find no. 1519.1 WOODAN-id: 23220000
Find location: Square DT-4 (Dredging layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Part of a writing tablet with one recessed and one plain face. The board was probably broken and then reused as it has no raised rim but it does have a notch for a string at one end.
Ht. >3.9 cm x W. 13.1 cm x Th. 0.6 cm (face) and Th. 1 cm (rim)

Plate XXXVI.132 Writing tablet Find no. 3277 WOODAN-id: 23244000
Find location: AWN excavation, trench 9-2 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of a writing tablet with a small part of the rim. One face is recessed and the other plain.
Ht. >5.9 cm x W. >10 cm x Th. 0.2 cm (face) and Th. 0.5 cm (rim)

Plate XXXVII.133 Writing tablet Find no. 1229.1 WOODAN-id: 23212000
Find location: Square DN-13 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: S2
Middle part of a board with both sides preserved. Both faces are recessed and there is a seal-groove on the inner face. This is one of the two tablets found in Velsen I of type S2, with a raised ridge on both sides of the seal-groove. The annual rings are slightly curved in cross-section. The board has not been conserved and only a drawing of the inner face exists.
Ht. >3.7 cm x W. 12 cm x Th. 0.3 cm (face) and Th. 0.5 cm (rim); seal-groove: W. 1.8 cm x Th. 0.3 cm; ridges: W. 1 cm x Th. 0.8 cm

Plate XXXVII.134 Writing tablet Find no. 1026 WOODAN-id: 23208000
Find location: Square DI-14 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: S1
Fragment of a writing tablet with one side preserved. Both faces are recessed and there is a seal-groove on the inner face. The annual growth rings are at right angles in cross-section.
Ht. >5.7 cm x W. >11.9 cm x Th. 0.4 cm (face) and Th. 0.6 cm (rim)

Plate XXXVII.135 Writing tablet Find no. 1577.2 WOODAN-id: 23224000
Find location: Square DU-12 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of the middle part of a writing tablet with one recessed and one plain face. A straight line has been scratched at a right angle across the recessed face of the board. This may have been a mark to indicate one side of a seal-groove, but, ultimately, no deepening of the surface was undertaken.
Ht. >1.3 cm x W. 14.4 cm x Th. 0.4 cm (face) and Th. 0.7 cm (rim)

Plate XXXVII.136 Writing tablet Find no. 4005a WOODAN-id: 22072000
Find location: Square CW-11 (Dredging layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of the middle part of a writing tablet with one side preserved. The annual growth rings are almost at right angles in cross-section. One face is recessed, the other plain. On the recessed face there are traces of writing.
Ht. >4.1 cm x W. >11.9 cm x Th. 0.5-0.8 cm (face) and Th. 1 cm (rim)

Plate XXXVII.137 Writing tablet Find no. 1337.1 WOODAN-id: 23214000
Find location: Square DP-22 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of the middle part of a writing tablet with both sides preserved. The board has one recessed and one plain face. The annual growth rings are slightly curved in cross-section.
Ht. >2.3 cm x W. 13.2 cm x Th. 0.5 cm (face) and Th. 0.9 cm (rim)

Plate XXXVII.138 Writing tablet Find no. 1642 WOODAN-id: 23227000
Find location: Square DV-7 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of the middle part of a writing tablet with both sides preserved. The annual growth rings are slightly curved in cross-section. One face is plain and the other recessed.
Ht. >2.2 cm x W. 14.1 cm x Th. 0.6 cm (face) and Th. 0.7 cm (rim)

Plate XXXVII.139 Writing tablet Find no. 40180 WOODAN-id: 22269000
Find location: Square DO-20 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Incomplete; the middle part of a writing tablet with both sides preserved. The inner face is recessed, while the outer face is plain.
Ht. >3.8 cm x W. 13.9 cm x Th. 0.3 cm (face) and Th. 0.4 cm (rim)

Plate XXXVII.140 Writing tablet Find no. 848 WOODAN-id: 23203000
Find location: Square DE-17 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Narrow fragment of the middle part of a writing tablet with both sides preserved. One face of the board is plain and the other is recessed.
Ht. >0.8 cm x W. 13.1 cm x Th. 0.6 cm (face) and Th. 0.8 cm (rim)

Plate XXXVII.141 Writing tablet Find no. 1576.1 WOODAN-id: 23223000
Find location: Square DU-23 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of a board with one plain and one recessed face. The writing tablet has one intact end, with a V-shaped notch on the rim, and with both sides preserved. On the recessed inner face faint traces of text are present. The growth rings are at right angles in cross-section. The board was not conserved and has therefore dried out and become deformed.
Ht. >2.5 cm x W. 13.5 cm x Th. 0.5 cm (face) and Th. 0.6 cm (rim)

Plate XXXVII.142 Writing tablet Find no. 3349 WOODAN-id: 23246000
Find location: Square DO-14 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of a board with one plain and one recessed face, preserving one end and part of both sides. There are traces of text on the recessed face. The growth rings are slightly curved in cross-section.
Ht. 3.5 cm x W. 13.1 cm x Th. 0.6 cm (face) and Th. 0.8 cm (rim)

Plate XXXVII.143 Writing tablet Find no. 314 WOODAN-id: 23196000
Find location: Square CK-2 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of a writing tablet with one plain and one recessed face, preserving one end and both sides. The growth rings are at right-angles in cross-section.
Ht. >3.5 cm x W. 14 cm x Th. 0.3 cm (face) and Th. 0.5 cm (rim)

Plate XXXVII.144 Writing tablet Find no. 2501 WOODAN-id: 23232000
Find location: Well 1989-S160 (layer unknown)
Wood species: *Abies alba*/Silver fir
Type: A1
Incomplete, but preserving one end and part of both sides. The inner face is recessed and the outer face is plain. The annual rings are slightly angled in cross-section. The board has not been conserved and is, therefore, dried out and highly deformed.
Ht. 3.6 cm x W. 13.5 cm x Th. 0.5-0.7 cm (face) and Th. 0.8 cm (rim)

Plate XXXVIII.145 Writing tablet Find no. 542.1 WOODAN-id: 23198000
Find location: Square CV-9 (layer unknown)
Wood species: *Abies alba*/Silver fir
Type: S1
Middle part of a writing tablet with both sides preserved but lacking both ends. Both faces are recessed and one has a seal-groove. The growth rings are slightly angled in cross-section. The board has not been conserved and, due to shrinkage, it is highly deformed.
Ht. >6.4 cm x W. 14 cm x Th. 0.3 cm (face) and Th. 0.9-1 cm (rim); seal-groove: W. 2.4 cm x Th. 0.3 cm

Plate XXXVIII.146 Writing tablet Find no. 591 WOODAN-id: 23199000
Find location: Dumping ground next to trench, probably from Square CX-21 (layer unknown)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of a writing tablet, preserving the bottom end and both sides. The board with one recessed and one plain face is slightly charred in some places (these are the darker parts on the drawing).
Ht. 3.6 cm x W. 13.3 cm x Th. 0.7 cm (face) and Th. 0.8-0.9 cm (rim)

Plate XXXVIII.147 Writing tablet Find no. 3072 WOODAN-id: 23237000
Find location: Square CM-8 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of the middle part of a writing tablet with both sides preserved. One face is recessed and the other is plain. The board has not been conserved, but has dried naturally and is, therefore, deformed. The crack at the lower end is the result of shrinkage.
Ht. >3.9 cm x W. >12.8 cm x Th. 0.3 cm (face) and Th. 0.5 cm (rim)

Plate XXXVIII.148 Writing tablet Find no. 3420 WOODAN-id: 23249000
Find location: AWN excavation 1979, trench 9 (layer unknown)
Wood species: *Abies alba*/Silver fir
Type: A1
Incomplete; the lower edge of a writing tablet with both sides preserved. On the recessed inner face there are vague traces of text present. The plain outer face is slightly charred. The growth rings are curved.
Ht. >4.2 cm x W. 12.7 cm x Th. 0.5 cm (face) and Th. 0.8 cm (rim)

Plate XXXIX.149 Writing tablet Find no. 3086 WOODAN-id: 23240000
Find location: Square DS-8 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: S1
Writing tablet with both faces recessed and with a seal-groove on one side. The upper end is missing. At one end, a V-shaped notch is present on the rim of the seal-groove. In cross-section, the annual growth rings are slightly angled. The object is dried out and deformed due to shrinkage.
Ht. >5.5 cm x W. 14 cm x Th. 0.5 cm (face) and Th. 0.9 cm (rim); seal-groove: W. 2.9 cm x Th. 0.4 cm

Plate XXXIX.150 Writing tablet Find no. 1987.2 WOODAN-id: 23229000
Find location: Square EC-5 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: S1
Corner fragment of a writing tablet with both faces recessed. One hinge-hole is preserved. One of the faces is charred, and on the other face, traces of text are present.
Ht. >4.2 cm x W. >4.2 cm x Th. 0.5 cm (face) and Th. 0.9 cm (rim)

Plate XXXIX.151 Writing tablet Find no. 3079.1 WOODAN-id: 23239000
Find location: Square DC-14 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of a corner of the upper end of a writing tablet with one recessed and one plain face and with one hinge-hole preserved. The annual rings are at right angles in cross-section.
Ht. >5 cm x W. >7.2 cm x Th. 0.2 cm (face) and Th. 0.5 cm (rim)

Plate XXXIX.152 Writing tablet Find no. 3025 WOODAN-id: 23234000
Find location: From a ditch near Square DK-12/DL-13 (layer unknown)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of the corner of a writing tablet with one plain and one recessed face and with one hinge-hole.
Ht. >2.9 cm x W. >9.9 cm x Th. 0.4 cm (face) and Th. 0.7 cm (rim)

Plate XXXIX.153 Writing tablet Find no. 986.1 WOODAN-id: 23206000
Find location: Square DH-26 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Corner fragment of a writing tablet with one recessed and one plain face. The annual growth rings are at right angles in cross-section.
Ht. >3 cm x W. >10 cm x Th. 0.5 cm (face) and Th. 0.6 cm (rim)

Plate XL.154 Writing tablet Find no. 4636 WOODAN-id: 23460000
Find location: AWN excavation 1979, trench 9 (layer unknown)
Wood species: not identified
Type: A1
Fragment of a writing tablet with one plain and one recessed face and preserving part of one edge.
Ht. >2.1 cm x W. >10.2 cm x Th. 0.4 cm (face) and Th. 0.5 cm (rim)

Plate XL.155 Writing tablet Find no. 1551 WOODAN-id: 23221000
Find location: Square DU-07 (Dredging layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of the lower end of a writing tablet with one recessed face and one plain face.
Ht. >2.4 cm x W. >9.3 cm x Th. 0.5 cm (face) and Th. 0.7 cm (rim)

Plate XL.156 Writing tablet Find no. 1378 WOODAN-id: 22268000
Find location: Square DQ-12 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Small fragment of the rim of a writing tablet with one recessed and one plain face.
Ht. >2.5 cm x W. >2.3 cm x Th. 0.5 cm (face) and Th. 0.6 cm (rim)

Plate XL.157 Writing tablet Find no. 4538 WOODAN-id: 22885000
Find location: Square unknown (layer unknown)
Wood species: *Abies alba*/Silver fir
Type: unknown
Thin fragment of the writing surface of a writing tablet with one or, possibly, two recessed faces. Traces of writing are visible on one face.
Ht. >2.3 cm x W. >5.4 cm x Th. 0.3 cm (face)

Plate XL.158 Writing tablet Find no. 1344 WOODAN-id: 23215000
Find location: Square DP-09 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: S1 (?)
Small fragment of the rim of a writing tablet with both faces recessed. This fragment was probably part of a writing tablet of type S1. The growth rings are at right angles in cross-section.
Ht. >2.1 cm x W. >5.6 cm x Th. 0.4 cm (face) and Th. 0.6 cm (rim)

Plate XL.159 Writing tablet Find no. 1183 WOODAN-id: 23210000
Find location: Square DM-14 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: S1 (?)
Small corner piece of a writing tablet with both faces recessed.
Ht. >2.7 cm x W. 4.9 cm x Th. 0.5 cm (face) and Th. 0.7 cm (rim)

Plate XL.160 Writing tablet Find no. 987 WOODAN-id: 23207000
Find location: Square DH-6 (layer unknown)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of the middle part of a writing tablet with one recessed and one plain face. The recessed face is damaged; the wood is partly torn.
Ht. >3.5 cm x W. >10.9 cm x Th. 0.6 cm (face) and Th. 1.1 cm (rim)

Plate XL.161 Writing tablet Find no. 943 WOODAN-id: 23461000
Find location: Square DH-11 (Roman layer)
Wood species: not identified
Type: S1
Fragment of a writing tablet preserving one side and part of a seal-groove.
Ht. >2.5 cm x W. 8.5 cm x Th. 0.6 cm (face) and Th. 0.8 cm (rim); seal-groove: W. 3 cm x Th. 0.3 cm

Plate XL.162 Writing tablet Find no. 1484.1 WOODAN-id: 23218000
Find location: Square DT-2 (Dredging layer)
Wood species: not identified
Type: A1
Fragment of a writing tablet with part of one side.
Ht. >6 cm x W. 1.3 cm x Th. 0.6 cm (face) and Th. 0.8 cm (rim)

Plate XL.163 Writing tablet Find no. 1988 WOODAN-id: 23230000
Find location: Square unknown (layer unknown)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of the rim of a writing tablet with one recessed and one plain face.
Ht. >1.3 cm x W. >8.9 cm x Th. 0.4 cm (face) and 0.7 cm (rim)

Plate XL.164 Writing tablet Find no. 1380 WOODAN-id: 23216000
Find location: Square DQ-13 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: S1
Fragment of a writing tablet preserving one side and part of a seal-groove.
Ht. >2.5 cm x W. 9.2 cm x Th. 0.7 cm (face) and Th. 0.9 cm (rim); seal-groove: W. 2.5 cm x Th. 0.3 cm

Plate XL.165 Writing tablet Find no. 797 WOODAN-id: 23202000
Find location: Square DD-13 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: S1
Fragment of the middle part of a writing tablet which is broken on the seal-groove.
Ht. >3.2 cm x W. 7.8 cm x Th. 0.5 cm (face) and Th. 0.8 cm (rim); seal-groove: W. >2 cm x Th. 0.3 cm

Plate XL.166 Writing tablet Find no. 1588.1 WOODAN-id: 23225000
Find location: Square DV-05 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: S1 (?)
Corner of a writing tablet with both faces recessed. The annual growth rings are at right angles in cross-section.
Ht. >2.4 cm x W. >7.6 cm x Th. 0.2 cm (face) and Th. 0.7 cm (rim)

Plate XL.167 Writing tablet Find no. 787 WOODAN-id: 23201000
Find location: Square DD-03 (Dredging layer)
Wood species: *Abies alba*/Silver fir
Type: S1 (?)
Fragment of a writing tablet. Both faces are recessed. The growth rings are at right angles in cross-section.
Ht. >2.9 cm x W. >5.4 cm x Th. 0.4 cm (face) and Th. 0.5 cm (rim)

Plate XL.168 Writing tablet Find no. 1379 WOODAN-id: 22270000
Find location: Square DQ-12 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: S1
Small fragment of a writing tablet with both faces recessed.
Ht. >2.3 cm x W. 5.1 cm x Th. 0.6 cm (face) and Th. 0.8 cm (rim)

Plate XL.169 Writing tablet Find no. 1051.2 WOODAN-id: 23209000
Find location: Square DJ-13 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Corner fragment of a writing tablet with one recessed and one plain face. There is an extended marking line in the rim. The growth rings are at right angles in cross-section.
Ht. >2.5 cm x W. >4.2 cm x Th. 0.3 cm (face) and Th. 0.5 cm (rim)

Plate XL.170 Writing tablet Find no. 1184 WOODAN-id: 23211000
Find location: Square DM-9 (Roman layer)
Wood species: *Abies alba*/Silver fir
Type: A1
Fragment of the corner of a writing tablet.
Ht. >3.6 cm x W. >2.4 cm x Th. 0.4 cm (face) and Th. 0.5 cm (rim)

Styli

Plate XLI.171 *Stylus* Find no. 1654 WOODAN-id: 22991000
Find location: Square DV-19 (Dredging layer)
Wood species: *Acer* spp./Maple
Turned *stylus* with a tapered handle and a pointed end for writing. Before conservation, an incised X was visible in the middle of the handle of the *stylus*. After conservation, the X is no longer visible. The pointed end with a broken tip is slightly crooked.
L. >20 cm (*22 cm) x Dia. 0.1-0.7 cm; handle: L. 13.6 cm

Plate XLI.172 *Stylus* Find no. 4285 WOODAN-id: 22631000
Find location: Square BZ-19 (Roman layer)
Wood species: *Acer* spp./Maple
Turned *stylus* with a tapered handle and a pointed end for writing.
L. >20.5 cm (*21.5 cm) x Dia. 0.1-0.8 cm; handle: L. 15.7 cm

Plate XLI.173 *Stylus* Find no. 3063 WOODAN-id: 22994000
Find location: Square unknown (layer unknown)
Wood species: *Sambucus* spp./Elder
Incomplete; the upper end of the tapered handle of a *stylus*. The *stylus* is broken below the ledge of the handle, at the beginning of the writing point.
L. >17.5 cm x Dia. 0.4-0.7 cm (writing point) and Dia. 1 cm (handle)

Plate XLI.174 *Stylus* Find no. 513.1 WOODAN-id: 22989000
Find location: Square CT-23 (Roman layer)
Wood species: cf. *Acer* spp./Maple
Turned *stylus* with a handle that is tapered from the top to the beginning of the pointed end and is carefully carved and smoothly finished. Just above the thickest part of the handle, an X with an oblique line next to it is engraved. The tip was sharpened by the removal of material, leaving irregular facets.
L. >16.8 cm (*17.3 cm) x Dia. 0.2-0.9 cm; handle: L. 11.3 cm

Plate XLI.175 *Stylus* Find no. 2143.1 WOODAN-id: 22992000
Find location: Square EI-7 (Roman layer)
Wood species: *Sambucus* spp./Elder
Turned *stylus* with, from the upper end to the middle, a slightly tapered handle terminating in the thickest part at a ledge between the handle and writing point. Here, the handle of the *stylus* continues below the shoulders to a thin and pointed end. The tip of the writing point is broken.
L. >13.7 cm (*14.2 cm) x Dia. 0.3-1.1 cm; handle: L. 7.1 cm

Plate XLI. 176 *Stylus* Find no. 1577.1 WOODAN-id: 22990000
Find location: Square DU-12 (Roman layer)
Wood species: *Sambucus* spp./Elder
Turned *stylus* with a slightly tapered handle and a ledge between the handle and the writing point. The surface is smoothly finished. The lower 4 cm of the writing point are sharpened with a knife and show three narrow cutting surfaces.
L. 13.8 cm x Dia. 0.2-1 cm; handle: L. 6.8 cm

Plate XLI.177 *Stylus* Find no. 22.1 WOODAN-id: 22986000
Find location: Square AW-11 (Roman layer)
Wood species: *Sambucus* spp./Elder
Turned *stylus*, tapered from the top to the point. The writing point is slightly crooked.
L. 12.2 cm x Dia. 0.8 cm

Plate XLI.178 *Stylus* Find no. 3039 WOODAN-id: 22993000
Find location: Trench 9-2 (Roman layer)
Wood species: *Sambucus* spp./Elder
Handle of a *stylus* which is broken at the writing point. The object is circular in cross-section and tapers towards each end.
L. >7.1 cm x Dia. 0.5 cm (after conservation)

Plate XLI.179 *Stylus* (*Calamus?*) Find no. 76 WOODAN-id: 22987000
Find location: Square BQ-4 (Roman layer)
Wood species: not identified
Presumably, a *stylus*, slightly tapered from the top to the point. A deep split is cut into the narrow end. The object is not preserved and it is not known whether this *stylus* was made of wood or reed. If it was made of reed, it was a pen that was used for writing with ink, a *Calamus*.
L. 13.1 cm x Dia. 0.3-0.8 cm; split: D. 2.2 cm

Other writing implements

Plate XLI.180 *Spatula* Find no. 181.1 WOODAN-id: 22988000
Find location: Square CB-10 (Roman layer)
Wood species: cf. *Sambucus* spp./Elder
Small *spatula* with a rectangular blade and a broken handle. The straight-finished end of the blade evolves from a wider and thicker shoulder part to a slightly thinner part at the edge. On one side of the blade, the end is chamfered. A thin leather ribbon is wrapped around the handle. This object does not appear to be suitable for preparing or serving food. It may have been used to smooth the wax surface of a writing tablet for the purpose of reuse.
L. >6.2 cm; blade: L. 4 cm x W. 3-4.4 cm x Th. 0.7-0.9 cm; handle: L. >2.2 cm x Dia. 0.6-1.5 cm

Plate XLII.181 Inscribed bark Find no. 1388.1 WOODAN-id: 23235000
Find location: Square DQ-13 (Roman layer)
Wood species: cf. *Betula spp.*/cf. Birch
A piece of bark with carved letters between two grooves. It also appears as if some letters are scratched across the grooves. Above the two grooves with letters, a third groove is present. The grooves seem too straight and too deep to be natural. However, it cannot be excluded with certainty that the grooves were formed by the natural splitting of the bark on the long, horizontal lenticels which are characteristic for birch bark.
L. 5 cm x W. 3.5 cm x Th. 0.4-0.8 cm; letters: Ht. 0.5-1 cm x W. 0.15 cm x D. 0.1 cm;
grooves: W. 0.2-0.3 cm x D. 0.2 cm; distance between grooves: 1.8 cm (with letters) and 1.6 cm (above the groove without letters)

Provisioning

Wine barrels (staves)

Plate XLIII.182 Stave with graffiti Find no. 182.2 WOODAN-id: 23313000
Find location: Well 1989-S182
Wood species: *Abies alba*/Silver fir
Part of a stave with one intact end and the other end broken. On the inner side there are graffiti present on two parts: diagonally under the broken end and above the croze groove. The letters have not yet been deciphered. There are also some dotted marks (letters?). A clean croze groove has been sawn between 4.75-5.25 cm below the rim of the chamfered end.
L. >90 cm x W. 13.25-16 cm x Th. 2 cm

Plate XLIII.183 Stave with graffiti Find no. 182.3 WOODAN-id: 23314000
Find location: Well 1989-S182
Wood species: *Abies alba*/Silver fir
Fragment of a stave with a croze groove on the damaged lower end. On the inner side, towards the broken upper end, the letters ABCD are incised. The graffiti originally continued all the way to the upper end.
L. >85.5 cm x W. 11.5-13 cm x Th. 2.1 cm

Plate XLIII.184 Stave with graffiti Find no. 182.6 WOODAN-id: 23316000
Find location: Well 1989-S182
Wood species: *Abies alba*/Silver fir
Fragment of a stave with graffiti on the inner side. The intact lower end is chamfered below the croze groove which is between 4-4.5 cm above the lower edge of the stave. According to Bosman, the letters IXI and part of the end of the alphabet (the letters QR T X) were incised. It is difficult to read because other markings have been scratched over these, namely XII and II (Bosman 1997, 85).
L. >90 cm x W. 12.5-13.5 cm x Th. 2 cm

Plate XLIV.185 Stave with graffiti Find no. 182.10 WOODAN-id: 23317000
Find location: Well 1989-S182
Wood species: *Abies alba*/Silver fir
Fragment of a stave with graffiti scratched on the inner side above the croze groove. The graffiti contains two crosses, partly overlapping each other. One cross is larger than the other. The croze groove is between 4-4.5 cm above the lower edge of the stave.
L. >84 cm x W. 12-13 cm x Th. 2 cm

Plate XLIV.186 Stave with graffiti Find no. 182.11 WOODAN-id: 23318000
Find location: Well 1989-S182
Wood species: *Abies alba*/Silver fir
Fragment of a stave with part of the alphabet and a cross-like mark incised on the inner side, slightly diagonally below the broken upper end. The graffiti is interrupted by the fracture. There is some damage at the base. The croze groove is between 5.5-6 cm above the lower end.
L. >84 cm x W. 11-12.5 cm x Th. 2.2 cm

Plate XLIV.187 Stave with graffiti Find no. 182.12 WOODAN-id: 23319000
Find location: Well 1989-S182
Wood species: *Abies alba*/Silver fir
Fragment of a stave with graffiti in the form of crossed lines scratched on three places on the inner side. The uppermost graffiti is interrupted by the fracture of the stave. At 72.5 cm above the lower end is an oval knothole. Half of a bunghole is visible on the weathered end; the second half is on the adjacent stave (find number 182.13). The letters RV of a brand that was punched across the bunghole are present. The croze groove is between 5-5.5 cm above the lower end.
L. >89 cm x W. 13-14 cm x Th. 2 cm

Plate XLIV.188 Stave with graffiti Find no. 182.13 WOODAN-id: 23320000
Find location: Well 1989-S182
Wood species: *Abies alba*/Silver fir
Fragment of a stave with graffiti on the inner side below the broken upper end and on the edge of the middle part. The croze groove is between 5.5-6 cm above the lower end. On the weathered top, half of a bunghole can be recognised which connects with that of stave 182.12. From the brand that was punched across the bunghole, the letters IVN and, a little further on, NN remain.
L. >90 cm x W. 13-14.5 cm x Th. 2 cm

Plate XLV.189 Stave with graffiti Find no. 182.4 WOODAN-id: 23315000
Find location: Well 1989-S182
Wood species: *Abies alba*/Silver fir
Part of a stave with, in longitudinal direction, incised letters of the alphabet: ABDEFGHIKLMNOPQRST. The alphabet appears to have been repeated, but in a sloppier style and omitting some letters: ABDEGHIKLMNO STV.
L. >99 cm x W. 13-16 cm x Th. 3 cm

Plate. XLVI.190 Stave with stamps Find no. 3213 WOODAN-id: 23468000
Find location: Well 1989-S180
Wood species: *Picea abies/Larix decidua*, Norway spruce/European larch
Fragment of a stave with the letters LACIDI (or PACIDI) punched on the inner side at 26 cm above the croze groove. On the outside, at 60 cm above the croze groove, there is an incised cross.
L. >99 cm (*200 cm) x W. 13-16 cm x Th. 3 cm

Plate XLVII.191 Stave with stamps Find no. 4637 WOODAN-id: 23473000
Find location: Well 1976-1
Wood species: *Picea abies/Larix decidua*, Norway spruce/European larch
Fragment of a stave with a bunghole and a venting hole. On the outside, a stamp was branded over the venting hole, of which the letters LISE [...] MARI can still be recognised. The letters between LISE and MARI were on the original bung that seems to have been removed and replaced with another one. The letters ACESTIS were struck on the inside of this stave and on two other staves of the same barrel.
L. >37 cm (*200 cm) x W. 18-25 cm x Th. 3.3 cm; bunghole: Dia. 6 cm; venting hole: Dia. 1.8 cm

Plate XLVIII.192 Stave with stamps Find no. 4638 WOODAN-id: 23476000
Find location: Well 1977-2 (upper barrel of two from well-lining)
Wood species: *Abies alba*/Silver fir
Complete stave from the upper barrel of well 1977-2. There is a stamp branded upside down across the bunghole which shows the letters T T [...] A or I T [...] A. The bung with the letters in between the stamp is missing. Perpendicular to this stamp, the letters C.C [...] A were branded. Above the bunghole there is a venting hole, and above the venting hole is another, smaller bunghole or venting hole. Across the smaller hole, another brand is present. Here, the letters TTER [...] AVTI were recognised after excavation; the last letters are a ligature. This stamp was interpreted by Vos as TITI TERENTIEE AVITI (Vos 1977, a note in his journal, not published; archive of the Archaeological Working Group Velsen). Bosman reads it as ITER [AVTI], but gives no interpretation of the name (Bosman 1997, 84).
L. approximately 200 cm x W. 24 cm x Th. 3.2 cm; bunghole: Dia. 6.5 cm; venting hole Dia. 1 cm; venting or small bunghole: Dia. 3 cm

Plate XLIX.193 Stave with stamps Find no. 4639 WOODAN-id: 23477000
Find location: Well 1977-2 (lower barrel of two from well-lining)
Wood species: *Abies alba*/Silver fir
Stave from the lower barrel of the well-lining from well 1977-2. Only some black and white photographs and a drawing of the branded stamp around the hole of this stave have survived. The stave itself is not preserved. Across the bunghole, the letters T.T [...] t ? and, around the bunghole, the letters CNAEI [...] A could be recognised. Above the bunghole, the letters NA have been struck.
Original measurements after recovery: L. approximately 200 cm x W. 23 cm x Th. 3 cm; bunghole: Dia. 5.5 cm

Plate L.194 Stave with stamps Find no. 4640 WOODAN-id: 23475000
Find location: Well 1977-2 (lower barrel from well-lining)
Wood species: *Abies alba*/Silver fir
Fragment of a stave of the lower barrel from well 1977-2. On the inside of one of the staves, the letters OICORC were struck.
L. >38 cm (*200 cm) x W. 18 cm x Th. 3.2 cm

Plate LI.195 Stave with stamps Find no. 3160 WOODAN-id: 23312000
Find location: Well 1989-S186
Wood species: *Picea abies/Larix decidua,* Norway spruce/European larch
Fragment of a stave with a chamfered lower end and a croze groove on the inner side. On the inner side, two overlapping circles were punched. Between the rim and the croze groove is a hole, used for a dowel to secure the base of the cask. The croze groove was cut 4.5-5 cm above the rim of the chamfered end and has a rectangular profile. Originally, the length of the stave was approximately 200 cm. For ease of storage, the stave was sawn in parts after salvage. The top of the stave has been damaged since excavation.
L. >73 cm (*200 cm) x W. 10.5-11.5 cm x Th. 2.5 cm

Plate LII.196 Stave with stamps Find no. 3172 WOODAN-id: 23469000
Find location: Well 1989-S186
Wood species: *Abies alba*/Silver fir
Fragment of a stave with the letters P.V.P stamped on the inside at 63.5 cm above the croze groove.
L. >98.5 cm (*200 cm) x W. 12.5-14.5 cm x Th. 2.3 cm

Plate LII.197 Stave with stamps Find no. 3188 WOODAN-id: 23470000
Find location: Well 1989-S186
Wood species: *Picea abies/Larix decidua,* Norway spruce/European larch
Fragment of a stave with the letters P.V.P stamped on the inside at 17.5 cm above the croze groove.
L. >98.5 cm (*200 cm) x W. 13.2-15.8 cm x Th. 2.5 cm

Plate LII.198 Stave with stamps Find no. 3190 WOODAN-id: 23471000
Find location: Well 1989-S186
Wood species: *Picea abies/Larix decidua*, Norway spruce/European larch
Fragment of a stave with the letters VALER struck on the inside at 68 cm above the croze groove.
L. >98.5 cm (*200 cm) x W. 13.2-15.5 cm x Th. 3 cm

Plate LII.199 Stave with stamps Find no. 3191 WOODAN-id: 23472000
Find location: Well 1989-S186
Wood species: *Abies alba*/Silver fir
Fragment of a stave with the letters P.VALE [...] struck on the inside at 32.5 cm above the croze groove. Five circles (diameter 3 cm), struck one under the other on the inner side of the stave, are poorly visible.
L. >98.5 (*200 cm) cm x W. 13.2-15.5 cm x Th. 3 cm

Plate LII.200 Stave with stamps Find no. 3193 WOODAN-id: 23474000
Find location: Well 1989-S186
Wood species: *Abies alba*/Silver fir
Fragment of a stave with the letters VALER struck on the inside at 68 cm above the croze groove.
L. >98.5 cm (*200 cm) x W. 13.2-15.5 cm x Th. 3 cm

Bungs and stoppers

Plate LIII.201 Bung Find no. 3037 WOODAN-id: 23286000
Find location: AWN excavation, trench 9-2 (Roman layer)
Wood species: *Picea abies*/Norway spruce
Almost complete; one side is damaged. The bung has straight sides and flat ends.
Dia. 5.6-6.2 cm x Th. 1.5 cm

Plate LIII.202 Bung Find no. 3021 WOODAN-id: 23285000
Find location: Well 1989-S470
Wood species: *Abies alba*/Silver fir
Three fourths of a flat and slightly tapered bung.
Dia. 5.7-6.2 cm x Th. 1.7 cm (after conservation)

Plate LIII.203 Bung Find no. 3422 WOODAN-id: 23304000
Find location: Square unknown (layer unknown)
Wood species: *Picea abies*/Norway spruce
Flat bung which is slightly tapered.
Dia. 5.5-6.1 cm x Th. 1.8 cm

Plate LIII.204 Bung Find no. 3043 WOODAN-id: 23289000
Find location: AWN excavation, trench 9-2 (Roman layer)
Wood species: *Picea abies*/Norway spruce
Half of a slightly tapered bung which is partly charred.
Dia. 5.6-5.8 cm x Th. 0.8 cm

Plate LIII.205 Bung Find no. 4275 WOODAN-id: 22621000
Find location: Square unknown (layer unknown)
Wood species: *Abies alba*/Silver fir
Carved bung with straight sides and flat ends.
Dia. 5.7-6.3 cm x Th. 2.1 cm

Plate LIII.206 Bung Find no. 4115 WOODAN-id: 22461000
Find location: Square unknown (layer unknown)
Wood species: *Fagus sylvatica*/Beech
Carved bung with straight sides and flat ends.
Dia. 3.7-4.2 cm x Th. 2.2 cm

Plate LIII.207 Bung Find no. 3061 WOODAN-id: 23293000
Find location: Well 1989-S180
Wood species: *Picea abies*/Norway spruce
Tapered bung with flat ends.
Dia. 5.4-6.2 cm x Th. 1.2 cm (after conservation)

Plate LIII.208 Bung Find no. 3040 WOODAN-id: 23288000
Find location: AWN excavation, trench 9-2 (Roman layer)
Wood species: *Abies alba*/Silver fir
Flat bung with one sloping end and the other straight. The object had dried out and shrunk before conservation.
Dia. 3.6 x Th. >1 cm

Plate LIII.209 Bung Find no. 1089.1 WOODAN-id: 23279000
Find location: Square DK-27 (Roman layer)
Wood species: *Pinus* spp./Pine
Flat bung with straight sides.
Dia. 3.5 cm x Th. 1.2 cm

Plate LIII.210 Bung Find no. 4001n WOODAN-id: 22014000
Find location: Square unknown (layer unknown)
Wood species: *Abies alba*/Silver fir
Bung made of split stem wood, tapered. The bung is oval in cross-section due to shrinkage.
Dia. 4.7-5.8 cm x Th. 7.2 cm

Plate LIII.211 Bung Find no. 3404 WOODAN-id: 23300000
Find location: Square unknown (layer unknown)
Wood species: *Fagus sylvatica*/Beech
Cylindrical bung which is slightly tapered. The object is deformed due to shrinkage before conservation.
Dia. 3.8-4.3 cm x Th. 4.5 cm (before conservation)

Plate LIII.212 Bung Find no. 3392 WOODAN-id: 23299000
Find location: Square EG-15 (Dredging layer)
Wood species: *Fraxinus excelsior*/Ash
Turned bung, tapered, with flat ends. The bung is made of roundwood.
Dia. 3.4-4 cm X Th. 4 cm

Plate LIII.213 Bung Find no. 3408 WOODAN-id: 23302000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Bung with straight sides and one flat end. The other end is damaged.
Dia 4.5 cm x Th. 2 cm

Plate LIII.214 Bung Find no. 3405 WOODAN-id: 23301000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Cylindrically turned bung with one slightly sloping end and the other straight. The bung is oval in cross-section due to shrinkage before conservation.
Dia. 4.1 cm x Th. 4.1 cm

Plate LIII.215 Bung Find no. 1900.1 WOODAN-id: 23464000
Find location: Square EG-3 (Roman layer)
Wood species: Coniferous wood
Three fourths of a tapered bung.
Dia. 4.2 x Th. 2.1 cm

Plate LIII.216 Perforated bung Find no. 463.1 WOODAN-id: 23278000
Find location: Square CR-10 (Roman layer)
Wood species: *Abies alba*/Silver fir
Half of a tapered bung with perforation. The hole in the centre is conical and charred.
Dia. 3.4 cm x Th. 2.7 cm; hole: Dia. 0.7-0.9 cm

Plate LIII.217 Perforated bung Find no. 1306 WOODAN-id: 23278000
Find location: Square DO-14 (Roman layer)
Wood species: not identified
Half of a tapered bung with perforation. The hole in the centre is conical.
Dia. 2.8-3.1 cm x Th. 2 cm; hole: Dia. 0.7-1 cm

Plate LIII.218 Perforated bung Find no. 3417 WOODAN-id: 23303000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Cylindrical bung with a slightly sloping top and a straight hole in the centre.
Dia. 3.2 cm x Th. 3.2 cm; hole: Dia. 0.6 cm

Plate LIV.219 Stopper Find no. 4303 WOODAN-id: 22649000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Turned, conical stopper. On the top end there is a hole from the spill of a lathe.
L. 8.3 cm x Dia. 2.3-3.5 cm

Plate LIV.220 Stopper Find no. 3091 WOODAN-id: 23295000
Find location: Square DU-3 (Roman layer)
Wood species: *Quercus* spp./Oak
Carefully carved stopper with eight facets on the pointed end. Due to shrinkage, the object is now not round but oval in cross-section.
L. 11 cm x W. 4 cm x Th. 2.5 cm (after conservation)

Plate LIV.221 Stopper Find no. 3056 WOODAN-id: 23292000
Find location: Square CQ-20 (Roman layer)
Wood species: *Acer* spp./Maple
Stopper, made from a branch, with slightly tapering sides. The top is flat and partly damaged.
L. 11.5 cm x Dia. 3.2 cm

Plate LIV.222 Stopper Find no. 3049 WOODAN-id: 23290000
Find location: AWN excavation, trench 9-2 (Roman layer)
Wood species: not identified
Conical stopper made of split wood. The top end is round in cross-section. The stopper is partly charred.
L. 7.5 cm x Dia. 2.5 cm

Plate LIV.223 Stopper Find no. 1251.1 WOODAN-id: 23280000
Find location: Square DN-10 (Roman layer)
Wood species: *Acer* spp./Maple
Conical stopper which is round in cross-section and made of radially split stem wood. The stopper is charred at the upper end.
L. 7 cm x Dia. 3 cm

Plate LIV.224 Stopper Find no. 4370 WOODAN-id: 22717000
Find location: Square unknown (layer unknown)
Wood species: *Pinus* spp./Pine
Half of a turned stopper, tapered, with both ends flat-worked. There is a shallow hole at the top, probably a poppet mark, caused by the point of the holding device of a lathe.
L. 5.2 cm x Dia. 1.3-2.7 cm

Plate LIV.225 Stopper Find no. 3054 WOODAN-id: 23291000
Find location: AWN excavation, trench 9-1 (Roman layer)
Wood species: *Alnus* spp./Alder
Conical stopper made of split wood. The tip is missing and the object is partly charred. The object is carved; the cut edges are still visible.
L. >3.5 cm x Dia. 2 cm

Plate LIV.226 Stopper Find no. 3375 WOODAN-id: 23298000
Find location: Square EE-4 (Roman layer)
Wood species: F*raxinus excelsior*/Ash
Stopper with head and shaft, both circular in cross-section. At 2 cm above the lower end, the shaft is pierced. The head is flat and the shoulders below the head are straight. A stamp in the shape of a Z was branded on the top of the head.
L. 8 cm x Dia. 1.2 cm (shaft) and Dia. 2.2 cm (head)

Plate LIV.227 Stopper Find no. 1883.2 WOODAN-id: 23282000
Find location: Square EA-1 (Roman layer)
Wood species: F*raxinus excelsior*/Ash
This stopper has a conical lower end and a knob-like, rounded head.
L. 7 cm x Dia. 1.6-3.2 cm

Plate LIV.228 Stopper Find no. 3117 WOODAN-id: 23297000
Find location: Square EJ-3 (Roman layer)
Wood species: *Juniperus communis*/Common juniper
Turned stopper with head. The head is convex at the top and shows traces of wear. Below the head and the straight shoulders, the shaft is almost cylindrical. At 2.5 cm below the head there is a shallow ledge, and from there the shaft is slightly narrower and tapers towards the lower end.
L. 7 cm x Dia. 1.7-4.5 cm; shaft: L. 5 cm x Dia. 1.7-2.2 cm

Plate LIV.229 Stopper Find no. 3098 WOODAN-id: 23296000
Find location: Square DG-22 (Roman layer)
Wood species: *Carpinus betulus*/European hornbeam
Turned stopper with a cylindrical head and broken shaft. Around the circumference of the rim of the head there is an incised line. The top of the head is chamfered with irregular facets. The shaft is straight.
L. >5 cm x Dia. 1.2 cm (shaft) and Dia. 2.2 cm (head)

Plate LIV.230 Bung with stamp Find no. 1630 WOODAN-id: 23281000
Find location: Square DV-4 (layer unknown)
Wood species: not identified
Half of a tapered bung with three stamped letters. Presumably, the letters were part of a stamped mark (name?) across the bung hole. The object is deformed due to shrinkage before conservation.
Dia. 3-5.8 cm x Th. 0.8-2.5 cm

Plate LIV.231 Bung with stamp Find no. 2035.1 WOODAN-id: 23283000
Find location: Square EE-15 (Roman layer)
Wood species: *Abies alba*/Silver fir
Complete tapered bung with stamped letters on the top. The mark consists of the letter C and a feather-like incision.
Dia. 2.3-3.8 cm x Th. 3.2 cm

Plate LIV.232 Bung Find no. 2035.2 WOODAN-id: 23284000
Find location: Square EE-14 (Roman layer)
Wood species: *Abies alba*/Silver fir
Complete tapered bung with stamp. On the top of the bung, the shape of a V is visible. The bung has one sloping end.
Dia. 3.1-3.8 cm x Th. 1.7-2.2 cm

Plate LIV.233 Bung Find no. 3038 WOODAN-id: 23287000
Find location: AWN excavation, trench 9-2 (Roman layer)
Wood species: *Picea abies/Larix decidua*, Norway spruce/European larch
Three fourths of a flat and tapered bung with stamped letters. The letters are barely recognisable.
Dia. 6 cm x Th. 1.8 cm (after conservation)

Plate LIV.234 Bung Find no. 3071 WOODAN-id: 23294000
Find location: Square CM-5 (Dredging layer)
Wood species: *Abies alba*/Silver fir
Fragment of a bung with a stamped letter on the top. The bung is deformed after conservation.
Dia. 4.9 cm x Th. >1 cm (after conservation)

Fastening and Securing

Bolts and catches

Plate LV.235 Bolt Find no. 3127 WOODAN-id: 23341000
Find location: Square EN-6 (Roman layer)
Wood species: *Fagus sylvatica*/Beech
Bolt with a triangle-shaped head which is damaged. Below the head there is a right-angled notch. The shaft is straight and broken at the end.
L. >21 cm x W. 4.5 cm x Th. 3.6 cm; head: L. 9.5 cm x W. 7 cm x Th. 3.7 cm

Plate LV.236 Bolt Find no. 3366 WOODAN-id: 23347000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Bolt with a triangle-shaped head which is rounded at the top. Part of the shaft is broken. The object is dried out and deformed due to shrinkage.
L. >18 cm x W. 5.5 cm x Th. 4 cm; head: L. 5 cm x W. 5.5 cm x Th. 4 cm; shaft: L. 13.3 cm x W. 3.5 cm x Th. 4 cm

Plate LV.237 Bolt Find no. 3132 WOODAN-id: 23342000
Find location: Square DU-19 (Roman layer)
Wood species: *Acer* spp./Maple
Bolt, rectangular in cross-section and with a rectangular head. The upper edge of the head is damaged and the shaft is broken. There is an almost right-angled notch below the head.
L. >16 cm x W. 3.8 cm x Th. 2 cm; head: L. 3.2 cm x W. 3.8 cm x Th. 1.8 cm; shaft: W. 1.8 cm x Th. 1.8 cm

Plate LV.238 Catch Find no. 122.1 WOODAN-id: 23323000
Find location: Square BY-7 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Catch, rectangular in cross-section and with one chamfered end. The upper part is straight. On the side that faced towards a doorpost or cupboard, etc., a right-angled notch is present. At the chamfered end, the remnant of a slanted iron nail suggests that the catch was initially nailed onto a wooden surface.
Ht. 10 cm x W. 4 cm x Th. 2.5 cm

Plate LV.239 Catch Find no. 3044 WOODAN-id: 23339000
Find location: AWN excavation, trench 9-2 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Catch, rectangular in cross-section and with one chamfered end. The upper part is straight. On the side that faced towards a door post or cupboard, etc., a right-angled notch is present. At the chamfered end, the remnant of an iron nail suggests that the catch was initially nailed onto a wooden surface.
Ht. 9.6 cm x W. 2.4-4 cm x Th. 2.8-5.4 cm (after conservation)

Plate LV.240 Bolt Find no. 3347 WOODAN-id: 33450000
Find location: Square unknown (layer unknown)
Wood species: *Alnus* spp./Alder
Bolt with a triangle-shaped head which is rounded at the top. The shaft of the bolt is broken. The object is slightly trapezoidal in cross-section.
L. >12 cm x W. 5.5 cm x Th. 2.5 cm; head: L. 5.5 cm x W. 5.2 cm x Th. 3 cm

Locks and latch lifters

Plate LVI.241 Tumbler lock Find no. 1918.1 WOODAN-id: 23337000
Find location: Square EB-18 (Dredging layer)
Wood species: *Fraxinus excelsior*/Ash
Rectangular block with curved outer side. Initially, this was a part of a tumbler lock which housed a deadbolt and the tumbler pins of the locking mechanism. On the inside of the lock there is one vertical groove between two vertical ledges. At 2.2 cm above the ends of the ledges there are two horizontal grooves which divide the inner side into compartments. The wider groove below was for the bolt, the upper groove for the latch lifter. The compartments were for the loose latches that could be lifted with the latch lifter, so that the bolt could be retracted and the door would open. On the outside of the lock there are two square impressions of mounting brackets at the bottom and top. Another square-shaped impression is also present at approximately 2.5 cm from the top end. These impressions are probably related to the securing of the lock on a door frame or inside a chest, for example.
L. 13.5 cm x W. 4.0 cm x Th. 3.0 cm; vertical groove: W. 1.1 cm x D. 1.8 cm; horizontal grooves: W. 2.4 cm x D. 1.8 cm and W. 2.2 cm x D. 1.3 cm

Plate LVI.242 Deadbolt Find no. 3323 WOODAN-id: 23344000
Find location: Square CO-11 (Dredging layer)
Wood species: *Fraxinus excelsior*/Ash
Rectangular batten with a broken end. On the inside are three sunken compartments for the tumblers. In one of these compartments, a remnant of a tumbler, made of oak, is present.
L. >12.4 cm x W. 2.5 cm x Th. 2.4 cm; grooves: W. 1.2 cm x D. 1 cm, W. 1 cm x D. 1.2 cm and W. >(?)1 cm x >0.7 cm (the last dimensions are from the groove at the broken end)

Plate LVII.243 Latch lifter Find no. 1803 WOODAN-id: 23336000
Find location: Square DZ-2 (Roman layer)
Wood species: not identified
Fragment of a latch lifter. At the upper side there are two tines between two grooves and a ledge in front of the chamfered end. The back side of the object is straight. The handle has broken off and has been reworked with three narrow facets. A protruding corner remains from the original handle.
L. 24.4 cm x W. 2.3-3.1 cm x Th. 1.4-1.9 cm; tines: Ht. 3.1 cm and Ht. 3.2 cm

Plate LVII.244 Latch lifter Find no. 1553.1 WOODAN-id: 23333000
Find location: Square DJ-19 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Latch lifter with an elongated and perforated handle and a triangular protrusion which initially stopped the latch lifter from pushing too far into the lock. Three tines are preserved. The latch lifter was probably originally longer and would have had a fourth tine at the end.
L. >20 cm x W. 1-1.9 cm x Th. 0.6-0.9 cm; tines: Ht. 2 cm x W. 0.8 cm, Ht. 2 cm x W. 1 cm and Ht. 1.9 cm x W. 0.7 cm

Plate LVII.245 Latch lifter Find no. 923 WOODAN-id: 23326000
Find location: Square DG-5 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Completely preserved latch lifter with three tines and a handle with a hole. The handle has a rounded end and, on one side, curves concavely upwards to a triangle-shaped block. This block prevented the latch lifter rom pushing too far into the lock. The other side of the latch lifter, including the handle, is straight.
L. 18.2 cm x W. 1-2.1 cm x Th. 0.8-0.9 cm; tines: Ht. 2.1 cm x W. 1-1.2 cm, Ht. 2 cm x W. 1-1.2 cm and Ht. 2 cm x W. 1.2 cm

Plate LVII.246 Latch lifter Find no. 1165.1 WOODAN-id: 23330000
Find location: Square DL-21 (Roman Layer)
Wood species: cf. *Acer pseudoplatanus*/Sycamore maple
Fragment of a latch lifter with three tines and a broken handle. The object is weathered and thinner towards the handle because of erosion. No conclusions can be drawn about the shape of the first tine because only a small part of it is preserved. The other tines have a rectangular shape.
L. >17.2 cm x W. 0.8-2.2 cm x Th. 0.8-1.1 cm; tines: Ht. >2.4 cm x W. 1.8 cm, Ht. 1.8 cm x W. 1.5 cm and Ht. >0.8 cm x W. >1.2 cm

Plate LVII.247 Latch lifter Find no. 1004 WOODAN-id: 23327000
Find location: Square DI-6 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Fragment of a latch lifter with three tines. The upper part of the handle with two slanted sides remains. The back side of the handle, as well as the rest of the latch lifter, is straight.
L. >16.7 cm x W. 1.9 cm x Th. 0.8-1 cm; tines: Ht. 1.9 cm x W. 0.6-0.8 cm, Ht. 1.5 cm x W. 0.5-0.8 cm and Ht. 1.5 x W. 0.5-0.6 cm

Plate LVII.248 Latch lifter Find no. 1774.1 WOODAN-id: 23335000
Find location: Square DY-3 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Fragment of a latch lifter with three rectangular tines. The beginning of the handle is thinner than the part with the tines and is broken.
L. >13.1 cm (*16 cm) x W. 0.8-1.8 cm x Th. 1-1.1 cm

Plate LVII.249 Latch lifter Find no. 3299 WOODAN-id: 23343000
Find location: Square DE-11 (Oer-IJ layer)
Wood species: *Alnus* spp./Alder
Almost complete latch lifter with two tines and a tapered handle. The handle is broken at the upper side.
L. >11.4 cm x W. 1.9 cm x Th. 0.6 cm; tines: Ht. 1.9 cm x W. 0.6 cm and Ht. 1.8 cm x W. 0.9 cm

Plate LVII.250 atch lifter Find no. 1291.1 WOODAN-id: 23332000
Find location: Square DO-12 (Roman layer)
Wood species: not identified
Small latch lifter with two tines and an oval handle with a hole. The hole contains wear marks, probably caused by a string.
L. 9.9 cm x W. 0.6-1.7 cm x Th. 0.4-0.5 cm; hole: Dia. 0.6 cm

Plate LVII.251 Latch lifter Find no. 1032.1 WOODAN-id: 23329000
Find location: Square DJ-30 (Roman Layer)
Wood species: cf. *Acer* spp./Maple
Fragment of a latch lifter with four tines. The handle is missing. The first tine is rectangular, the other three are trapezoidal in shape.
L. >11.1 cm x W. 1-2 cm x Th. 0.6-0.8 cm; tines: Ht. 1 cm x W. 1.4-1.8 cm, Ht. 1 cm x W. 0.8-1.4 cm, Ht. 1 cm x W. 0.6-0.8 cm, and Ht. 0.8 cm x W. 0.6 cm

Plate LVII.252 Latch lifter Find no. 466 WOODAN-id: 23325000
Find location: Square CR-9 (Roman layer/Oer-IJ layer)
Wood species: not identified
Incomplete latch lifter; the handle is missing. Three of the original, probably four, tines are preserved. The shape of the tines is slightly trapezoidal.
L. >6.8 cm x W. 0.5-1.2 cm x Th. 0.8 cm; tines: Ht. 1.2 cm x W. 0.5-1.6 cm, Ht. 1.2 cm x W. 0.8-1 cm and Ht. 1.1 cm x W. 0.8-1.2 cm

Plate LVII.253 Latch lifter Find no. 1249.1 WOODAN-id: 23331000
Find location: Square DN-13 (Roman layer)
Wood species: Maloideae, type *Malus/Crataegus/Pyrus*, Apple/Hawthorn/Pear
Fragment of a latch lifter with three tines and a broken handle. The first and third tines have one sloping and one straight edge. The tine in the middle is rectangular. The saw with which the tines were cut has slipped too far through the wood and left a deep saw mark on the inner side of the last tine.
L. >6.6 cm x W. 0.5-1.5 cm x Th. 0.8 cm; tines: Ht. 1.5 cm x W. 0.4-0.6 cm, Ht. 1.4 cm x W. 0.9 cm and Ht. 1.4 cm x W. 0.5-0.9 cm

Plate LVII.254 Latch lifter Find no. 1987.1 WOODAN-id: 23338000
Find location: Square EC-5 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Perforated handle of a latch lifter. The object is rectangular in cross-section and slightly charred.
L. >2.7 cm x W. 2.7 cm x Th. 1.2-1.3 cm

Plate LVII.255 Latch lifter Find no. 3356 WOODAN-id: 23346000
Find location: Square CI-5/CH-5 (Roman layer)
Wood species: *Quercus* spp./Oak
Fragment of the tine of a latch lifter.
L. >3.8 cm x W. 0.5-1.7 cm x Th. 0.3 cm (after conservation)

Plate LVII.256 Latch lifter Find no. 3066 WOODAN-id: 23340000
Find location: Square DG-7 (Dredging layer)
Wood species: *Fagus sylvatica*/European beech
Fragment; one tine of a latch lifter. The tine is slightly trapezoidal.
L. >3.9 cm x W. 1-2 cm x Th. 0.8 cm

Seal locks

Plate LVIII.257 Seal lock Find no. 1567 WOODAN-id: 23334000
Find location: Square DU-5 (Dredging layer)
Wood species: *Acer* spp./Maple
Rectangular lock made of a block with one horizontal and one vertical groove. The horizontal groove was sawn too deeply and the saw left two deep saw marks on the narrow side of the block. On the outer side of the end with the horizontal groove, a hole has been drilled completely through the lock. The upper end of the vertical groove is rounded by use and the side walls of this groove show traces of wear.
L. 6.6 cm x W. 4.1 cm x Th. 2.5 cm; hole: Dia. 0.5-1 cm; vertical groove: L. 3.7 cm x W. 1.4-1.8 cm x D. 1.8 cm; horizontal groove: L. 4.1 cm x W. 0.7-0.8 cm x D. 1.7 cm; tool marks of chisel: W. 0.4 cm

Plate LVIII.258 Seal lock Find no. 1031 WOODAN-id: 23328000
Find location: Square DJ-20 (Roman layer)
Wood species: not identified
Rectangular lock with two grooves. On the inner side of the lock, a shallow vertical groove terminates at a horizontal groove. The vertical groove is narrow at the upper side and widens towards the deeper horizontal groove. The horizontal groove has two straight sides and is irregularly wide.
L. 6.5-6.7 cm x W. 4.5 cm x Th. 2 cm; vertical groove: L. 3.7 cm x W. 0.8-2 cm x D. 1.2 cm; horizontal groove: L. 4.5 cm x W. 1.1-1.4 cm x D. 1.1 cm

Plate LVIII.259 Seal lock Find no. 422 WOODAN-id: 23324000
Find location: Square CP-6 (Roman layer)
Wood species: not identified
Fragment of a rectangular lock with a curved outer side. On the inner side of the seal lock, a vertical groove terminates at a horizontal groove. The presence of a nail hole on each preserved corner suggests that the lock was nailed to a door, cupboard, or chest. One end of the outer side is chamfered.
L. 7 cm x W. >5.4 cm x Th. 1.3-2.6 cm; vertical groove: L. 2.9 cm x W. >1.2 cm x D. 0.6 cm; horizontal groove: L. >2.6 cm x W. 2.8 cm x D. 1 cm

Stakes, boards, battens, and slats

Plate LVIX.260 Slat Find no. 3082 WOODAN-id: 23109000
Find location: Square DK-20 (Dredging layer)
Wood species: *Quercus* spp./Oak
Fragment of a tangentially split or sawn slat with a hole in the middle. Both ends are broken off. The sides are damaged and will have originally been straight. The slat is slightly profiled with a thicker midsection and thinner ridges.
L. >21 cm x W. 7.5 cm x Th. 2.2 cm; hole: Dia. 2.5 cm

Plate LVIX.261 Board Find no. 3372 WOODAN-id: 23117000
Find location: Square EH-2 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Fragment of a board made of the outer split of roundwood. Both edges are broken off. Three holes have been pierced in the board, two of which have broken. It seems that, originally, two rows of holes were drilled along the edges that were opposite each other.
L. >13 cm x W. 9 cm x Th. 2 cm; holes: Dia. 1.7 cm

Plate LVIX.262 Board Find no. 368.1 WOODAN-id: 23087000
Find location: Square CM-2 (Roman layer)
Wood species: *Quercus* spp./Oak
Thin, radially split board with two holes, one below the other. The holes are not in the centre but lie closer to one edge of the board. One end is slightly curved and the other is damaged and broken off.
L. >13 cm x W. 9 cm x Th. 1.3 cm; holes: Dia. 1 cm

Plate LVIX.263 Slat Find no. 3411 WOODAN-id: 23119000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Radially cleaved from stem wood, with a chamfered end and a hole approximately in the middle of the slat. The ends are broken off and the slat is weathered on all sides.
L. >14 cm x W. 3.2 cm x Th. 2 cm; hole: Dia. 0.8 cm

Plate LVIX.264 Stake Find no. 2601 WOODAN-id: 23105000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Stake made of a roundwood from a young trunk or branch, with a mortise. Both ends are broken off.
L. >11 cm x Dia. 6.5 cm; hole: Dia. 2.2 cm

Plate LVIX.265 Board Find no. 3078 WOODAN-id: 23108000
Find location: Square DH-26 (Roman layer)
Wood species: *Fagus sylvatica*/Beech
Fragment of a board with a conical mortise on one side and a broken mortise diagonally opposite. Made of radially cleaved stem wood.
L. >11 cm x W. 5.3 cm x Th. 0.2-1 cm

Plate LX.266 Board Find no. 3046 WOODAN-id: 23107000
Find location: AWN excavation, trench 9-2 (Roman layer)
Wood species: *Quercus* spp./Oak
Fragment of a board tangentially split from a roundwood stem. The board has three holes at the end, of which two are broken. In one of the holes is a remnant of a dowel of split oak.
L. >9 cm x W. 7 cm x Th. 1.5 cm; holes: Dia. 0.8-1.1 cm

Plate LX.267 Batten Find no. 3045 WOODAN-id: 23106000
Find location: AWN excavation, trench 9-2 (Roman layer)
Wood species: *Alnus* spp./Alder
Incomplete; one side is broken. The batten has a slanted drilled hole in the recessed, diagonally sawn-off end. There are saw marks on the recessed face.
L. >9.5 cm x W. 6.5 cm x Th. 4.5 cm; hole: Dia. 0.5 cm

Plate LX.268 Board Find no. 606.1 WOODAN-id: 23092000
Find location: Square CX-24 (Roman layer)
Wood species: *Alnus* spp./Alder
Fragment of a radially cleaved board with a small knot; both ends are broken off. On one side there is a broken hole. The board probably broke through the middle and was originally twice as wide as it is now.
L. >8 cm x W. >4.5 cm (*9 cm) x Th. 1-1.5 cm; hole: Dia. 0.6 cm

Plate LX.269 Batten Find no. 1211 WOODAN-id: 23096000
Find location: Square DM-26 (Dredging layer)
Wood species: not identified
Fragment of a batten which is rectangular in cross-section and which has a groove on each narrow side. The straight top was recessed by sawing off half of the thickness of the batten to create a lap for a half lap joint. The saw went a bit too far and left a deep saw mark. The other end of the batten is broken.
L. >14.5 cm x W. 10 cm x Th. 4 cm; grooves: W. 0.9 cm x D. 2.3 cm and W. 1 cm x D. 2 cm; top: W. 0.7 cm x D. 2 cm

Plate LX.270 Batten Find no. 2160.1 WOODAN-id: 23104000
Find location: Square EJ-12 (Dredging layer)
Wood species: *Fraxinus excelsior*/Ash
Mitred sawn batten with a groove but no tongue on the short side and with a nail hole on the long straight side. The batten is damaged on the grooved side and was originally wider. It was probably part of a framework.
L. >10 cm x W. >4 cm x Th. 1.8 cm; groove: W. 0.8 cm x D. >2.1 cm

Plate LXI.271 Batten Find no. 3363.5 WOODAN-id: 23129000
Find location: Square unknown (layer unknown)
Wood species: *Alnus spp.*/Alder
Fragment of a batten with a rectangular-shaped groove in the centre.
L. >10.3 cm x W. 5.3 cm x Th. 5.5-6.5 cm; groove: W. 1.5 cm x D. 1 cm

Plate LXI.272 Batten Find no. 3361.4 WOODAN-id: 22128000
Find location: Square unknown (layer unknown)
Wood species: *Alnus spp.*/Alder
Fragment of a batten with a groove in the centre. Due to shrinkage before conservation, it is slightly deformed.
L. >8.7 cm x W. 3.5 cm x Th. 3.2-4 cm; groove: W. 1.2 cm x D. 1.5 cm

Plate LXI.273 Batten Find no. 3361.1 WOODAN-id: 23126000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Fragment of a batten with a groove. The groove is placed off-centre on the broad side of the batten.
L. >7 cm x W. 7.8 cm x Th. 2.7-3.6 cm; groove: W. 1.7 cm x D. 1.2 cm

Plate LXI.274 Batten Find no. 1514.1 WOODAN-id: 23098000
Find location: Square DT-1 (Dredging layer)
Wood species: *Fraxinus excelsior*/Ash
Fragment of a batten with a groove at 0.6 cm from one side.
L. 4.8 cm x W. 4.1 cm x Th. 2.6 cm; vertical groove: W. 1.3 cm x D. 1.7 cm

Plate LXI.275 Board Find no. 3361.2 WOODAN-id: 23127000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Fragment of a board with a groove on both narrow sides and a narrow groove below the top. The top is recessed to the rim of the narrow groove. The other end of the board is broken.
L. >14.6 cm x W. 10.3 cm x Th. 3-4 cm; grooves: W. 0.8 cm x D. 2 cm (groove 1) and W. 0.5 cm x D. 2.5 cm (groove 2); narrow groove below the top: W. 0.4 cm x D. 0.4 cm

Plate LXI.276 Batten Find no. 2155 WOODAN-id: 23103000
Find location: Square EJ-12 (Roman layer)
Wood species: *Alnus* spp./Alder
Fragment of a profiled batten with a groove on both edges. Due to shrinkage, the grooves are not rectangular in cross-section, as they originally were.
L. >7 cm x W. 9 cm x Th. 3.5 cm; grooves: W. 0.9-1.3 cm x D. 1 cm (groove 1) and W. 1-1.2 cm x D. 1 cm (groove 2)

Plate LXII.277 Batten Find no. 3146 WOODAN-id: 23114000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Fragment of a batten with a tapered end and with a long nail through the wood. The end is damaged.
L. >22 cm x W. 5 cm x Th. 3.5 cm; shaft of nail: L. >10.2 cm x W. 0.4 cm x Th. 0.4 cm

Plate LXII.278 Batten Find no. 3085 WOODAN-id: 23110000
Find location: Square DU-23 (Roman layer)
Wood species: *Alnus* spp./Alder
Batten made of radially split wood, with a notch which has one straight edge and one angled edge for a half lap joint. There are traces of wear.
L. >22 cm x W. 4.2 cm x Th. 2.5-3 cm

Plate LXII.279 Board Find no. 644.1 WOODAN-id: 23093000
Find location: Square DH-26 (Roman layer)
Wood species: *Quercus* spp./Oak
Fragment of a board made from cleaved stem wood, with a T-shaped profile on one side and carefully rounded on the other side. This board will have covered a groove between two surfaces.
L. >14 cm x W. 11 cm x Th. 2-5 cm

Plate LXII.280 Board Find no. 596.1 WOODAN-id: 23091000
Find location: Square CX-29 (Roman layer)
Wood species: *Alnus* spp./Alder
Fragment of a board with an intact tongue, but with a damaged groove.
L. >7 cm x W. 11.5 cm x Th. x 0.5-2.7 cm; lip: W. 4 cm

Plate LXIII.281 Slat Find no. 322.1 WOODAN-id: 23086000
Find location: Square CK-10 (Roman layer)
Wood species: *Abies alba*/Silver fir
Thin narrow strip, rectangular in cross-section, with one straight finished edge and one edge which is damaged and partly broken off. The slat was probably part of a furniture framework.
L. >39.5 cm x W. 4 cm x Th. 2.3 cm

Plate LXIII 282 Batten Find no. 1123.1 WOODAN-id: 23095000
Find location: Square DK-29 (Roman layer)
Wood species: *Quercus* spp./Oak
Fragment of a narrow batten with one straight and one broken end, rectangular in cross-section and with two nail holes offset on the preserved end. Weathered saw marks are present.
L. >35 cm x W. 5 cm x Th. 3.5 cm

Plate LXIV.283 Batten Find no. 3114 WOODAN-id: 23111000
Find location: Square EL-10 (Roman layer)
Wood species: *Euonymus europaeus*/Spindle tree
End of a batten with a rectangular stub mortise. In the mortise there are tool marks (of a chisel?) that resemble letters. Given the type of wood, the batten may have been a part of a piece of furniture.
L. >18 cm x W. 5.5 cm x Th. 4 cm; mortise: L. 7 cm x W. 2-2.6 cm x D. 1.2 cm

Plate LXIV.284 Board Find no. 2076 WOODAN-id: 23102000
Find location: Square EF-1 (Roman layer)
Wood species: not identified
Fragment of a board with five conical drilled holes, of which two are on the edges and broken.
L. >14.1 cm x W. 3.5 cm x Th. 0.3-1 cm; holes: Dia. 0.9-1.2 cm

Plate LXIV.285 Batten Find no. 3291 WOODAN-id: 23115000
Find location: Square DV-8 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
End of a batten, with a diagonal saw mark. Below the saw mark, half of the thickness of the wood has been removed over a length of 2.5 cm because of its original application in a half lap joint construction.
L. >7.5 cm x W. 6 cm x Th. 3.7 cm

Plate LXIV.286 Batten Find no. 4433 WOODAN-id: 22780000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Fragment of a batten made of radially split stem wood, which has a slanted nail. Approximately 1.7 cm from the chamfered base there is a sawn groove. The end with one bevelled side and a groove suggests that the board is made of a discarded stave from a cask.
L. >10 cm x W. 5.5 cm x Th. 1.8 cm; groove: W. 0.4 cm x D. 0.3 cm

Plate LXIV.287 Batten Find no. 1345.1 WOODAN-id: 23097000
Find location: Square DP-12 (Dredging layer)
Wood species: *Fagus sylvatica*/Beech (batten); *Fraxinus excelsior*/Ash (tenon)
Fragment of a narrow batten with a chamfered end. Next to the chamfer there is a slanted hole with remnants of a peg for a mortise and tenon joint. The batten is broken at a second mortise hole.
L. >7.5 cm x W. 2.6 cm x Th. 2 cm; peg: L. >2.7 x Dia. 0.6 cm

Plate LXIV.288 Slat Find no. 1756.1 WOODAN-id: 23099000
Find location: Square DX-10 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Fragment of a narrow slat with a thick rectangular-finished end.
H. >5 cm x W. 3.5 cm x Th. 1.8 cm

Plate LXV.289 Board Find no. 408.1 WOODAN-id: 23088000
Find location: Square CO-10 (Dredging layer)
Wood species: *Alnus* spp./Alder
Radially split board with two slanted ends. One edge has a recessed rectangular section in the middle for a lap joint. The opposite edge has two rectangular recesses. The object was probably part of a furniture framework.
L. >15.5 cm x W. 7 cm x Th. 2.2 cm

Plate LXV.290 Batten Find no. 439 WOODAN-id: 23090000
Find location: Square CP-24 (Roman layer)
Wood species: not identified
Complete but partly damaged joint, probably for a piece of furniture. The rectangular batten has flat protruding parts on three sides. There were probably three, or perhaps even four, connecting wood elements attached to these protruding parts.
L. 12.8 cm x W. 6 cm x Th. 5.1 cm; protruding parts: L. 4.5 cm x W. 0.6-1.5 cm, L. 3-3.8 cm x W. 0.9 cm and Ht. 1.5 cm x W. 4.9 cm x Th. 1.6 cm

Plate LXV.291 Board Find no. 3133 WOODAN-id: 23112000
Find location: Square DV-15 (Roman layer)
Wood species: *Alnus* spp./Alder
Rift-sawn board with a diagonally recessed part. In the recessed part there is a circular (nail?) hole. In the upper part of the board there is a triangular hole that does not run through the entire piece of wood. The board was probably part of a framework.
L. >9 cm x W. 7.5 cm x Th. 1.3 cm

Plate LXV.292 Batten Find no. 245 WOODAN-id: 23085000
Find location: Square CF-8 (Roman layer)
Wood species: *Alnus spp.*/Alder
Fragment of a batten with two grooves and a short tenon at the top. The grooves could have held a wooden element which had two tenons on the end. The short tenon on the top probably secured an ascending, perpendicular element. This joinery could have been part of the corner joinery of a piece of furniture.
Ht. >9.4 cm x W. 4 cm x Th. 2.2 cm; tenon: L. 1 cm x W. 1.3-1.5 cm x Th. 0.8-1.2 cm; grooves: W. 0.5 cm x D. 0.8 cm and W. 0.6 cm x D. 0.8 cm

Plate LXV.293 Batten Find no. 3419 WOODAN-id: 23120000
Find location: Square DM-14 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Fragment of the end of a narrow batten with a tenon of a bridle joint. The shoulders of the tenon have been mitred with a saw to fit into the mortise of the other batten.
L. >6 cm x W. 4.5 cm x W. 3 cm

Plate LXVI.294 Board with holes Find no. 3348 WOODAN-id: 23116000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Fragment of a board with four holes. The holes were not drilled straight into the side of the board. The distances between the holes are 3.5 and 4 cm. The board has split open lengthwise and the holes are halved.
L. >34 cm x W. 10 cm x Th. 4.8 cm; holes: Dia. 0.7 cm (hole 1 and 2) and Dia. 0.6 cm (holes 3 and 4)

Two battens of frameworks with remains of transverse connections

Plate LXVII.295 Batten of framework Find no. 3142 WOODAN-id: 23113000
Find location: Field survey by A. Bosman; find from the construction pit of the Wijkertunnel (Roman layer)
Wood species: *Pinus* spp./Pine; tenons and wedges are made from *Quercus* spp./Oak
Fragment of a batten with two rectangular mortises spaced 6.5 cm apart; one is complete and one has broken off. In the mortises are remains of pegged tenons which strengthened the original joinery. The tenons and pegging are all wedged.
One end of the batten has a mitred face and is broken off on a circular mortise. Based on its limited size, the batten could have been part of a framework for a piece of furniture. The object is fragmented and dried out after conservation.
L. >33 cm x W. 4 cm x Th. 4 cm; complete mortise: L. 5.8 cm x W. 0.8 cm x Th. 1.1 cm; tenons of vertical elements: W. 2.3 cm x Th. 0.7 cm and W. 2.5 cm x Th. 0.8 cm; holes for pegging: Dia. 1.1 cm

Plate LXVII.296 Batten of framework Find no. 418.1 WOODAN-id: 23089000
Find location: Square CO-23 (Dredging layer)
Wood species: *Pinus* spp./Pine
Batten with two rectangular mortises 8 cm apart. The batten is damaged at the mortises. Both ends of the batten are broken off.
L. >73 cm x W. 4 cm x Th. 3.3 cm; mortises: L. 8.6 cm x W. 1 cm

Furniture

Furniture legs and spindles

Plate LXVIII.297 Leg of a chair or a stool Find no. 3033 WOODAN-id: 23159000
Find location: Square EH-2 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Incomplete, spindle-turned object with alternating six beads (convex parts) and five coves (concave parts). One end is broken at the top of a turned bead and the other end has a bead which is fractured at a tenon for a mortise and tenon joint. The tenon is round in cross-section.
L. >26.5 cm x Dia. 2.1-4 cm; beads (convex parts): Ht. 2 cm; coves (concave parts): Ht. 3 cm

Plate LXVIII.298 Leg of a chair or a stool Find no. 3314 WOODAN id: 23168000
Find location: Square BG-6 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Turned furniture leg, slightly tapered. The furniture leg is decorated with alternating patterns of two and one incised lines. A tenon for a mortise and tenon joint on the upper side is not preserved after conservation. On a drawing made before conservation, it appears that the tenon had a hole on the top, which contained the remnant of a dowel.
L. >23.2 cm x Dia. 3.8-4.2 cm

Plate LXVIII.299 Bed leg Find no. 994.1 WOODAN-id: 23140000
Find location: Square DI-21 (Roman layer)
Wood species: *Alnus* spp./Alder
Decorative, turned chair leg, with four rings and no (preserved) tenons on the top. The shape is convex, then concave, and then again convex, alternating with turned rings and grooves. Three rings are the same in diameter; the ring below the flat top is narrower. On the underside of the wide foot there is a poppet mark from the point of a holding device of a lathe.
L. 23.1 cm x Dia. 3/1.8/5.9 cm (base/middle/top); largest cross-section is deformed by conservation to an oval of W. 7 cm x Th. 4 cm

Plate LXIX.300 Spindle Find no. 1015.1 WOODAN-id: 23141000
Find location: Square DI-9 (Dredging layer)
Wood species: *Euonymus europaeus*/Spindle tree
Almost complete, turned part of a piece of furniture with a convex shape eliding into a cylindrical part. The upper part with a decorative line and a ledge transitions to a narrow cylindrical part with one flat ring followed by another flat ring. At one end a tenon (rectangular in cross-section) for a mortise and tenon joint is preserved. The spindle is deformed due to shrinkage and therefore no longer symmetrical.
L. 18.7 cm x Dia. 1-2 cm

Plate LXIX.301 Spindle Find no. 922.1 WOODAN-id: 23188000
Find location: Square DG-10 (Roman layer)
Wood species: *Fagus sylvatica*/Beech
Complete lathe-turned, tapered spindle with the widest part 2 cm below the shoulder. On the narrow end there is a decoratively turned ledge with a tenon at the top. On the wider end, the curved body becomes concave with two thin incised lines followed by two rings with a tenon. Both tenons show a perforation for a pegged mortise and tenon joint. The holes are not in the centre of the tenons. One of the tenons still contains parts of the peg or dowel. After conservation, both tenons show some damage.
L. 19.3 cm x Dia. 2.1-4 cm; tenons: L. 1.6 cm and 2.2 cm

Plate LXIX.302 Spindle Find no. 55.1 WOODAN-id: 23131000
Find location: Square BI-10 (Roman layer)
Wood species: Maloideae, type *Malus/Crataegus/Pyrus*, Apple/Hawthorn/Pear
Lathe-turned, tapered spindle with a cove and a flattened bead with decorative lines on the narrow end. The wider end is broken and on the narrow end the remnant of a tenon is present. On sketches done shortly after excavation, the tenon seems to have been complete with a small hole (diameter 0.5 cm) for a pegged mortise and tenon joint.
L. >25.3 cm x W. 2.7-3.8 cm; remnant of tenon: Ht. >1.2 cm (*2.5 cm)

Plate LXIX.303 Spindle Find no.: 3058 WOODAN-id: 23160000
Find location: Square DJ-22 (Roman layer)
Wood species: cf. *Alnus* spp./Alder
Turned spindle with a tapered end. At the upper side there is a flat ring under an angular bead, then a bead and then, again, a flat ring . On the top of the final ring there is a tenon for a pegged mortise and tenon joint. Therefore, the tenon is perforated. The object is badly deformed due to shrinkage before conservation.
L. >16.1 cm x Dia. 1.1-1.6 cm; tenon: Ht. 1.5 cm x W. 1.5 cm; hole: Dia. 0.2 cm

Plate LXIX.304 Part of a furniture leg Find no. 3398 WOODAN-id: 23175000
Find location: Square F-9 (layer unknown)
Wood species: indeterminable
Decorative turned part of furniture, presumably a ring of a composed wooden furniture leg with a central perforation for an iron rod. The object is dried out and deformed.
L. 2.8 cm x Dia. 1.2-4.6 cm; hole: Dia. 0.7 cm

Plate LXIX.305 Part of a furniture leg Find no. 3253 WOODAN-id: 23166000
Find location: Square ED-12 (layer unknown)
Wood species: Maloideae, type *Malus/Crataegus/Pyrus*, Apple/Hawthorn/Pear
Fragment of a cylindrically turned part of a furniture leg which has broken in half. The shape of the hole drilled in the centre over the entire length is irregular. The hole was presumably intended for an iron rod which would have stabilised the original construction.
L. >4.5 cm x W. 4 cm x Th. 1.5 cm; hole: Dia. 0.9 cm

Plate LXX.306 Stool leg Find no. 1902.2 WOODAN-id: 23153000
Find location: Square EB-6 (Roman layer)
Wood species: Maloideae, type *Malus/Crataegus/Pyrus*, Apple/Hawthorn/Pear
Lathe-turned furniture leg, presumably from a couch or table. The upper part is cylindrical with sloping shoulders and has a remnant of a tenon for a mortise and tenon joint. The lower part is curved outwards and ends in a claw foot. At the end of the cylindrical part, an area of 3 cm is recessed. Due to the moderate state of preservation, it is no longer possible to see if this was caused by natural processes in the soil or had actually been carved with tools.
L. 25 cm x Dia. 3-4.5 cm; remnant of the tenon: Ht. >0.5 cm x Dia. 2.1 cm

Plate LXX.307 Chair leg Find no. 2112.1 WOODAN-id: 23155000
Find location: Square EG-1 (Roman layer)
Wood species: *Quercus* spp./Oak
Straight furniture leg. The upper part, over a length of 16 cm, has the shape of an angular oval in cross-section; at the tapered end, the leg is round in cross-section. There are small knots in the wood along the transition from the angular oval to the round sections. It is unclear whether the object was made on the lathe or carved. Due to the presence of the small knots, the second interpretation seems more likely. The top is broken and the tapered end is partly carbonised.
L. >31 cm x W. 4.5 cm x Th. 3.3 cm (upper part) x Dia. 1.8-3 cm (tapered end)

Plate LXX.308 Chair leg Find no. 3303 WOODAN-id: 23167000
Find location: Square DQ-19 (Dredging layer)
Wood species: *Quercus* spp./Oak
Furniture leg with a piece of the tip missing. The turned leg has a tapered shape and a tenon-like top.
L. >24.7 cm (*25.5 cm) x Dia. 2.2-3.6 cm; knob: Ht. 0.8 cm x Dia. 2.5-2.9 cm

Plate LXXI.309 Furniture leg Find no. 79.1 WOODAN-id: 22478000
Find location: Square BR-11 (Roman layer)
Wood species: *Alnus* spp./Alder
Carved furniture leg with a curved shape, tapering downwards and oval in cross-section. The object is deformed due to shrinkage.
L. >20.5 cm x W. 5.6 cm x Th. 4 cm

Plate LXXI.310 Furniture leg Find no. 3350 WOODAN id: 23170000
Find location: Square unknown (layer unknown)
Wood species: *Fagus sylvatica*/Beech
Turned furniture leg which is a rounded square in cross-section; one side is tapered and the other is straight.
L. 19 cm x W. 4.5 cm x Th. 4.3 cm

Plate LXXI.311 Furniture leg Find no. 3136 (6026-24 ADNH) WOODAN-id: 23426000
Find location: AWN excavation 1970, Velsen 2
Wood species: *Fagus sylvatica*/Beech
Turned leg with straight sides and round in cross-section. Both ends are sawn and straight.
L. 16.7 cm x Dia. 4.8 cm

Plate LXXI.312 Furniture leg Find no. 112.1 WOODAN-id: 23133000
Find location: Square BW-13 (Roman layer)
Wood species: cf. *Acer campestre*/Field maple
Slightly tapered furniture leg. On the wider end, a remnant of a tenon is present. The object is lathe-turned.
L. >16.7 cm x Dia. 3-4 cm

Plate LXXI.313 Furniture leg Find no. 3382 WOODAN id: 23174000
Find location: Square EA-2 (Dredging)
Wood species: *Acer campestre*/Field maple
Incomplete and weathered, lengthwise-split tapered furniture leg with a knob on the upper end. The object is lathe-turned.
L. >16 cm x W. 3.8 cm x Th. >1.8 cm

Plate LXXI.314 Furniture leg Find no. 3315 WOODAN-id: 23427000
Find location: Square unknown (layer unknown)
Wood species: *Fagus sylvatica*/Beech
Turned furniture leg which is oval in cross-section and tapered towards the lower end. Below the upper end there is a deep saw mark.
L. 13.7 cm x W. 4.9-5.5 cm x Th. 4.1-4.3 cm; saw mark: W. 0.7 cm x D. 0.3 cm

Plate LXXI.315 Furniture leg Find no. 3109 WOODAN-id: 23424000
Find location: Square CP-4/5 (layer unknown)
Wood species: *Fagus sylvatica*/Beech
Turned furniture leg with straight sides and flat ends; oval in cross-section.
L. 11 cm x W. 6.2 cm x Th. 5 cm

Plate LXXI.316 Furniture leg Find no. 133.1 WOODAN-id: 23423000
Find location: Square BY-16 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Turned furniture leg with straight sides and flat ends; oval in cross-section. At the top there is a conical hole, presumably from the spill of a lathe.
L. 8.2 cm x W. 5.5 cm x Th. 4 cm; hole: Dia. 0.4 cm

Plate LXXI.317 Furniture leg Find no. 3119 WOODAN-id: 23425000
Find location: Square EB-10 (Roman layer)
Wood species: Maloideae, type *Malus/Crataegus/Pyrus*, Apple/Hawthorn/Pear
Turned object with straight sides and narrowed in the central part over a length of 2.5 cm. One end is straight and the other end is slightly convex.
L. 7 cm x Dia. 3-4.5 cm

Plate LXXII.318 Table leg Find no. 394.1 WOODAN-id: 23135000
Find location: Square CO-6 (Roman layer)
Wood species: *Acer campestre*/Field maple
Carved furniture leg with a tenon on the top and, below the tenon, a shallow ledge. The knee of the furniture leg curves outwards and the ankle curves inwards. The lower part was possibly finished as a claw base, but, due to weathering and shrinking, no traces of ornamental finishing are visible. Moreover, the top is damaged and charred on one side. The furniture leg was probably part of a low bench or table. The piece is deformed due to conservation.
L. 25 cm x W. 5.2 cm x Th. 4.5 cm

Plate LXXII.319 Stool leg Find no. 75.1 WOODAN-id: 23132000
Find location: Square BP-16 (Roman layer)
Wood species: *Quercus* spp./Oak
Complete leg of a stool, with a tenon at the top end to fit into a mortise of the sitting board. The stool leg is carved from a young stem or branch and has a knot on one side.
L. 24.1 cm x W. 2.5-4.2 cm x Th. 3 cm

Plate LXXIII.320 Table leg Find no. 4132 WOODAN-id: 22478000
Find location: Square CF-11 (Roman layer)
Wood species: *Alnus* spp./Alder
Outwardly curved table leg, trapezoidal in cross-section. The cross-section was probably originally rectangular or square but has been deformed by shrinkage. The end of the carved leg is tapered. The top and the tip are broken and a part of the edge is damaged.
L. >33 cm x W. 4 cm x Th. 2.7 cm

Plate LXXIV.321 Furniture leg (?) Find no. 1360.1 WOODAN-id: 23144000
Find location: Square DQ-20 (Roman layer)
Wood species: Maloideae, type *Malus/Crataegus/Pyrus*, Apple/Hawthorn/Pear
Lathe-turned, tapered furniture leg with a straight knob on the lower end. At the top of the wide end there is a poppet mark from the point of the holding device of a lathe.
L. 11.5 cm x Dia. 2.8-4.8 cm; knob: Ht. 2.2 cm x Dia. 2.8 cm; hole: Dia. 0.8-0.9 cm

Plate LXXIV.322 Furniture leg (?) Find no. 1826.1 WOODAN-id: 23150000
Find location: Square EA-2 (Dredging layer)
Wood species: *Buxus* spp./Boxwood
Lathe-turned furniture leg. The shape of the leg is curved and it tapers towards a semi-circular base.
L. >5.9 cm x Dia. 1.3-1.7 cm (after conservation)

Plate LXXIV.323 Furniture leg Find no. 3128 WOODAN-id: 23163000
Find location: AWN excavation 1994, trench 9-2
Wood species: *Acer pseudoplatanus*/Sycamore maple
Incomplete, turned decorative part of a furniture leg. The shaft is cylindrical and has two flattened beads with a cove between the beads. On the top, an irregularly shaped hole is present.
L. >4.5 cm x Dia. 2.8-3.8 cm; hole: Dia. 0.8 cm x D. 0.9 cm

End pieces

Plate LXXIV.324 End piece (finial) Find no. 1854.1 WOODAN-id: 23151000
Find location: Square EA-12 (Roman layer)
Wood species: Maloideae, type *Malus/Crataegus/Pyrus*, Apple/Hawthorn/Pear
Turned end piece (finial) consisting of a concave knob with a shaft. The end of the shaft or tenon below the knob is broken. Traces of lathe-turning are still visible at the top of the knob. The object is dried out and deformed.
L. >9.1 cm x Dia. 4.5-4.7 cm; shaft: Ht. 4.4 cm x Dia. 1.1-1.3 cm

Plate LXXIV.325 End piece Find no. 1467.1 WOODAN-id: 23146000
Find location: Square DS-26 (Roman layer)
Wood species: *Quercus* spp./Oak
Rectangular block with four sloping sides and with a hole in the middle.
L. 12.3 cm x W. 8.3 cm x Th. 2.6 cm

Plate LXXIV.326 End piece Find no. 1074.1 WOODAN-id: 23142000
Find location: Square DJ-25 (Roman layer)
Wood species: *Fagus sylvatica*/Beech
Half of a rectangular block with three of the initially four sloping sides. There is a rectangular hole in the middle of the object.
L. 5.7 cm x W. >2.4 cm (*4.6 cm) x Th. 0.6-1.8 cm; hole: W. >0.5 cm (*1 cm) x Th. 0.5 cm

Cornices and mouldings

Plate LXXV.327 Cornice Find no. 3068 WOODAN-id: 23161000
Find location: Square DW-3 (Roman layer)
Wood species: *Fagus sylvatica*/Beech
Complete, but slightly damaged at one side. Profiled with a curved ledge at the top and a groove at the bottom side, it also has a vertical ledge in the middle between two incised lines.
L. 18.2 cm x W. >3.5 cm x Th. 2.1 cm; hole: Dia. 0.8 cm (after conservation)

Plate LXXV.328 Cornice Find no. 1206.1 WOODAN-id: 23143000
Find location: Square DM-13 (Roman layer)
Wood species: *Fagus sylvatica*/Beech
Complete, but damaged at one side of the dovetail. In profile, the object is more or less triangular. The front face has a slightly curved upper side which is also the thickest part. Below the curved section is a concave part which evolves into a narrow, convex ridge with a decorative incised line. The lower part has a flat finish and a carefully chamfered narrow rim. The narrow sides and the back side are smoothly finished.
L. 12 cm x W. 4 cm x Th. 2.7 cm

Plate LXXV.329 Moulding Find no. 4020t WOODAN-id: 22326000
Find location: Square DO-16 (Roman layer)
Wood species: *Quercus* spp./Oak
Sawn-off piece of a moulding profiled with three recessed grooves. It is slightly deformed due to shrinkage.
L. 9.7 cm x W. 2.3 cm x Th. 2.7 cm

Plate LXXV.330 Cornice Find no. 1407.1 WOODAN-id: 23145000
Find location: Square DR-11 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Almost complete piece of furniture with a dovetail on top. The joint was sawn and the saw has gone too far, which is illustrated by a deep, non-functional saw cut under the joint. The front face has a thick, curved upper side which flattens towards the underside. At the top of the piece, below the dovetail, the piece continues in a straight line up to a decorative groove, then proceeds to a curved shape that turns into a concave section. There is a protruding ledge which becomes thinner and narrower towards the bottom of the cornice.
L. 11.8 cm x W. 5.6 cm x Th. 0.9-3.6 cm; dovetail: Ht. 3.9 cm x W. 0.8-2.4 cm

Plate LXXV.331 Moulding Find no. 3367 WOODAN-id: 23173000
Find location: Square CF-20 (Roman layer)
Wood species: *Alnus* spp./Alder
Moulding of radially split stem wood, triangular in cross-section and with a profiled bevelled face. The back side and narrow sides are smoothly finished. The object was probably the rim of the pediment of a house altar or shrine (*aedicula*).
L. 6.7 cm x W. 3 cm x Th. 2-3 cm

Plate LXXVI.332 Cornice Find no. 4166 WOODAN-id: 22512000
Find location: Square DF-19 (Roman layer)
Wood species: *Quercus* spp./Oak
Cornice, rectangular in cross-section, with profiled decorative grooves. The object has been deformed by shrinkage.
L. 9.5 cm x W. 3.3 cm x Th. 5.6 cm

Plate LXXVI.333 Cornice Find no. 4253 WOODAN-id: 22599000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Cornice, triangular in cross-section. The front face is profiled with five deep grooves for decorative purposes. The back has an irregularly curved shape.
L. 3.6 cm x W. 4.1 cm x Th. 0.4-2.2 cm

Plate LXXVI.334 Cornice Find no. 4205 WOODAN-id: 22551000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Complete. The object is triangular in profile and has a thicker, curved ridge on the upper side and a concave, chamfered underside. A remarkable detail is a dowel on one side which does not run through the entire thickness of the wood.
L. 5.7 cm x W. 4 cm x Th. 1.2-3.6 cm; dowel: Dia. 0.4 cm

Plate LXXVI.335 Moulding Find no. 1928.1 WOODAN-id: 23154000
Find location: Square EB-6 (layer unknown)
Wood species: *Fagus sylvatica*/Beech
Fragment of a slat with one recessed edge, made from radially split knotty wood. The object is weathered and the edges are damaged.
L. >32 cm x W. 7 cm x Th. 2 cm (after conservation)

Plate LXXVI.336 Moulding Find no. 868 WOODAN-id: 23137000
Find location: Square DF-11 (Roman layer)
Wood species: not identified
Part of a moulding with a profiled face on the front side and a tenon on the back side. The object is partly damaged; one end is broken.
L. >3 cm x W. 4.1 cm x Th. 4 cm

Plate LXXVI.337 Moulding Find no. 607 WOODAN-id: 23136000
Find location: Square CX-11 (Roman layer)
Wood species: not identified
Profiled board, rectangular in cross-section and with three gouged decorative grooves. The back side is flat.
L. 6.8 cm x W. 11 cm x Th. 1.7-1.8 cm

Ornamental slats

Plate LXXVII.338 Ornamental slat Find no. 1710.1 WOODAN-id: 23148000
Find location: Square DW-12 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Incomplete, narrow slat with both ends broken and damaged at one corner of one of the broken ends. On the upper face there is a pattern consisting of gouged vertical lines and crosses: three vertical grooves, then a cross, again three grooves, and again a cross. The distances between each of the first three vertical lines differ from those between the other three lines. The back side of the slat is smoothly finished but not decorated. The slat is tinted brownish-red and was originally painted.
L. >19.8 cm x W. 6.2 cm x Th. 1.3-2 cm; grooves: W. 0.3 cm x D. 0.2 cm

Plate LXXVII.339 Ornamental slat Find no. 3032 WOODAN-id: 23158000
Find location: Well 1977-2
Wood species: *Buxus* spp./Boxwood
Fragment of a slat with three longitudinal grooves and three imprints of decoratively-worked nail heads. One of the imprints overlaps one of the grooves. On the back side are saw marks left from the production process. It is unclear whether the object is complete in length, or whether the ends have been broken.
L. 12.8 cm x W. 3.5 cm x Th. 1.3 cm (after conservation)

Stretchers at ground level

Plate LXXVIII.340 Board Find no. 4018g WOODAN-id: 22261000
Find location: Square unknown (layer unknown)
Wood species: *Alnus* spp./Alder
Fragment of the end of a board with one sloping and one straight side and with an imprint of a trapezoidal end of a wooden element that stood vertically on the board. The board is made of radially cleaved stem wood. Perhaps this board was part of a bench and served as a stretcher at ground level.
L. >6.6 cm x W. 3.2 cm x Th. 1.7 cm

Plate LXXVIII.341 Board Find no. 3401 WOODAN-id: 23118000
Find location: Square unknown (layer unknown)
Wood species: *Fagus sylvatica*/Beech
Fragment of a board with an oval recess, possibly from a furniture leg. This fragment probably belongs to a board that served as a stretcher at ground level.
L. >10 cm x W. 5 cm x Th. 4.2 cm; imprint: L. 4.6 cm x W. 2.5 cm

Plate LXXVIII.342 Board Find no. 1815.1 WOODAN-id: 23100000
Find location: Square DZ-8 (Roman layer)
Wood species: *Alnus* spp./Alder
Fragment of a board, rectangular in cross-section. The edges and corners are slightly rounded through erosion. Perhaps the object can be interpreted as part of a stretcher at ground level or as a board under tent poles.
L. >7 cm x W. 4 cm x Th. 1.6 cm

Plate LXXVIII.343 Board Find no. 1815.2 WOODAN-id: 23101000
Find location: Square DZ-8 (Roman layer)
Wood species: *Alnus* spp./Alder
Rectangular board with an oval impression of a vertical wood element; the edges and corners are slightly rounded. Perhaps this piece was part of a stretcher at ground level or of a board under tent poles.
L. 5.5 cm x W. 4 cm x Th. 0.8 cm

Battens with a notch

Plate LXXVIII.344 Batten with a notch Find no. 78.1 WOODAN-id: 23121000
Find location: Square BR-9 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Object with a rectangular notch on one side. One end is mitred sawn, the other is broken.
L. 14.7 cm x W. 5 cm x Th. 2 cm; notch: L. 4 cm x D. 2.8 cm (after conservation)

Plate LXXVIII.345 Batten with a notch Find no. 4013q WOODAN-id: 22189000
Find location: Square unknown (layer unknown)
Wood species: *Alnus* spp./Alder
Object with one flat and one curved side and a triangular notch in the curved side. One end is broken. Initially, the object had two symmetrically worked ends. The object is weathered.
L. >13 cm (*16 cm) x W. 2.7 cm x Th. 1.5-2 cm

Plate LXXVIII.346 Batten with a notch Find no. 1167.1 WOODAN-id: 23122000
Find location: Square DL-17 (Roman layer)
Wood species: Coniferous wood
Completely dried out and deformed object. The shape would initially have been symmetrical, with one curved and one straight side. On the curved side there is a notch with two sloping sides.
L. 11.2 cm x W. 2.4 cm x Th. 1 cm; notch: L. >1 cm x D. >0.7 cm (dimensions after deformation)

Plate LXXVIII.347 Batten with a notch Find no. 1525.1 WOODAN-id: 23123000
Find location: Square DU-2 (Dredging layer)
Wood species: *Alnus* spp./Alder
Rectangular in cross-section, an object with one curved and one straight side. On the straight side, one rectangular notch and the remains of a second one are visible. The distance between the notches is 2.8 cm. Initially, the object was worked symmetrically and had two notches with the same width; both ends were chamfered.
L. >7.2 cm (*12.2 cm) x W. 1.9 cm x Th. 0.9 cm; intact notch: L. 2.4 cm x D. 0.8 cm

Base of a wicker chair (?)

Plate LXXIX.348 Base of a wicker chair (?) Find no. 3024 WOODAN-id: 23157000
Find location: Square DU-2 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Almost complete board, probably a base for a wicker chair, with two rows of holes for the stakes of the wickerwork. One row has 14 large holes, of which two are broken, and one row has 22 small holes. The distances between the large holes are 2.7-3 cm and between the small holes, 1.6 cm. The board is damaged at both ends and partially split in the middle.
L. >38 cm x W. 4 cm x Th. 2 cm; large holes: Dia. 0.8 cm; small holes: Dia. 0.4 cm

Parts of small boxes

Plate LXXIX.349 Slat Find no. 1084.1 WOODAN-id: 23094000
Find location: Square DJ-21 (Roman layer)
Wood species: *Alnus* spp./Alder
Complete slat with two square holes at the ends; the distance between the holes is 17.5 cm.
L. 23 cm x W. 3 cm x Th. 1.7 cm; holes: W. 0.6 cm x Th. 0.6 cm

Plate LXXIX.350 Slat Find no. 3325 WOODAN-id: 23169000
Find location: Square unknown (layer unknown)
Wood species: *Buxus* spp./Boxwood
Narrow batten with one sloping and one straight edge. The sloping edge is profiled with three grooves. Both ends are original, but one is damaged. At each end is a hole with a remnant of a dowel (not identified). The distance between the holes is 6.8 cm. Presumably, the batten belonged to a box.
L. 13.3 cm x W. 1.3 cm x Th. 0.6 cm; holes/dowels: Dia. 0.4 cm

Plate LXXIX.351 Removable insert of a box Find no. 296.1 WOODAN-id: 23134000
Find location: Square CI-3 (Roman layer)
Wood species: not identified
Rectangular insert of, for example, a box or piece of furniture. Both narrow ends are fitted on one corner with a tenon for a hinged mechanism. The insert includes a smaller and a larger compartment.
L. 15 cm x W. 3 cm x Th. 2.1 cm; compartments: L. 3.5 cm x W. 2.5 cm x D. 1.4 cm and L. 6.8 cm x W. 2.5 cm x D. 1.4 cm; tenons: L. 1.2 cm and L. 0.9 cm

Plank of a chest

Plate LXXX.352 Plank of a chest Find no. 936 WOODAN-id: 23139000
Find location: Square DG-10 (Roman layer)
Wood species: *Quercus* spp./Oak
Fragment of a radially split plank. The plank has one slanted end and the other end is broken. Remnants of an iron sheet, ten iron nails, and several empty nail holes were documented shortly after the plank was excavated. In two larger oval-rectangular holes on the edge, leather fragments were present at the time of excavation. After conservation, there are no remnants left of the iron sheet nor of the leather or nail remains. Presumably, the plank belonged to a leather-covered chest with a decorative trimming made of nail heads.
L. >56 cm x W. >9.5 cm x Th. 3.1-3.4 cm

Boards of seats and of a lid or a door

Plate LXXXI.353 Board Find no. 3364 WOODAN-id: 23130000
Find location: Square unknown (layer unknown)
Wood species: *Fagus sylvatica*/Beech
Board made of radially split stem wood with a small knot and with one slanted and one rounded end. The edges of the board are damaged. It is possible that this board was the seat of a stool.
L. >43 cm x W. >17 cm x Th. 2.7 cm

Plate LXXXI.354 Board Find no. 3151 WOODAN-id: 23165000
Find location: Square unknown (layer unknown)
Wood species: *Abies alba*/Silver fir
Fragment of a board made of radially split stem wood. One end is straight and one end is broken off. The board has a rectangular, slightly tapered hole 10 cm from the original end. This board is probably a reused stave and could have been used as seat for a stool or bench.
L. >26 cm x W. 18 cm x Th. 2.8 cm; hole: W. 4.7 cm x Th. 2 cm (top) and W. 3.5 cm x Th. 3.5 cm (bottom)

Plate LXXXI.355 Lid or door Find no. 3135 WOODAN-id: 23164000
Find location: Square CR-16 (Roman layer)
Wood species: *Alnus* spp./Alder
Part of a board with one straight end and one broken end. At the straight end there is a knob-like protrusion, probably used as a handle for lifting or closing. On the back side, there are two incised marking lines, one vertical and one horizontal, which cross each other at 5 cm from the corner of the board. The board was made of a tangentially sawn stem and was probably part of a chest lid.
L. >14 cm x W. 9 cm x Th. 1.3 cm; handle: Ht. 3 cm x W. 1.4 cm x Th. 1.4 cm

Wall hooks

Plate LXXXI.356 Hook Find no. 3107 WOODAN-id: 23162000
Find location: Square CP-4/5 (layer unknown)
Wood species: *Sambucus* spp./Elder
Almost complete object, made from a naturally formed, right-angled branch. The outer sides of the hook are flat. One end is chamfered and the other end is broken.
L. >26 cm x W. 3.5 cm x Th. 2.8 cm and L. >24.5 cm x Dia. 2.1 cm

Plate LXXXI.357 Hook Find no. 3359 WOODAN-id: 23172000
Find location: Square DS-10 (Roman layer)
Wood species: *Juniperus communis*/Juniper
Complete object with a right angle, made from a naturally shaped branch; the outer edges are finished flat. One end of the hook could be put behind a beam; something could be hung on the other end.
L. 26 cm x W. 2.6 cm x Th. 2.4 cm and L. 17.8 cm x W. 2.2 cm x Th. 0.7-2.0 cm

Interior boards or boards from cupboard doors or hatch covers

Plate LXXXII.358 Board Find no. 4011a WOODAN-id: 22121000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
A radially cleaved board from stem wood, with both ends broken. Approximately in the middle of the board there is a nail hole surrounded by a black discolouration where the tannin from the oak has reacted with the metal. On one of the narrow sides there is sap wood present on the largest width of the board. After excavation, the five fragments of the board were glued together. Glue residue has appeared between the glue joints.
L. >36 cm x W. 6.7 cm x Th. 0.2-0.5 cm (after conservation)

Plate LXXXII.359 Board Find no. 4641 WOODAN-id: 23478000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Fragments of a radially cleaved board from stem wood with a fractured nail hole on one side. The ends are not preserved. Two fragments fit together; a third fragment cannot be fitted in.
L. >25.5 cm x W. 6.8 cm x Th. 0.2-0.5 cm (after conservation)

Plate LXXXII.360 Board Find no. 4642 WOODAN-id: 23479000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Fragmentarily preserved board from a radially cleaved oak log. One of the fragments has an original straight end, preserving one rounded corner. At approximately 2 cm above the end a nail hole is present.
L. >34 cm x W. 6.3 cm x Th. 0.2-0.5 cm (after conservation)

Plate LXXXII.361 Board Find no. 4643 WOODAN-id: 23480000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Five fragments of a radially cleaved board from stem wood. The ends are not preserved. At some point after excavation, the board was glued. Traces of this are visible between the glued edges.
L. >26 cm x W. 5.6-5.9 cm x Th. 0.2-0.5 cm (after conservation)

Plate LXXXII.362 Board Find no. 4644 WOODAN-id: 23481000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Fragments of a radially cleaved board with no ends preserved.
L. >32 cm x W. 6.5 cm x Th. 0.2-0.5 cm (after conservation)

Plate LXXXII.363 Board Find no. 4001a WOODAN-id: 22001000
Find location: Square CD-9 (layer unknown)
Wood species: *Quercus* spp./Oak
Fragments of a radially cleaved board; the ends are not preserved.
L. >31 cm x W. 6.4 cm x Th. 0.2 cm (after conservation)

Plate LXXXIII.364 Board Find no. 4435 WOODAN-id: 22782000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Fragments of a thin board made of radially split stem wood. The dark stripes visible on the board are not saw marks but traces of the cleaving process. The ends are not preserved.
L. >34.2 cm x W. 5.6 cm x Th. 0.4-0.6 cm

Plate LXXXIII.365 Board Find no. 4459 WOODAN-id: 22806000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Fragments of a thin board made of radially split stem wood.
L. >37 cm x W. 4 cm x Th. 0.2 cm

Plate LXXXIII.366 Board Find no. 4013v WOODAN-id: 22194000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Fragments of a thin board made of radially split stem wood.
L. >26 cm x W. 3.8 cm x Th. 0.2 cm

Plate LXXXIII.367 Board Find no. 4463 WOODAN-id: 22810000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Fragments of a thin board made of radially cleaved stem wood and preserving one slightly rounded end.
L. >7.7 cm x W. 5.2 cm x Th. 0.2-0.3 cm

Fenestration

Muntin bars

Plate LXXXIV.368 Muntin bar Find no. 1956 WOODAN-id: 23124000
Find location: Square EC-? (layer unknown)
Wood species: indeterminable
Fragment of a narrow slat with broken ends. The slat is made of split wood and has a groove over the entire length of both narrow sides. The object is elliptical in cross-section.
L. >9.2 cm x W. 2.1 cm x Th. 1.4 cm; grooves: W. 0.15-0.2 cm x D. 0.5 cm

Plate LXXXIV.369 Muntin bar Find no. 3030 WOODAN-id: 23125000
Find location: Well 1977-2
Wood species: *Abies alba*/Silver fir
Fragment of a slat with one broken end and one intact preserved end. The slat has a groove on both narrow sides. The object is elliptical in cross-section.
L. >12.2 cm x W. 2.4 cm x Th. 1.3 cm; groove: W. 0.2-0.3 cm x D. 0.4 cm

Plate LXXXIV.370 Muntin bar Find no. 4558 WOODAN-id: 22905000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Short fragment of a slat with both ends broken. The slat is made from split wood, with one intact groove and one damaged groove. The object is deformed. It was probably elliptical in cross-section.
L. >5.2 cm x W. >2 cm x Th. 1.4 cm; groove: W. 0.3 cm x D. 0.8 cm

Domestic Utensils

Carved bowls

Plate LXXXV.371 Bowl Find no. 940.1 WOODAN-id: 23258000
Find location: Square DG-31 (Roman layer)
Wood species: *Alnus* spp./Alder
Piece of a shallow bowl with a small fragment of a broken handle on each side. On one of the long sides, just below the rim, a cylindrical hole has been drilled. The bowl was hand-carved from a section from one half of a stem. The bottom of the inside is charred.
L. 22 cm (without handles) x W. 18 cm x Ht. 8 cm x Th. 0.5-1.2 cm; hole: Dia. 0.4 cm

Plate LXXXV.372 Bowl Find no. 3385 WOODAN-id: 23275000
Find location: Square EF-12 (Dredging layer)
Wood species: *Alnus* spp./Alder
Almost complete bowl which is missing a part of the long side and one of the two handles. The preserved handle has a knob-like shape and appears to be carved out of the wall of the bowl two centimetres below the rim. The bowl is carved from half of a stem.
L. 25 cm x W. 22 cm x Ht. 6 cm x Th. 1.2-2 cm

Plate LXXXVI.373 Bowl Find no. 4470 WOODAN-id: 22817000
Find location: Square CU-3 (Roman layer)
Wood species: *Alnus* spp./Alder
Approximately half of the upper side of a bowl with a handle on each side. The shape of the bowl is oval, and the handles are angular. The handles have a decorative finish consisting of two concave curves on the ends. Part of the rim is charred.
L. 24 cm (body) and 30 cm (body with handles) x W. 24 cm x Ht. 7 cm x Th. 1-2.2 cm

Plate LXXXVII.374 Bowl Find no. 3343 WOODAN-id: 23274000
Find location: Square DA-12 (Roman layer)
Wood species: *Alnus* spp./Alder
Fragment of a semi-circular handle and part of the rim of a carved bowl. The handle appears to be at the same level as the rim. With some caution, the original appearance of the bowl can be deduced. This is probably the same type of bowl as the other four bowls made from alder: made from half of a stem of alder, with an oval, shallow shape, and with handles on either side of the short sides.
L. >20 cm (*40 cm) x W. >10.5 cm (*22 cm) x Ht. 6 cm x Th. 0.7-1.8 cm

Plate LXXXVIII.375 Bowl Find no. 4012h WOODAN-id: 22154000
Find location: Square CH-14 (Roman layer)
Wood species: *Alnus* spp./Alder
Fragment of the base of a bowl. Judging by the thickness and the width of the fragment, it must have been quite a large bowl. Traces of the work of a chisel can still be recognised on the inner and outer surfaces. One side of the fragment is slightly charred.
The dimensions relate to the surviving piece of wood; the drawing of the shape is a reconstruction, and the initial shape remains unclear.
L. 20.6 cm x W. 9.6 cm x Th. 2.4 cm; reconstruction: Ht. 5 cm x Dia. 24.4 cm

Plate LXXXIX.376 Bowl Find no. 1128.1 WOODAN-id: 23259000
Find location: Square DK-25 (Roman layer)
Wood species: cf. *Acer pseudoplatanus*/Sycamore maple
Half of an oval bowl with one half-broken and one completely broken handle. Underneath each handle there is a rib which has an elongated triangular shape and is carved from the bowl. The handles, also triangular in shape, appear to sit at an equal height with the rim. Based on the preserved part of one of the handles, the handles were initially slightly bent downwards. Immediately after excavation, tool marks of a chisel were clearly discernible but these vanished following conservation.
L. >24 cm (*26 cm) x W. >10.5 cm (*20 cm) x Ht. 7.5 cm x Th. 1-2.3 cm; rib: L. 7.6 cm x W. 0.2-1.2 cm x Th. 0.2-0.8 cm

Lathe-turned bowls

Plate XC.377 Bowl containing bitumen Find no. 1572.1 WOODAN-id: 23262000
Find location: Square DU-19 (Roman layer)
Wood species: *Acer pseudoplatanus/platanoides*, Sycamore maple/Norway maple
Spherical bowl curving inwards towards the rim. The design is quite simple: the base has no foot ring and the rim is not facetted. Inside the bowl there is a black, shiny, hard resin. The resin has been determined to be bitumen, a natural petroleum tar. The bowl is deformed due to shrinkage.
Dia. 11.8 x Ht. 5.8 cm x Th. 0.3 cm

Plate XCI.378 Bowl Find no. 352.1 WOODAN-id: 23254000
Find location: Square CM-13 (Roman layer)
Wood species: *Acer pseudoplatanus/platanoides*, Sycamore maple/Norway maple
Half of a lathe-turned bowl with a moulded rim and with sides sloping inwards towards the base with a foot ring. The exterior profile is thickened over an area of 1.1 cm below the rim; the interior profile has two shallow grooves below the rim at 1.2 and at 2.3 cm. Initially, remnants of a zig-zag pattern made with a copper alloy strip inlaid were present in the rim. After conservation, the strip is no longer present and the object has become deformed. The bowl's ceramic counterpart is the terra sigillata bowl of the Haltern 10 type.
Dia. 12 cm x Ht. 6.5 cm x Th. 0.3-0.4 cm (wall) and Th. 0.8-0.9 cm (base with foot ring); foot ring: Dia. 5.5 cm

Plate XCII.379 Bowl Find no. 1995.1 WOODAN-id: 23266000
Find location: Square ED-14 (Roman layer)
Wood species: *Buxus* spp./Boxwood
Face-turned bowl with a round base, and on each side, a pierced, triangular broken ear. The rim is moulded to fit a lid with which the bowl could originally be closed. The bowl resembles ceramic colour-coated cups from Lyon and, in particular, from Spain.
Dia. 7.6 cm x Ht. 4.8 cm x Th. 0.2-0.8 cm (body) and Th. 1 cm (base)

Plate XCII.380 Bowl Find no. 3308 WOODAN-id: 23272000
Find location: AWN excavation, trench 9-1 (Roman layer)
Wood species: *Buxus* spp./Boxwood
Fragment of a delicate, face-turned bowl with a handle in the shape of an initially pierced, triangular ear. The tip of the handle is broken, leaving two protrusions where the handle originally began. On the other side of the bowl there was, presumably, a second ear. The exterior profile has straight sides to 1.3 cm below the rim, from which point the sides curve inwards towards a flat base. This bowl shows strong similarities to ceramic colour-coated cups from Lyon and from Spain (as in the case with find number 1995.1).
Dia. 7.5 cm x Ht. >3 cm x Th. 0.3 cm

Plate XCII.381 Bowl Find no. 298 WOODAN-id.: 23253000
Find location: Square CI-3 (Roman layer)
Wood species: not identified
Base of a turned bowl with a foot ring expanding into a globular body.
Dia. >6.7 cm x Ht. >0.8 cm x Th. 0.3-0.5 cm

Pyxides

Plate XCIII.382 Spherical *pyxis* Find no. 3140 WOODAN-id: 23277000
Find location: AWN excavation 1978, dumping ground next to trench 9-1 (probably from Roman layer)
Wood species: *Buxus* spp./Boxwood
Round, spindle-turned *pyxis* with a flat base. The exterior profile has a decorative groove with one fine line above it and one below; the interior profile is shallowly ribbed with four grooves below the rim. The sides are thin-walled and run inwards at the top. The bottom is quite thick, which will have given the *pyxis* more stability. The *pyxis* has two grooves incised on the base. In the central point of the base, there is a poppet mark from the point of a holding device of a lathe. Fine traces of a chisel are visible on the inside and outside of the bowl. Initially, the *pyxis* could be closed with a small lid. However, a groove for the lid is not recognisable on the damaged rim. This *pyxis* will have been used for cosmetics or a medicinal ointment. After conservation, the *pyxis* is deeply split on one side.
Dia. 4.1 cm (widest part) and Dia. 3.2 cm (opening) x Ht. 3.9 cm x Th. 0.15 cm (body) and Th. 1.8 cm (base)

Plate XCIV.383 Lid of a *pyxis* Find no. 555.1 WOODAN-id: 23276000
Find location: Square CW-21 (Roman layer)
Wood species: *Buxus* spp./Boxwood
Three quarters of a flat lid of a *pyxis* which was face-turned on a lathe. Two thin, circular lines are incised along the edge and near the centre which surrounds two tiny poppet marks from the point of the holding device of a lathe. The exterior profile has a ledge which broadened the lid on the top. Beneath the ledge, the sides are straight. The lid was probably made to be dropped over the rim of the top of a cylindrically turned *pyxis*.
Dia. 5.5 cm x Ht. 1.2 cm x Th. 0.3-0.5 cm

Discs and lids

Plate XCV.384 Disc Find no. 4469 WOODAN-id: 22816000
Find location: Square DG-8 (Dredging layer)
Wood species: *Alnus spp.*/Alder
Three fourths of a disc made of radially split stem wood.
Dia. 9.8 cm x Th. 0.9 cm

Plate XCV.385 Disc Find no. 1005 WOODAN-id: 233306000
Find location: Square DI-11 (Roman layer)
Wood species: not identified
Approximately half of a disc made of radially split stem wood. The rim of the object is thicker than the inner part. The diameter of the disc was initially 9.5 cm.
L. >8 cm (Dia. *9.5 cm) x W. 4.9 cm x Th. 0.8-1 cm

Plate XCV.386 Disc Find no. 585.1 WOODAN-id: 23305000
Find location: Square CW-10 (Roman layer)
Wood species: *Quercus* spp./Oak
Complete; circular disc with a straight rim, made of radially split stem wood.
Dia. 10.6 cm x Th. 0.6 cm

Plate XCV.387 Disc Find no. 4011b WOODAN-id: 22122000
Find location: Square DF-10 (Roman layer)
Wood species: *Quercus* spp./Oak
Three fourths of a disc made of radially split stem wood with wide annual rings. Half of the disc is from sapwood. The disc is roughly carved, as can be seen on the angular sides.
Dia. 10.5 cm x Th. 0.2-1.1 cm

Plate XCVI.388 Perforated disc Find no. 4137 WOODAN-id: 22483000
Find location: Square CG-17 (Roman layer)
Wood species: *Ulmus* spp./Elm
Three fourths of a disc with a hole in the centre, made of radially split stem wood. The edge is slightly chamfered. After conservation, the object dried out and shrank. This may have been the lid of a churn.
Dia. 15 cm x Th. 1.5 cm; hole: Dia. 4 cm

Plate XCVI.389 Perforated disc Find no. 2095.1 WOODAN-id: 23308000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Fragment of a disc with a hole in the middle. The object is slightly chamfered along the edge. The reconstructed diameter is approximately 18 cm. The object strongly resembles the lid of a churn.
L. >11.5 cm (Dia. *18 cm) x W. >5.8 cm x Th. 3 cm; hole: Dia. 3 cm (dimensions of the fragment)

Plate XCVI.390 Perforated disc Find no. 1643.1 WOODAN-id: 233307000
Find location: Square DV-9 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Almost three fourths of a disc with a hole in the middle. The sides are slightly tapered.
Dia. 11.3 cm x Th. 1.4 cm; hole: Dia. 3.9 cm

Plate XCVII.391 Perforated disc Find no. 3218 WOODAN-id: 23310000
Find location: Square DW-3 (Roman layer)
Wood species: *Abies alba*/Silver fir
Approximately half of a disc with one hole drilled off-centre. The disc is made of split stem wood; the surface and the edge are smoothly worked. Presumably, there was a second hole next to the first one. A string could be threaded through the holes to serve as a handle with which the lid could be lifted.
Dia. 10.5 cm x Th. 1.8 cm; hole: Dia. 1.1-1.2 cm

Plate XCVII.392 Disc Find no. 4012j WOODAN-id: 22156000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Half of a disc made of radially split wood.
Dia. 8.2 cm x Th. 1 cm

Plate XCVII.393 Lid Find no. 3326 WOODAN-id: 23311000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Complete lid of a vessel, slightly tapered towards the bottom, probably to fit in the opening of a wooden vessel or a vessel of another material such as pottery. On the top there is a knob which could be used as a handle to lift the lid. Initially, the lid was circular but, due to shrinkage, it is now oval in cross-section.
Dia. 5.8 cm x Ht. 2.2 cm; knob: Ht. 0.8 cm x Dia. 1.2 cm

Plate XCVII.394 Lid Find no. 3019 WOODAN-id: 23156000
Find location: Square DT-3 (Dredging layer)
Wood species: *Acer spp.*/Maple
Three fourths of a lid with a profiled rim. The widest part is the flat bottom side. Towards the top, the object narrows gradually through incised grooves that mark the transition to a narrower part. In the middle there is a hole from the spill of a lathe.
Dia. 6 cm (bottom) and Dia. 4.5 cm (top) x Ht. 1.5 cm; hole: Dia. 0.5 cm

Plate XCVII.395 Lid Find no. 3028 WOODAN-id: 23309000
Find location: AWN excavation, trench 9-1 (Roman layer)
Wood species: *Fagus sylvatica*/Beech
Almost complete, oval-shaped disc with part of the edge damaged. Two holes are drilled at the rim along the broad sides. The disc is made of radially split stem wood.
L. 6.6 cm x W. 4.5 cm x Th. 0.2 cm; holes: Dia. 0.2 cm and Dia. 0.3 cm

Spoons

Plate XCVIII.396 Spoon Find no. 3316 WOODAN-id: 23273000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Almost complete spoon with a shallow curved bowl. A piece of the tapered handle from the lower part of the object (just above the beginning of the handle) is missing. From the nearly straight shoulders the bowl evolves into a half-rounded rim. The object is made from radially split wood.
L. >17 cm (*24 cm) x W. 4.7 cm x Th. 0.8 cm; handle: L. >11.5 cm x W. 1 cm x Th. 0.7 cm; bowl: L. 4.7 cm x W. 4.6 cm x Th. 0.2-0.3 cm

Plate XCVIII.397 Spoon Find no. 1912.1 WOODAN-id: 23263000
Find location: Square EB-4 (Roman layer)
Wood species: *Alnus* spp./Alder
Almost complete, carved spoon; a small piece of the handle is missing. The tear-shaped bowl of the spoon is perforated. Clear traces of tool marks are present in the inside of the bowl. These are presumably half-rounded cuts of the gouge with which the bowl was hollowed. Considering the roughness of the inside of the bowl, its manufacture does not seem to have been finished. On the other hand, finishing it may not have been necessary for its use. The spoon could still fulfil its function, for example, for serving cooked eggs or small fruits such as olives.
L. >12.5 cm x W. 6.3 cm x Th. 2.5 cm; handle: L. >5.5 cm x W. 1.2-2.2 cm x Th. 0.8-1.6 cm; bowl: L. 7 cm x W. 6.5 cm x Th. 2 cm; hole: Dia. 1.2 cm; tool marks of gouge: W. approximately 1.2 cm

Plate XCVIII.398 Spoon Find no. 3272 WOODAN-id: 23271000
Find location: Square DS-? (layer unknown)
Wood species: *Quercus* spp./Oak
Shallow bowl of a spoon with the remains of a handle. The object is carved from a piece of roundwood and roughly worked.
L. >9 cm x W. 4.7 cm x Th. 1.7 cm; bowl: L. 7.6 cm x W. 4.1 cm x Th. 0.8 cm

Plate XCVIII.399 Spoon Find no. 4002e WOODAN-id: 22031000
Find location: Square BO-8 (Roman layer)
Wood species: *Fagus sylvatica*/Beech
Perforated flat handle, rectangular in cross-section and with a rounded end. One side is straight, the other curves concavely towards a probably asymmetrical bowl which is no longer present.
L. >9.4 cm x W. 2-4 cm x Th. 0.4-0.6 cm; hole: Dia. 0.4 cm

Plate XCVIII.400 Handle of a spoon or a spatula Find no. 468.1 WOODAN-id: 23255000
Find location: Square CR-26 (Roman layer)
Wood species: *Fagus sylvatica*/Beech
Part of the handle of a spatula with sharp-edged sides and a hole at the rounded end. The shaft widens below the rounded end.
L. >12 cm x W. 3 cm x Th. 0.5 cm; hole: 1.2 cm (after conservation); shaft: L. >6.5 cm

Spatulas (*spatulae*)

Plate XCIX.401 Spatula Find no. 1359 WOODAN-id: 23260000
Find location: Square DP-13 (Roman layer)
Wood species: not identified
Almost complete spatula with a long, slender handle which widens towards the shoulders of the flat and rectangular blade. The handle is an angular oval in cross-section.
L. >36.3 cm x W. 1.6-3.1 cm x Th. 1.2 cm; blade: L. 9 cm x W. 3.1 cm x Th. 0.1-1 cm

Plate XCIX.402 Spoon-like spatula Find no. 234.1 WOODAN-id: 23252000
Find location: Square CA-10 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Spatula handle which slightly tapers towards the upper side and which terminates in a narrow, tray-like end. A small fragment of the end of the tray no longer fits.
L. >37.4 cm x W. 2-3.5 cm x Th. 1.7-3 cm; handle: L. 23.7 cm x W. 2.1-3.2 cm x Th. 1.7-2.5 cm; tray-like end: L. 13.1 cm x W. 2.5-3.5 cm x Th. 3 cm x D. 2.9 cm

Plate XCIX.403 Spatula Find no. 3105 WOODAN-id: 23269000
Find location: Square CP-4/5 (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Spatula, rectangular in cross-section, widening towards the beginning of a somewhat asymmetrical blade which is slightly curved inwards. The end of the tapered handle is pointed. The object is deformed due to shrinkage.
L. >31 cm x W. 4.5 cm x Th. 1.7 cm; blade: L. 9 cm x W. 4.5 cm x Th. 0.5-1 cm; handle: L. 22 cm x W. 0.5-1 cm x Th. 0.3-1.7 cm

Plate C.404 Spatula Find no. 527.1 WOODAN-id: 23256000
Find location: Square CT-22 (Roman layer)
Wood species: *Abies alba*/Silver fir
Incomplete spatula; parts of the handle and the blade are missing. The spatula has a slightly tapered handle which widens towards the sloping shoulders of the rectangular, flat blade. One edge of the blade is damaged, making it look asymmetrical, as if one side is wider than the other. Initially, the blade was symmetrical. Traces of wear indicate that the blade was used on both sides, probably to lift or spread food. The handle is oval in cross-section.
L. >28.5 cm x W. 1.3-3 cm x Th. 1.8 cm; blade: L. >12.3 cm x W. 2.2-3 cm x Th. 0.2-1.4 cm

Plate C.405 Spatula Find no. 1936.1 WOODAN-id: 23264000
Find location: Square EB-8 (Roman layer)
Wood species: *Alnus* spp./Alder
Handle of a spatula with sloping shoulders and the beginning of a rectangular blade. The object is made of radially split wood and is a rounded rectangle in cross-section.
L. >18.8 cm x W. 2.2-2.4 cm x Th. 0.4-1.4 cm; handle: L. >13.2 cm x W. 2.2 cm x Th. 1.4 cm

Plate C.406 Spatula Find no. 933.1 WOODAN-id: 23257000
Find location: Square DG-9 (Roman layer)
Wood species: *Quercus* spp./Oak
Incomplete spatula, baking shovel or peel; the handle is broken. The carefully worked object retains a part of its handle and has two sloping shoulders which evolve into a flat blade which widens towards the straight rim. The object is made of a radially split stem with sapwood and had dried and shrunk before conservation.
L. >16 cm x W. 9.5 cm x Th. 0.5 cm; blade: L. >11.6 cm x W. 9.5 cm x Th. 0.2-0.5 cm; shaft: L. >4.4 cm x W. 2 cm x Th. >0.3 cm (after conservation)

Plate C.407 Spatula Find no. 3022 WOODAN-id: 23268000
Find location: AWN excavation, trench 9-2, feature 96 (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Blade of a peel or spatula with a remnant of a handle which is broken above the sloping shoulders. One edge of the blade is damaged (probably a fracture) and has been reworked. The object is made of radially split stem wood.
L. >15.8 cm x W. 4.5 cm x Th. 0.8-1 cm

Plate C.408 Spatula Find no. 1395.1 WOODAN-id: 23261000
Find location: Square DQ-16 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Complete spatula with a tapered, slightly curved handle and an asymmetrical blade which has one straight and one curved edge. The end of the blade is straight. The object is made of radially split wood and is irregularly rounded in cross-section.
L. 18.8 cm x W. 4.5 cm x Th. 1.1 cm; handle: L. 12.6 cm x W. 0.4-2.1 cm x Th. 0.5-1.1 cm

Knives

Plate CI.409 Knife Find no. 1372 WOODAN-id: 23410000
Find location: Square DQ-10 (Roman layer)
Wood species: not identified
Knife with a slightly tapered handle leading towards a carved butt. Only a drawing exists of the knife. Therefore, the description is based on the drawing. A remnant of the iron tang was inserted 5.3 cm deep into the handle. The tanged blade was fixed with two clinch nails. The tang was also fastened with a clinch nail at 0.5 cm above the beginning of the handle. Another clinch nail, just above the end of the tang, was damaged and protruded from one side of the handle.
L. 26 cm (with blade) x W. 2-2.6 cm x Th. 1.8 cm; handle: L. 16.3 cm x W. 2.1 cm x Th. 1.8 cm (butt) and W. 2.7 cm x Th. 1.8 cm (beginning of handle)

Plate CI.410 Knife Find no. 3302 WOODAN-id: 23411000
Find location: Square DC-13 (layer unknown)
Wood species: not identified
Knife with a straight handle, almost round in cross-section, with a hook-like butt at the end and a shallow ledge at the bolster. It has not been possible to identify the species after conservation.
L. >15 cm (with remnants of the blade); handle: L. 8 cm x W. 2.3 cm x Th. 2 cm

Plate CI.411 Knife Find no. 5099-103 (ADNH) WOODAN-id: 23412000
Find location: AWN excavation, Velsen 2, trench D, square P-13
Wood species: cf. *Acer* spp./Maple
Knife with a handle that tapers from the bolster towards the butt of the handle. The handle was initially round in cross-section.
L. 13.8 cm (with remnants of the blade); handle: L. 6.8 cm x Dia. 2.1-2.5 cm

Bases of a stave bucket and of a lath-walled box

Plate CII.412 Base of a stave bucket Find no. 3112 WOODAN-id: 23270000
Find location: Square CP-4/5 (layer unknown)
Wood species: *Quercus* spp./Oak
Fragment of a circular base made of split stem wood. It is probably a base of a coopered bucket of which the reconstructed diameter of the base is approximately 23 cm.
L. 10 cm x W. 2.8 cm x Th. 0.8 cm (dimensions of fragment)

Plate CII.413 Base of a lath-walled box Find no. 1508 WOODAN-id: 23465000
Find location: Square DT-21 (Roman layer)
Wood species: not identified
Complete oval base of a lath-walled box made of radially split wood.
L. 9.7 cm x W. 4.4 x Th. 0.4 cm

Basketry

Coiled basket

Plate CIII.414 Coiled Basket Find no. 3102 WOODAN-id: 23321000
Find location: Square CM-11 (Roman layer)
Wood species: *Cytisus* spp./Broom
Eleven fragments of a basket that can no longer be reassembled to form a whole. Based on the fragments, the basket had a dense structure reminiscent of a technique used for beehive skeps. The shape of the fragments suggests that the basket originally had a pointed lower end and widened towards the top. The rim was bent slightly inwards. Initially, the diameter was approximately 20 cm and the height of the basket approximately 16 cm. For the wrapping, bundles of fibres from broom were used as cores. These are 1-2mm thick fibres which were twisted in pairs in an S-direction to create 0.6-0.8 cm thick strings. The cores were wound from the lower end to the top in a continuous spiral and were stitched together with 1 mm-thick thread. The distance between the stiches is approximately 1 cm. On the inside of the basket there is a shiny, resinous mass. Analysis of the material has shown that it is pitch, obtained through pyrogenation (distillation) of pine wood.
Ht. 6-16 cm x W. 8-16 cm x Th. 4-8 cm (fragments)

Base of wicker work

Plate CIV.415 Base of wicker work Find no. 6026-18 (ADNH) WOODAN-id: 23322000
Find location: Velsen 2, trench E, square C-12 (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Tangentially sawn board with two rectangular notches in the middle. One of the ends is damaged. At both sides of the notches, holes have been drilled along the edges. On the intact end there are seven holes; on the damaged end five of the seven holes remain. Presumably, there were stakes in these holes for the initially upward weave, and battens in the notches from a framework for a support.
L. 36.5 cm x W. 10.8 cm x Th. 2 cm; holes: Dia. 0.8-0.9 cm; notches: W. 3.6 cm x D. 2.5 cm and W. 4.3 cm x D. 3.2 cm

Wood-soled footwear

Plate CV.416 Sole Find no. 3060 WOODAN-id: 23405000
Find location: Square DZ-7 (Dredging layer)
Wood species: *Fraxinus excelsior*/Ash
Almost complete left-foot sole with rectangular stilts at the tread and the seat; the remaining heights are 0.4 cm (tread) and 0.6 cm (seat). The waisted sole has an oval hole 1.5 cm from the toe end and 1 cm from the inner edge for a strap and two holes, of which is one broken, at the beginning of the stilt under the seat. The holes are quite irregular and are larger at the upper side than at the bottom side. The stilts are clearly worn and the holes for the strap show traces of wear. Remarkable are the marks of dog bites on the sole between the two stilts at the inside edge.
L. 24.2 cm x W. 6.5 cm (tread) and W. 5.6 cm (seat) x Th. 0.4-1.7 cm; holes: W. 0.6-0.8 x Th. 0.3-0.5 cm

Plate CVI.417 Sole Find no. 3327 WOODAN-id: 23406000
Find location: Square DE-6 (Dredging layer)
Wood species: *Fagus sylvatica*/Beech
Complete right-foot sole with no stilts under the bottom. At 2.5 cm from the toe end, approximately between the big toe and the other toes, there is a slightly sloping, round hole. The upper side is smoothly finished; the bottom has a sharp edge and shows no traces of wear.
L. 18.6 cm x W. 4.8 cm (seat) and W. 6.8 cm (tread) x Th. 2 cm; hole: Dia. 1.4 cm

Plate CVI.418 Sole Find no. 398 WOODAN-id: 23407000
Find location: Square CO-6 (Roman layer)
Wood species: not identified
Sole for a left foot. There are two triangular-shaped stilts under the tread and a curved stilt along the edge of the seat (the height including the thickness of sole is 2 cm). The height of the stilts under the tread is 1.5 cm (and including the thickness of the sole 2.3 cm). The toe end of the waisted sole shows some damage. There are three holes for a strap, one at the toe end and two at the seat end. The hole at the toe end is smaller than the other two at the seat end. The object is not in the collection of the RMO and can be considered to be lost. Only a few sketches have been found.
L. 20.2 cm x W. 4.9 cm (seat), W. 3.7 cm (middle) and W. 5.8 cm (tread) x Th. 2 cm (seat), Th. 0.9 cm (middle part) and Th. 2.3 cm (tread); hole: W.0.3 cm x Th. 0.5 cm (toe end) and W. 0.5 cm x Th. 0.6 cm (heel)

Plate CVI.419 Sole Find no. 728 WOODAN-id: 23408000
Find location: Square DB-3 (Dredging layer)
Wood species: not identified
Part of a right-foot sole with a broad stilt under the tread. The width of the stilt is 4 cm at the inner edge and 3 cm at the outer edge of the sole. A conical hole is drilled at the rim of the stilt towards the toe end.
L. >11.3 cm x W. 5.3 cm x Th. 0.9-1.3 cm; hole: Dia. 0.4-0.6 cm

Plate CVI.420 Sole Find no. 1461.1 WOODAN-id: 23404000
Find location: Square DS-3 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Part of a sole for a left foot, with two stilts under the tread which are 1.2 cm high (2.4 cm including the thickness of sole). The toe end is quite pointed. At 4 cm from the toe end and at 2.5 cm from the inner edge, a round hole is present. This hole was initially meant to secure a strap between the toes, similar to present-day flip-flop sandals.
L. >14.8 cm x W. 8.4 cm x Ht. 0.7-2.4 cm; hole: W. 0.8 x Th. 0.9 cm

Plate CVII.421 Roughout for a sole Find no. 3397 WOODAN-id: 23409000
Find location: Square unknown (layer unknown)
Wood species: *Alnus* spp./Alder
Roughly cut, a possible roughout for a sole of wood-soled footwear. There is no hole for a leather strap.
L. 22 cm x W. 7.8 cm x Th. 3-4.5 cm

Comb

Plate CVIII.422 Comb Find no. 4645 WOODAN-id: 23482000
Find location: AWN excavation, Velsen 2, trench E, square B14-a
Wood species: *Buxus* spp./Boxwood
Double-sided comb, lozenge-shaped in cross-section, with one row of 87 fine teeth and one row of 49 coarse teeth; the spacing between the teeth of the two rows is different. The teeth were sawn. Both ends are semi-circular. Over the years, the comb has dried out and the wood has shrunk. Remains of head lice are present between the teeth.
L. 9.8 cm x Br. 5.7 cm x D. 0.2-0.7 cm

Entertainment

Panpipe (*syrinx*)

Plates CIX/423, CX/423 Panpipe (*syrinx*) Find no. 3365 WOODAN-id: 32422000
Find location: Square unknown (layer unknown)
Wood species: *Buxus* spp./Boxwood
Fragment of a panpipe made of a sawn board of boxwood. The panpipe is complete in length and has one original edge preserved. On the upper edge there are three pipes, of which one is broken and incomplete in length. Two pipes show a length of c. 2.6 cm and c. 3 cm. The remaining length of the third pipe is c. 3.8 cm. The preserved edge has a hole with a wooden pin, probably for tying a string. The species of the pin is not identified. There are no traces of decoration on the panpipe. The object is broken diagonally, following the grain.
L. 12 cm x W. >4 cm x Th. 1 cm; pipes: L. c. 2.6 cm (pipe 1), L. c. 3 cm (pipe 2), L. 3.8 cm (pipe 3) x Dia. 0.5 cm; hole with pin: L. 2.8 cm x Dia. 0.5 cm (dimensions from the unconserved and dried out object)

Gaming pieces

Plate CXI.424 Gaming piece Find no. 3029.1 WOODAN-id: 23414000
Find location: AWN excavation, trench 9-1 (Roman layer)
Wood species: *Abies alba*/Silver fir
Carved, round.
Dia. 3 x Th. 1 cm

Plate CXI.425 Gaming piece Find no. 3029.2 WOODAN-id: 23415000
Find location: AWN excavation, trench 9-1 (Roman layer)
Wood species: *Pinus* spp./Pine
Carved, round.
Dia. 2.8 cm x Th. 1.4 cm

Plate CXI.426 Gaming piece Find no. 3029.3 WOODAN-id: 23416000
Find location: AWN excavation, trench 9-1 (Roman layer)
Wood species: *Alnus* spp./Alder
Carved, irregularly round.
Dia. 3 cm x Th. 0.8 cm

Plate CXI.427 Gaming piece Find no. 3029.4 WOODAN-id: 23417000
Find location: AWN excavation, trench 9-1 (Roman layer)
Wood species: *Acer spp.*/Maple
Carved, round.
Dia. 2.8 cm x Th. 0.8 cm

Plate CXI.428 Gaming piece Find no. 3029.5 WOODAN-id: 23418000
Find location: AWN excavation, trench 9-1 (Roman layer)
Wood species: *Alnus* spp./Alder
Carved, round.
Dia. 2.9 cm x Th. 1.2 cm

Plate CXI.429 Gaming piece Find no. 3029.6 WOODAN-id: 23419000
Find location: AWN excavation, trench 9-1 (Roman layer)
Wood species: *Alnus* spp./Alder
Carved, round.
Dia. 3 cm x Th. 0.8 cm

Plate CXI.430 Gaming piece Find no. 3029.7 WOODAN-id: 23420000
Find location: AWN excavation, trench 9-1 (Roman layer)
Wood species: *Abies alba*/Silver fir
Roughly cut, round.
Dia. 2.6 cm x Th. 1 cm

Plate CXI.431 Gaming piece Find no. 3029.8 WOODAN-id: 23421000
Find location: AWN excavation, trench 9-1 (Roman layer)
Wood species: *Picea abies*/Norway spruce
Roughly cut, round.
Dia. 2.5 cm x Th. 0.8 cm

Plate CXI.432 Gaming piece Find no. 4202 WOODAN-id: 22548000
Find location: Square unknown (layer unknown)
Wood species: *Abies alba*/Silver fir
Carved, oval-shaped, slightly damaged on one side.
L. 3.1 cm x W. 2.5 x Th. 0.3 cm

Plate CXI.433 Gaming piece Find no. 4622 WOODAN-id: 22969000
Find location: Square unknown (layer unknown)
Wood species: *Abies alba*/Silver fir
Carved, round.
Dia. 2.6 cm x Th. 0.5 cm

Plate CXI.434 Gaming piece Find no. 4011k WOODAN-id: 22131000
Find location: Square unknown (layer unknown)
Wood species: *Abies alba*/Silver fir
Carved, round.
Dia. 2.6 cm x Th. 0.5 cm

Plate CXI.435 Gaming piece Find no. 4011L WOODAN-id: 22132000
Find location: Square unknown (layer unknown)
Wood species: *Abies alba*/Silver fir
Carved, round, damaged at one side.
Dia. 2.5 cm x Th. 0.4 cm

Plate CXI.436 Gaming piece Find no. 1730.1 WOODAN-id: 23413000
Find location: Square DX-3 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Carved, round.
Dia. 2 cm x Th. 0.4 cm

Fishing and Fowling

Fish traps

Plate CXII.437 Fish trap Find no. 1988-1 WOODAN-id: 22653000
Find location: Squares DT-15/DT-16; DU-15/DU-16 (layer unknown)
Wood species: *Salix* spp./Willow
Bell-shaped wickerwork basket with an integrated internal funnel or throat. There is an opening at the end of the basket to take out the catch. Remarkable is the small diameter of the rear throat opening, which suggests that this trap was used to catch eel. On the side wall of the basket there is a handle made of three pairs of twined branches of unpeeled willow. The basket shows a dense wicker structure made of one-year old unsplit and unpeeled rods of willow, with diameters between 0.2-0.5 cm. After years in storage, the wickerwork is dried out, shrunken and deformed.
L. 85 cm x Dia. 30 cm; funnel: L. 35 cm x Dia. 17 cm (opening) and Dia. 12 cm (rear throat opening); opening at the end of the basket to take the catch: Dia. 9 cm

Plate CXIII.438 Fish trap Find no. 1988-2 WOODAN-id: 23400000
Find location: Squares DF-22/DF-23 (layer unknown)
Wood species: *Salix* spp./Willow
Bell-shaped basket with a dense wicker structure, similar to 1988-1 but smaller. Due to post-depositional processes and the pressure of the weight of sediment, the basket became deformed and was incomplete. Part of the funnel is preserved. The opening at the end for removing the catch was initially closed with a moss prop. As was the other fish trap, this one was made of one-year-old, unpeeled and unsplit rods of willow with diameters between 0.2-0.4 cm. The wickerwork is completely dried and shrunken. The drawing was made after the shrinkage took place and shows the remains of the basket without the funnel (which was already absent).
L. 70 cm (estimated length) x Dia. 35 cm; funnel: L. >18 cm x Dia. 20 cm (opening) and Dia. approximately 6 cm (rear throat opening); opening at the end of the basket to take the catch: Dia. 8 cm

Other fishing gear

Plate CXIV.439 Net float Find no. 4002a WOODAN-id: 22027000
Find location: Square BF-8 (Roman layer)
Wood species: cf. *Populus* spp./*Salix* spp., Poplar/Willow (bark)
Half of a disc made of bark, with a hole in the centre. It was probably used as a float for a net.
Dia. 5.8 cm x Th. 1.1 cm; hole: Dia. 1 cm

Plate CXIV.440 Float Find no. 3065.1 WOODAN-id: 23401000
Find location: Square DY-8 (Roman layer)
Wood species: *Betula* spp./Birch (bark)
Rolled-up piece of bark. The float could be used for a fishing line as well as for a net.
Dia. 2.2 cm x Ht. 1.8 cm x Th. 0.1-0.2 cm

Plate CXIV.441 Float Find no. 3065.2 WOODAN-id: 23402000
Find location: Square DY-8 (Roman layer)
Wood species: *Betula* spp./Birch (bark)
Rolled-up piece of bark. The float could be used for a fishing line as well as for a net.
Dia. 1.4 cm x Ht. 1.3 cm x Th. 0.1-0.2 cm

Plate CXIV.442 Float Find no. 3065.3 WOODAN-id: 23403000
Find location: Square DY-8 (Roman layer)
Wood species: *Betula* spp./Birch (bark)
Rolled-up piece of bark. The float could be used for a fishing line as well as for a net.
Dia. 1.8 cm x Ht. 1.6 cm x Th. 0.1-0.2 cm

Throwing stick or boomerang for fowling

Plate CXV.443 Throwing stick/boomerang Find no. 131 WOODAN-id: 23399000
Find location: Square BY-14 (Roman layer)
Wood species: not identified
Fragment of a curved slat which is rhombus-shaped in cross-section. The two wings widen towards the ends. The object is carved from a naturally bent branch.
L. >34.5 cm (*38 cm) x W. 3.1-4.2 cm x Th. 0.8-1.1 cm

Planes

Plate CXVI.444 Plane Find no. 759 WOODAN-id: 23349000
Find location: Square DC-13 (Roman layer)
Wood species: *Acer pseudoplatanus/platanoides*, Sycamore maple/Norway maple
Plane with a wooden stock and a handgrip at each side of the pitch. Initially, the pitch contained a cutting iron when it was found in 1988. A half-round piece of wood (species not identified) held the iron in place in the pitch. Both sides of the pitch are bevelled. On the outer side, the course of the sloping sides is marked with two incised lines. The sides of the pitch have a 55-degree angle. For a better grip, the openings of the handgrips are oval-shaped and narrowed at the upper side of the stock. The stock is finished at both ends with a symmetrical half-round heel which extends up to a narrow ledge which forms the transition between the part with the handgrips and the sole.
L. 32.8 cm x W. 3.9 cm (sole) and W. 3.6 cm (upper side) x Ht. 6.1 cm; handgrips: L. 6.5 cm x Ht. 1.8 cm; pitch: L. 13 cm x W. 2.6 cm (upper side) and L. 1.8 cm x W 2.3 cm (sole)

Plate CXVII.445 Plane Find no. 6026-20 (ADNH) WOODAN-id: 23359000
Find location: AWN excavation 1970, Velsen 2, trench G, square E-5 (layer unknown)
Wood species: *Acer* spp./Maple
Plane with a wooden stock and a handgrip at each side of the pitch. For a better grip, the handles are narrower than the middle part of the stock. The pitch has two slanted sides and the bed angle measures 52 degrees. A slightly sloping ledge marks the transition between the part with handles and the sole. Remarkable is the presence of a lead reinforcement on both sides of the pitch. For this purpose, rectangular holes have been made and filled with lead. This extra weight probably ensured the stability of the plane during work.
L. 33.7 cm x W. 1-2.8 cm x Ht. 6.2 cm; handgrips: L. 6.8 cm x Ht. 1.8 cm and L. 6.6 cm x Ht. 1.7 cm; lead-reinforcements: W. 2 cm x Th. 1.1 cm x Ht. 2.2 cm and W. 2 cm x Th. 1.7 cm x Ht. 2.2 cm

Mallets

Plate CXVIII.446 Mallet (maul) Find no. 3059 WOODAN-id: 23354000
Find location: Well 1989-S190
Wood species: *Quercus* spp./Oak
Beating tool with an almost flat, rectangular blade and a conically shaped handle. The mallet is slightly curved over the entire length and is made from radially split stem wood with sapwood. At the time of excavation, the mallet or maul was thought to be a lead-beater.
L. 31.2 cm x W. 6.5 cm x Th. 4.5 cm; handle: L. 16 cm x Dia. 3.9-5.2 cm

Plate CXVIII.447 Mallet Find no. 3322 WOODAN-id: 23356000
Find location: Square DI-9 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash (head and handle)
Mallet with a head and a shaft which were initially both round in cross-section, but which became oval due to shrinkage. In the centre, the head is perforated for the insertion of the handle. The diameter of the handle increases towards the head. The end surfaces of the head show some damage in the form of small dents, perhaps caused by the hammering of small nails, such as shoe nails. Part of the handle has broken off and, after conservation, is missing.
L. >9 cm (*30 cm) x Dia. 6 cm; handle: L. >9 cm x Dia. 1.5-2.2 cm; head: L. 8.7 cm x Dia. 6 cm (after conservation: L. 8.5 cm x W. 5.5 cm x Th. 4 cm)

Plate CXIX.448 Mallet Find no. 1937.1 WOODAN-id: 23265000
Find location: Square EB-7 (Roman layer)
Wood species: *Quercus* spp./Oak
Mallet, made of roundwood, with an incised pattern of rectangular blocks which are divided by grooves. The upper part is round in cross-section; the handle is oval in cross-section.
L. 31 cm x Dia. 7 cm; handle: L. 13 cm x W. 3.9 x Th. 3.2 cm

Possible tool-rest support

Plate CXX.449 Tool-rest support Find no. 3396 WOODAN-id: 23358000
Find location: Square CP-24 (Dredging layer)
Wood species: *Quercus* spp./Oak
Two parts of an object with three U-shaped grooves and three hooks which curve slightly inwards. The tips of the hooks are broken; the middle hook is the longest preserved hook. Initially, the height of all of the hooks might have been the same. The hooks terminate in a notch with a sloping side, just short of the broken end. On a drawing made immediately after excavation, both parts fit together, and the object had remnants of a rectangular opening. The object has dried out and become shrunken before conservation, and the two parts no longer fit together.
L. >19 cm x W. 3.7-6 cm x Th. 1-2 cm (dimensions after conservation)

Pegs and wedges

Plate CXXI.450 Peg with a head Find no. 3362 WOODAN-id: 23384000
Find location: Square CA-5 (Roman layer)
Wood species: *Quercus* spp./Oak
Peg with a head and shaft. The head is semi-circular with a flat, sloping top. In cross-section, the head is trapezoidal. Below the head, the slightly sloping shoulders evolve into a tapered shaft, which is placed off-centre in relation to the head. The shaft is circular in cross-section and broken.
L. >18.9 cm x W. 1.8-4.6 cm x Th. 3 cm; head: Ht. 2.8-3.2 cm x W. 4.6 cm x Th. 3 cm; shaft: L. >16.1 cm x Dia. 1.8-3 cm

Plate CXXI.451 Peg with a head Find no. 3070 WOODAN-id: 23377000
Find location: Square ED-5 (Roman layer)
Wood species: *Quercus* spp./Oak
Peg with a head and shaft. The head is round and has a convex-shaped top. The shaft is straight and has been pointed at the bottom by reducing the thickness around the circumference. It became deformed before conservation.
L. >19.5 cm x Dia. 1.5-2 cm; head: Ht. 2.3 cm x W. 3 cm x Th. 2.5 cm

Plate CXXI.452 Peg with a head Find no. 2182.1 WOODAN-id: 23376000
Find location: Square EX-3 (Roman layer)
Wood species: *Quercus* spp./Oak
Peg with a half-round head with a convex-shaped top. The peg has a straight shaft which is broken at the bottom. The facets on the top of the head have been smoothed by wear.
L. >8.7 cm x Dia. 1.8 cm (shaft) and Dia. 2.2 cm (head)

Plate CXXI.453 Peg with a head Find no. 3387 WOODAN-id: 23387000
Find location: Square EC-4 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Except for missing a small piece of the tip, an otherwise complete peg with a rounded rectangular head in cross-section. The shoulders slope gradually into the round shaft. A branch was used to make the peg and it was shaped with uneven cuts.
L. >12 cm x Dia. 1.8 cm; shaft: L. 10.8 cm x W. 3 cm x Th. 2.7 cm

Plate CXXI.454 Peg with a head Find no. 1270.1 WOODAN-id: 23372000
Find location: Square DN-14 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Peg with a head and a broken shaft. The head is rectangular (also in cross-section). Through the removal of material at two sides, the head obtained two chamfered sides. Below the head and the straight shoulders, the shaft is round in cross-section.
L. >10 cm x W. 1.5-3.5 cm x Th. 1.5-2.8 cm; head: L. 4.2 cm x W. 3.5 cm x Th. 2.8 cm; shaft: L. >5.8 cm x Dia. 1.5 cm

Plate CXXI.455 Peg with a head Find no. 1350.1 WOODAN-id: 23373000
Find location: Square DP-12 (Roman layer)
Wood species: *Quercus* spp./Oak
Peg with a rounded, conical head and a straight shaft. The shaft was deformed before conservation and became flattened. Initially, the shaft was oval in cross-section. The head and shaft are damaged and the shaft is broken.
L. >11.5 cm x W. 3 cm x Th. 1.8 cm; head: Ht. 2.8 cm x W. 3 cm x Th. 2.7 cm; shaft: L. >8.9 cm x W. 2.5 cm x Th. 1.5 cm

Plate CXXII.456 Peg Find no. 3357 WOODAN-id: 23383000
Find location: Square unknown (layer unknown)
Wood species: *Alnus* spp./Alder
Fragment of a peg or stake made from split wood. The peg has been sharpened through the removal of facets along the circumference at 16 cm above the lower end.
L. >20 cm x W. 1-4.5 cm x Th. 3-3.5 cm

Plate CXXII.457 Peg Find no. 3219 WOODAN-id: 23379000
Find location: Square DW-9 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Peg made from split wood. The upper part is almost square and tapers towards the lower part, which is round in cross-section.
L. >12 cm x W. 2.1 cm x Th. 2 cm (top) and Dia. 1.4 cm (bottom)

Plate CXXII.458 Peg Find no. 3352 WOODAN-id: 23381000
Find location: Square unknown (layer unknown)
Wood species: *Alnus* spp./Alder
Peg tapered from the top towards the bottom. It is rectangular in cross-section and a small part of the tip is missing.
L. 11 cm x W. 2 cm x Th. 0.8-1.8 cm

Plate CXXII.459 Peg (from furniture?) Find no. 3353 WOODAN id: 23382000
Find location: Square unknown (layer unknown)
Wood species: *Euonymus europaea*/Spindle tree
Peg tapered from the top towards the bottom. A small part of the tip is missing. The peg is rectangular in cross-section.
L. >10 cm x W. 2 cm x Th. 1.5 cm

Plate CXXII.460 Peg Find no. 3099 WOODAN-id: 23378000
Find location: Square DH-11 (Roman layer)
Wood species: *Quercus* spp./Oak
Conical peg with a pointed end, almost round in cross-section.
L. 15.8 cm x Dia. 2.4 cm

Plate CXXII.461 Peg Find no. 1537.1 WOODAN-id: 23374000
Find location: Square DU-16 (Roman layer)
Wood species: *Abies alba*/Silver fir
Peg or stake roughly cut from a reused stave from a cask.
L. >15.2 cm x W. 1.2-1.4 cm x Th. 1.2 cm

Plate CXXII.462 Peg Find no. 2013.1 WOODAN-id: 23375000
Find location: Square ED-1 (Roman layer)
Wood species: *Quercus* spp./Oak
Peg with a chamfered top and tapered shaft. The peg is rectangular in cross-section. Part of the tip is missing.
L. >9.3 cm x Dia. 1.3-2 cm

Plate CXXII.463 Peg Find no. 3310 WOODAN-id: 23380000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Complete peg. At the top, the peg is straight for a length of 2.5 cm and then tapers towards the bottom. The peg is rectangular in cross-section.
L. 9.6 cm x W. 2.6 cm x Th. 1.9 cm

Plate CXXII.464 Peg Find no. 1064.1 WOODAN-id: 23371000
Find location: Square DJ-13 (Dredging layer)
Wood species: *Fraxinus excelsior*/Ash
Carefully carved peg made from split wood, almost square in cross-section. The peg is tapered from the broken top towards the bottom and is missing a piece of the tip.
L. >9 cm x W. 1.5 cm x Th. 1.3 cm

Plate CXXIII.465 Wedge Find no. 1792.1 WOODAN-id: 23391000
Find location: Square DZ-8 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Rectangular object with one chamfered end and one pierced end.
L. >8.8 cm x W. 5 cm x Th. 4.1 cm; hole: Dia. 0.9 cm

Plate CXXIII.466 Wedge Find no. 1066.1 WOODAN-id: 23388000
Find location: Square DJ-22 (Roman layer)
Wood species: *Alnus* spp./Alder
Complete wedge composed of two inclined planes. The wedge is rectangular in cross-section.
L. 10.5 cm x W. 2.8 cm x Th. 1.6 cm

Plate CXXIII.467 Wedge Find no. 699.1 WOODAN-id: 23389000
Find location: Square DA-25 (Roman layer)
Wood species: *Ulmus* spp./Elm
Complete wedge composed of one inclined plane. At the top, the wedge is almost square in cross-section.
L. 9 cm x W. 1.7 cm x Th. 1.5 cm

Plate CXXIII.468 Wedge Find no. 3254 WOODAN-id: 23392000
Find location: Square EA-3 (Dredging layer)
Wood species: *Acer campestre*/Field maple
Small wedge composed of two inclined planes. The wedge is made of split wood and is rectangular in cross-section.
L. 7 cm x W. 1.4 cm x Th. 1.1 cm

Plate CXXIII.469 Wedge Find no. 3416 WOODAN-id: 23390000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Small rectangular object which is chamfered at one side to create one inclined plane. The block is oval in cross-section.
L. 9 cm x W. 1.7 cm x Th. 1.5 cm

Plate CXXIII.470 Wedge Find no. 4372 WOODAN-id: 22719000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Complete, symmetrically worked board in the shape of a trapezoid. The surface is smoothed. This could be a wedge to secure a mortise and tenon joint of a part of a piece of furniture.
L. 8.2 cm x W. 2.5-3.9 cm x Th. 2.1 cm

Plate CXXIII.471 Wedge Find no. 4012s WOODAN-id: 22165000
Find location: Square DW-9 (Roman layer)
Wood species: *Quercus* spp./Oak
Complete, symmetrically worked board in the shape of a trapezoid. The surface is smoothed. This could be a wedge to secure a mortise and tenon joint of a part of a piece of furniture.
L. 5 cm x W. 1.8-4 cm x Th. 1.1 cm

Processing waste

Plate CXXIV.472 Sawn-off piece Find no. 4426 WOODAN-id: 22773000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Piece of a board, sawn-off at an angle. The other end is broken.
L. >13.3 cm x W. 7.8 cm x Th. 1.2 cm

Plate CXXIV.473 Sawn-off piece Find no. 4414 WOODAN-id: 22761000
Find location: Square unknown (layer unknown)
Wood species: *Abies alba*/Silver fir
Straight sawn-off piece of a narrow board. It is probably a reused stave from a wine cask.
L. 8.5 cm x W. 6.8 cm x Th. 0.4 cm

Plate CXXIV.474 Sawn-off piece Find no. 4361 WOODAN-id: 22708000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Fragment of a board with one straight end and the other sawn at an angle.
L. 7.2 cm x W. 6.3 cm x Th. 2.8 cm

Plate CXXIV.475 Sawn-off piece Find no. 4362 WOODAN-id: 22709000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Fragment of a board with one straight end and the other sawn at an angle.
L. 8.4 cm x W. 6.2 cm x Th. 2.1 cm

Plate CXXIV.476 Sawn-off piece Find no. 4599 WOODAN-id: 22946000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Piece of a narrow board with two ends sawn off straight. One end is damaged.
L. 6.2 cm x W. 5.8 cm x Th. 2.1 cm

Plate CXXIV.477 Sawn-off piece Find no. 4352 WOODAN-id: 22699000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Piece of a narrow board with two ends sawn off straight.
L. 4.6 cm x W. 7.6 cm x Th. 1.2 cm

Plate CXXIV.478 Sawn-off piece Find no. 4353 WOODAN-id: 22700000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Piece of a board with both ends sawn off straight.
L. 4 cm x W. 8.6 cm x Th. 3.9 cm

Plate CXXIV.479 Sawn-off piece Find no. 4355 WOODAN-id: 22702000
Find location: Square unknown (layer unknown)
Wood species: *Abies alba*/Silver fir
Piece of a narrow board with both ends sawn off straight. The wood has been damaged by woodworm. This is probably reused wood from a discarded stave.
L. 5 cm x W. 4.8 cm x Th. 2.8 cm

Plate CXXIV.480 Sawn-off piece Find no. 4354 WOODAN-id: 22701000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Piece of a board with both ends sawn off straight. There is a deep saw cut on one side of the wood.
L. 5 cm x W. 6.6 cm x Th. 2.6-3.6 cm

Plate CXXIV.481 Sawn-off piece Find no. 4359 WOODAN-id: 22706000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Part of a radially split board with one end cut off and the other sawn off straight.
L. 5.2 cm x W. 5.5 cm x Th. 3.6 cm

Plate CXXIV.482 Sawn-off piece Find no. 4356 WOODAN-id: 22703000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Piece of a board with both ends sawn off straight.
L. 2.4 cm x W. 7.5 cm x Th. 4.2 cm

Plate CXXIV.483 Sawn-off piece Find no. 4360 WOODAN-id: 22707000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Fragment of a stake, both ends sawn off straight. One end is damaged.
L. 5.5 cm x W. 3.6 cm x Th. 1.6 cm

Plate CXXIV.484 Sawn-off piece Find no. 4424 WOODAN-id: 22771000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Piece of a board with both ends sawn off straight.
L. 2.2 cm x W. 6.1 cm x Th. 3.4 cm

Plate CXXIV.485 Sawn-off piece Find no. 4357 WOODAN-id: 22704000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Piece of a board with both ends sawn off straight.
L. 2.6 cm x W. 5.1 cm x Th. 2.6 cm

Plate CXXIV.486 Sawn-off piece Find no. 4415 WOODAN-id: 22762000
Find location: Square unknown (layer unknown)
Wood species: *Fagus sylvatica*/Beech
Piece of a batten with one straight and one slightly obliquely sawn end.
L. 4.2 cm x W. 5.2 cm x Th. 4 cm

Plate CXXIV.487 Sawn-off piece Find no. 4428 WOODAN-id: 22775000
Find location: Square unknown (layer unknown)
Wood species: *Alnus* spp./Alder
Piece of a board with one straight sawn-off end and one chamfered end.
L. 4 cm x W. 5.6 cm x Th. 1.7 cm

Plate CXXIV.488 Sawn-off piece Find no. 4430 WOODAN-id: 22777000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Piece of a radially split board with both ends sawn off straight.
L. 2.7 cm x W. 11.2 cm x Th. 2.0 cm

Plate CXXIV.489 Sawn-off piece Find no. 4014g WOODAN-id: 22205000
Find location: Square unknown (layer unknown)
Wood species: *Alnus* spp./Alder
Piece of a stake, both ends sawn off straight.
L. 2 cm x W. 3.5 cm x Th. 1.5 cm

Plate CXXV.490 Sawn-off piece Find no. 1917.4 WOODAN-id: 23394000
Find location: Square EB-17 (Roman layer)
Wood species: *Quercus* spp./Oak
Thin, sawn-off slice of a profiled batten. For the batten, half of a trunk was used. Based on the shape of the sawn-off piece, the trunk was hewn to create a rectangular piece of timber.
L. 1.8 cm x W. 7.5-9.5 cm x Th. 4.6 cm; protruding part of profile: W. 2.6 cm x Th. 1.6 cm

Plate CXXV.491 Sawn-off piece Find no. 3297.1 WOODAN-id: 23396000
Find location: Square DX-12 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Sawn-off piece of the shortened end of a board with one chamfered side. The piece is triangular in cross-section.
L. 2.6 cm x W. 5.3 cm x Th. 2 cm

Plate CXXV.492 Sawn-off piece Find no. 3297.2 WOODAN-id: 23397000
Find location: Square DX-12 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Sawn-off piece with straight ends, derived from a batten or lath, rectangular in cross-section, and made of half of a young stem or large branch.
L. 3.8 cm x W. 3.4 cm x Th. 1.8 cm

Plate CXXV.493 Sawn-off piece Find no. 3297.3 WOODAN-id: 23398000
Find location: Square DX-12 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Sawn-off piece with straight ends, from a lath, irregular in cross-section, and with one straight side. The lath was made of a split stem or branch.
L. 3.2 cm x W. 5 cm x Th. 3 cm

Plate CXXV.494 Sawn-off piece from a stave Find no. 4583 WOODAN-id: 22930000
Find location: Square unknown (layer unknown)
Wood species: *Abies alba*/Silver fir
Sawn-off piece from the chamfered end of a discarded stave. The stave has been sawn through the croze groove to avoid unnecessary loss of wood. The rest of the stave was probably reused as a board or for another purpose.
L. 5.3 cm x W. 11.5 cm x Th. 2.6 cm

Plate CXXV.495 Sawn-off piece Find no. 4079 WOODAN-id: 22425000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Sawn-off piece from a board.
L. 2.3 cm x W. 9 cm x Th. 7.2 cm

Plate CXXV.496 Cut-off piece from a stave Find no. 4541 WOODAN-id: 23393000
Find location: Square A-5 (Roman layer)
Wood species: *Abies alba*/Silver fir
A piece from a discarded stave, cut off with an axe below the croze groove.
L. 6 cm x W. 6.5 cm x Th. 1.4-2 cm

Plate CXXV.497 Turning waste Find no. 4474 WOODAN-id: 22821000
Find location: Square DA-7 (layer unknown)
Wood species: *Buxus* spp./Boxwood
Turning waste, of which the lower part has a flat end with a rounded ledge and extends from a cylindrical shape to a pointy top. In the lower end there is a hole in the centre, probably caused by the spill of a lathe. The top is slightly charred.
Ht. 4.5 cm x Dia. 3.5 cm; hole: Dia. 0.5 cm x D. 0.3 cm

Plate CXXV.498 Turning waste Find no. 4386 WOODAN-id: 22733000
Find location: Square BY-4 (Roman layer)
Wood species: *Acer* spp./Maple
Small, turned, cylindrical knob with a hole at the bottom from the spill of a lathe. The knob is slightly tapered towards the bottom and was deformed and damaged before conservation.
Ht. 3 cm x W. 3 cm x Th. 2.6 cm (top) and W. 2.7 cm x Th. 2.5 cm (bottom end); hole: Dia. 0.6 cm x D. 0.3 cm

Plate CXXV.499 Turning waste Find no. 3006 WOODAN-id: 23395000
Find location: Square DX-12 (Roman layer)
Wood species: *Acer* spp./Maple
Mushroom-shaped end-piece with a hole from the spill of a lathe in the centre of the broader end. It is deformed due to shrinkage before conservation.
L. 3.8 cm x Dia. 2.1-2.9 cm

Other Tools

Spade

Plate CXXVI.500 Spade Find no. 1401 WOODAN-id: 23351000
Find location: Square DQ-9 (Dredging layer)
Wood species: *Alnus* spp./Alder
Fragment of a blade of a narrow spade with a rounded and chamfered end, made of radially split stem wood. The blade is not complete in length and the handle is missing.
L. >26.4 cm x W. 9.1-11.4 cm x Th. 1.8-2.7 cm

Handles

Plate CXXVII.501 Handle (of a hand mill?) Find no. 46.1 WOODAN-id: 23360000
Find location: Square BH-10 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Handle with straight sides, made of a branch. The upper end has a straight edge; the lower end is broken. One side shows some damage.
L. >17 cm x Dia. 4 cm

Plate CXXVII.502 Handle (of a hand mill?) Find no. 3407 WOODAN-id: 23369000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Object carved from a branch with a small knot, oval in cross-section. The surface is smoothed. One end is irregularly carved; the other is broken.
L. >13 cm x W. 3.5 cm x Th. 2.5 cm

Plate CXXVII.503 Handle Find no. 1899 WOODAN-id: 23362000
Find location: Square EB-3 (Roman layer)
Wood species: Maloideae, type *Malus/Crataegus/Pyrus*, Apple/Hawthorn/Pear
Turned handle of split wood, slightly tapered. The top is flat with rounded edges due to usage; the bottom is carved. The clearness of the cut marks of the thinner end reveals that the end was resharpened, probably after a fracture.
L. 13.3 cm x Dia. 2.3-3.3 cm

Plate CXXVII.504 Handle (of a hand mill?) Find no. 1917.3 WOODAN-id: 23363000
Find location: Square EB-17 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Turned object. Both ends are straight and have chamfered rims. At one end, a poppet mark of the spill of a lathe is visible.
L. 12 cm x Dia. 2.5 cm (after conservation)

Plate CXXVII.505 Handle Find no. 3321 WOODAN-id: 23368000
Find location: Square CG-21 (Roman layer)
Wood species: *Fagus sylvatica*/Beech
Handle which slightly tapers from the top to the bottom. It is a rounded rectangle in cross-section and has two grooves at the short side, at 2 and 4 cm above the bottom. Perhaps the grooves were used to guide a rope.
L. 19 cm x W. 4.2 cm x Th. 2.6 cm (top) and W. 3.1 x Th. 2.1 cm (bottom)

Plate CXXVII.506 Handle (of a bow saw?) Find no. 3410 WOODAN-id: 23370000
Find location: Square unknown (layer unknown)
Wood species: *Buxus* spp./Boxwood
Cylindrically turned handle with a half-rounded top; the bottom is broken. Slightly oval in cross-section. From the broken end upwards, approximately 5 cm along one side of the handle, the surface is compressed. This is probably trace wear, such as could be caused by fixing the handle in the frame of a bow saw.
L. >13.5 cm x W. 2.8 cm x Th. 2.3 cm

Plate CXXVIII.507 Handle Find no. 3106 WOODAN-id: 23365000
Find location: Square CP-4/5 (layer unknown)
Wood species: *Fagus sylvatica*/Beech
Turned handle, oval in cross-section. The upper part is straight for a length of 12 cm, then narrows and tapers towards the bottom, which is broken.
L. >20.5 cm x W. 2.5-3.5 cm x Th. 2.8 cm

Plate CXXVIII.508 Handle (of a hand mill?) Find no. 4576 WOODAN-id: 22923000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Cylindrically turned handle, made of a branch and round in cross-section. One end is carefully half-round worked; the other end is broken. The surface is smoothly finished.
L. >16 cm x Dia. 2.5-2.8 cm

Plate CXXVIII.509 Handle Find no. 4145 WOODAN-id: 22491000
Find location: Square unknown (layer unknown)
Wood species: *Acer spp.*/Maple
Cylindrically turned handle, oval in cross-section. One end is rounded; the other end is broken. In the centre of the top there is a small hole which comes from the spill of a lathe.
L. >14.1 cm x W. 3.3 cm x Th. 2.7 cm (top) and W. 1.8 cm x Th. 1.5 cm (bottom)

Plate CXXVIII.510 Handle Find no. 4376 WOODAN-id: 22723000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Turned handle with a flared top. The handle tapers from the top towards the bottom.
L. >11.2 cm x W. 2.7 cm x Th. 1 cm

Plate CXXVIII.511 Handle Find no. 4399 WOODAN-id: 22746000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Turned handle made of a piece of roundwood with pith. The pith is not in the centre in cross-section. The handle tapers from the slightly flared upper end towards the lower end, which is broken. A hole from the spill of a lathe is visible at the upper end.
L. >8.5 cm x W. 2.6 cm x Th. 2.2 cm

Plate CXXVIII.512 Handle Find no. 3406 WOODAN-id: 23428000
Find location: Square unknown (layer unknown)
Wood species: *Acer campestre*/Field maple
Turned handle with straight sides, oval in cross-section. One end is sawn and straight, the other is carved irregularly.
L. 9 cm x Dia. 3 cm

Plate CXXVIII.513 Handle Find no. 3412 WOODAN-id: 23429000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Turned handle, slightly tapered and oval in cross-section. The object is partly compressed on one side, probably from wear.
L. >7.2 cm x W. 2.8-3.3 cm x Th. 2.3-2.8 cm

Plate CXXIX.514 Handle Find no. 3264 WOODAN-id: 23366000
Find location: AWN excavation, trench 9-1 (Roman layer)
Wood species: *Euonymus europaeus*/Spindle tree
Half of a turned handle, with a slightly concave curve towards the gently flaring upper end. The upper end has a convex upper side. The lower end is broken. Above the broken end there are three turned rings: two rings of equal size and one narrow ring. The rings divide the upper part from the lower part, which has a remnant of a wooden tenon. Remains of the tenon show that it was pierced for a tang about 5 cm from the upper end.
L. >12 cm x Dia. 2.9-5 cm; tenon: L. >0.8 cm x Dia. 1.9 cm

Plate CXXIX.515 Handle Find no. 2017.1 WOODAN-id: 23364000
Find location: Square ED-5 (Roman layer)
Wood species: not identified
Turned handle, cylindrically shaped towards a flared top with a decorative incised line at the rim. On the top of the handle there is the remnant of a knob-like protrusion. The lower end has been made thinner over a length of 3.5 cm, probably to fit the end of the handle into a metal part of the original tool. The top and the bottom of the handle show some damage. Part of the top is charred. This handle probably belonged to a socketed chisel.
L. >10.2 cm x Dia. 2.6 cm (cylindrical part) and Dia. 5.1 cm (flaring top)

Plate CXXIX.516 Handle Find no. 4036 WOODAN-id: 22382000
Find location: Square unknown (layer unknown)
Wood species: *Acer* spp./Maple
Part of a handle, oval in cross-section and tapered from the top to the bottom. At the top there is a small protuberance at one side. The object could have been the handle of a knife.
L. >6.6 cm x W. 4 cm x Th. 2.4 cm (top) and W. 2.4 cm x Th. 1.9 cm (bottom)

Plate CXXIX.517 Handle Find no. 1770 WOODAN-id: 23149000
Find location: Square DY-1 (Roman layer)
Wood species: Maloideae, type *Malus/Crataegus/Pyrus*, Apple/Hawthorn/Pear
Turned handle with decorative incised lines on the upper part. The handle narrows slightly towards a tapered shaft. The shaft is broken.
L. >10.2 cm x Dia. 2.2-4 cm; tenon: L. >4.1 cm x Dia. 1.8-2.5 cm

Plate CXXIX.518 Handle Find no. 4185 WOODAN-id: 22531000
Find location: Square unknown (layer unknown)
Wood species: *Acer* spp./Maple
Cylindrically shaped handle with flat ends. The rim of the upper end is rounded through the smoothing of the sharp edges. At the bottom end there is a hole in the centre, probably for a tang of a metal part of the tool. The object is slightly deformed in cross-section.
L. 5 cm x Dia. 3-3.4 cm

Plate CXXIX.519 Handle Find no. 4365 WOODAN-id: 22712000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Half of the top of a turned handle. The handle widens from the bottom towards the top and evolves into a flared head with, on the convex top side, a turned ring around a hole in the centre.
L. >3.1 cm x Dia. 2.2-3.4 cm

Plate CXXIX.520 Handle Find no. 4035 WOODAN-id: 22381000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Part of a turned handle with one broken end. The handle tapers from the top towards the bottom. On the top there is a hole with a raised edge.
L. >4.5 cm x W. 1.8-2.3 cm x Th. 1.2-1.6 cm

Plate CXXX.521 Handle Find no. 114 WOODAN-id: 23361000
Find location: Square BW-13 (Roman layer)
Wood species: not identified
Curved object with a rectangular opening on the inner side. Initially, the object was symmetrically worked with two identical ends. The end which is preserved has one sloping and one straight side. The straight side was probably fastened to a board of a lid of a chest or a hatch, for example. Another possibility is that it was a hand grip of a tool, of a trowel, for example, and that the opening was the hand grip.
L. >17.6 cm x W. 3-5.8 cm x Th. 2.9-4.1 cm; opening: L. 10.2 cm

Plate CXXX.522 Handle Find no. 1376 WOODAN-id: 23462000
Find location: Square DQ-13 (Roman layer)
Wood species: not identified
Longitudinally pierced handle made from a branch with a small knot on one side.
L. 15.3 cm x W. 3 cm x Th. 1.3 cm; perforation: Dia. 0.4 cm

Plate CXXX.523 Handle Find no. 4011e WOODAN-id: 22125000
Find location: Square unknown (layer unknown)
Wood species: *Alnus* spp./Alder
Handle with a rectangular shape, half-round finished top, and tapering towards the bottom, which is broken. The object is slightly charred.
L. >13.2 cm x W. 2-3 cm x Th. 2.1 cm

Plate CXXX.524 Handle Find no. 3318 WOODAN-id: 23367000
Find location: Square unknown (layer unknown)
Wood species: Maloideae, type *Malus/Crataegus/Pyrus*, Apple/Hawthorn/Pear
Cylindrical handle with a tenon-like protuberance. There is a sharp transition between the handle and the tapered protuberance, both of which are round in cross-section. The top of the object and part of the tip are missing.
L. >15 cm (*18 cm) x Dia. 1-3.5 cm

Plate CXXX.525 Handle Find no. 4388 WOODAN-id: 22735000
Find location: Square unknown (layer unknown)
Wood species: *Abies alba*/Silver fir
Handle, rectangular in cross-section and made from a discarded stave from a wine cask. From the top, the handle narrows towards the bottom. The first 7 cm are straight; below this section the thickness of the handle was reduced by removing material from all four sides along a length of approximately 5 cm. Further below this length, the handle continues straight to the lower end, which is broken.
L. >19.5 cm x W. 2 cm x Th. 1.5 cm

Plate CXXX.526 Handle Find no. 3379 WOODAN-id: 23385000
Find location: Square DZ-13 (Roman layer)
Wood species: *Abies alba*/Silver fir
Handle made from a discarded stave from a cask. The straight shaft, which is rectangular in cross-section, curves at one side towards the upper part; the other side remains straight. The rectangle-shaped top is roughly finished with an axe.
L. >16.5 cm x W. 3.5 cm x Th. 2.3 cm

Plate CXXX.527 Handle Find no. 3386 WOODAN-id: 23386000
Find location: Square EM-7 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Carved handle with a head and a broken end. The handle is rectangular in cross-section and tapers from the top towards the lower end. The top has two sloping sides. At 2 cm below the upper end there is a cutting trace and the middle of the handle is compressed, probably caused by usage.
L. >15 cm x W. 2.5 cm x Th. 2 cm

Plate CXXX.528 Handle Find no. 4383 WOODAN-id: 22730000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Handle, rectangular in cross-section, broken at the lower end. One side is bevelled.
L. >7.7 cm x W. 2.3 cm x Th. 1.8 cm (top) and W. 2.1 cm x Th. 1 cm (bottom)

Textile-processing Implements

Spindle

Plate CXXXI.529 Spindle Find no. 1785 WOODAN-id: 23432000
Find location: Square DY-5 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Spindle with pointed ends. From the top, the spindle first widens over a length of 9.7 cm and then tapers towards the bottom.
L. 14.3 cm x Dia. 0.4-2 cm

Thread winders

Plate CXXXI.530 Thread winder Find no. 3007 WOODAN-id: 23353000
Find location: Square DV-8 (Dredging layer)
Wood species: *Fraxinus excelsior*/Ash
Small board with a straight and a concave side, notched at both ends. One of the ends is broken at the height of the notch.
L. >7 cm x W. 3.2 cm x Th. 1.1 cm; notches: D. 1 cm

Plate CXXXI.531 Thread winder Find no. 1059.1 WOODAN-id: 23350000
Find location: Square DJ-21 (Dredging layer)
Wood species: *Acer campestre*/Field maple
Object with one straight and one curved side. On the straight side there is a rectangular opening.
L. 6.4 cm x W.1.9 cm x Th. 0.3-0.5 cm; opening: L. 1.9 cm x D. 1.1 cm

Plate CXXXI.532 Thread winder Find no. 3005 WOODAN-id: 23352000
Find location: Square DF-23 (Roman layer)
Wood species: *Abies alba*/Silver fir
Object with a flat side and a curved side, with a notch in the curved side. One end is broken. The weathered object initially had two symmetrically worked ends.
L. 6.5 cm x W. 0.8-1.2 cm x Th. 0.6 cm

Needle or netting tool

Plate CXXXI.533 Needle or netting tool Find no. 866 WOODAN-id: 23463000
Find location: Square DF-13 (Roman layer)
Wood species: not identified
Thin object with a forked end. The two tines are pointed. The function of the object is uncertain; possibly it was a needle or a netting tool.
L. 9.1 cm x W. 1.5 cm x Th. 0.3 cm; tines: L. 3.2 cm and L. 3.4 cm

Pin-beaters

Plate CXXXI.534 Pin-beater Find no. 3328 WOODAN-id: 23357000
Find location: Square unknown (layer unknown)
Wood species: cf. *Buxus* spp./Boxwood
Carefully carved object with a smoothed surface. The top end has a flat head with gently sloping shoulders from where the rod tapers towards the tip.
L. 11.5 cm x Dia. 1.5 cm

Plate CXXXI.535 Pin-beater Find no. 690.1 WOODAN-id: 23348000
Find location: Square DA-4 (Roman layer)
Wood species: *Sambucus* spp./Elder
Carefully carved rod with straight sides from the top to the bottom. At the bottom, the object is carved with six irregular facets. After conservation, there are no traces visible at the top which would help to conclude if the object was initially longer.
L. >10.6 cm x Dia. 1.1 cm

Weft bobbins

Plate CXXXI.536 Weft bobbin Find no. 3301 WOODAN-id: 23192000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Complete object with a recessed part below the knob-like head, probably a groove which was meant for holding thread. The shaft is pointed at the end.
L. 9.8 cm x 1.5 cm; groove: W. 0.5 cm x D. 0.3-0.4 cm

Plate CXXXI.537 Weft bobbin Find no. 3026 WOODAN-id: 23186000
Find location: Square DP-1 (Roman layer)
Wood species: *Pinus* spp./Pine
Complete object with a knob-like head and a groove below the head. The shaft is slightly tapered and, at the end, not sharpened to a point, but carefully rounded. The groove was presumably used for holding thread.
L. 7 cm x Dia. 1.2-1.5 cm; groove: W. 0.5 cm

Toggle

Plate CXXXI.538 Toggle Find no. 3027 WOODAN-id: 23187000
Find location: AWN excavation, trench 9-1 (Roman layer)
Wood species: Maloideae, type *Malus/Crataegus/Pyrus*, Apple/Hawthorn/Pear
Complete small object which is hourglass-shaped and round in cross-section.
L. 5.4 cm x Dia. 1.5 cm (middle) and Dia. 2 cm (thickest part)

Whorl

Plate CXXXI.539 Whorl Find no. 1707.1 WOODAN-id: 23147000
Find location: Square DW-11 (Dredging layer)
Wood species: *Buxus* spp./Boxwood
Three quarters of a flat and perforated turned bead with an incised decorative groove at the rim and two grooves of the same width next to the hole on what is presumably the upper face.
Dia. 3.2 cm x Th. 1.6 cm; hole: Dia. 0.4-0.6 cm; grooves: W. 0.1 cm x D. 0.1 cm

Weaving sword

Plate CXXXI.540 Weaving sword Find no. 3304 WOODAN-id: 23355000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Weaving sword with an elongated rectangular blade and an oval-shaped handle. A small part of the end of the blade is missing. The blade with sloping shoulders is symmetrically worked, except for the end where one side is curved and the other straight. The object is made of radially split stem wood.
L. >50.5 cm x W. 6.3 cm x Th. 1.3 cm; blade: L. 34 cm x W. 6.4 cm x Th. 0.4-1 cm; handle: L. 16 cm x W. 3-4 cm x Th. 1.5 cm (after conservation)

Miscellaneous

Plate CXXXII.541 Hair pin (?) Find no. 2109.1 WOODAN-id: 23448000
Find location: Square EG-1 (Roman layer)
Wood species: *Alnus* spp./Alder
Elongated, conical object with the remains of a tenon at the top end. Initially, the object was round in cross-section. It became irregular, due to shrinkage. Striking are the sharp tip and the decorative pattern below the tenon at the top . The decoration consists of diagonally incised grooves on a 1 cm-wide ledge. It was probably a hair pin with a tenon to attach an end piece of some other material, bone or ivory, for example.
L. 17.6 cm x W. 1.7-2.3 cm x Th. 1 cm

Plate CXXXII.542 Batten with notches Find no. 473.1 WOODAN-id: 23435000
Find location: Square CR-11 (Roman layer)
Wood species: *Quercus* spp./Oak
Batten with one flat side and one side with two carved tines. One end is carefully finished and has four sloping sides which are topped with a flat one. The other end is broken. Tool marks of what probably was an axe are still visible.
L. >14 cm x W. 3.7-6.2 cm x Th. 1.8-3.1 cm; tines: Ht. 4.3 cm (tine 1) and Ht. 6.2 cm (tine 2)

Plate CXXXII.543 Batten with notches Find no. 1862.1 WOODAN-id: 23152000
Find location: Square EA-12 (Roman layer)
Wood species: *Alnus* spp./Alder
Batten, rectangular in cross-section, with one flat side and one side which tapers to the end and has two irregularly carved notches.
L. 11.2 cm x W. 3.8 cm x Th. 1.2-1.4 cm

Plate CXXXII.544 Roughout (?) Find no. 1086.1 WOODAN-id: 23439000
Find location: Square DJ-19 (Dredging layer)
Wood species: *Alnus* spp./Alder
Fragment of a small shovel-like object. The shaft with straight sides extends via two sloping shoulders towards the blade. The blade is not symmetrical, probably caused by a knot on one side of the blade. Due to the decline of the quality of the wood before conservation, traces of processing are no longer visible. The object might have been longer at both ends. This could have been a roughout for a spatula or spoon. Perhaps the presence of the knot led the maker to decide not to finish the piece.
L. >12.5 cm x W. 6.5 cm x Th. 1.8 cm

Plate CXXXII.545 Perforated half sphere Find no. 3320.1 WOODAN-id: 23457000
Find location: Square unknown (layer unknown)
Wood species: F*raxinus excelsior*/Ash
Perforated half sphere which was probably part of a furniture leg or a finial of a wicker chair. The object has sloping sides and has become deformed to an oval due to shrinkage.
W. 4.7-5.8 cm (*Dia. 6 cm) x Ht. 2.5 cm; hole: Dia. 0.8 cm

Plate CXXXII.546 Perforated batten Find no. 716.1 WOODAN-id: 23437000
Find location: Square DB-8 (Dredging layer)
Wood species: F*raxinus excelsior*/Ash
Fragment of a batten, rectangular in cross-section, with one straight end and the other broken. There is a hole 1 cm from the intact end.
L. 3.7 cm x W. 2.5 cm x Th. 1.7 cm; hole: Dia. 1 cm

Plate CXXXIII.547 Slat with a notch Find no. 4523 WOODAN-id: 22870000
Find location: Square unknown (layer unknown)
Wood species: *Alnus* spp./Alder
Fragment of a narrow slat with broken ends. The slat is rectangular in cross-section. On one side, lines forming triangular patterns are incised.
L. 15 cm x W. 2.2 cm x Th. 1.5 cm

Plate CXXXIII.548 Slat with a leather strip Find no. 3393
WOODAN-id: 23458000
Find location: Square EJ-2 (Roman layer)
Wood species: not identified
Slat of split wood with both ends broken. A leather thong is skilfully knotted around the stick.
L. >15 cm x W. 2 cm x Th. 1.2 cm

Plate CXXXIII.549 Object with a hole Find no. 3317 WOODAN-id: 23456000
Find location: Square unknown (layer unknown)
Wood species: *Carpinus betulus*/European hornbeam
Fragment of a narrow batten with a pointed end and a broken end. There is a rectangular hole at the bevelled end.
L. 12.5 cm x W. 2.5 cm x Th. 1.8 cm; hole: W. 1.8 cm x Th. 1 cm

Plate CXXXIII.550 Rhombus Find no. 3051 WOODAN-id: 23452000
Find location: AWN excavation, trench 9-1 (Roman layer)
Wood species: F*raxinus excelsior*/Ash
Rhombus-shaped object with some damage on one side.
L. 6.2 cm x W. 1.7 cm x Th. 1.2 cm (after conservation)

Plate CXXXIII.551 Flap (?) Find no. 1680.1 WOODAN-id: 23447000
Find location: Square DW-9 (Roman layer)
Wood species: *Alnus* spp./Alder
Fragment of a half-cylindrical flap with part of a straight shaft. One side of the flap is broken. At 1 cm below the straight shoulder of the flap there is a groove on the shaft which has two slightly sloping sides. Above the groove, the shaft, rectangular in cross-section, is broken diagonally. The notch might have been used as a hinge element.
L. >16.3 cm x W. 3.6-8 cm x Th. 1-1.5 cm; groove: W. 1 cm x D. 0.6 cm

Plate CXXXIII.552 Object with protuberances Find no. 3057 WOODAN-id: 23453000
Find location: Square DZ-2 (Roman layer)
Wood species: *Ulmus* spp./Elm
Small triangle-shaped board with, at each corner, an elongated and pointed protuberance. The object shows no damage and no traces of wear.
L. 8.6 cm x W. 2.5 cm x Th. 2.2 cm; protuberances: L. 5.2 cm x W. 0.5 cm x Th. 0.4 cm

Plate CXXXIII.553 Stick with grooves Find no. 1197.1 WOODAN-id: 23442000
Find location: Squares DM-10/DN-14 (layer unknown)
Wood species: *Buxus* spp./Boxwood
Elongated object made from a branch with a knot. One end is carved and shows two grooves directly under the top. The other end is broken and was initially worked the same way as the preserved end. The function of this object is unclear.
L. >9.3 cm x W. 2.1 cm x Th. 1.2 cm; top: Dia. 3.6 cm (before conservation)

Plate CXXXIV.554 Branch Find no. 3077 WOODAN-id: 23454000
Find location: Square unknown (layer unknown)
Wood species: *Fraxinus excelsior*/Ash
Crooked branch attachment with knot. At the thinner, broken end, two 10 cm-long facets have been created by removing wood with an axe. The part where the branch was attached to a trunk or larger branch is charred.
L. >27 cm x Dia. 3-3.5 cm (branch) and W. 4.5 cm x Th. 4 cm (attachment)

Plate CXXXIV.555 Forked branch Find no. 4281.1 WOODAN-id: 22627000
Find location: Square DF-11 (Roman layer)
Wood species: *Corylus avellana*/Hazel
Forked branch with an outwardly curved side branch. The other branch of the fork has been cut off. The branch is chopped off diagonally on the bottom end.
L. >50 cm x Dia. 1.8 cm; side branch: L. >9 cm x Dia. 1.6 cm

Plate CXXXIV.556 Forked branch Find no. 4281.2 WOODAN-id: 22985000
Find location: Square DF-11 (Roman layer)
Wood species: *Corylus avellana*/Hazel
Forked branch with an outwardly curved side branch. The other branch of the fork has been cut off. The branch is broken.
L. >35 cm x Dia. 1.6-2 cm; side branch: L. >6 cm x Dia. 1.6 cm

Plate CXXXIV.557 Pointed branch Find no. 4013x WOODAN-id: 22196000
Find location: Square unknown (layer unknown)
Wood species: *Quercus* spp./Oak
Crooked branch, pointed on one end by reducing material and leaving six facets.
L. >24 cm x Dia. 2.8 cm

Plate CXXXIV.558 Forked branch Find no. 3409 WOODAN-id: 23459000
Find location: Square unknown (layer unknown)
Wood species: *Corylus avellana*/Hazel
Fragment of a forked branch. Both side branches of the fork are broken. The main branch below the fork is worked and shows one facet on the end.
L. >13 cm x Dia. 9.5 cm (main branch) and Dia. 3.5 cm (side branches)

Plate CXXXIV.559 Tube Find no. 3252 WOODAN-id: 23455000
Find location: Square DV-12 (Roman layer)
Wood species: indeterminable
Part of a tube made from a hollowed branch. The object tapers from the wider opening at the top towards the bottom; both ends are open. The inner and outer sides are smoothly worked. The tube was initially used as a container for delicate items.
L. 11.3 cm x Dia. 3.8 cm; opening: Dia. 2.4 cm

Plate CXXXIV.560 Tube Find no. 4259 WOODAN-id: 22605000
Find location: Square DJ-25 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Approximately one third of a tube with one straight end and one broken end. The tube was made by hollowing a piece of roundwood. The initial diameter of the tube was 9-10 cm.
L. >7.7 cm x W. 2.8 cm x Th. 0.4-0.6 cm

Plate CXXXV.561 Candle stick (?) Find no. 3031 WOODAN-id: 23451000
Find location: Square DZ-17 (Roman layer)
Wood species: *Buxus* spp./Boxwood
Turned object with a convex body, narrowed at the bottom, and with a slightly convex base on which the object cannot stand. The top has an outward-sloping thick rim around the hollowed inside. The depth of the hollowed inside is 5.6 cm. The rim and the upper part of the inner side are carbonised and show traces of wear. Just above the thickest part of the body, at 2.8 cm below the rim, the object has two holes opposite each other. One hole shows some damage due to usage. The function of the holes could be to hang the object. Despite the centuries of being buried in the ground, the wood still smells spicy (nutmeg, cedar?).
Dia. 2.6/1.4/3.2 cm (base/narrow part above base/rim) x Ht. 8.1 cm; opening: Dia. 2 cm; holes: Dia. 0.4 cm

Plate CXXXV.562 Button-like object Find no. 1574.2 WOODAN-id: 23446000
Find location: Square DU-23 (Roman layer)
Wood species: *Alnus* spp./Alder
Round object, hollowed inside, and with two flattened ends. There are two holes drilled through the object. The holes are next to each other on a marking line which is incised at the outer side of the middle of the object. Both of the flat sides are raised. On the inner face, the convex-shaped tool marks of a chisel are visible. The outer face is smoothed. This object is presumably one half of a two-part spherical object which could be bound together by a string. Perhaps this object was used as a seal lock.
L. 3 cm x W. 2.7 cm x Th. 1.1 cm; chisel marks: W. 0.3-0.5 cm

Plate CXXXV.563 Knob-like object Find no. 4005b WOODAN-id: 22073000
Find location: Square CW-11 (Dredging layer)
Wood species: *Acer* spp./Maple
Half of an angled knob with a pyramid-shaped top and a shallow hole at the bottom. Perhaps this knob belonged to the sliding mechanism of a seal lock.
Ht. 3.4 cm x W. 3.6 cm x Th. >2.4 cm (*4.8 cm); hole: Dia. 0.8 cm

Plate CXXXV.564 Knob-like object Find no. 4001z WOODAN-id: 22026000
Find location: Square unknown (layer unknown)
Wood species: *Acer pseudoplatanus*/Sycamore maple
Complete. This carefully carved pyramid-shaped knob had a flat head which has been cut off. Perhaps this knob belonged to the sliding mechanism of a seal lock.
Ht. 2.1 cm x W. 1.2-2.5 cm x Th. 1.2/2.5 cm

Plate CXXXVI.565 Head of a bird Find no. 1115.1 WOODAN-id: 23440000
Find location: Square DK-23 (Roman layer)
Wood species: *Alnus* spp./Alder
Carved piece in the shape of a bird's head with a long beak, made from a radially sawn board. Both sides are carefully smoothed. The object is broken at a shallow ledge below the bird's neck, towards the breast. Based on the presence of a ledge, the object was probably attached to something. The function of the object has not been definitively clarified. Interpretations vary from being a part of a piece of furniture to functioning as a decoy or a gable decoration.
Ht. 9.5 cm x W. 14.6 cm x Th. 1.6-2.3 cm; beak: L. 8.6 cm

Plate CXXXVII.566 Arched object Find no. 1569.1 WOODAN-id: 23445000
Find location: Square DU-11 (Roman layer)
Wood species: *Ulmus* spp./Elm
Fragment of an arched object with slightly convex sides. Both ends are broken. Based on the orientation of the grain, the curvature is not natural but sawn. The surface is carefully smoothed. Along the inner edge there is a rib-like elevation. This fragment was probably part of a larger, oval object.
L. >52 cm x W. 6.5 cm x Th. 5.6 cm

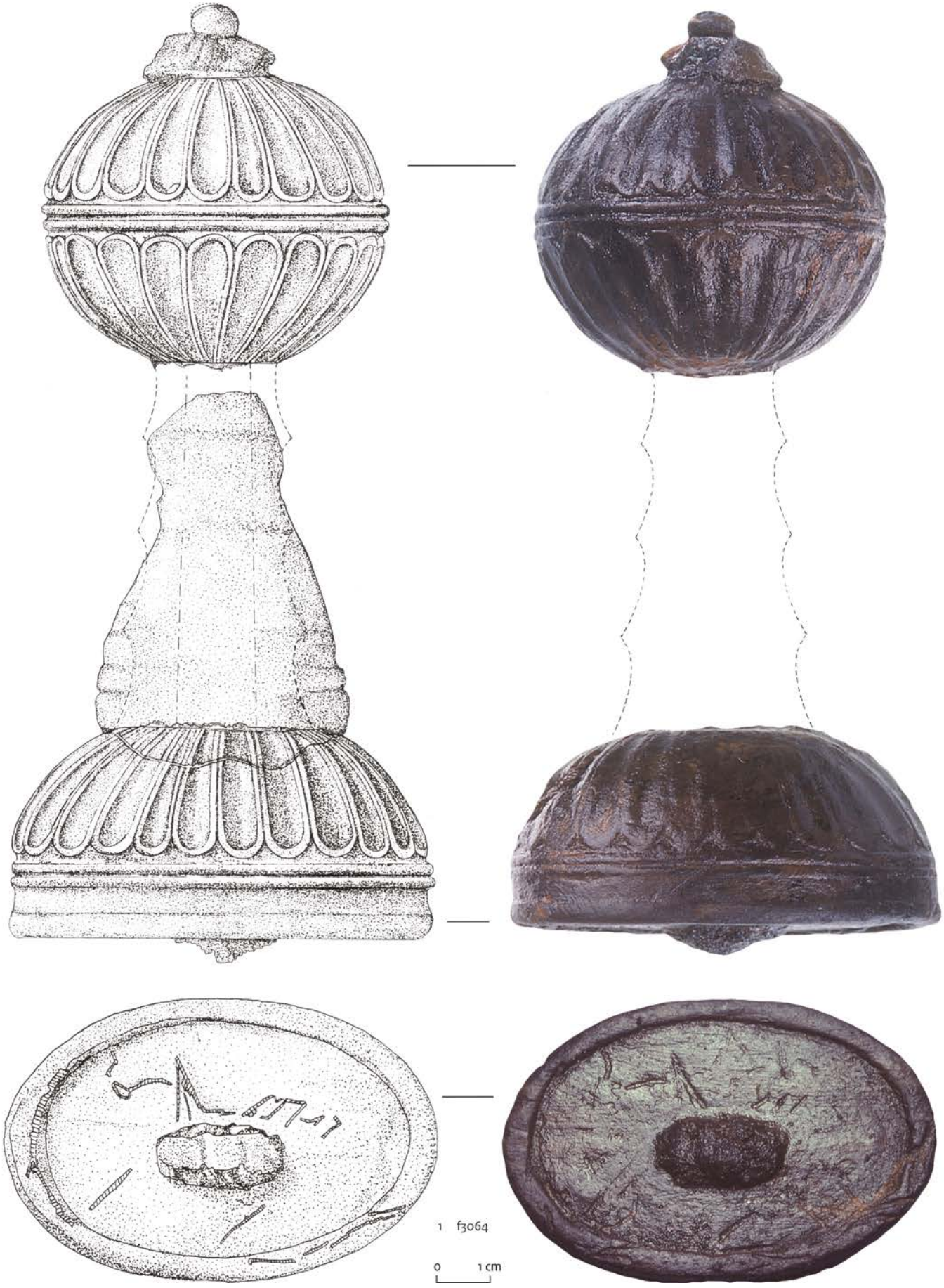
Plate CXXXVIII.567 Slat with notches Find no. 895 WOODAN-id: 23438000
Find location: Square DF-4 (Roman layer)
Wood species: not identified
Part of a slat, rectangular in cross-section and with both ends broken. One side is flat and the other has three notches: one wide notch with inward-sloping sides next to two triangle-shaped notches. The widths of the notches differ; the depth of all three notches is the same.
L. 29.6 cm x W. 1.9-3.3 cm x Th. 1.3-1.8 cm; notches: L. 5.8-7.5 cm (notch 1), L. 2 cm (notch 2) and L. 2.3 cm (notch 3) x D. 1.4 cm

Plate CXXXVIII.568 Rod with metal thread Find no. 1332.1 WOODAN-id: 23443000
Find location: Square DP-13 (Roman layer)
Wood species: *Lonicera periclymenum*/Honeysuckle
Straight rod, made from roundwood and wrapped with a metal thread over a length of 1 cm. Both ends are broken.
L. 25.5 cm x Dia. 1-1.2 cm

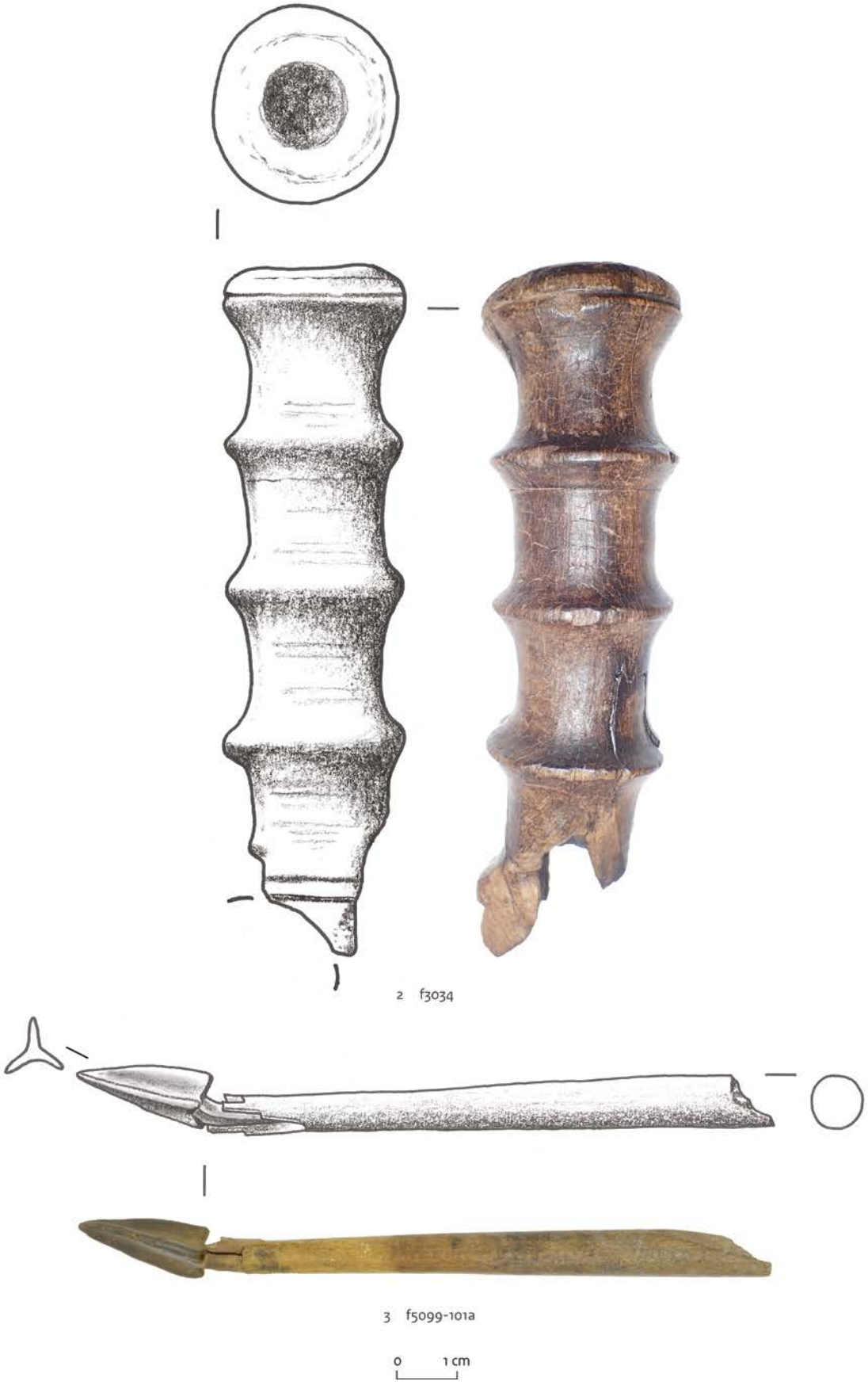
Plate CXXXVIII.569 Flap (?) Find no. 1178.1 WOODAN-id: 23441000
Find location: Square DL-19 (Roman layer)
Wood species: *Fagus sylvatica*/Beech
Part of a carefully carved and smoothed board with one broken end and one pointy end with a hole. The rim of the hole shows traces of wear at the upper side (orientated towards the pointy end). Perhaps this is the result of a hinged mechanism of a rope which initially went through the hole. The board is made of radially split stem wood.
L. >23.6 cm x W. 12.4 cm x Th. 0.3-1.5 cm (before conservation); hole: Dia. 1.2 cm

Plate CXXXVIII.570 Perforated batten Find no. 696 WOODAN-id: 23436000
Find location: Square DA-8 (Dredging layer)
Wood species: not identified
End of a board, made of radially split wood and rectangular in cross-section, with two mortises. One end is intact and the other is broken. The corner edges of the intact end are carefully chamfered. The board has a small notch due to damage at one edge.
L. >11.1 cm x W. 7.6 cm x Th. 1.1 cm; holes: Dia. 0.9 cm

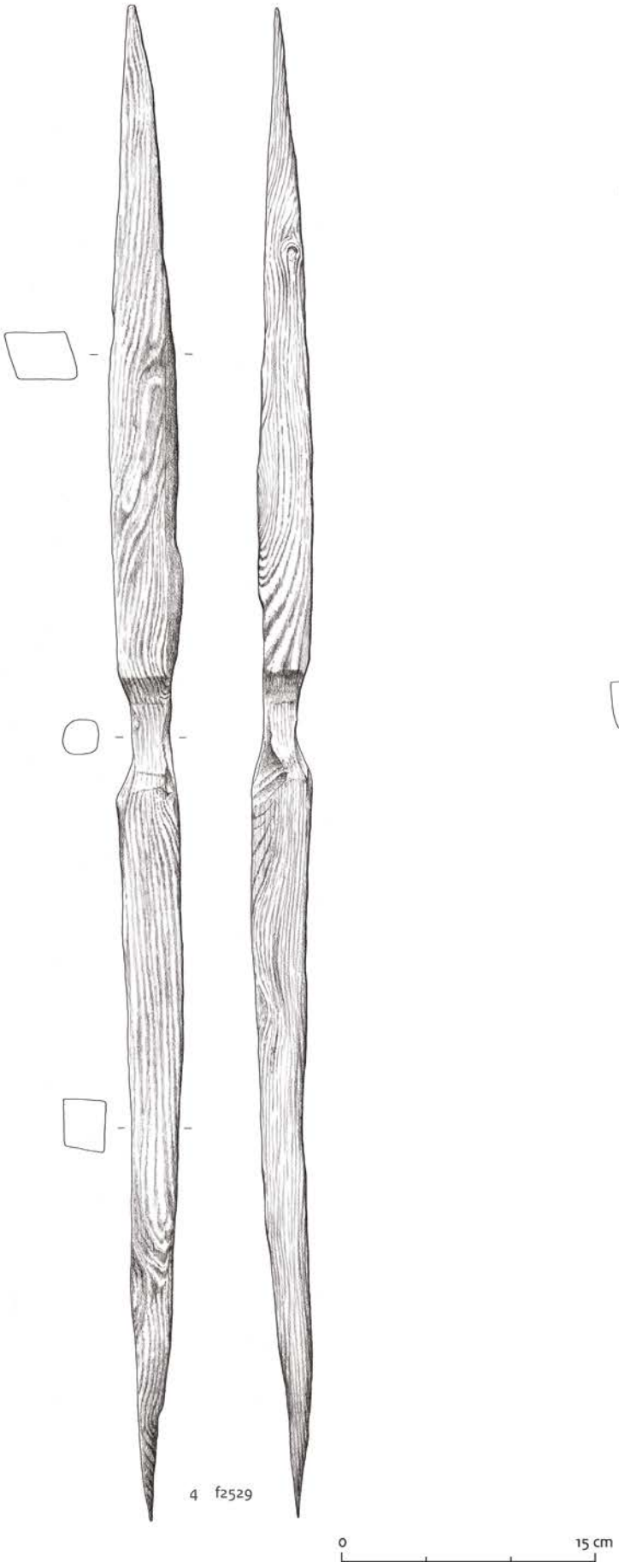
Plate CXXXVIII.571 Part of a machine (?) Find no. 1377 WOODAN-id: 23444000
Find location: Square DQ-21 (Roman layer)
Wood species: *Fraxinus excelsior*/Ash
Three quarters of a roughly rectangular block with two grooves. One groove runs from a notch at the rim of the disc straight over the centre part and has two sloping sides. The second groove, partly broken, diagonally carved on the back side, has a rounded shape.
Dia. 8 cm x Th. 6 cm; grooves: L. 5 cm x W. 3 cm x D. 0.5 cm (straight groove) and L. 8.1 cm x W. >3 cm x D. 0.5 cm

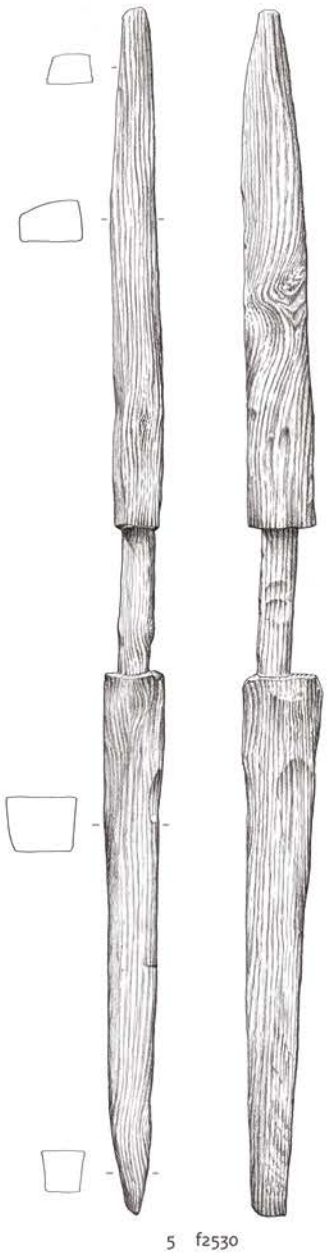


Military Equipment
Swords. Pommel and handguard of a gladius (1: boxwood).



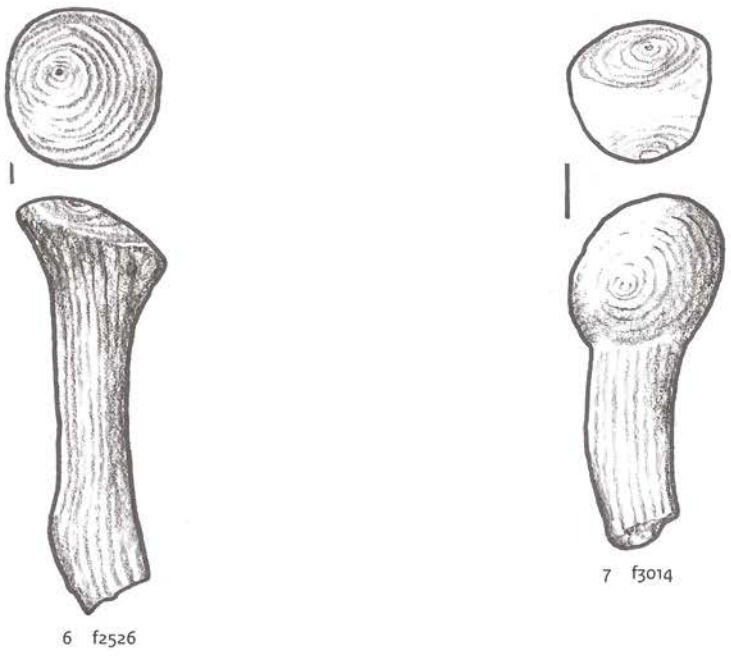
Military Equipment
Swords. Grip of a gladius (2: boxwood), arrow (3: dogwood).



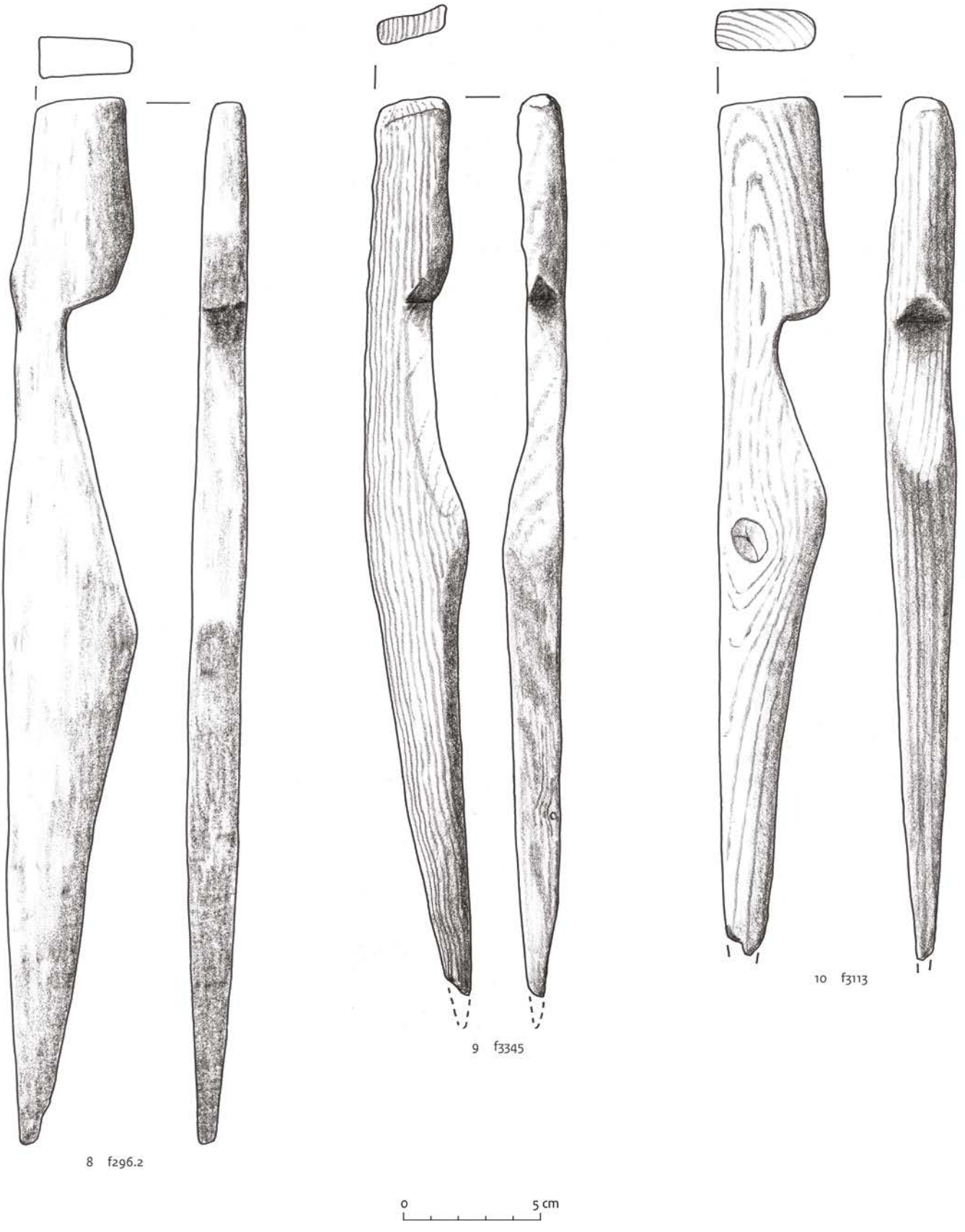


Military Equipment
Obstacles (4 and 5: oak).

Plate IV.6-7

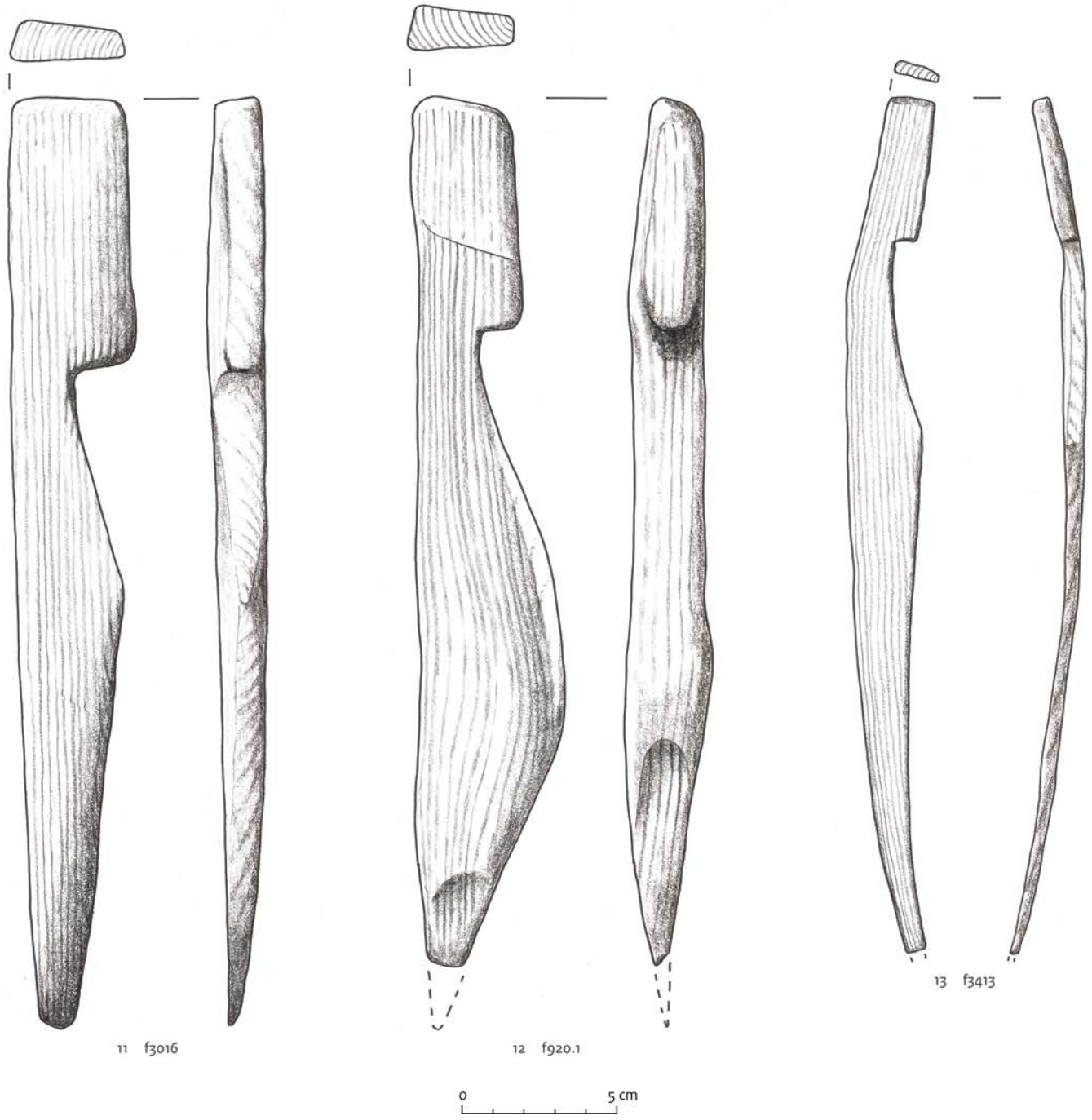


Military Equipment
Military signa. *Vitis* (6 and 7: common grape).

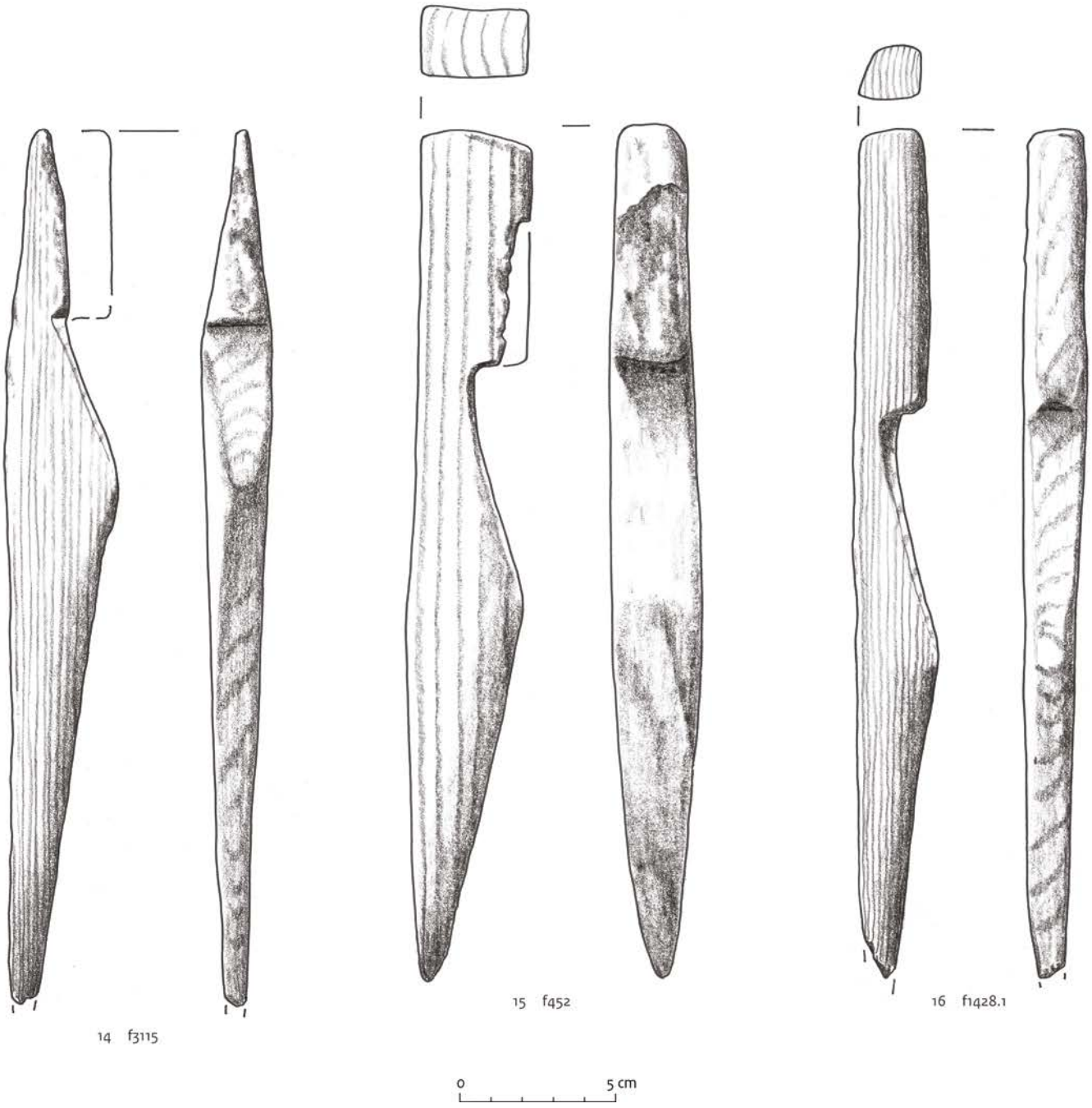


Military Equipment
Tent pegs (8-10: ash).

Plate VI.11-13

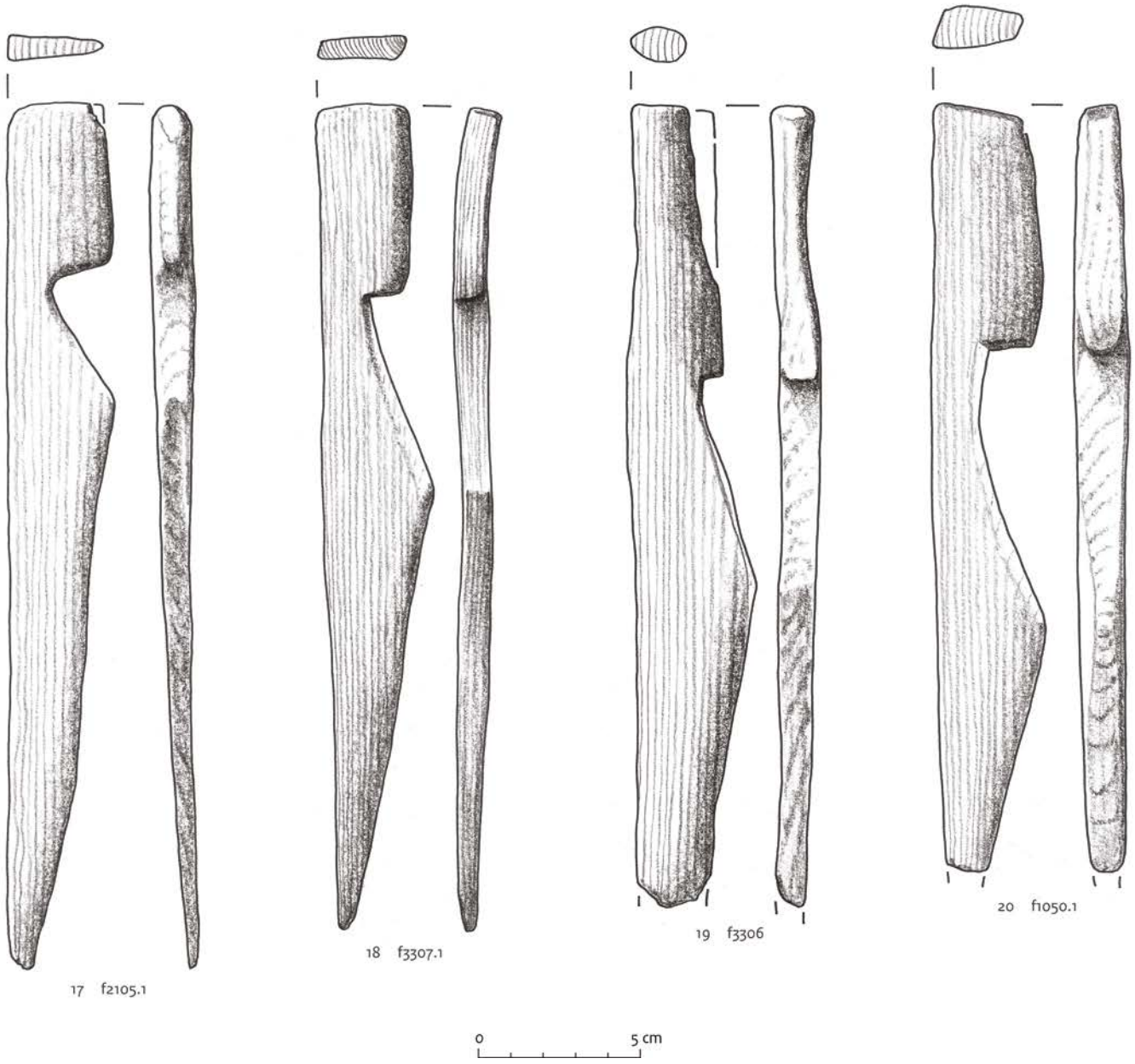


Military Equipment
Tent pegs (11-13: ash).

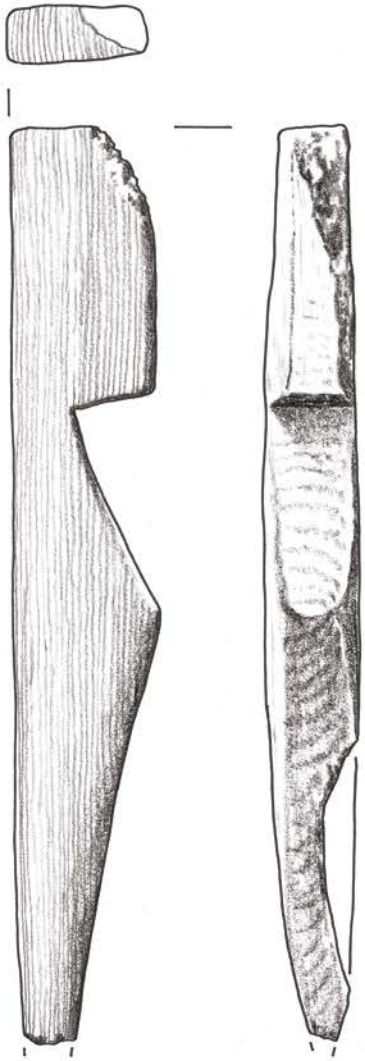


Military Equipment
Tent pegs (14-16: ash).

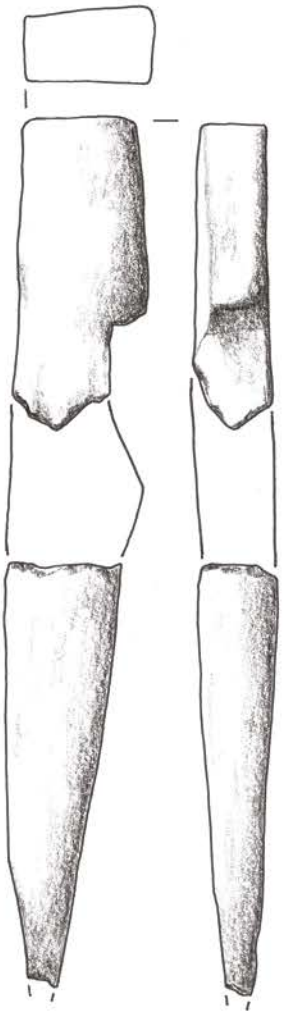
Plate VIII.17-20



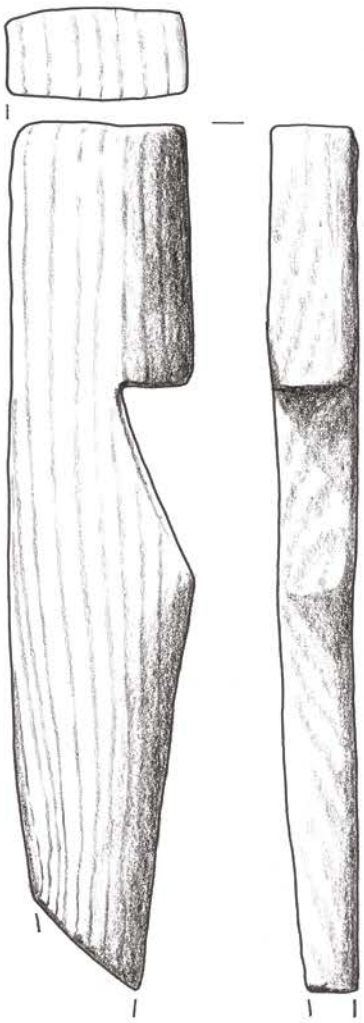
Military Equipment
Tent pegs (17-20: ash).



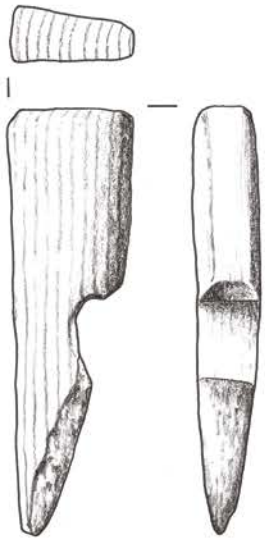
21 f3395



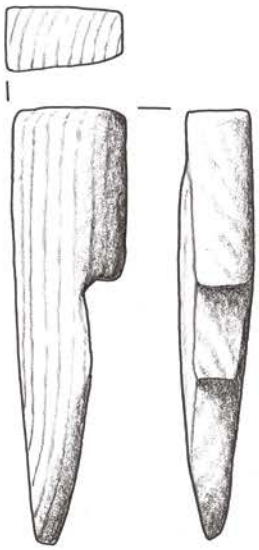
22 f261.1



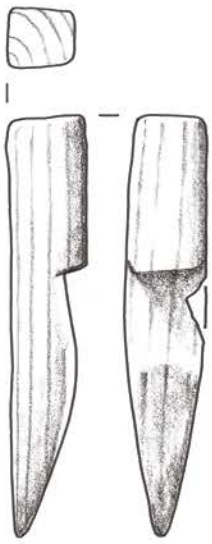
23 f1737.1



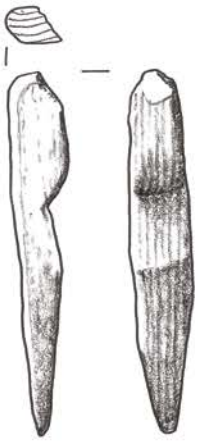
24 f1025



25 f1743



26 f3388

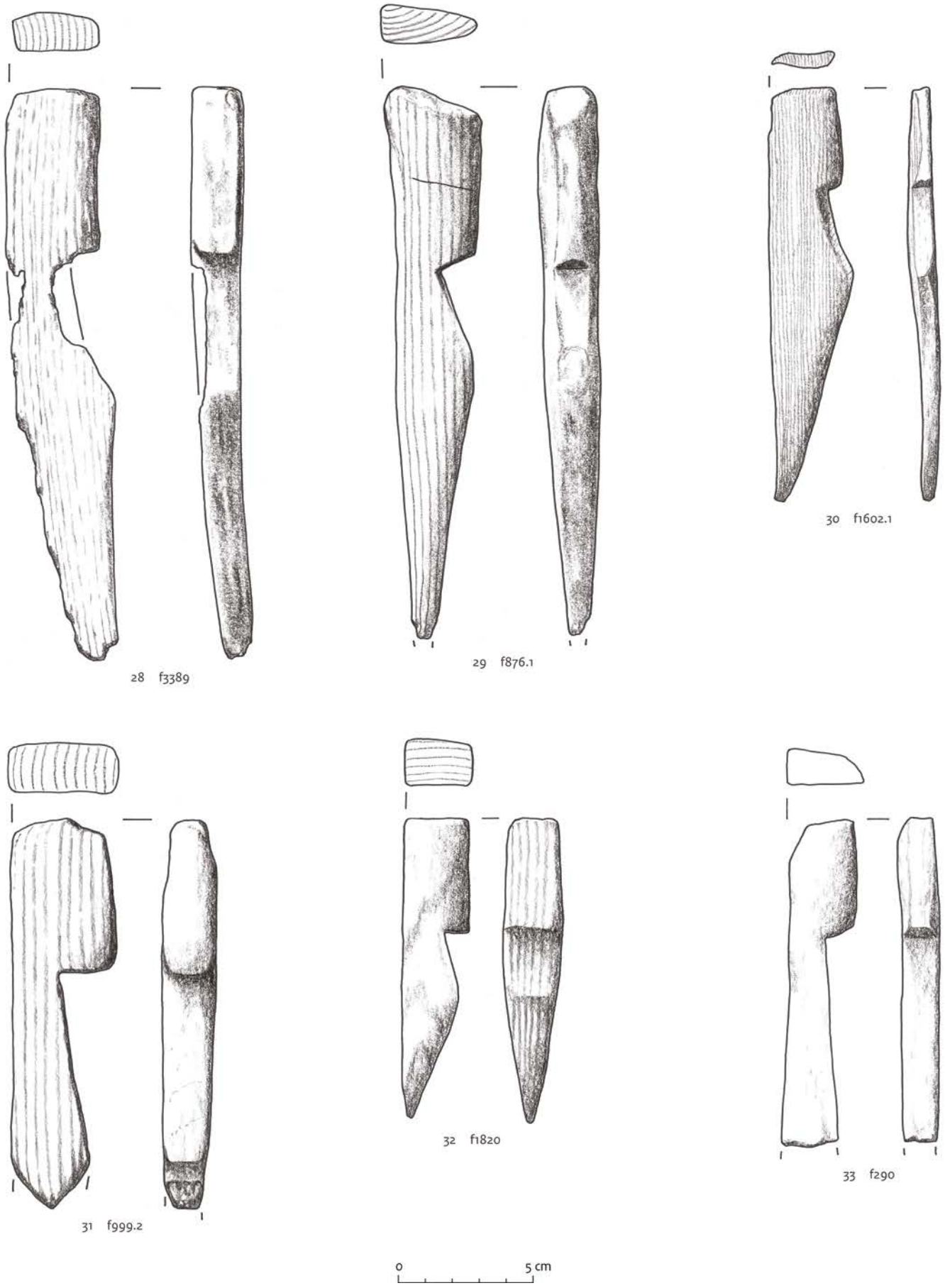


27 f3384

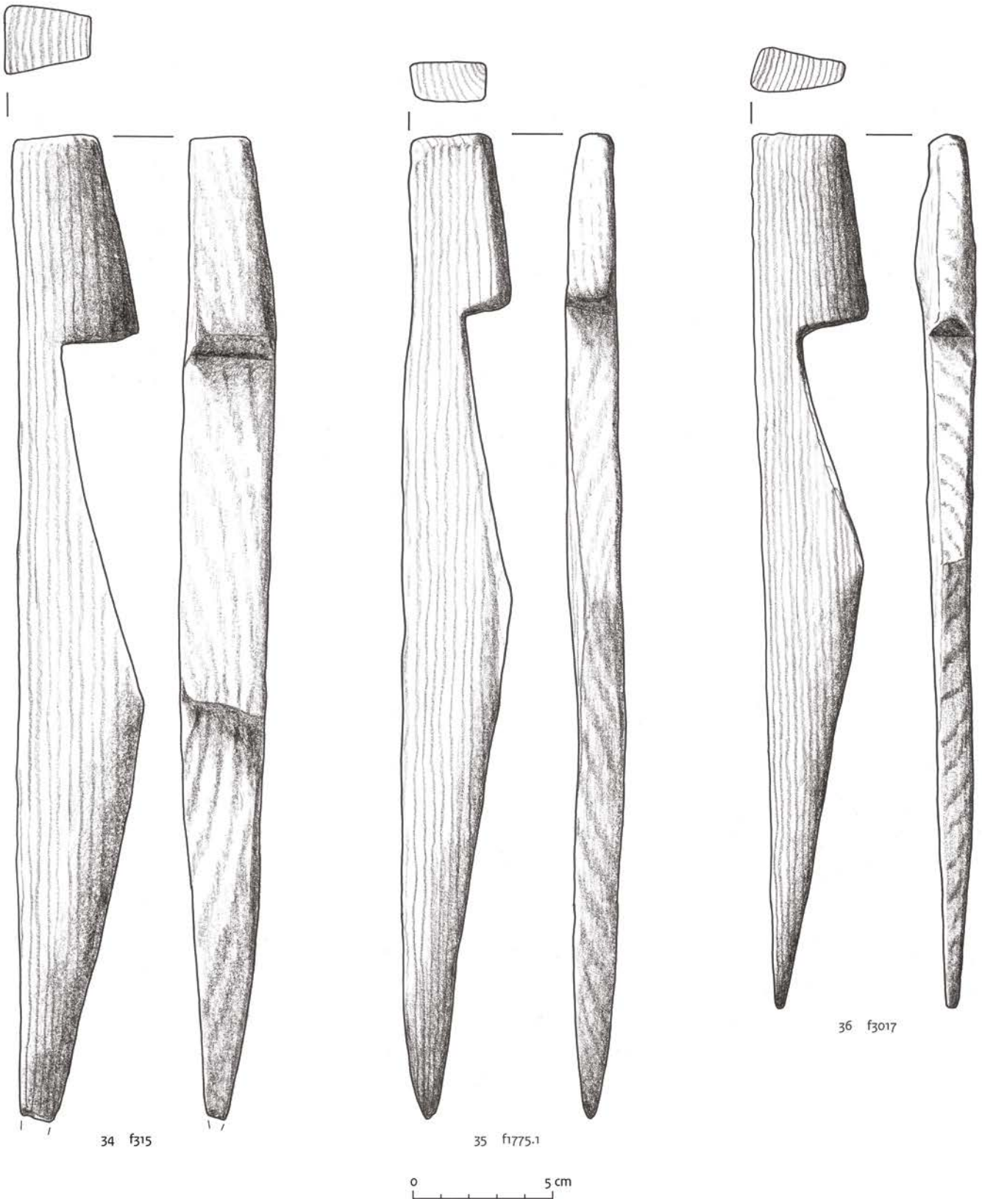
0 5 cm

Military Equipment
Tent pegs (21-27: ash).

Plate X.28-33

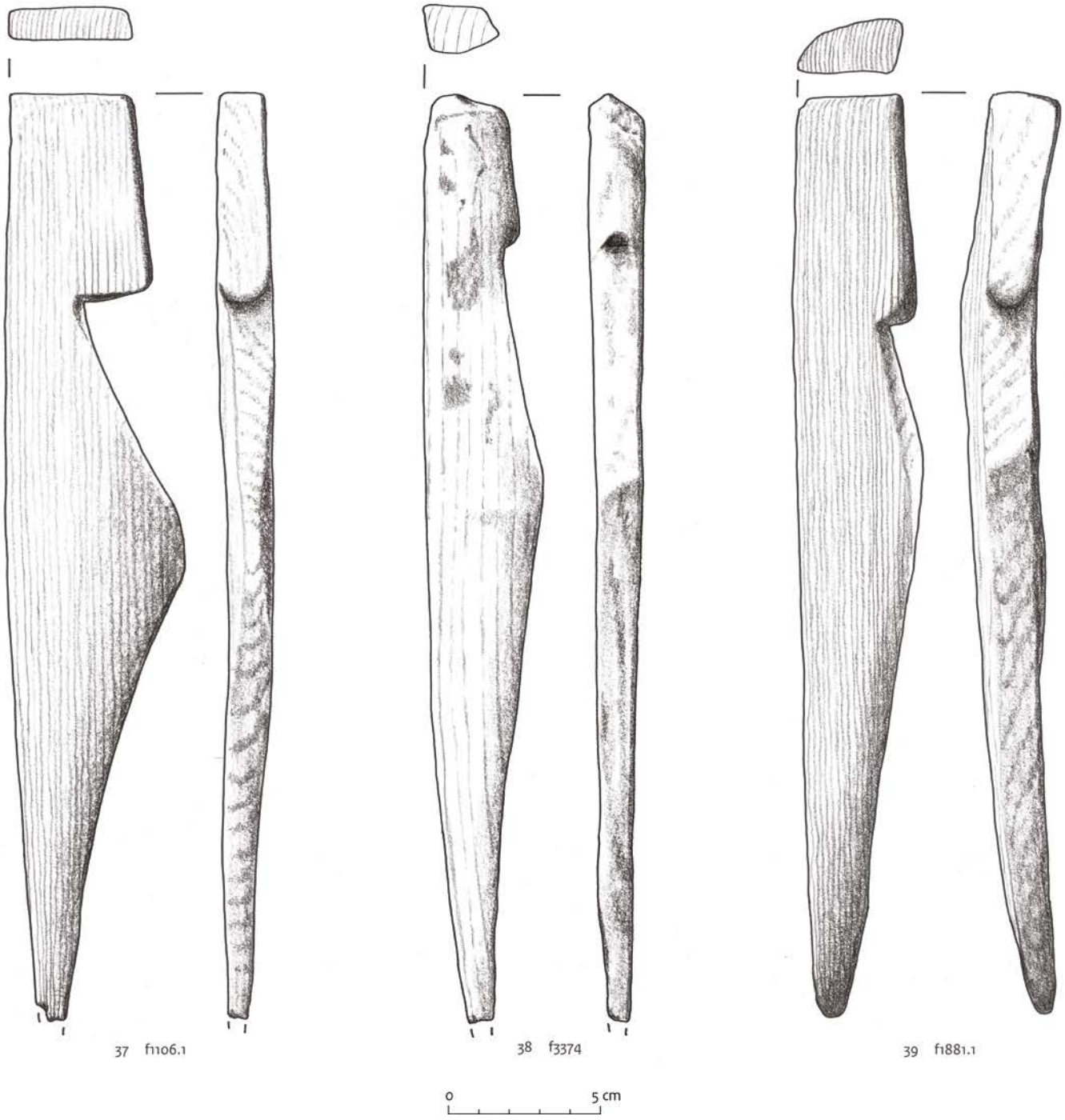


Military Equipment
Tent pegs (28 and 29: ash, 30: alder, 31-33: ash).

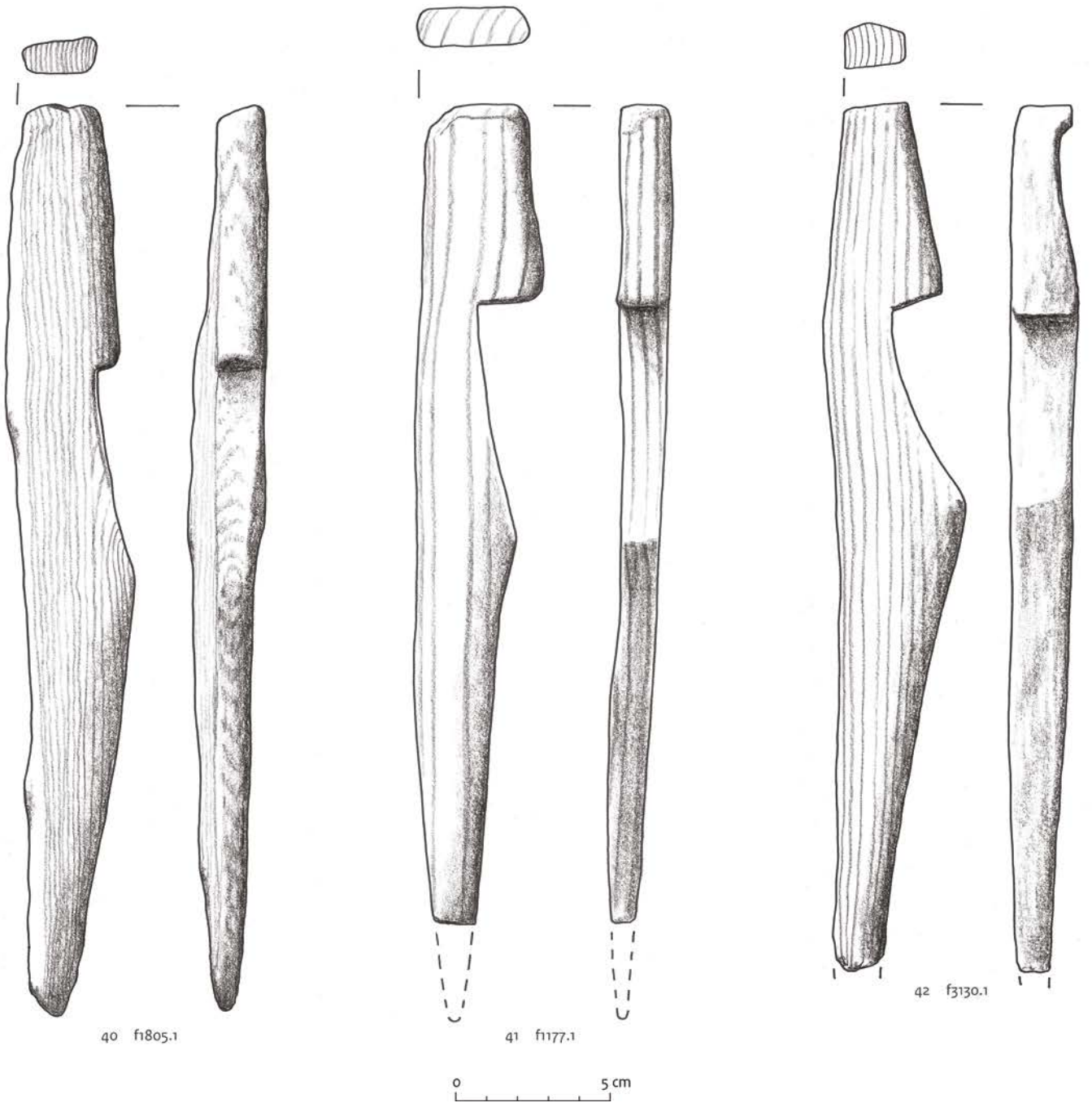


Military Equipment
Tent pegs (34-36: ash).

Plate XII.37-39

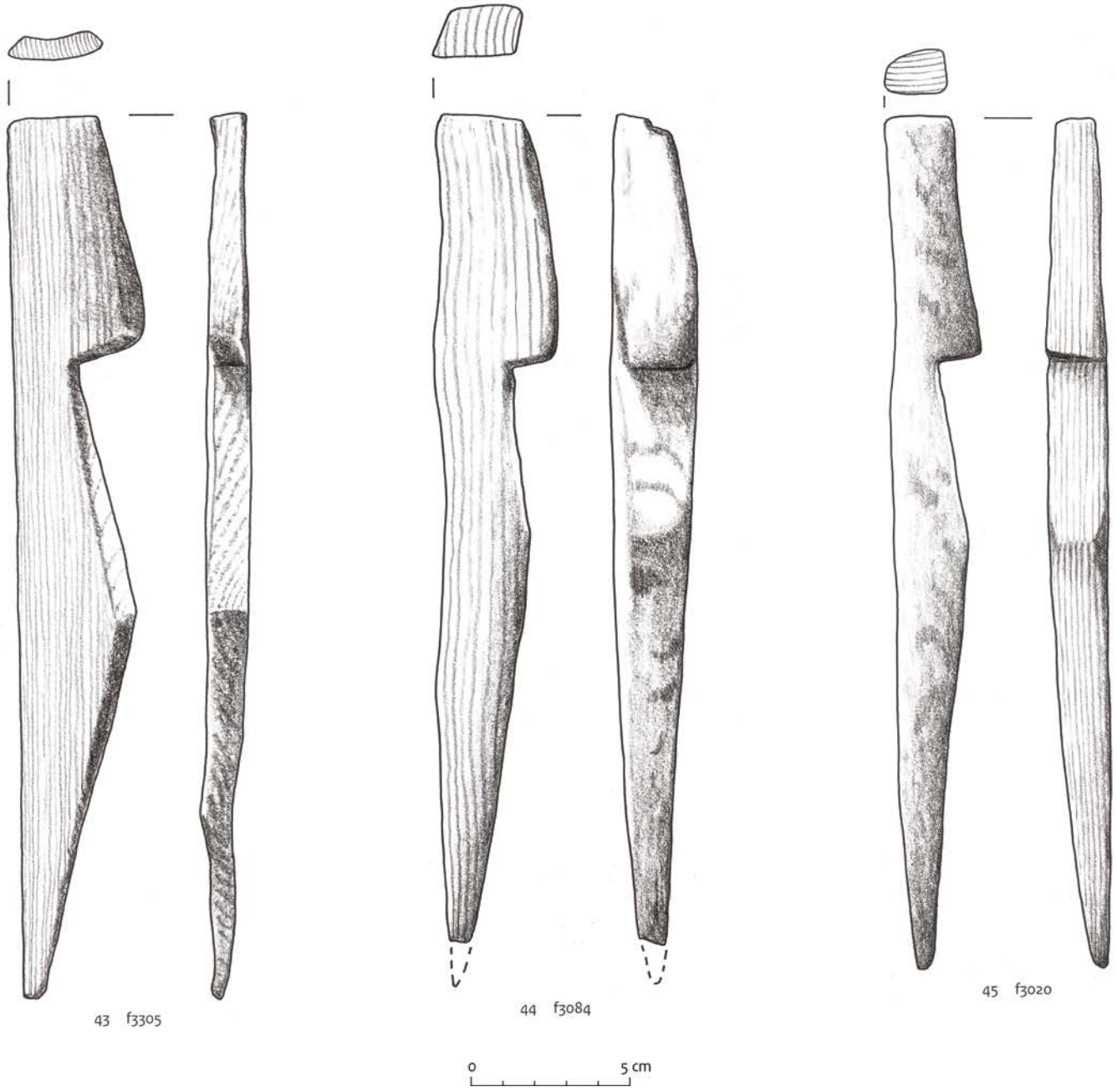


Military Equipment
Tent pegs (37: ash, 38: oak, 39: ash).

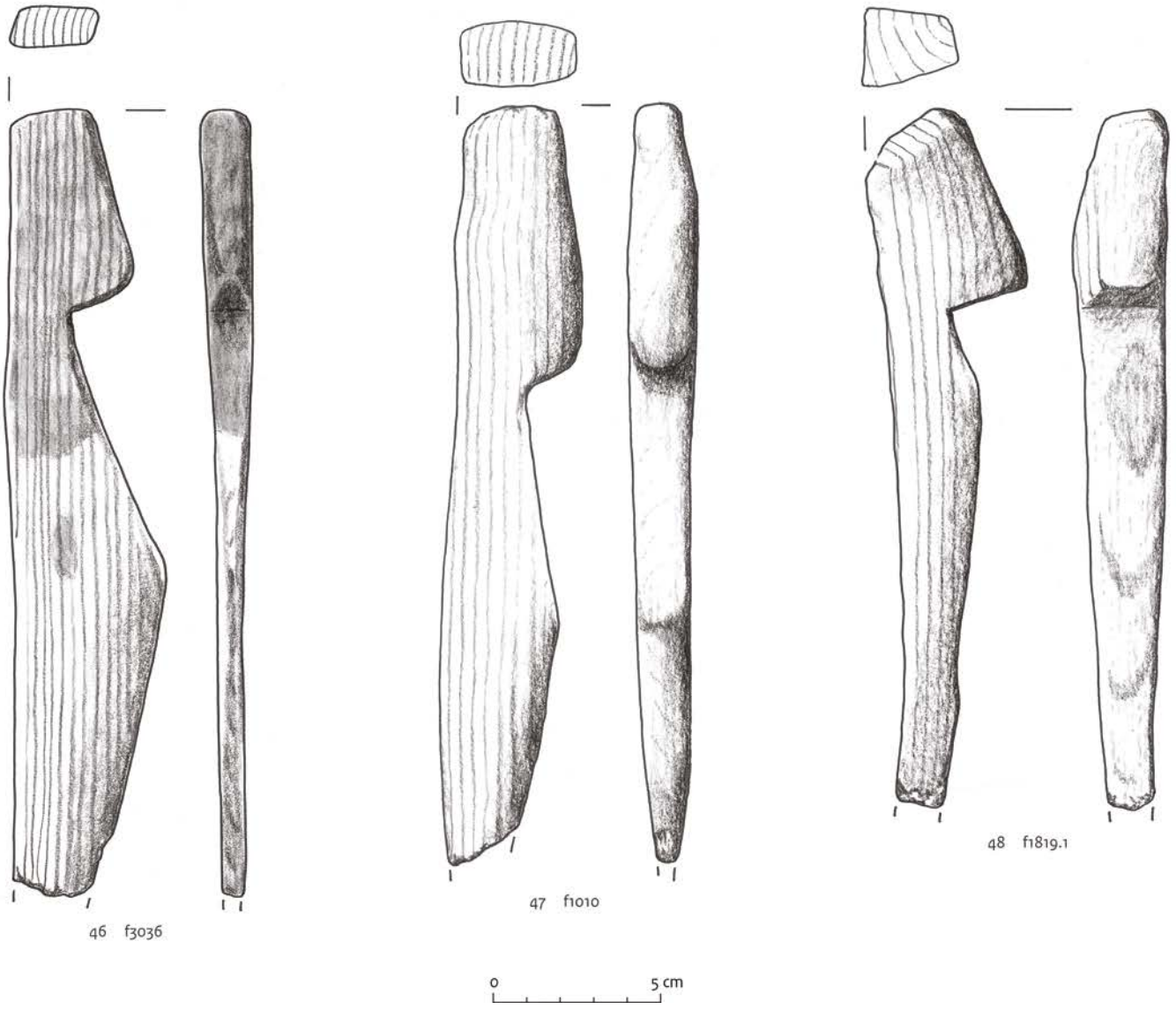


Military Equipment
Tent pegs (40-42: ash).

Plate XIV.43-45

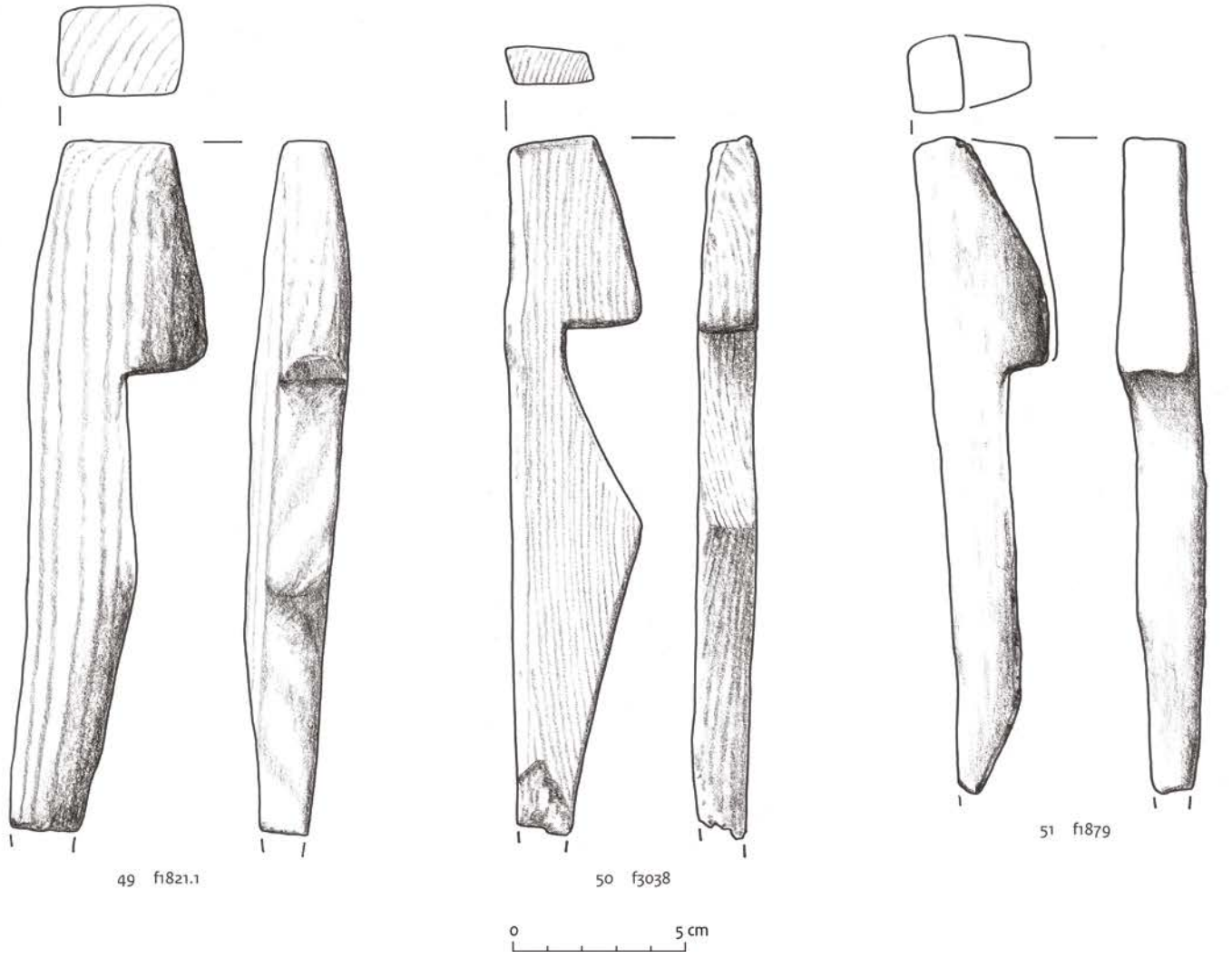


Military Equipment
Tent pegs (43: ash, 44: oak, 45: ash).

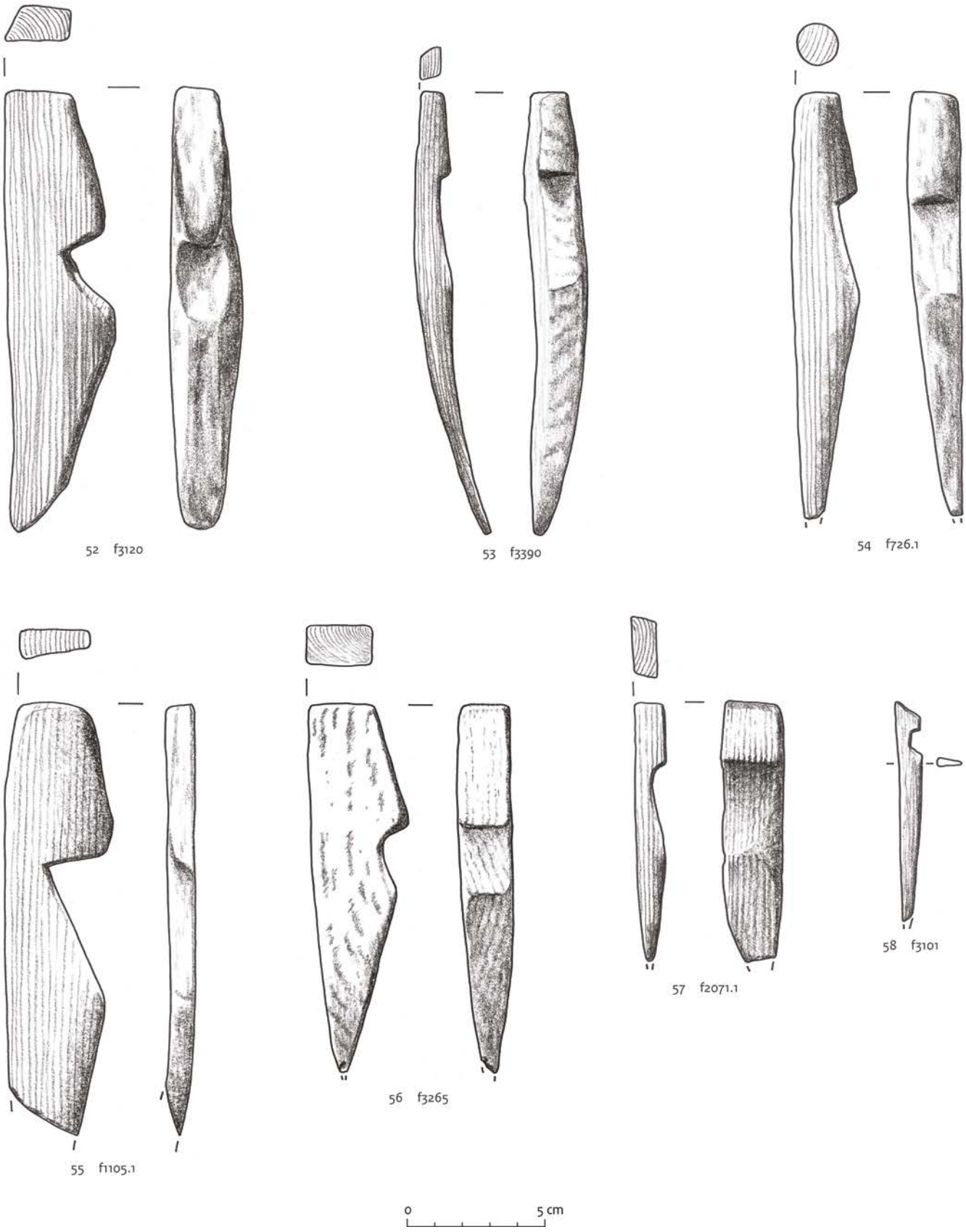


Military Equipment
Tent pegs (46-48: ash).

Plate XVI.49-51

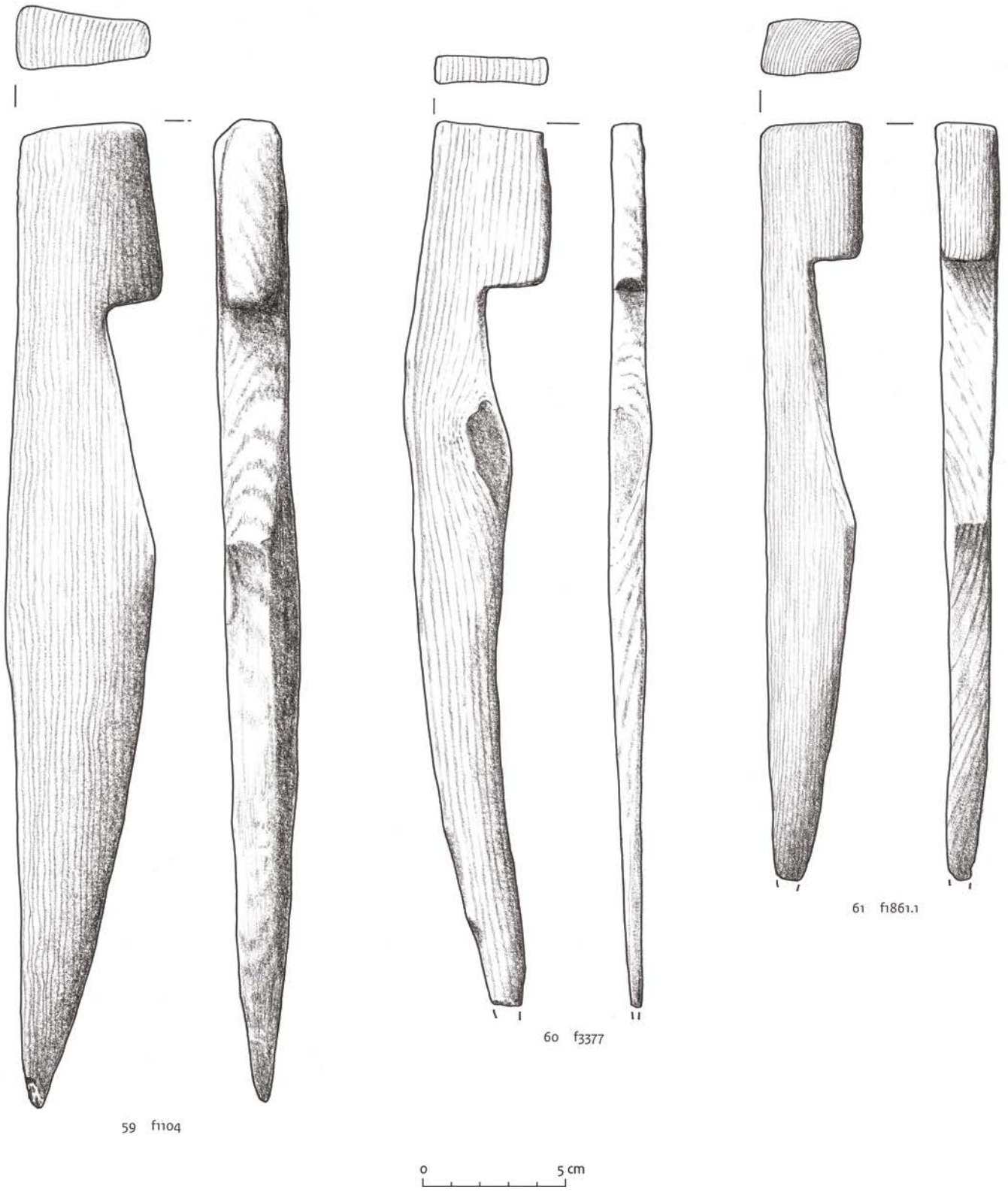


Military Equipment
Tent pegs (49 and 50: ash, 51: alder).

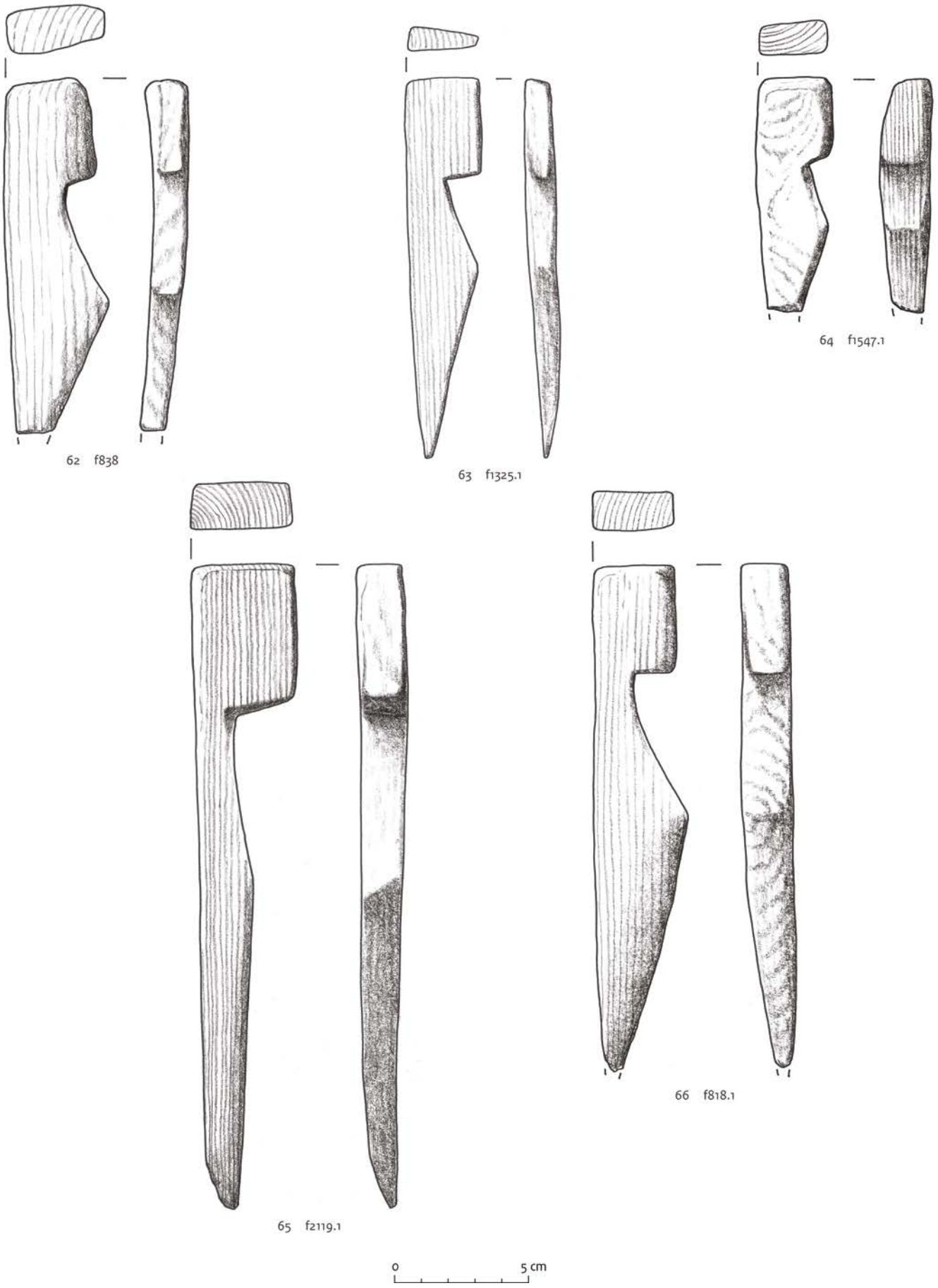


Military Equipment
Tent pegs (52-54: oak, 55: ash, 56 and 57: oak, 58: wood species not identified).

Plate XVIII.59-61

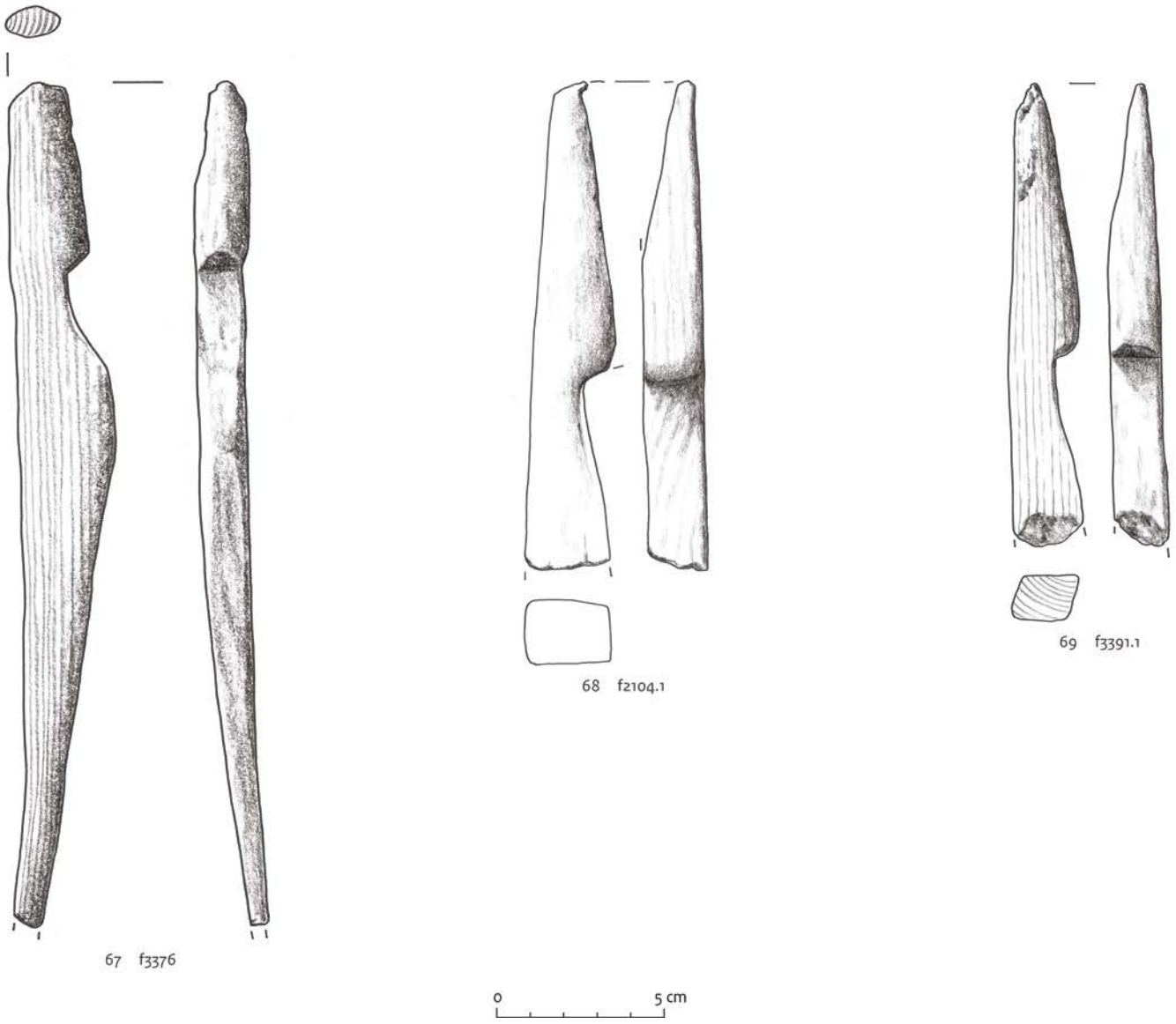


Military Equipment
Tent pegs (59-61: ash).

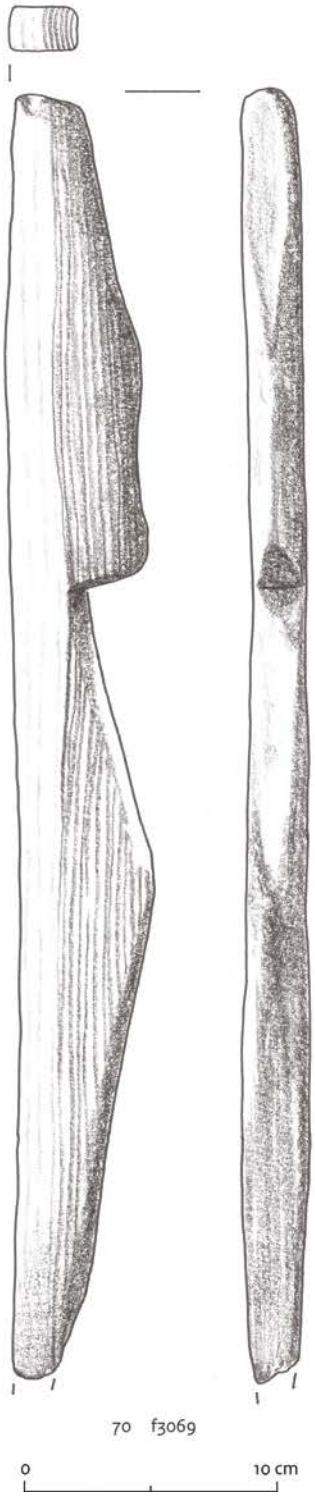


Military Equipment
Tent pegs (62-64: ash, 65: alder, 66: ash).

Plate XX.67-69

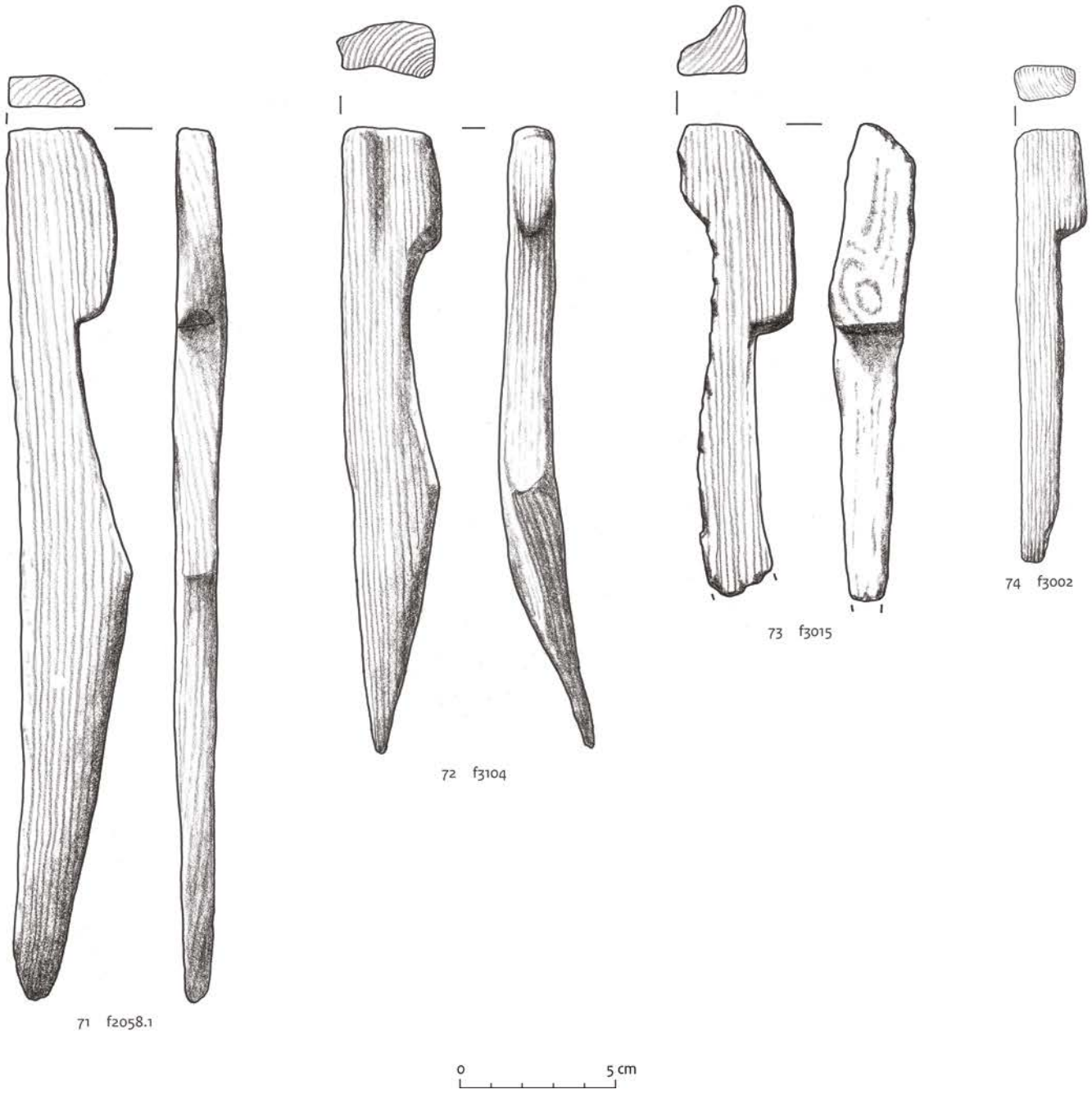


Military Equipment
Tent pegs (67: oak, 68: alder, 69: oak).

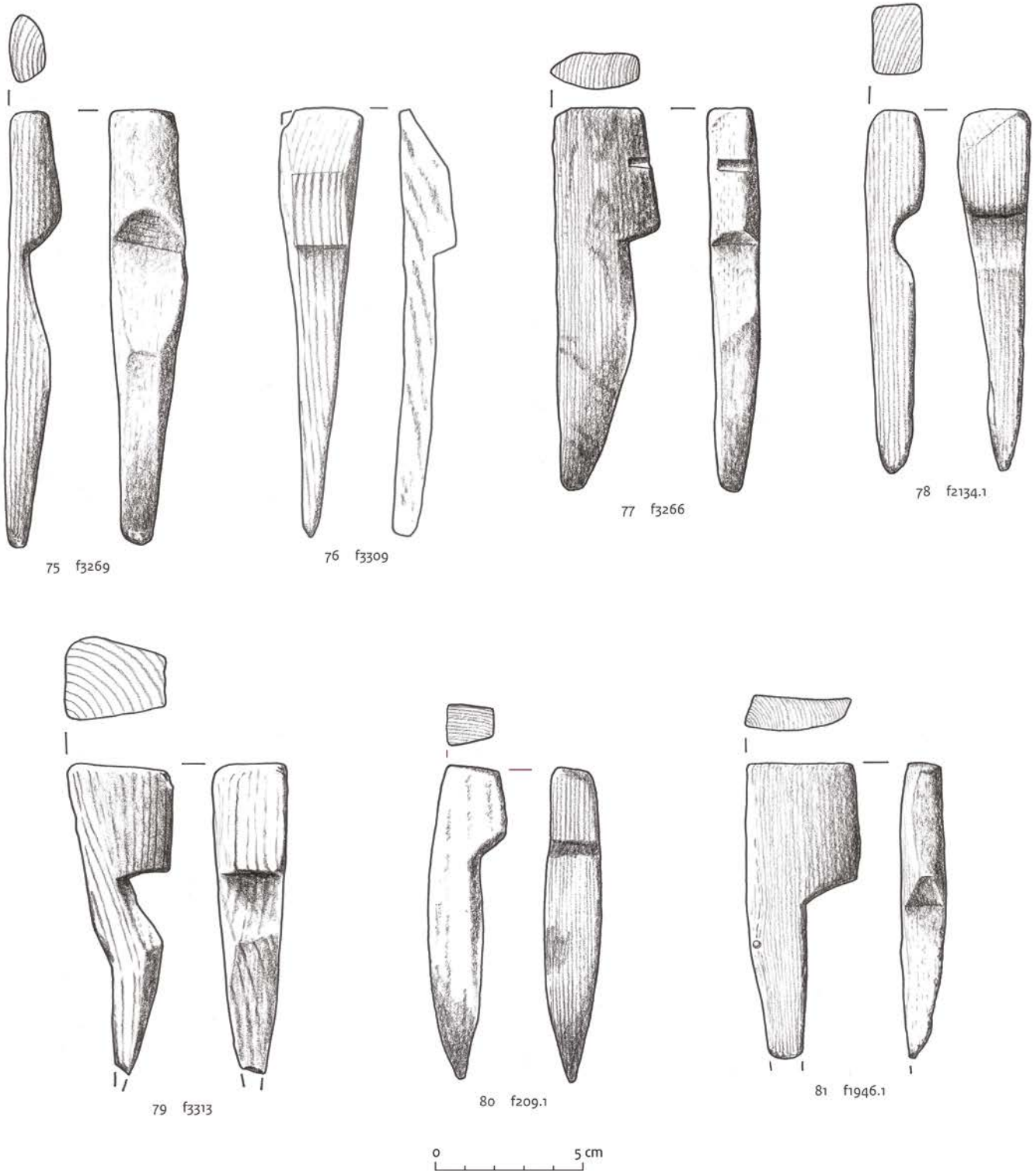


Military Equipment
Tent peg (70: oak).

Plate XXII.71-74

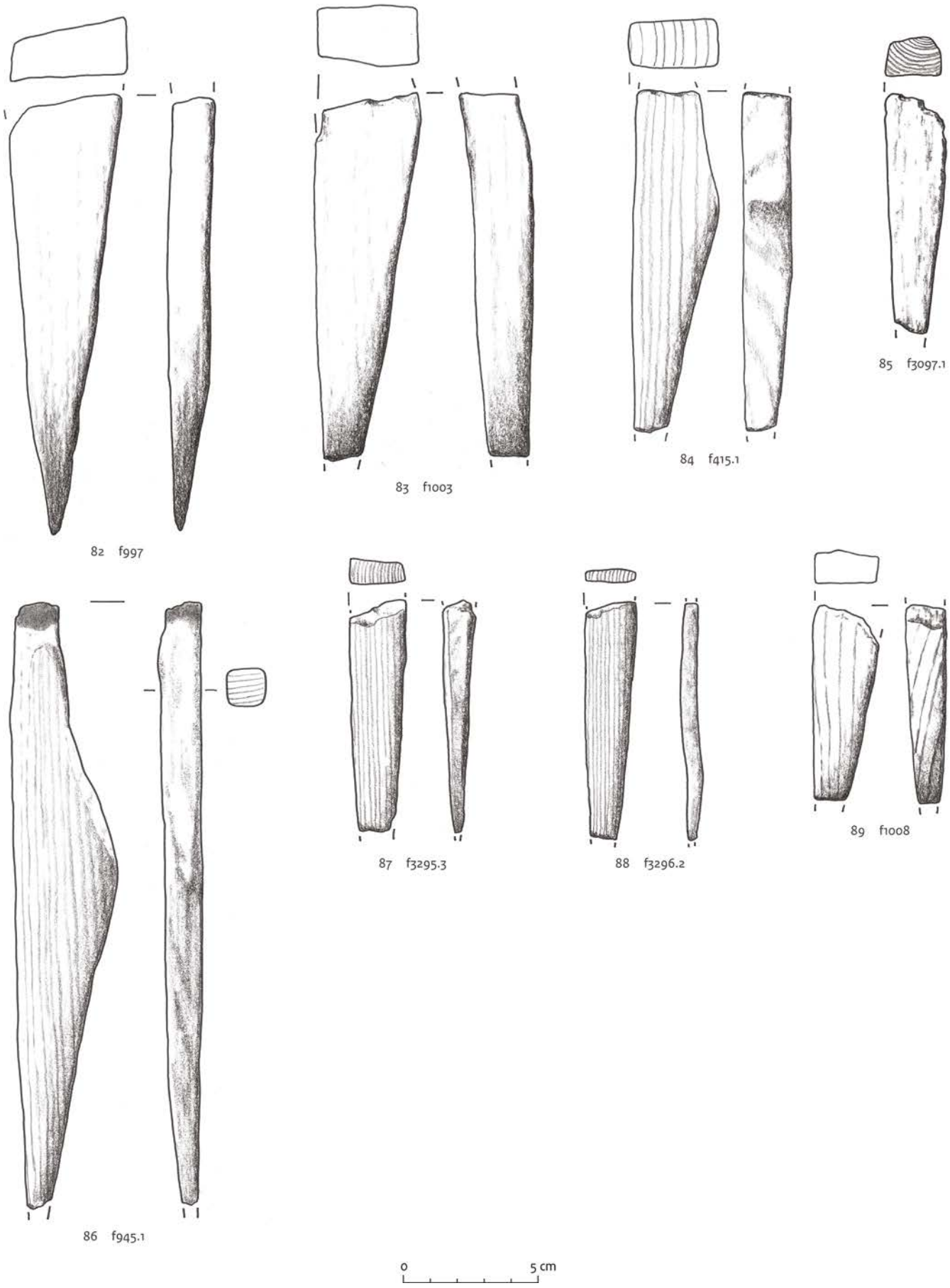


Military Equipment
Tent pegs (71 and 72: ash, 73: oak, 74: ash).

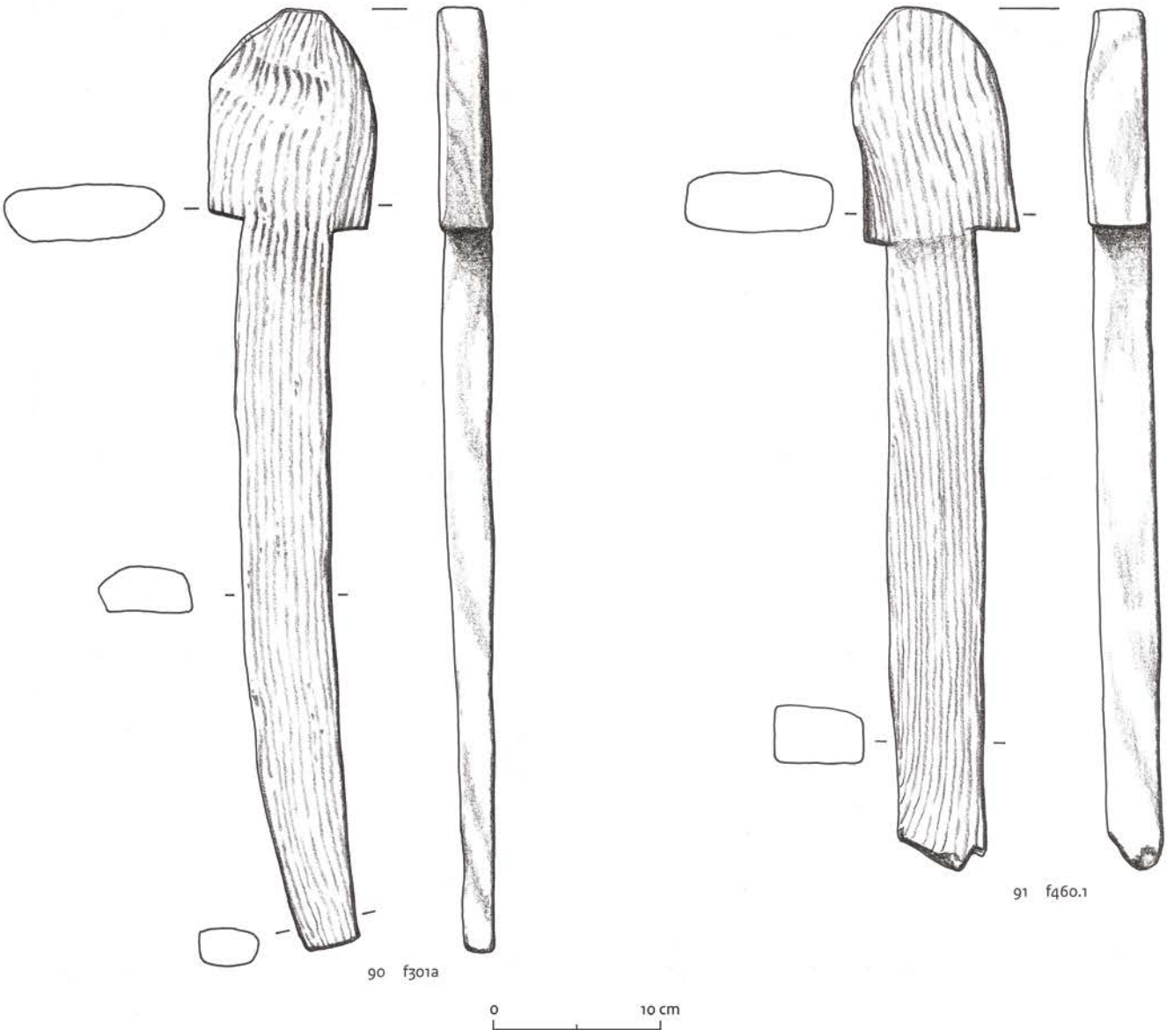


Military Equipment
Tent pegs (75: oak, 76: silver fir, 77 and 78: oak, 79: ash, 80: oak, 81: ash).

Plate XXIV.82-89

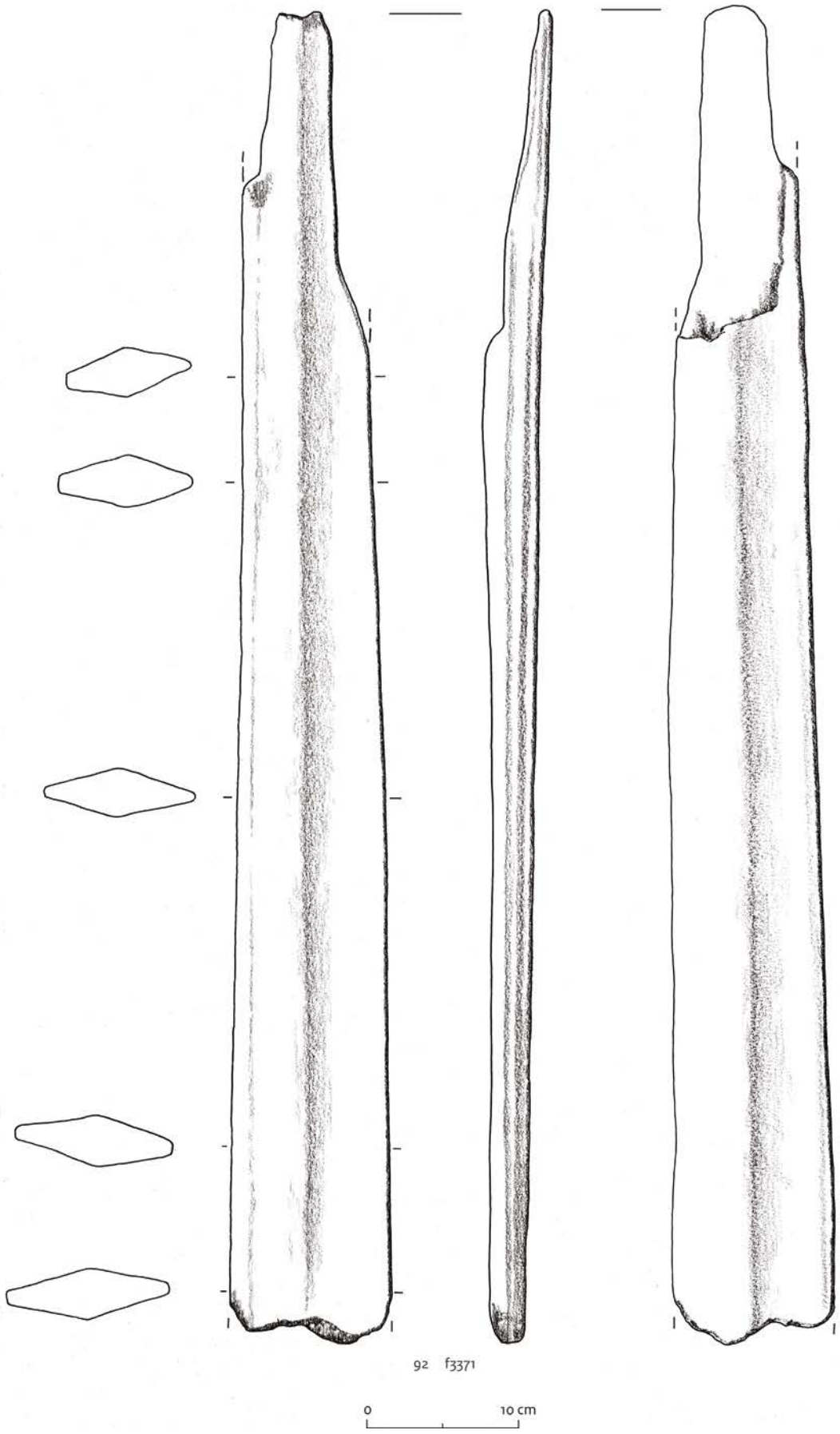


Military Equipment
Tent pegs (82-89: ash).

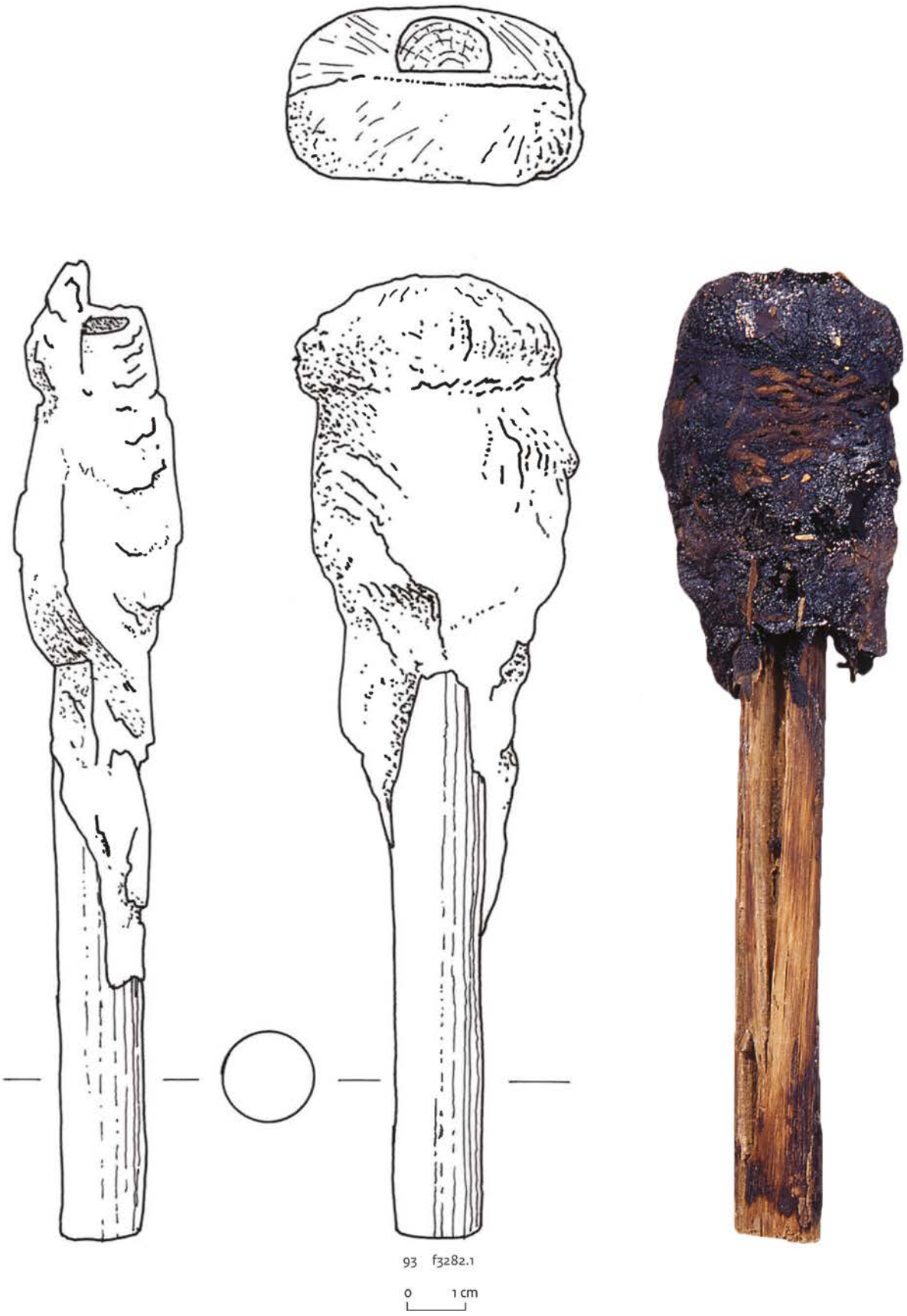


Military Equipment
Tent pegs (90 and 91: oak).

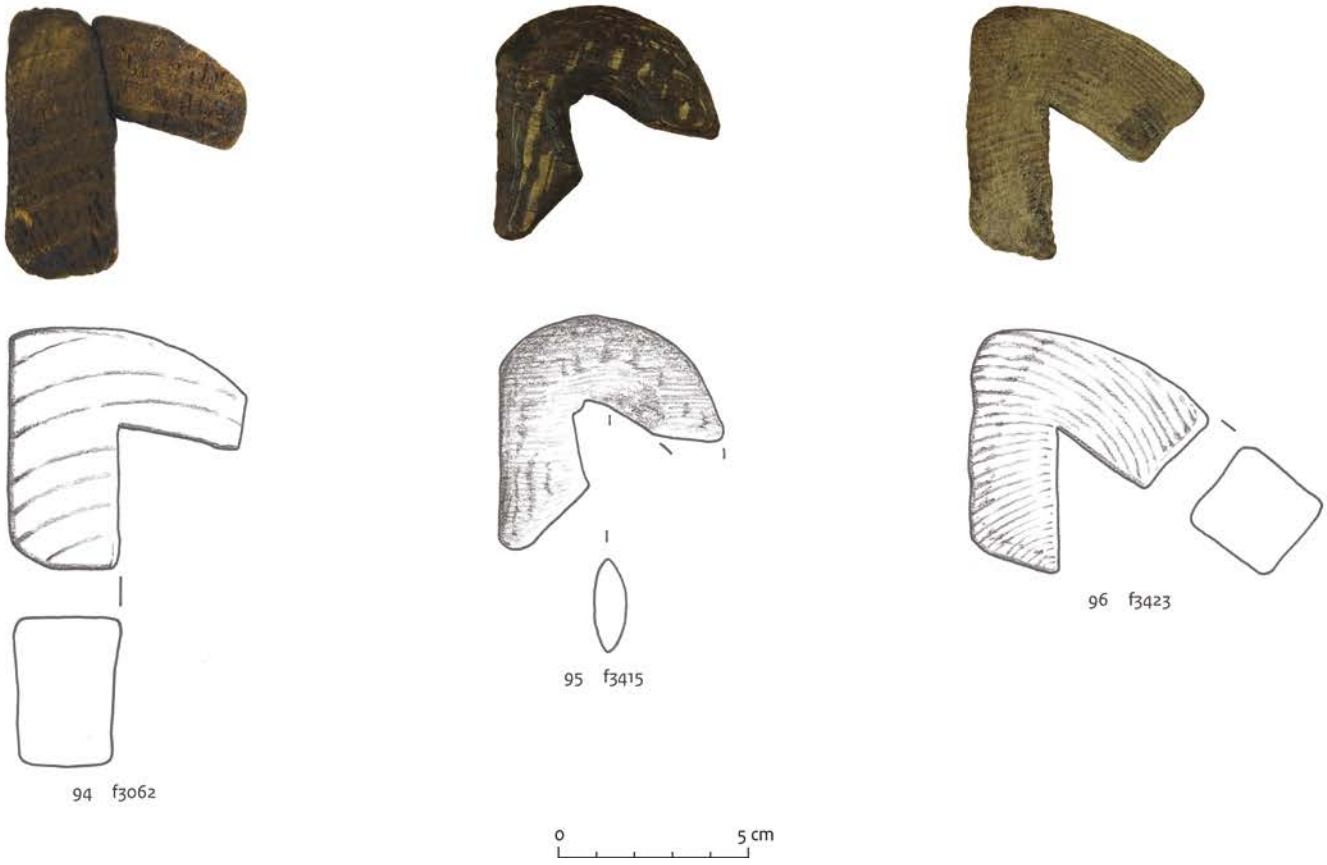
Plate XXVI.92



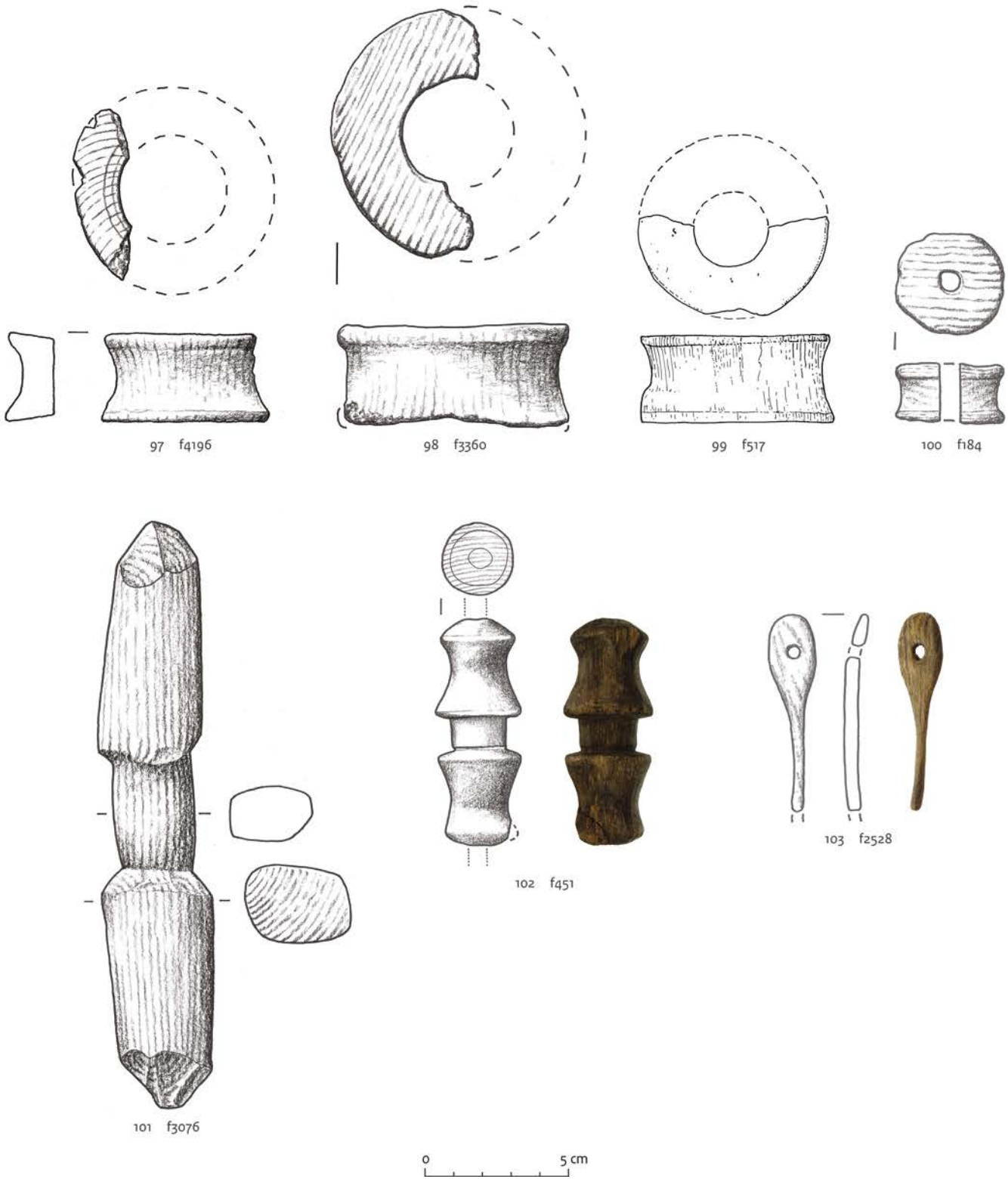
Ship Inventory
Paddle or oar (92: oak).



Ship Inventory
Tools for ship maintenance. Tar brush or torch (93: alder).



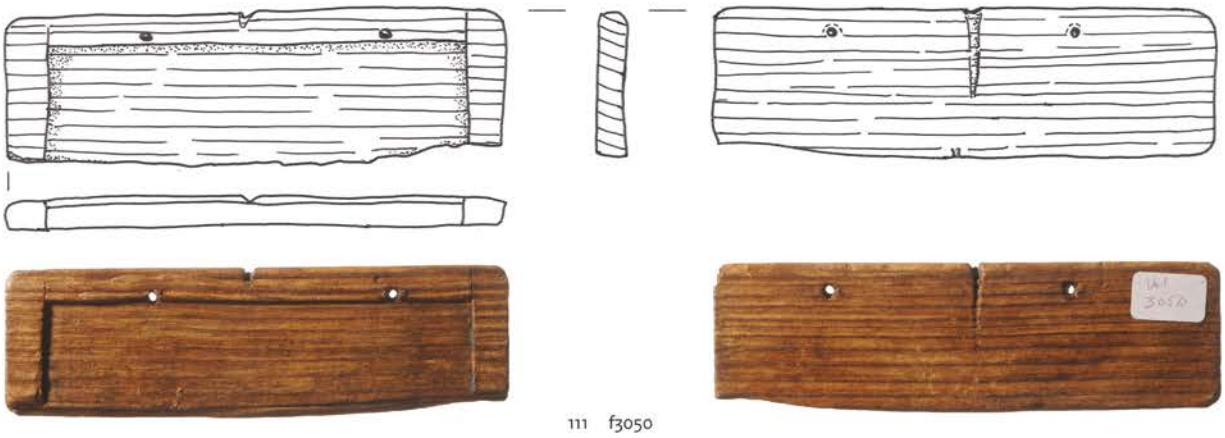
Ship Inventory
Tools for ship maintenance. Angular-shaped objects (94: ash, 95: beech, 96: ash).



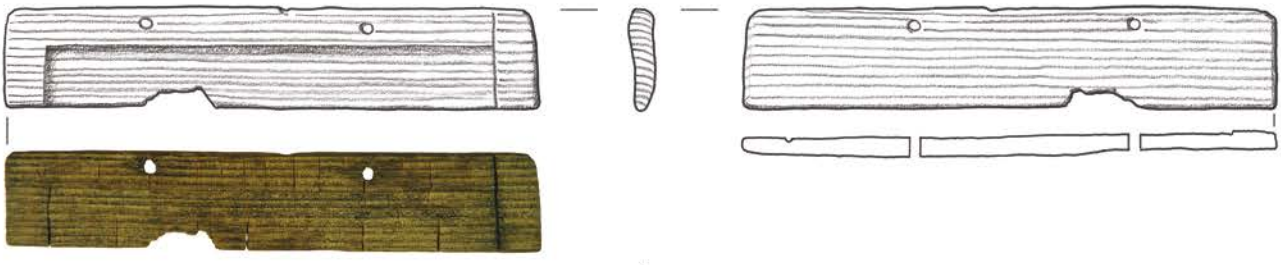
Ship Inventory
Rigging tools. Sheaves of pulleys (97: beech, 98: elm, 99 and 100: wood species not identified), toggles (101: pine, 102: field maple), spill toggle (103: ash).

Plate XXX.104-110

Ship Inventory
Rigging tools. Bobbin-style toggles (104 ash, 105 boxwood), wheels of pulleys (106: beech, 107: oak, 108: ash, 109: wood species not identified), small sheave of a pulley (110: bird cherry).



111 f3050



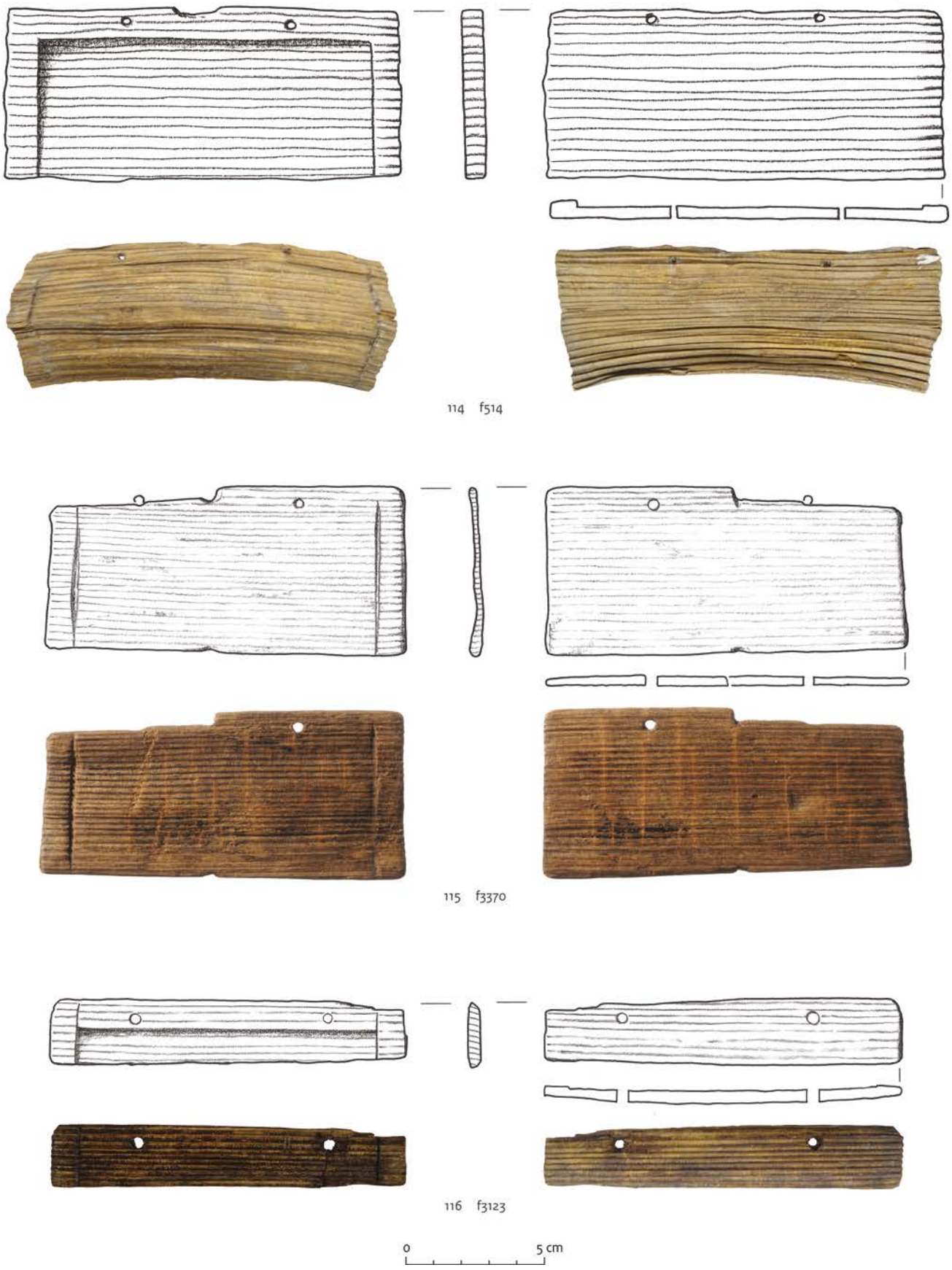
112 f3424

113 f3427

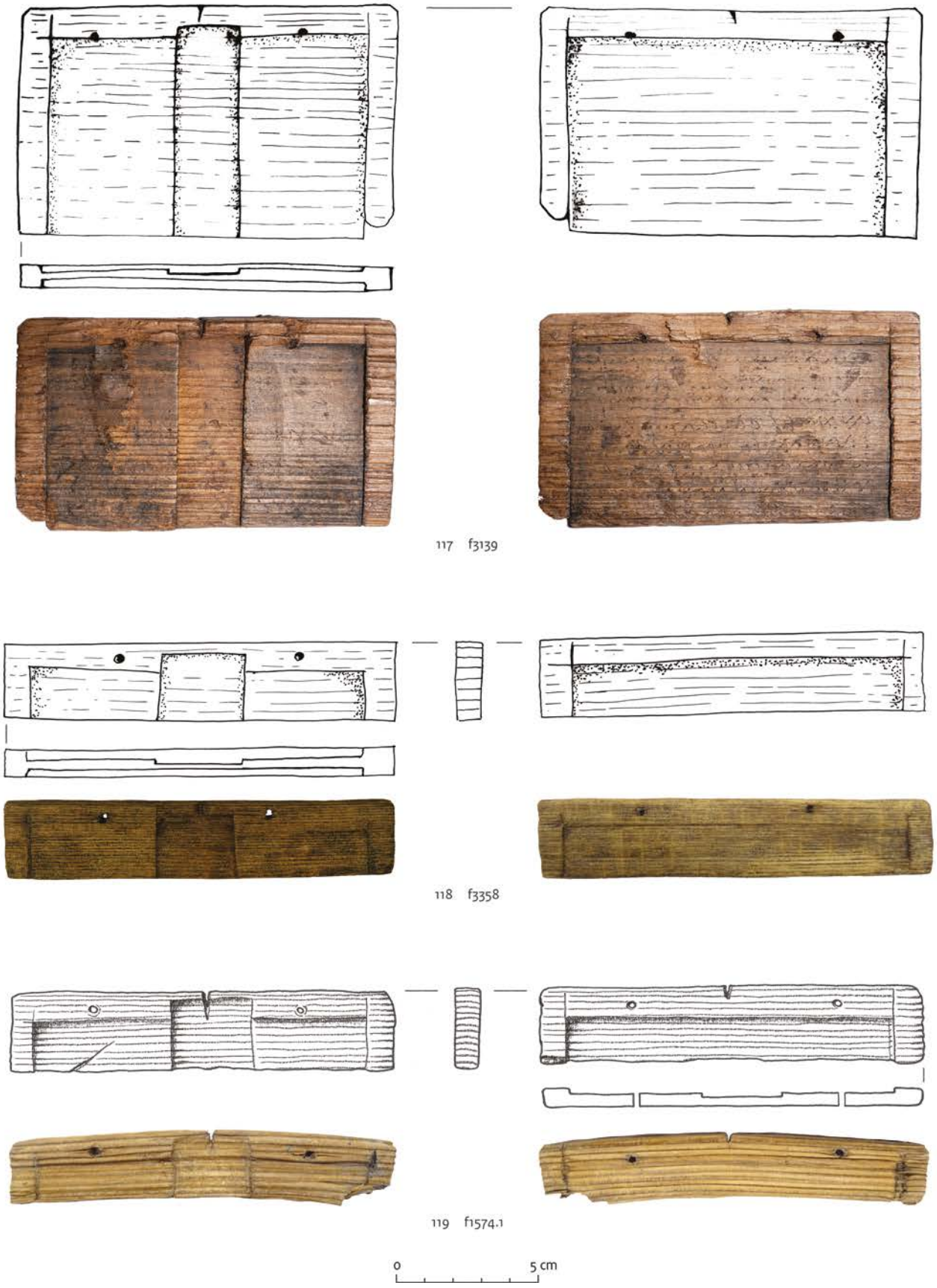
0 5 cm

Communication
Writing tablets (111-113: silver fir).

Plate XXXII.114-116

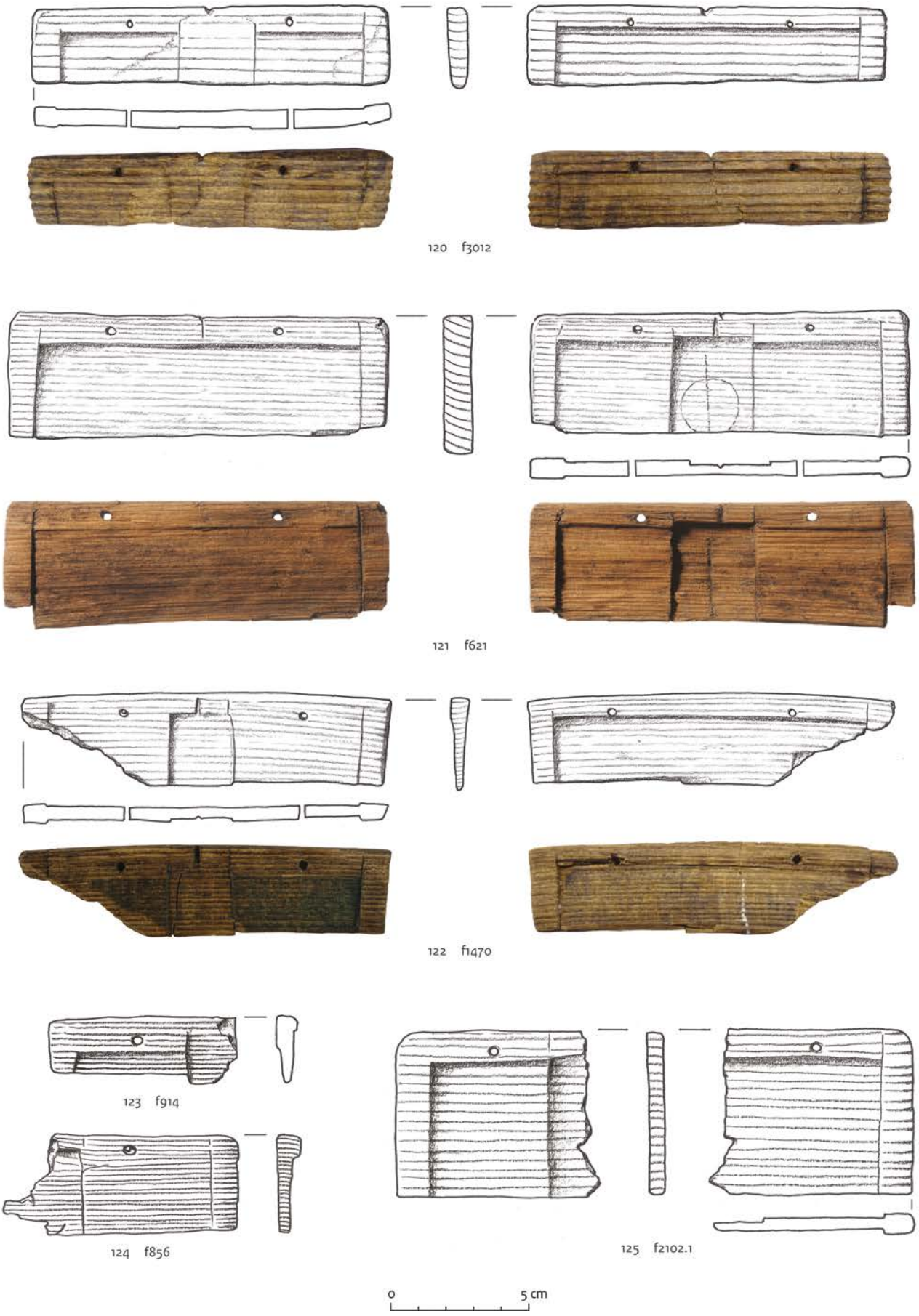


Communication
Writing tablets (114-116: silver fir).

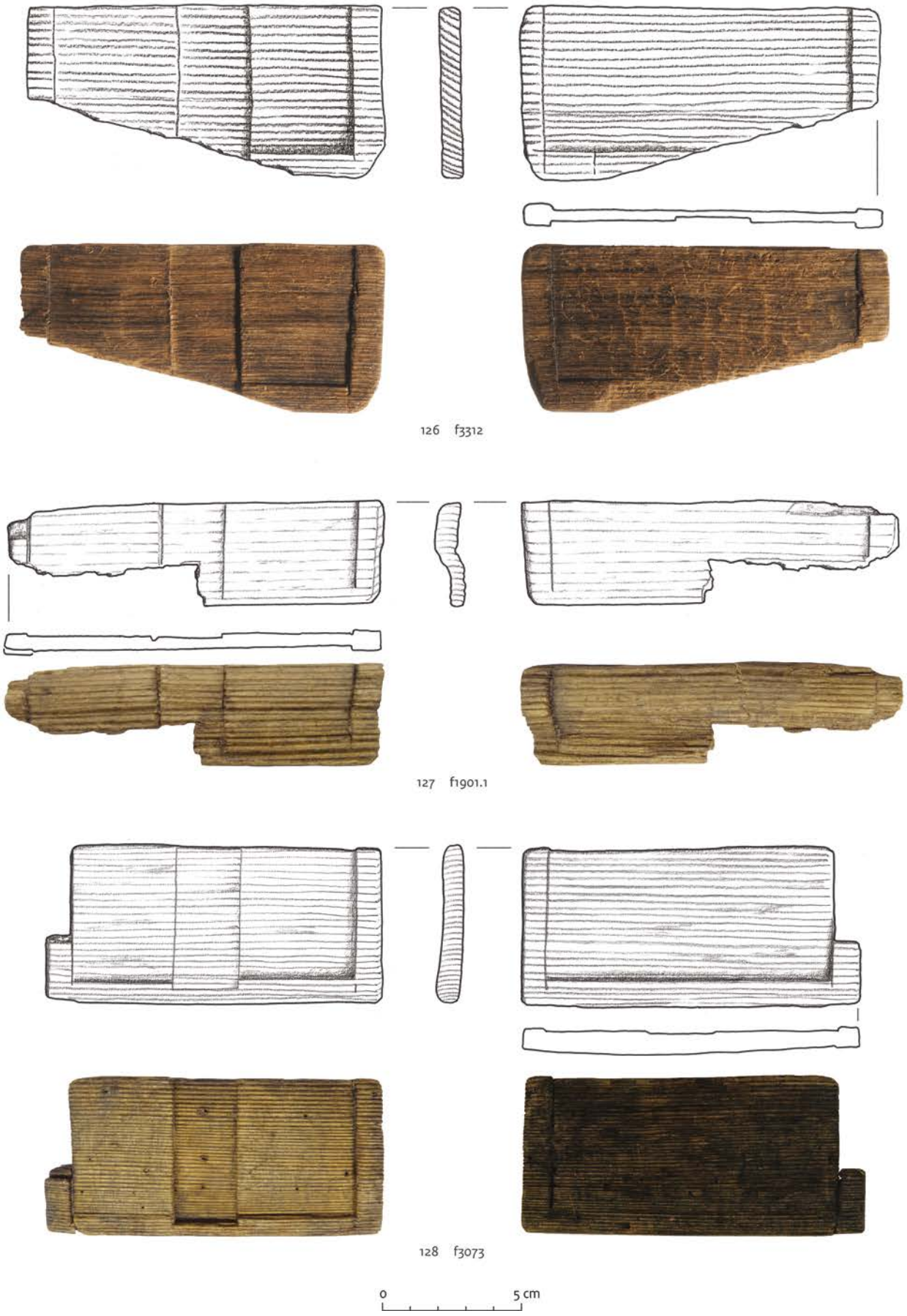


Communication
Writing tablets (117-119: silver fir).

Plate XXXIV.120-125

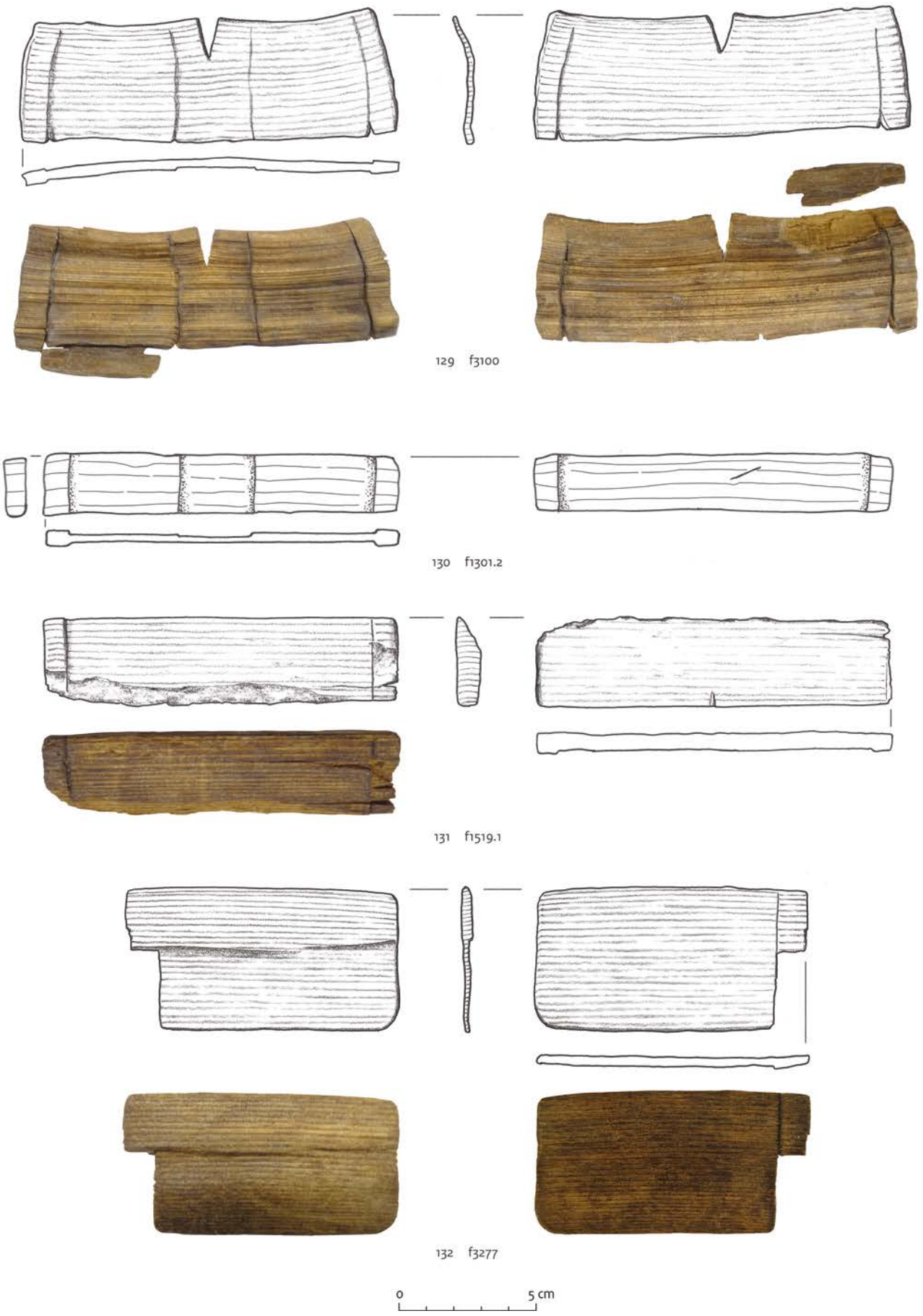


Communication
Writing tablets (120-125: silver fir).

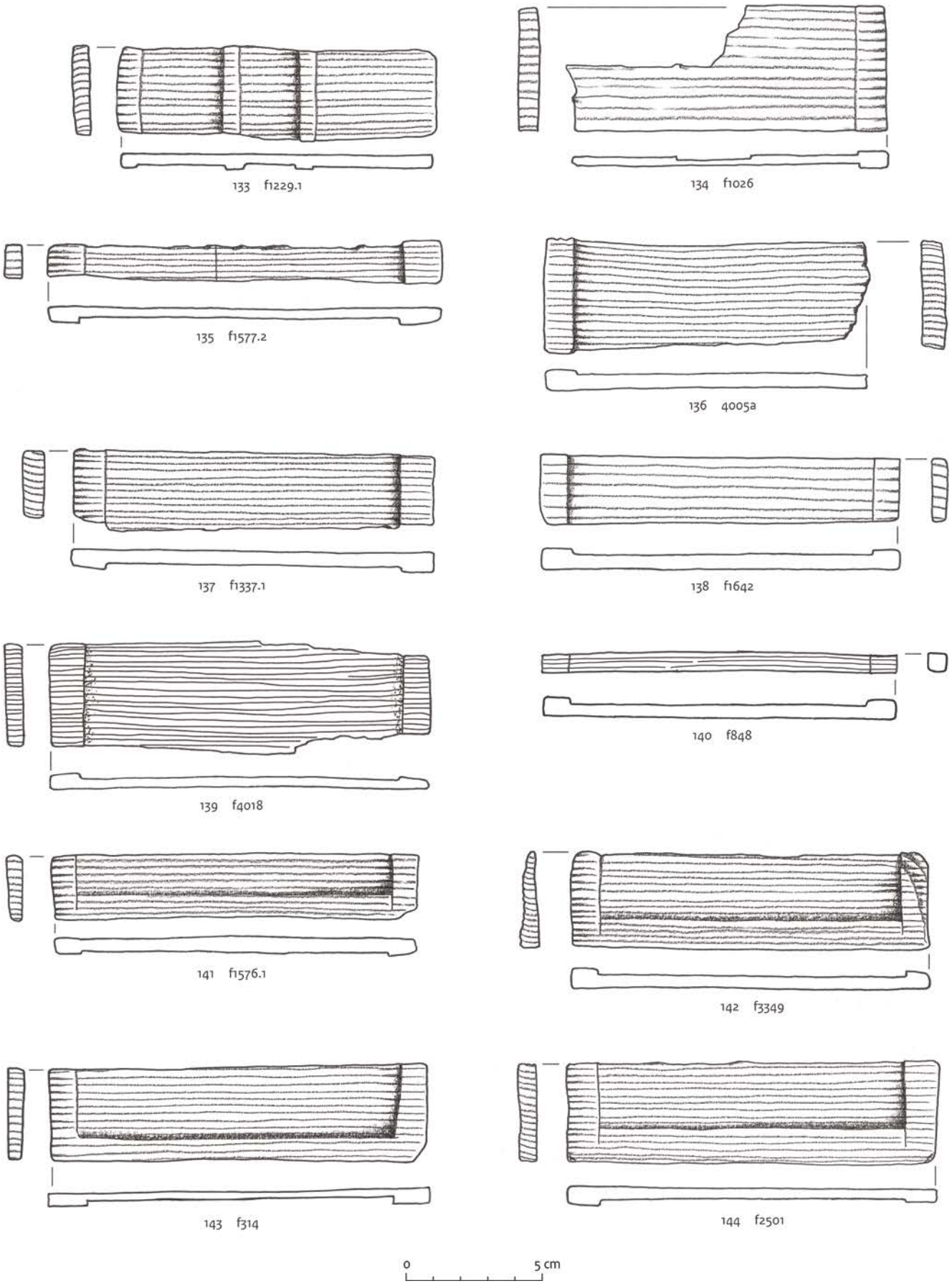


Communication
Writing tablets (126-128: silver fir).

Plate XXXVI.129-132

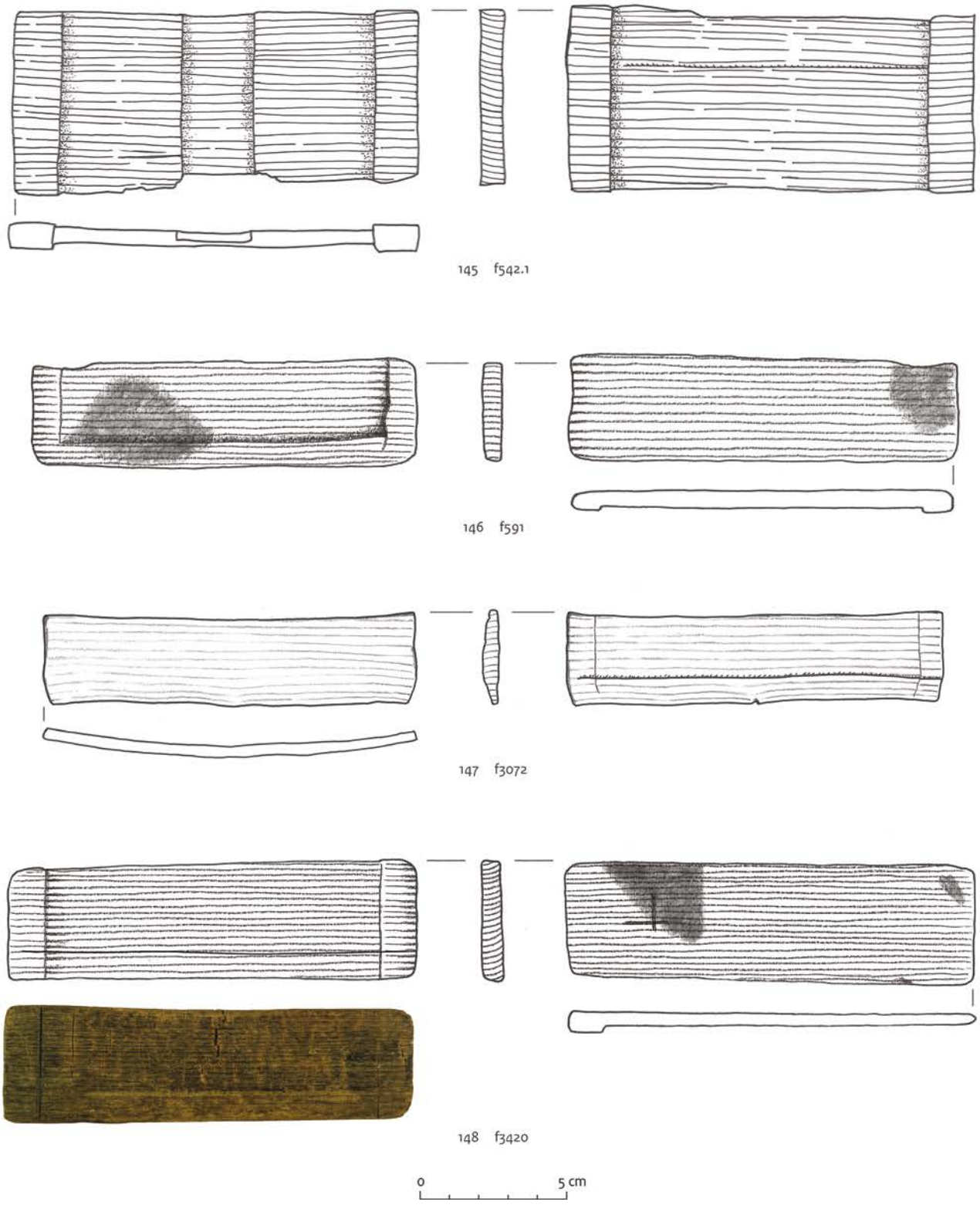


Communication
Writing tablets (129-132: silver fir).

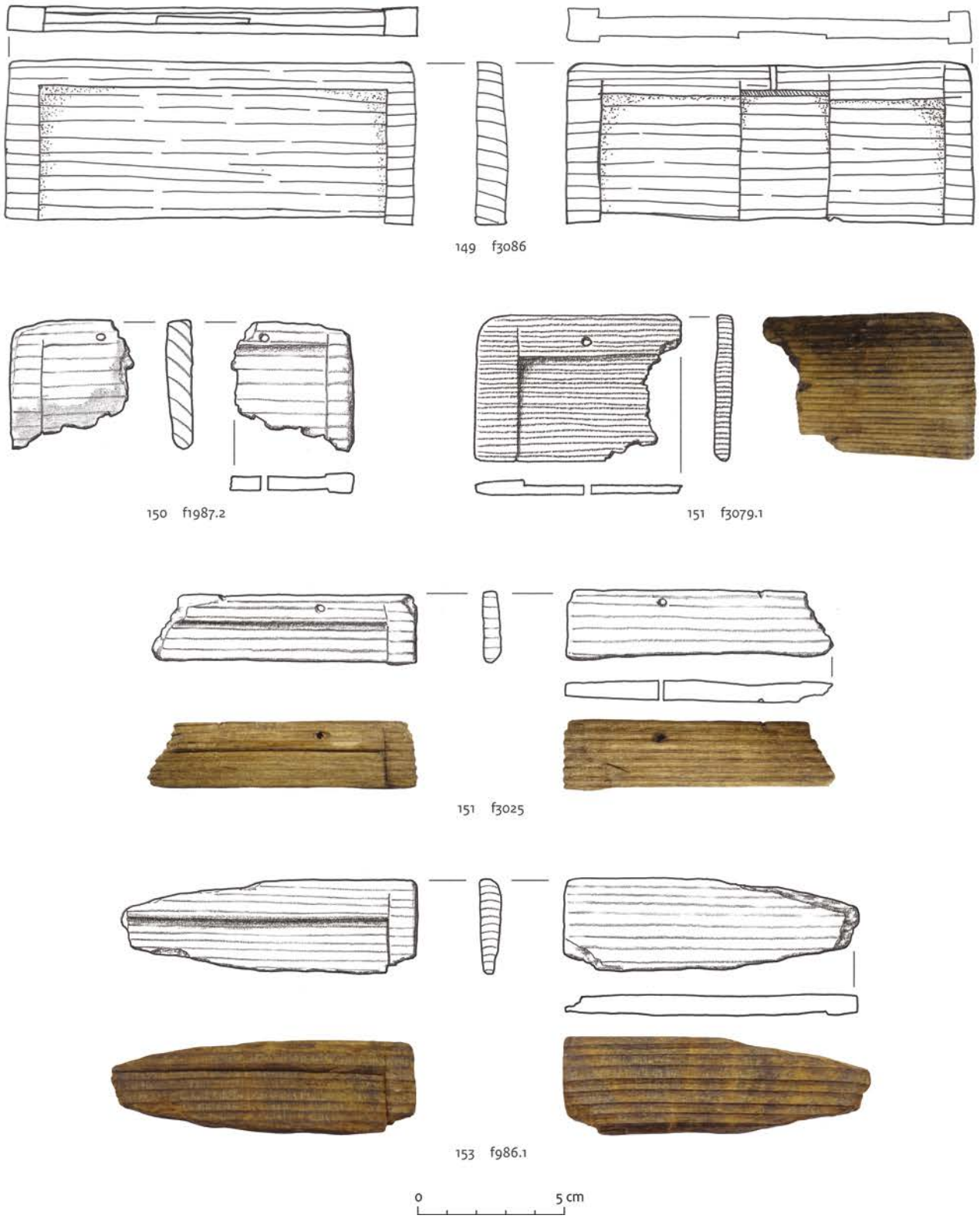


Communication
Writing tablets (133-144: silver fir).

Plate XXXVIII.145-148

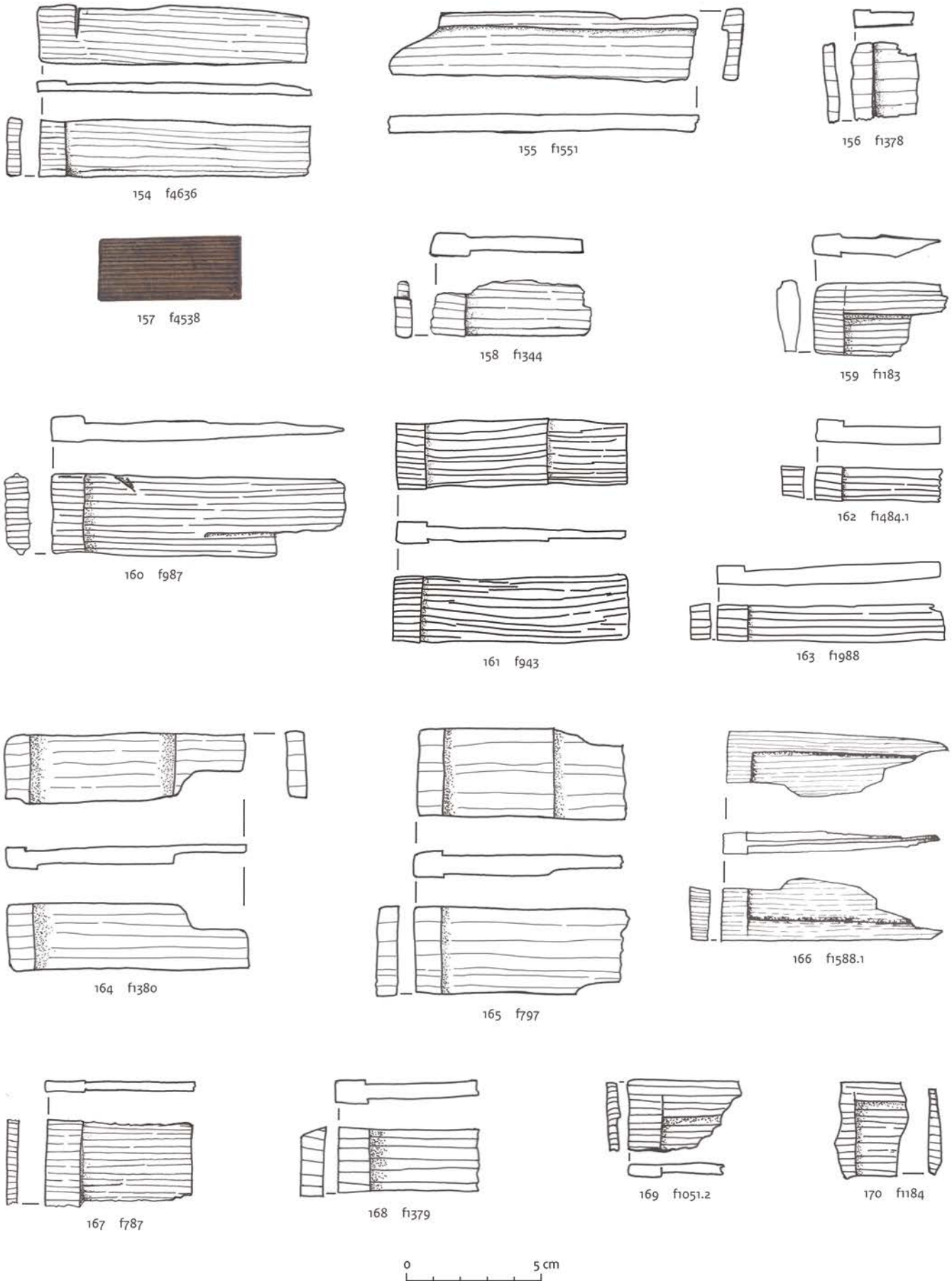


Communication
Writing tablets (145-148: silver fir).



Communication
Writing tablets (149-153: silver fir).

Plate XL.154-170

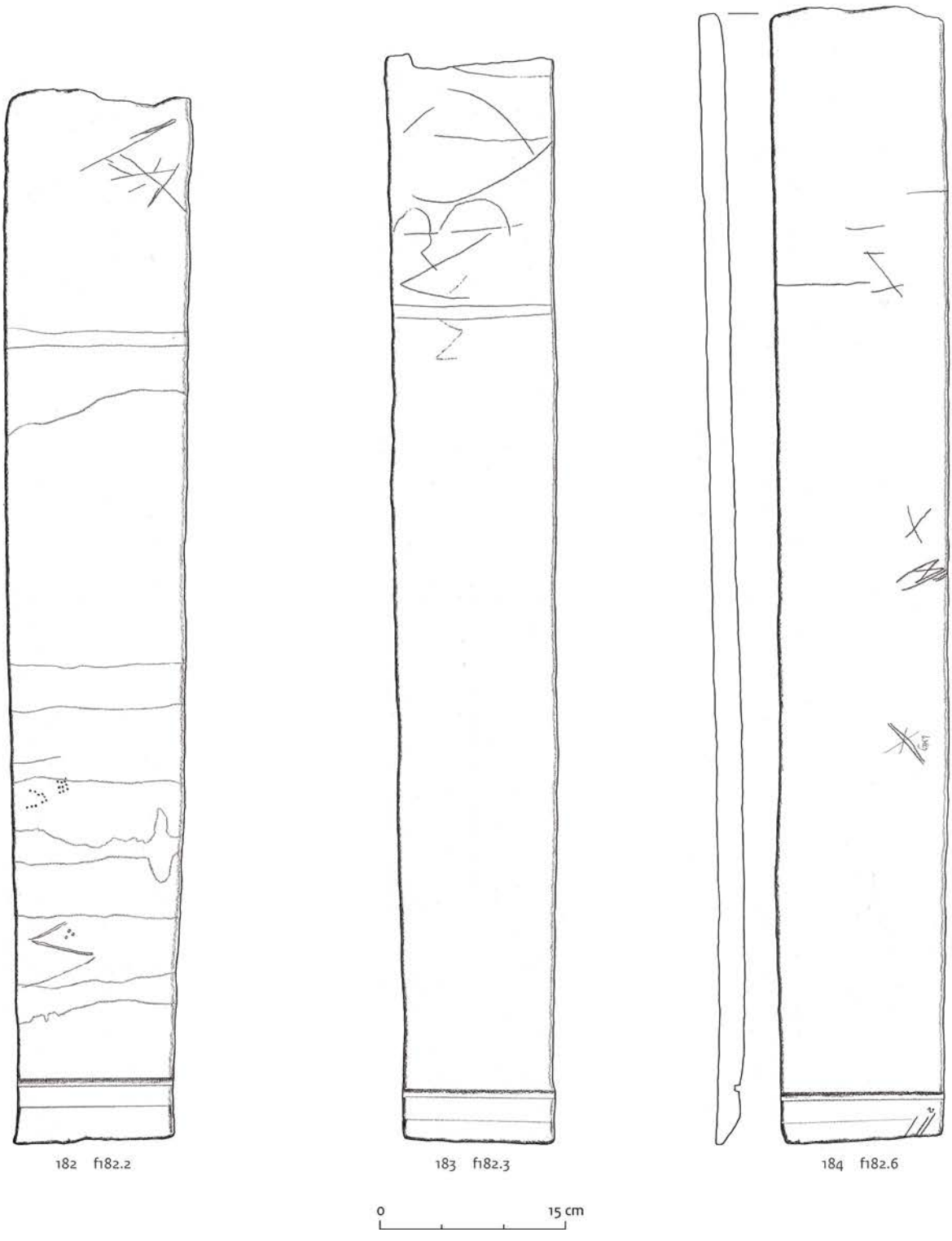


Communication
Writing tablets (154: wood species not identified, 155-160: silver fir, 161 and 162: wood species not identified, 163-170: silver fir).

Communication
Styli (171-172: maple, 173: elder, 174: maple, 175-178: elder, 179: wood species not identified), spatula (180: elder).

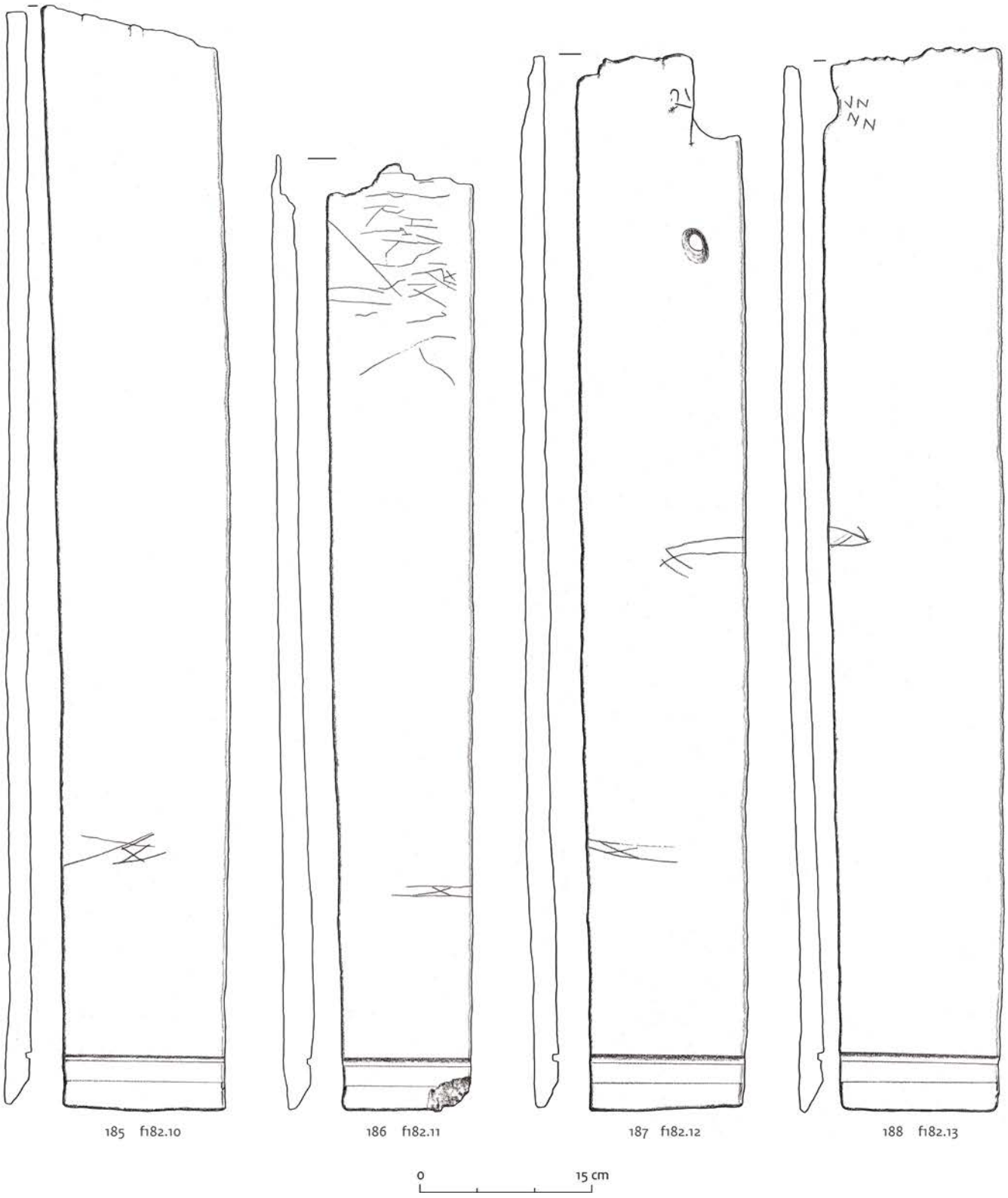
Plate XLII.181

Communication
Other writing implements. Inscribed bark (181: birch bark).

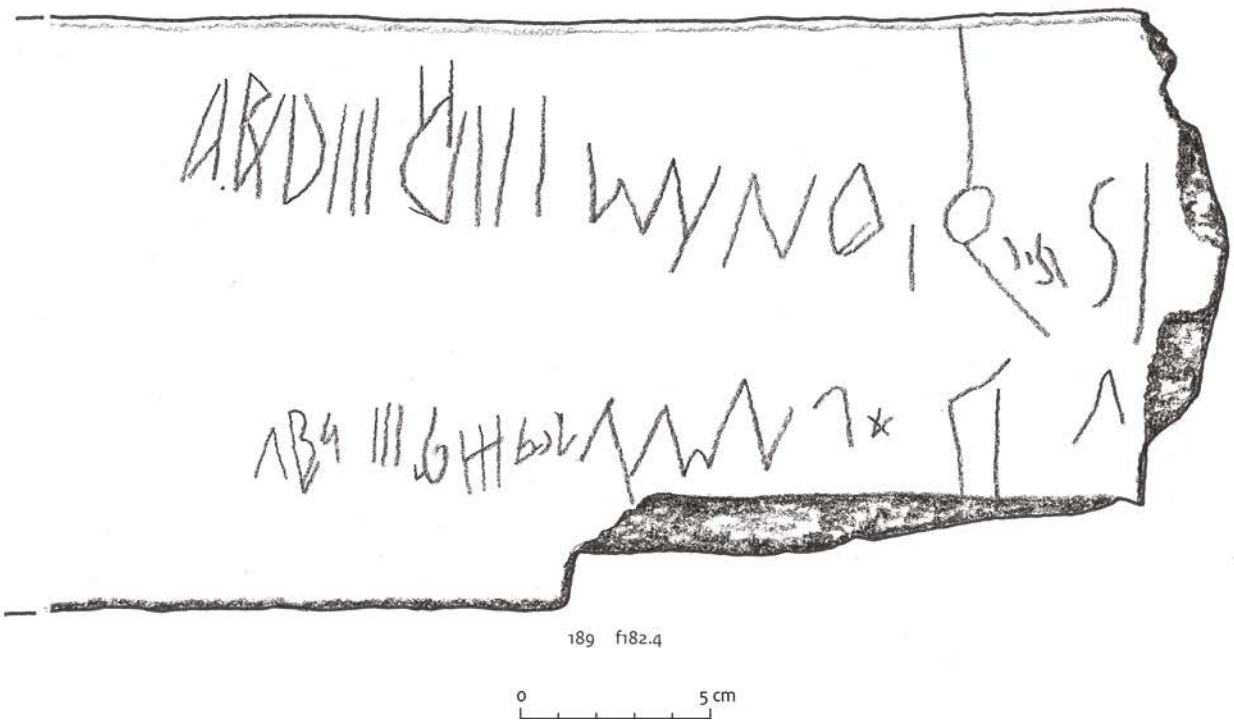


Provisioning
Wine barrels. Staves with graffiti (182-184: silver fir).

Plate XLIV.185-188



Provisioning
Wine barrels. Staves with graffiti (185-188: silver fir).



Provisioning
Wine barrels. Stave with graffiti (189: silver fir).

EACIDI

190 f3213

0 5 cm

Provisioning
Wine barrels. Stave with stamps (190: Norway spruce/European larch).

Provisioning
Wine barrels. Stave with stamps (191: Norway spruce/European larch).

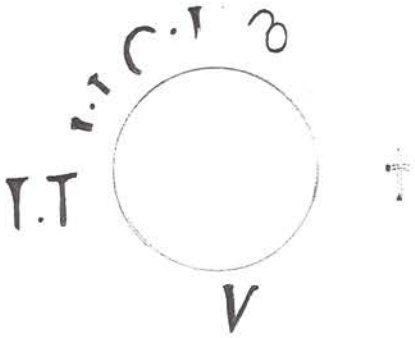
Plate XLVIII.192

192 f4638

0 5 cm

Provisioning
Wine barrels. Stave with stamps (192: silver fir).

193 f4639



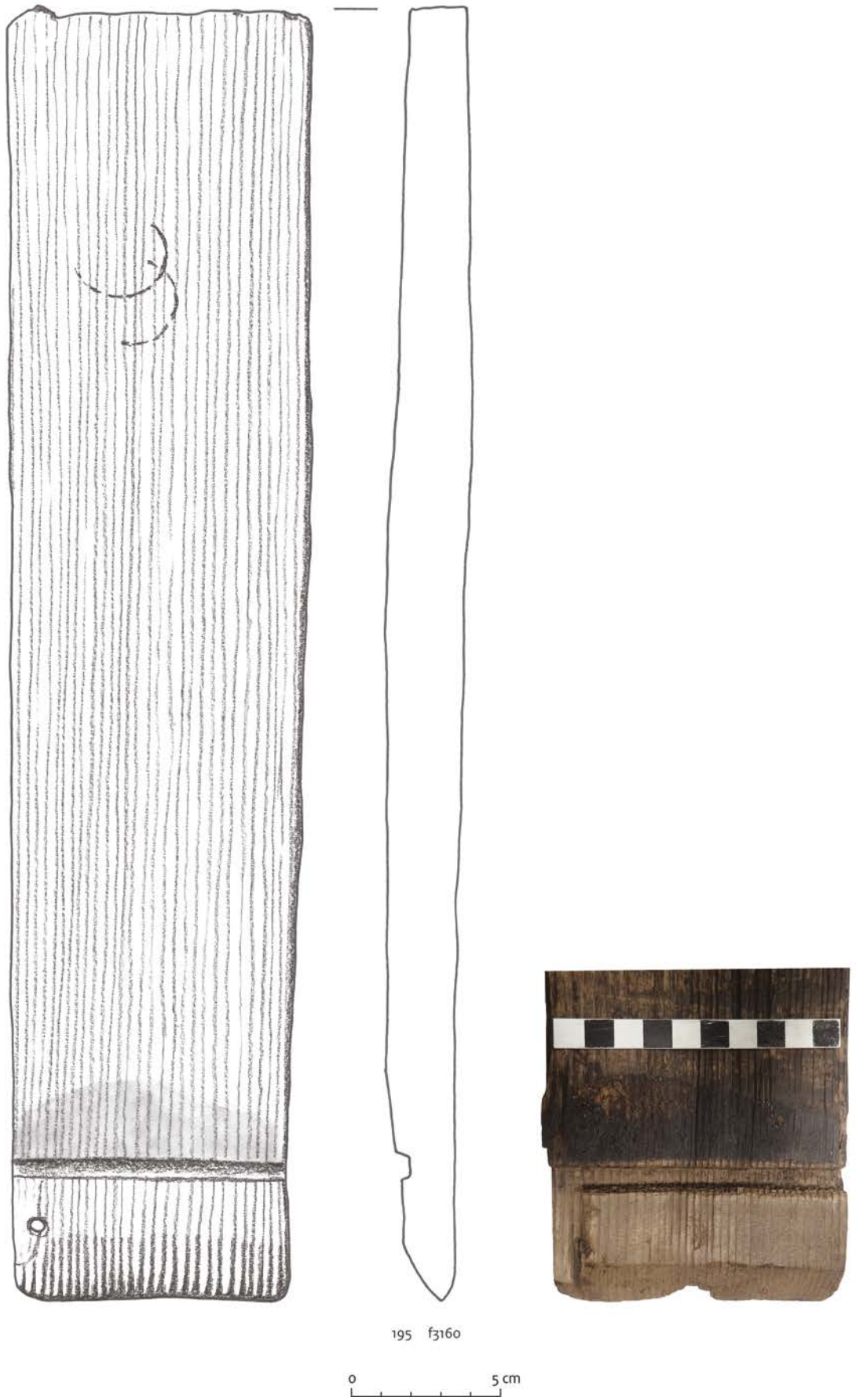
Provisioning
Wine barrels. Stave with stamps (193: silver fir).

Plate L.194

194 f4640

0 1 cm

Provisioning
Wine barrels. Stave with stamps (194: silver fir).



Provisioning
Wine barrels. Stave with stamps (195: Norway spruce/European larch).

Plate LII.196-200

196 f3172

197 f3188

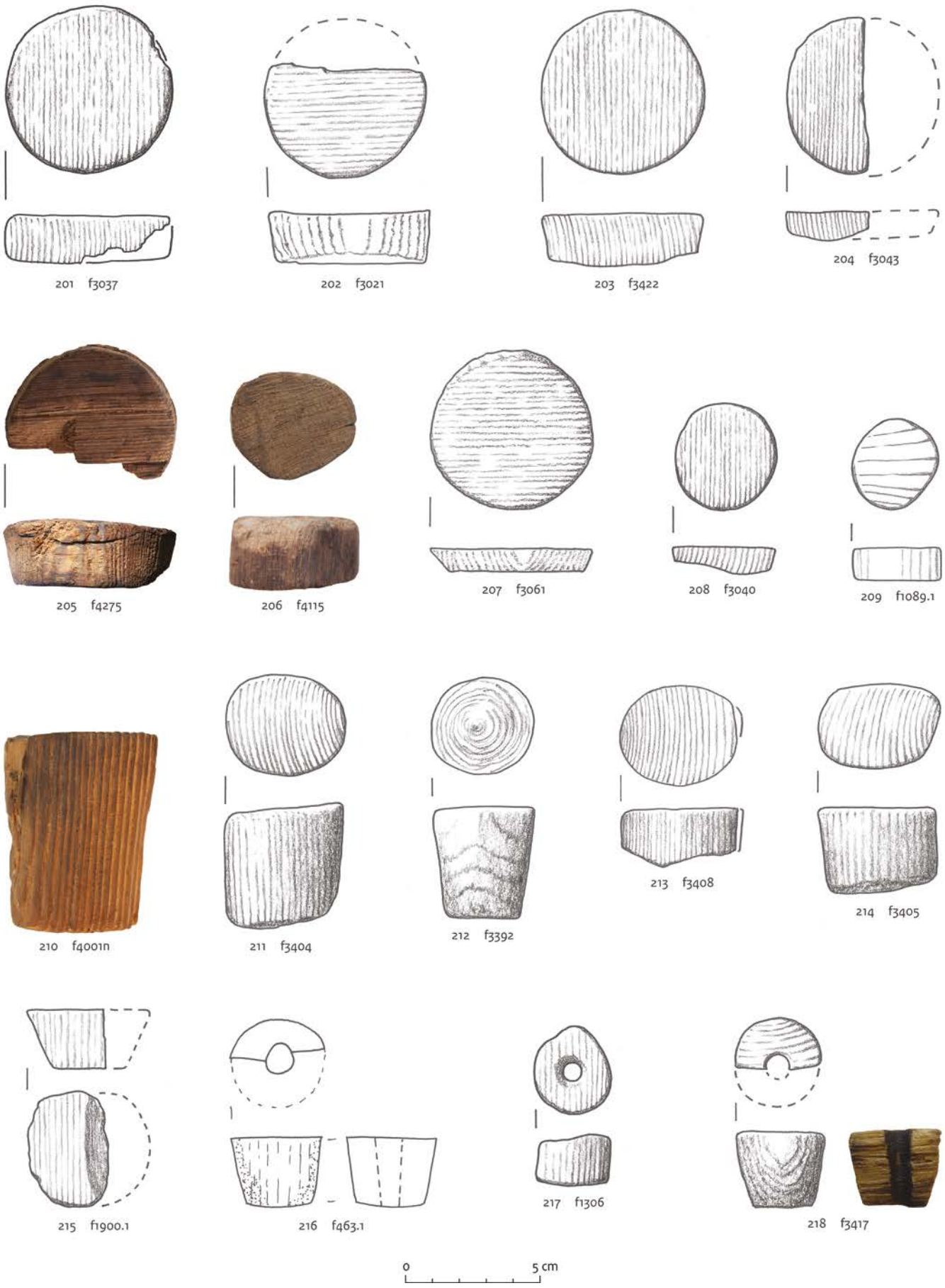
198 f3190

199 f3191

200 f3193

0 1 cm

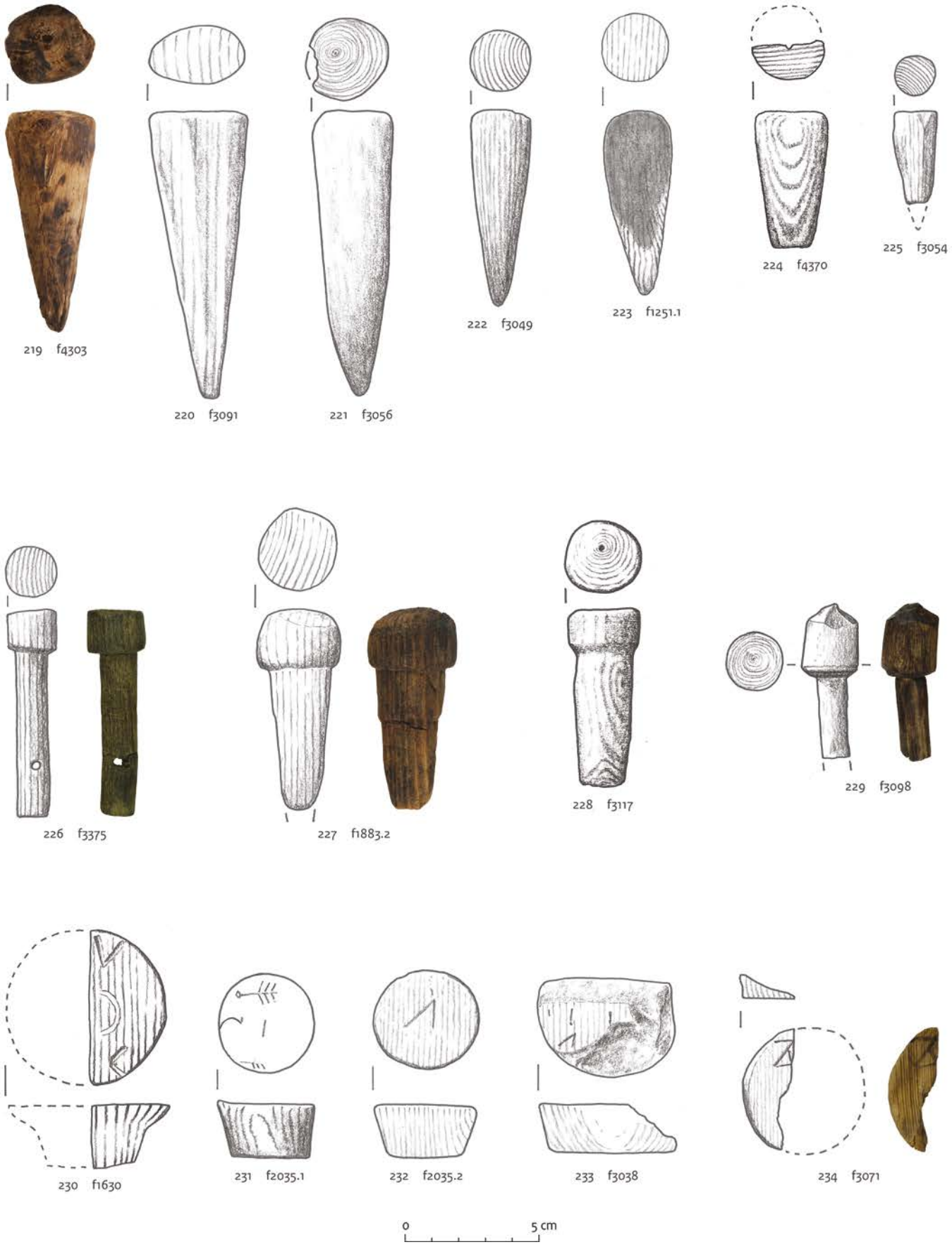
Provisioning
Wine barrels. Staves with stamps (196: silver fir, 197 and 198: Norway spruce/European larch, 199 and 200: silver fir).



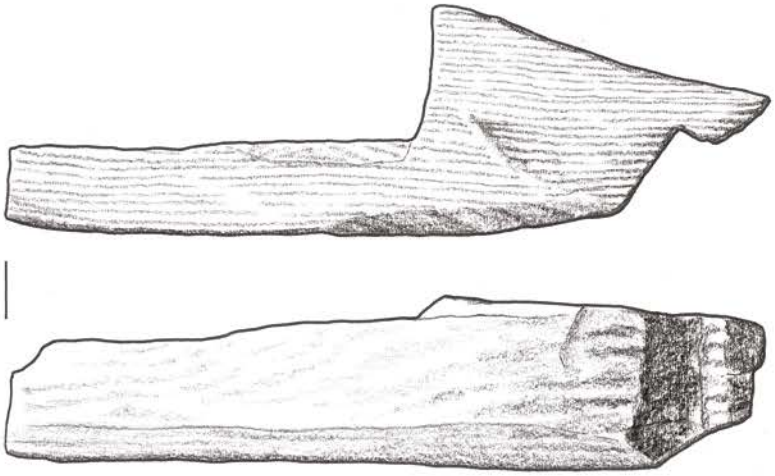
Provisioning

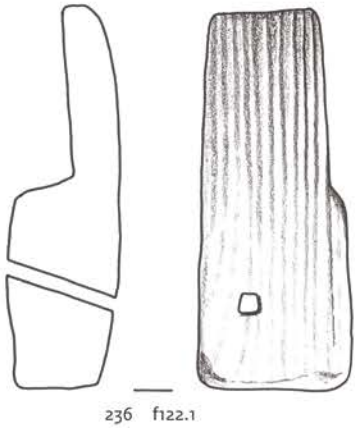
Bungs and stoppers. Bungs (201: Norway spruce/European larch, 202: silver fir, 203 and 204: Norway spruce/European larch, 205: silver fir, 206: beech, 207: Norway spruce/European larch, 208: silver fir, 209: pine, 210: silver fir, 211: beech, 212-214: ash, 215: coniferous wood, 216: silver fir, 217: wood species not identified, 218: ash).

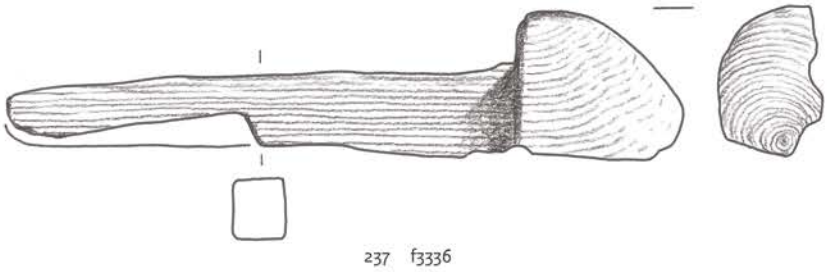
Plate LIV.219-234

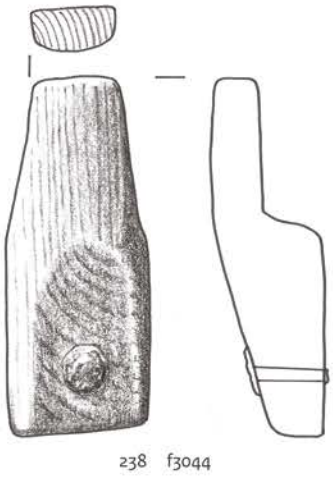


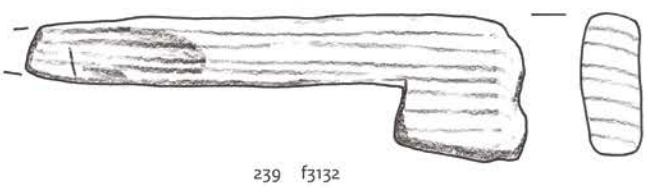
Provisioning
Bungs and stoppers. Stoppers (219: ash, 220: oak, 221: maple, 222: wood species not identified, 223: maple, 224: pine, 225: alder, 226 and 227: ash, 228: juniper, 229: European hornbeam), bungs with stamps (230: wood species not identified, 231 and 232: silver fir, 233: Norway spruce/European larch, 234: silver fir).

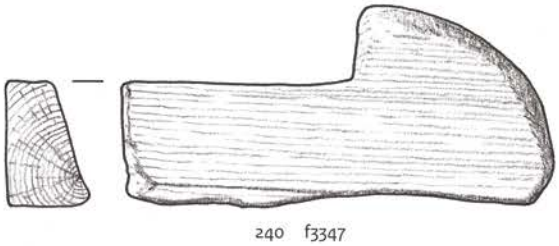


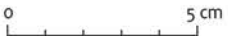






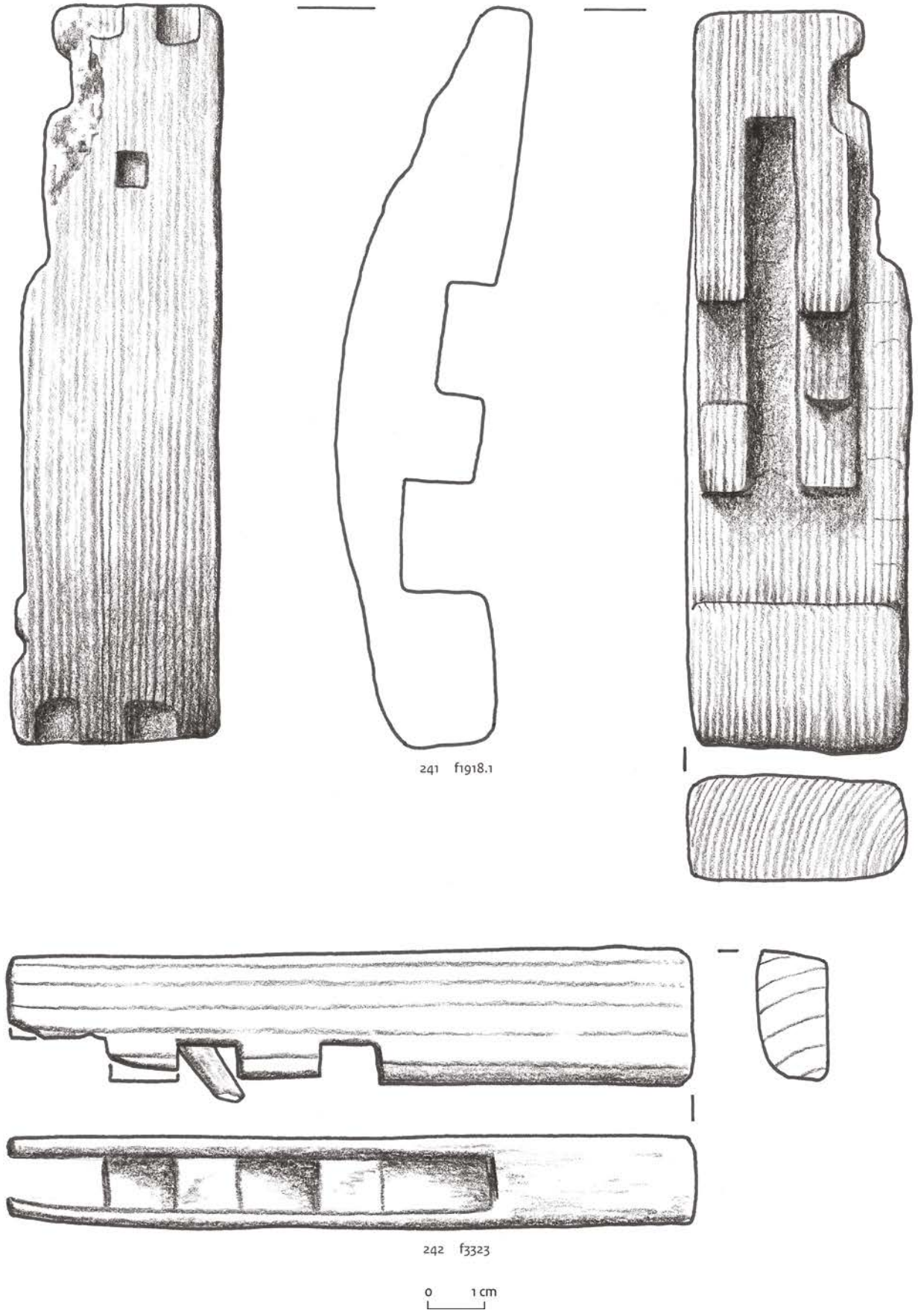




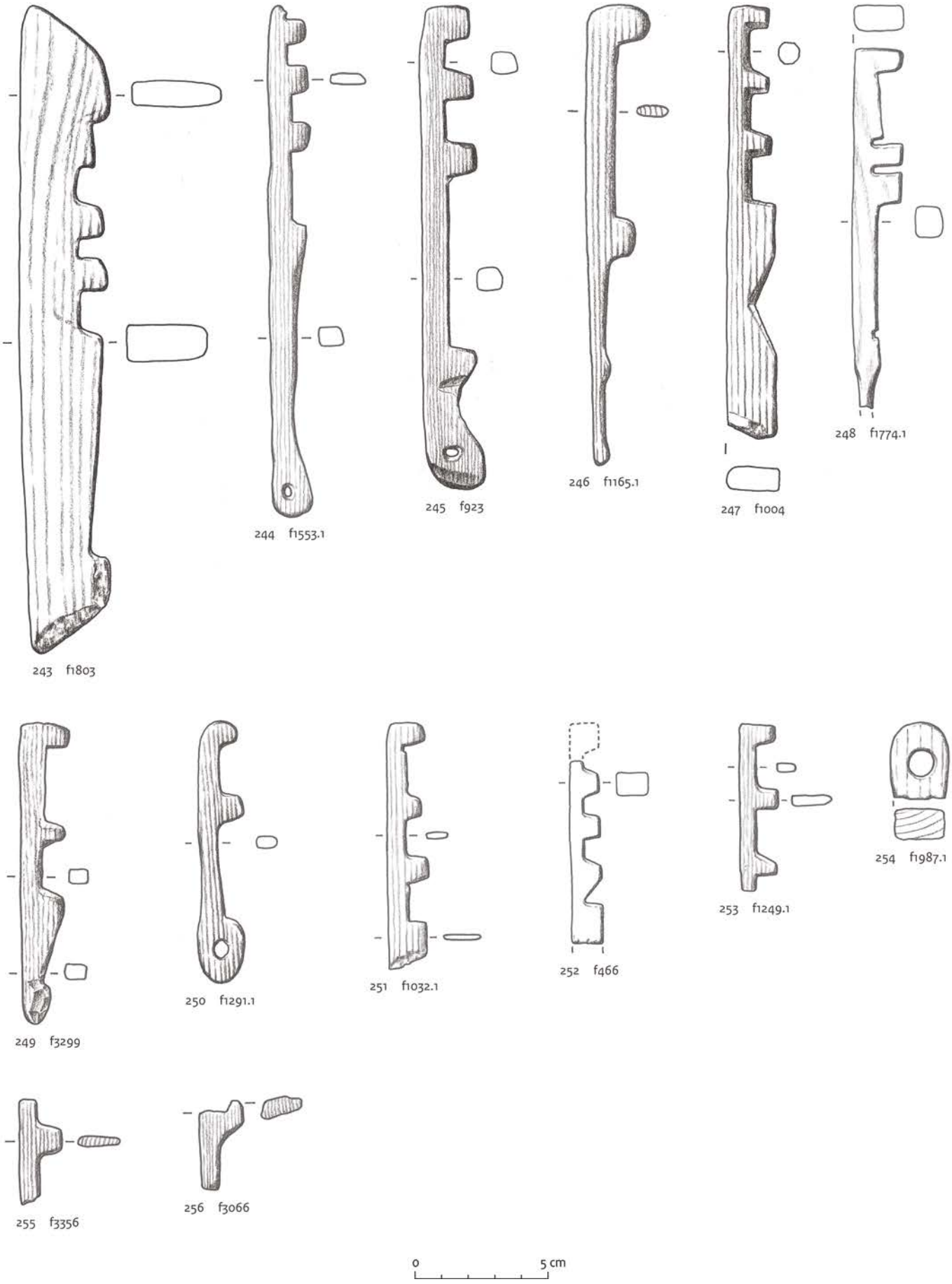


Fastening and Securing
Bolts and catches. Bolts (235: beech, 236: ash, 237: maple, 238 and 239: ash, 240: alder).

Plate LVI.241-242



Fastening and Securing
Locks and latch lifters. Tumbler lock (241: ash), deadbolt (242: ash).

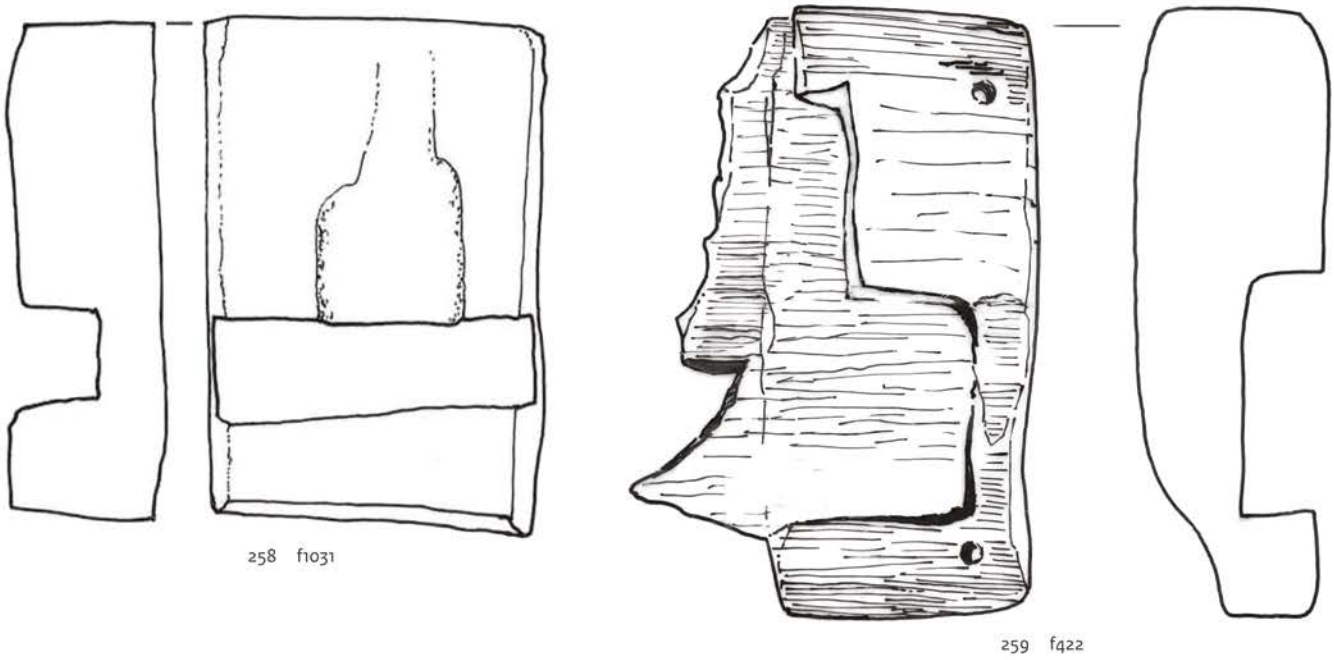


Fastening and Securing

Locks and latch lifters. Latch lifters (243: wood species not identified, 244 and 245: ash, 246: Sycamore maple, 247 and 248: ash, 249: alder, 250: wood species not identified, 251: maple, 252: wood species not identified, 253: Maloideae, type apple/hawthorn/pear, 254: ash, 255: oak, 256: beech).

Plate LVIII.257-259

257 f1567

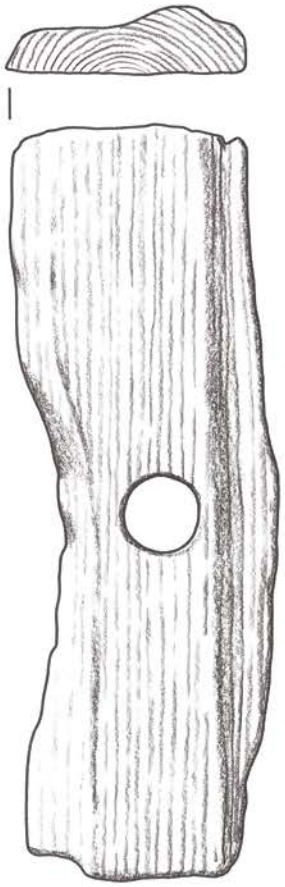


258 f1031

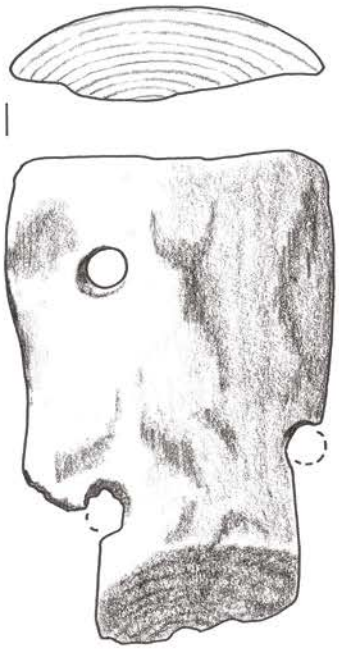
259 f422

0 1 cm

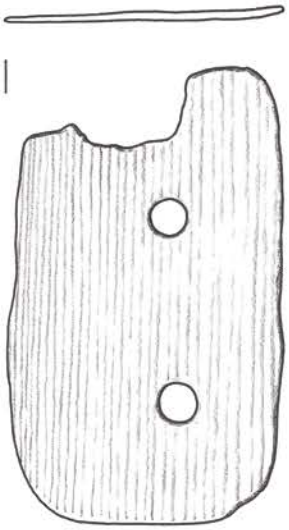
Fastening and Securing
Seal locks (257: maple, 258 and 259: wood species not identified).



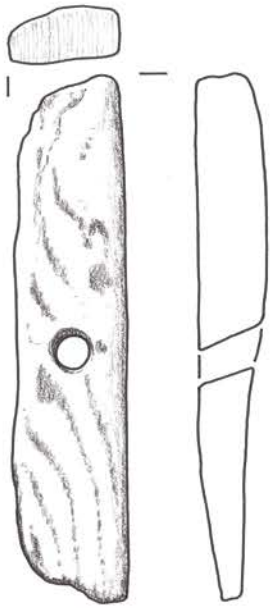
260 f3082



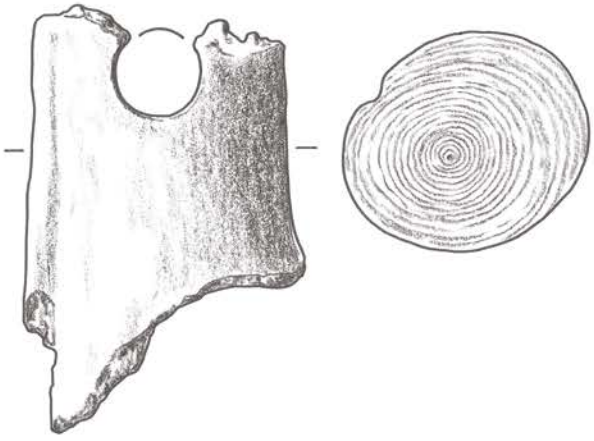
261 f3372



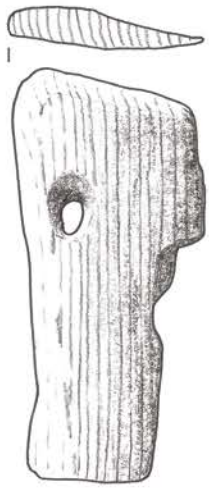
262 f368.1



263 f3411



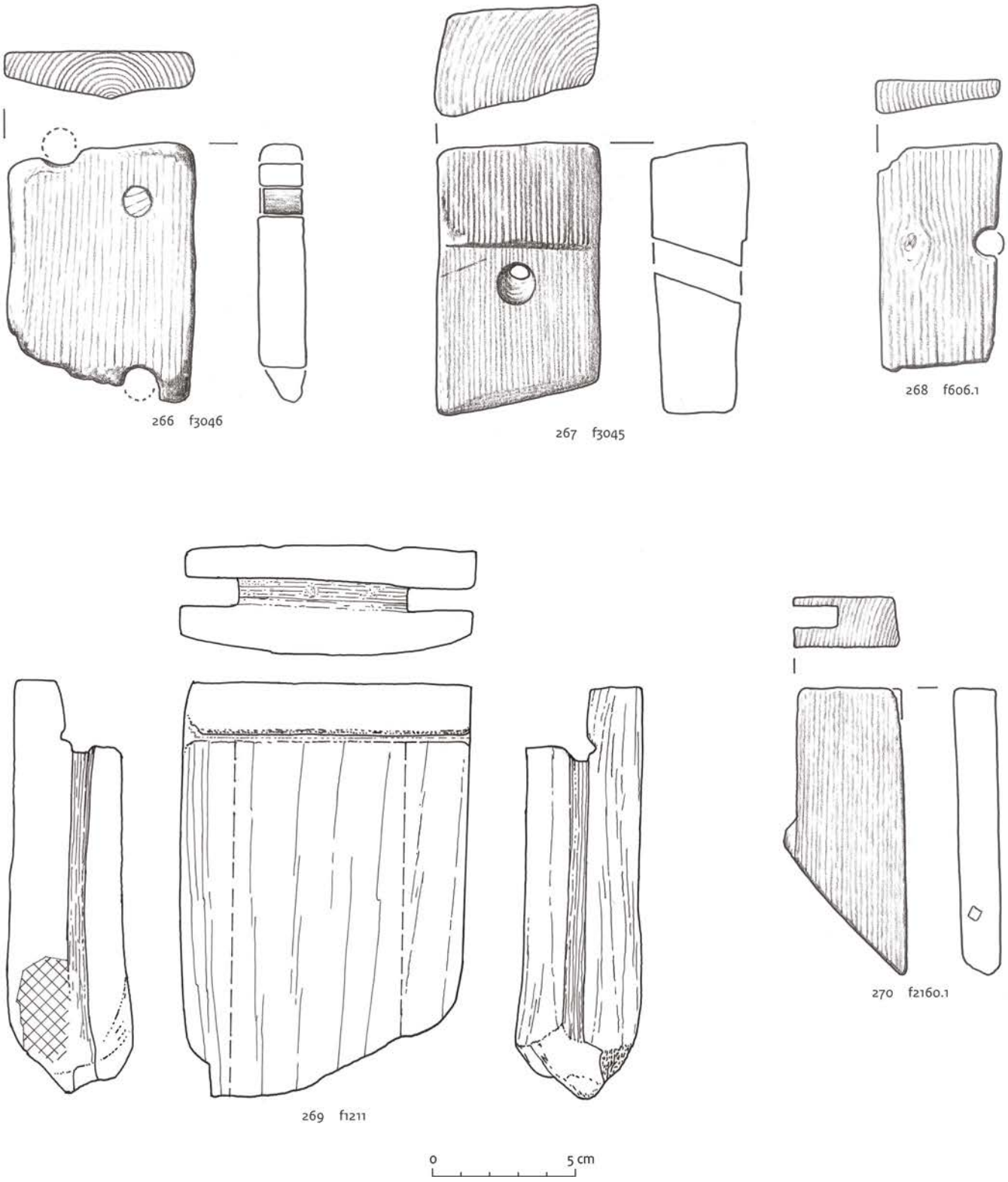
264 f2601



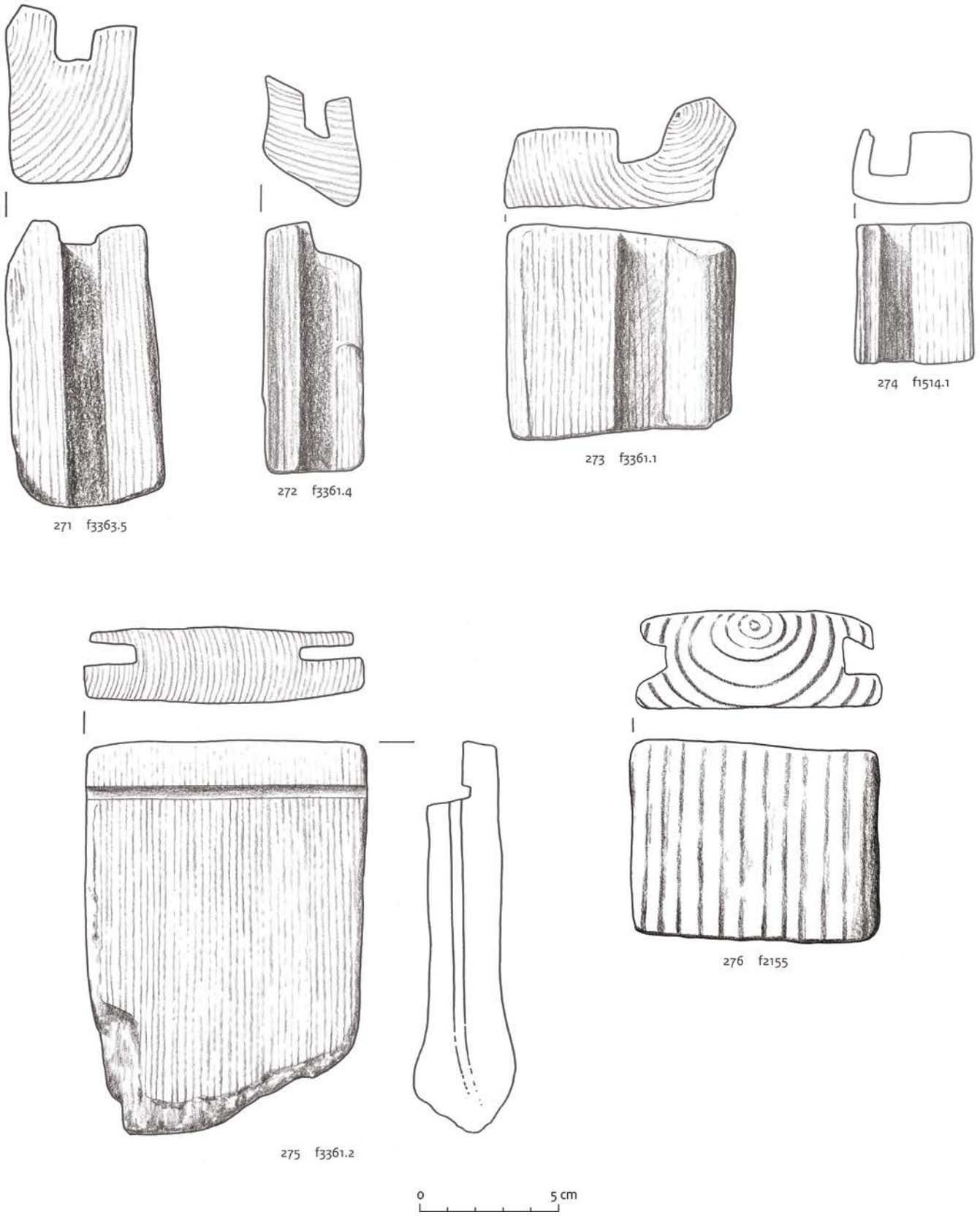
265 f3078

Lightweight Constructions
Stakes, boards, battens, and slats. Slats (260: oak, 263: oak), boards (261: ash, 262: oak, 265: beech), stake (264: ash).

Plate LX.266-270

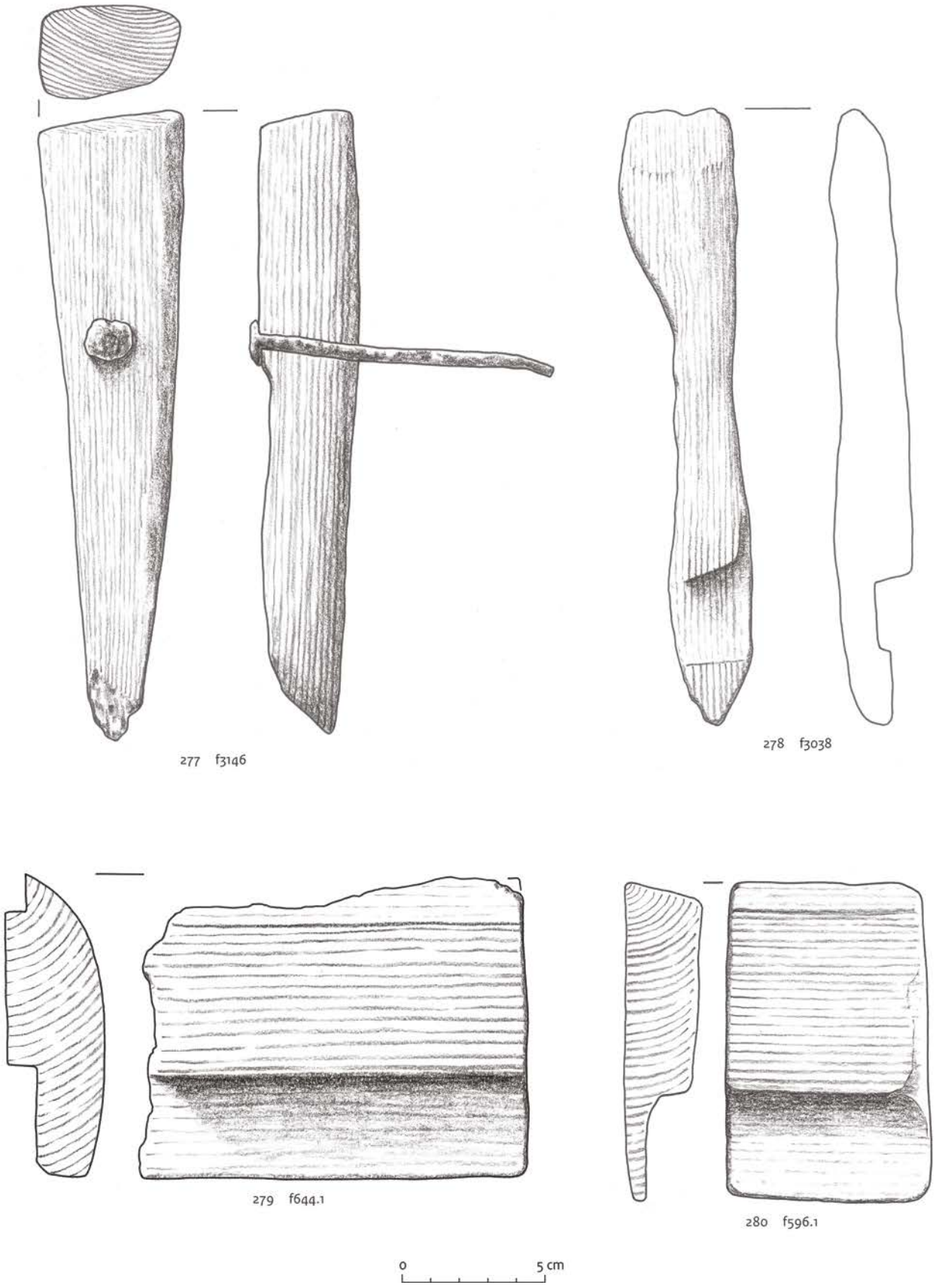


Lightweight Constructions
Stakes, boards, battens, and slats. Boards (266: oak, 268: alder), battens (267: alder, 269: wood species not identified, 270: ash).

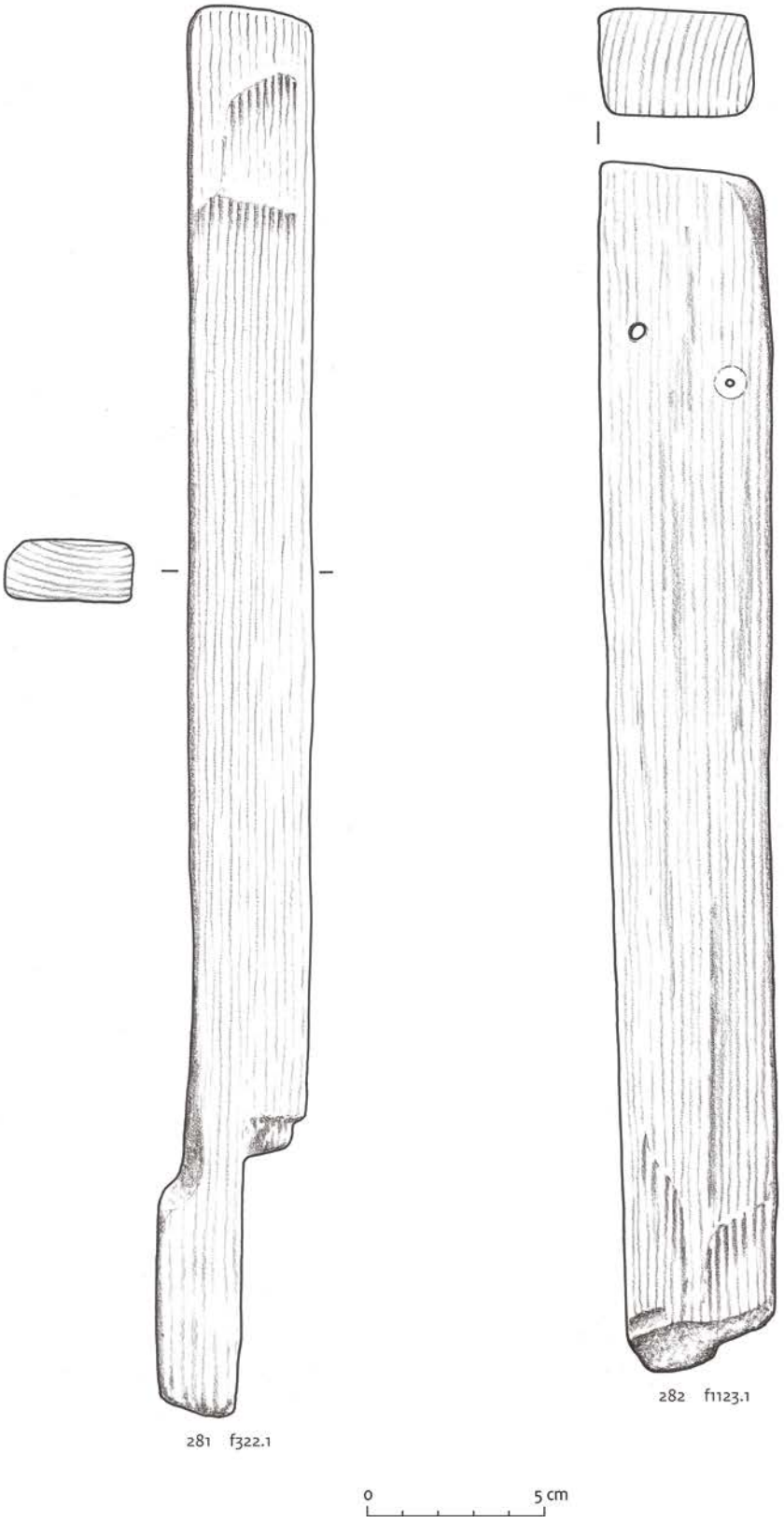


Lightweight Constructions
Stakes, boards, battens, and slats. Battens (271 and 272: alder, 273: oak, 274: ash), boards (275: ash, 276: alder).

Plate LXII.277-280

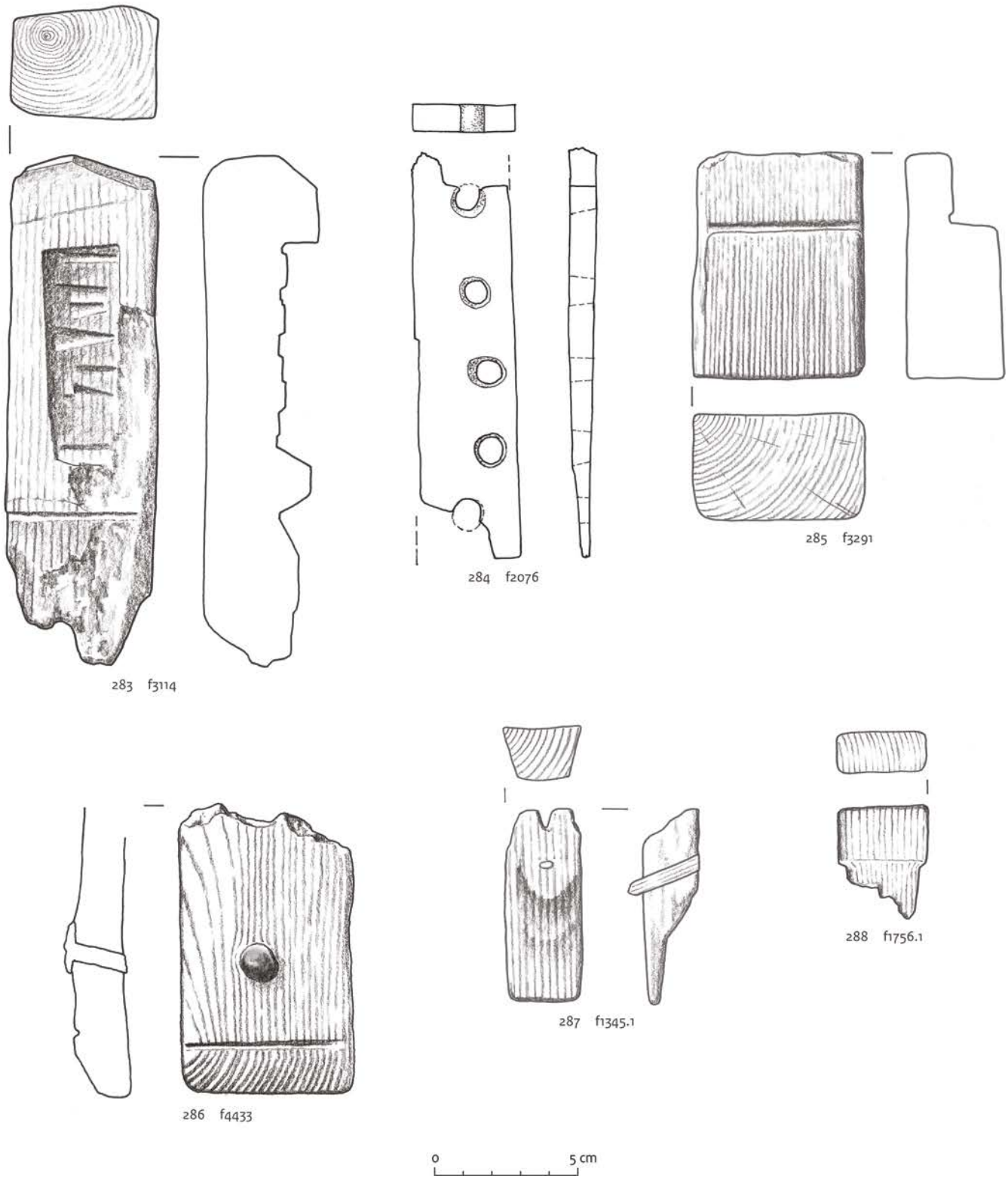


Lightweight Constructions
Stakes, boards, battens, and slats. Battens (277: oak, 278: alder), boards (279: oak, 280: alder).

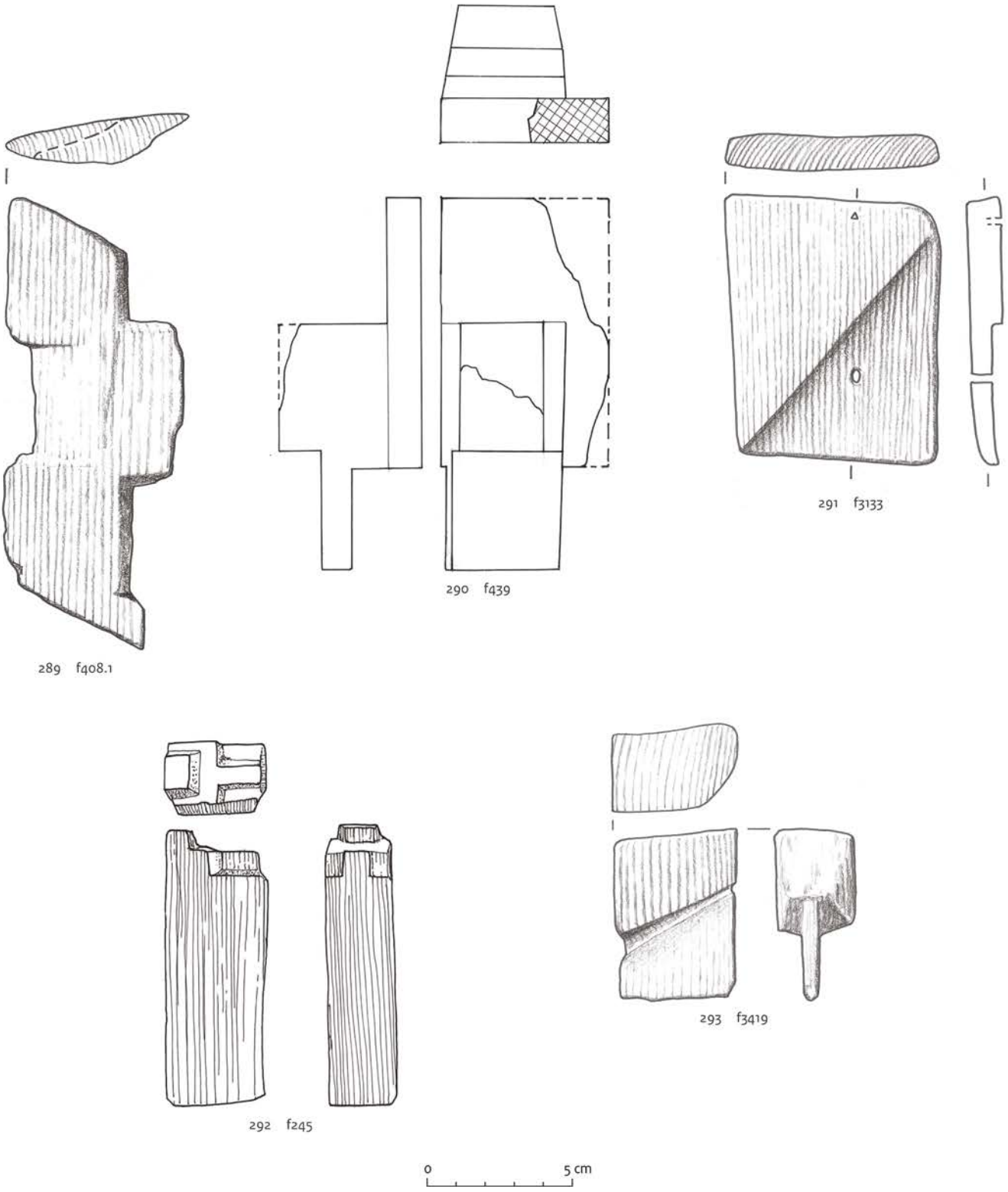


Lightweight Constructions
Stakes, boards, battens, and slats. Slat (281: silver fir), batten (282: oak).

Plate LXIV.283-288

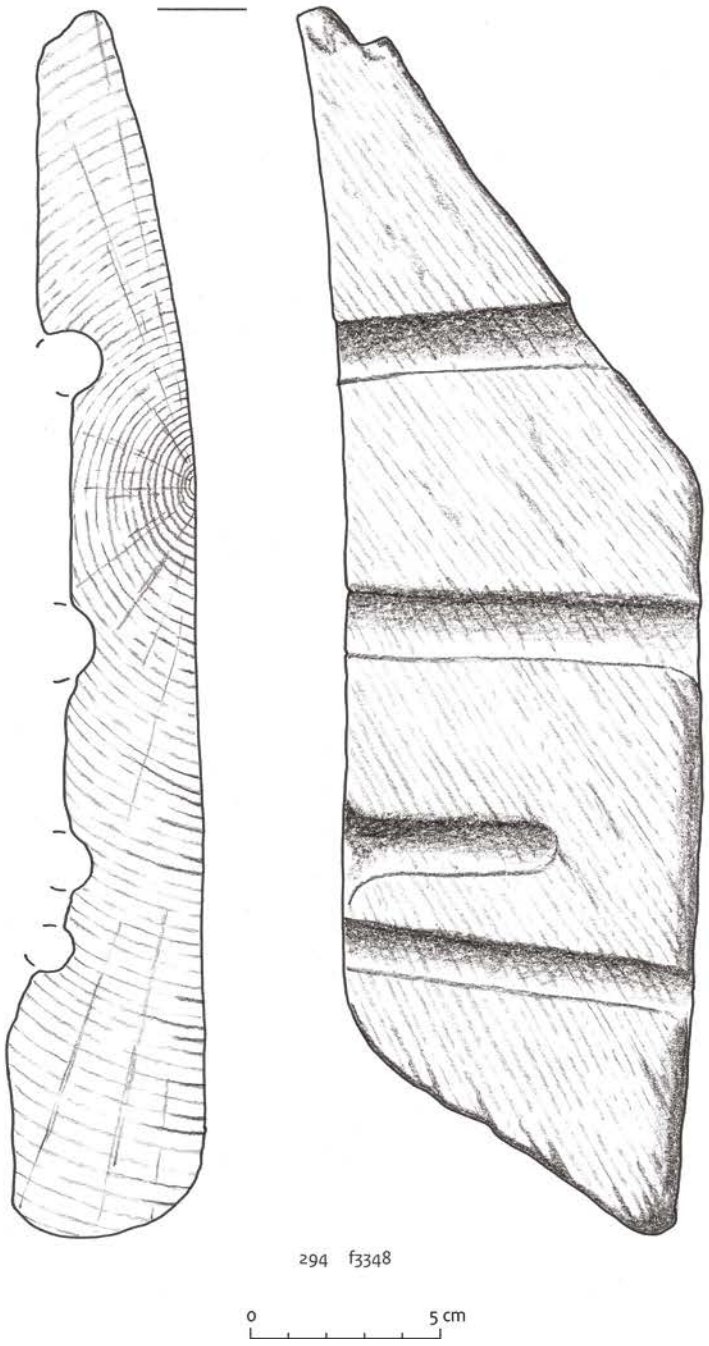


Lightweight constructions
Stakes, boards, battens, and slats. Battens (283: spindle tree, 285 and 286: ash, 287: beech), boards (284: wood species not identified), slat (288: ash).

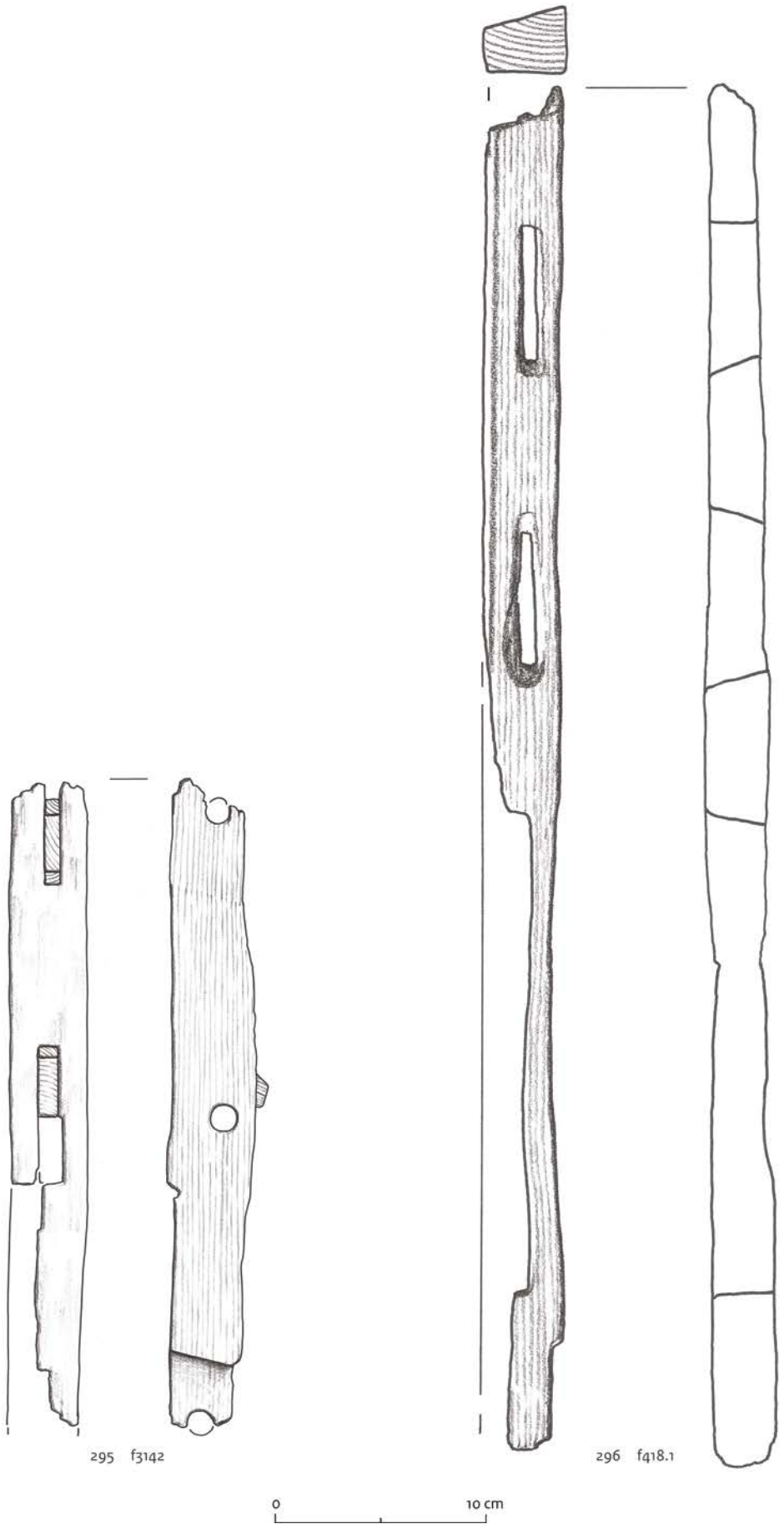


Lightweight Constructions
Stakes, boards, battens, and slats. Board (289: alder, 291: alder), battens (290: wood species not identified, 292: alder, 293: ash).

Plate LXVI.294

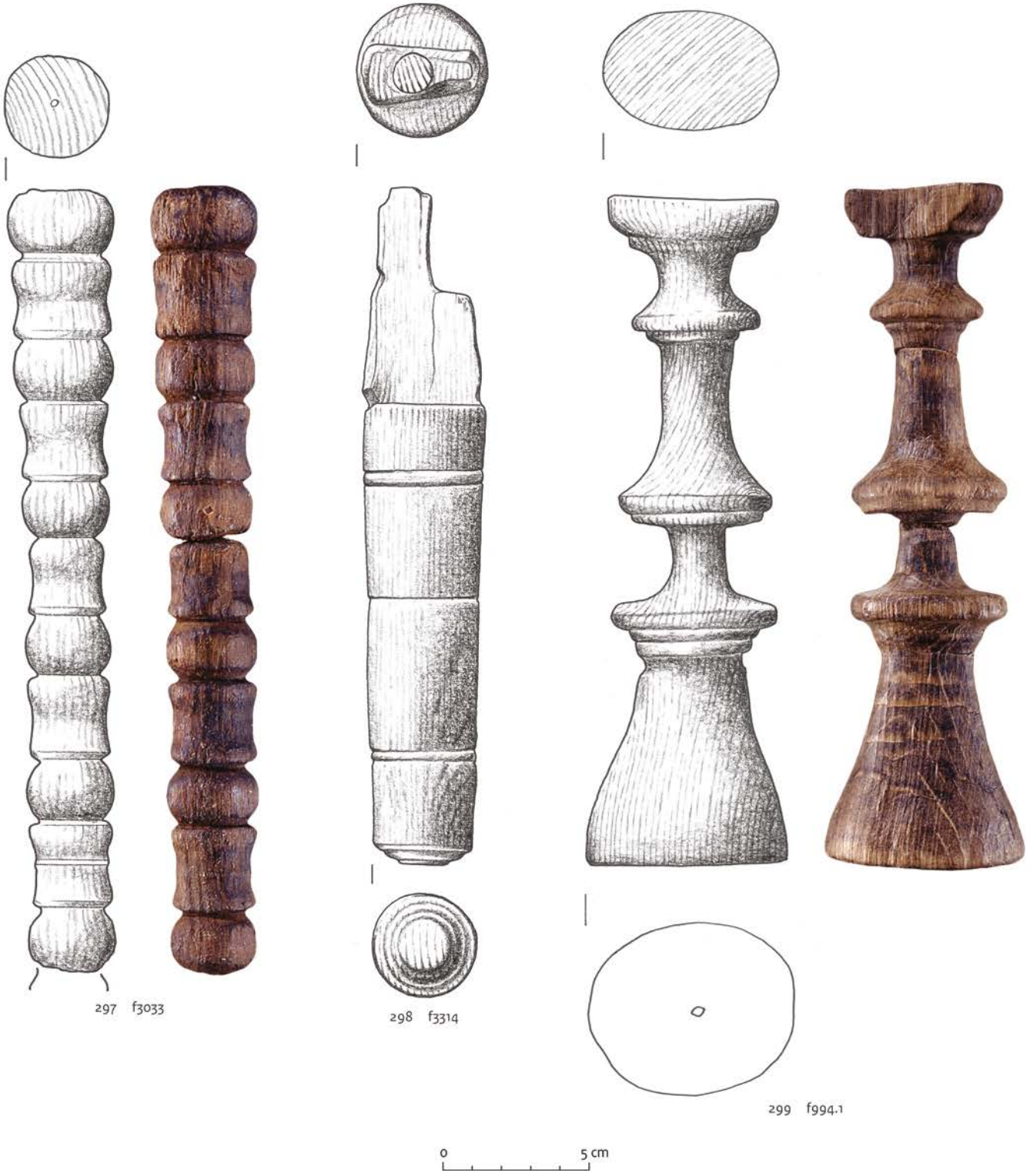


Lightweight Constructions
Stakes, boards, battens, and slats. Board (294: ash).



Lightweight Constructions
Two battens of frameworks with remains of transverse connections (295: pine and oak, 296: pine).

Plate LXVIII.297-299

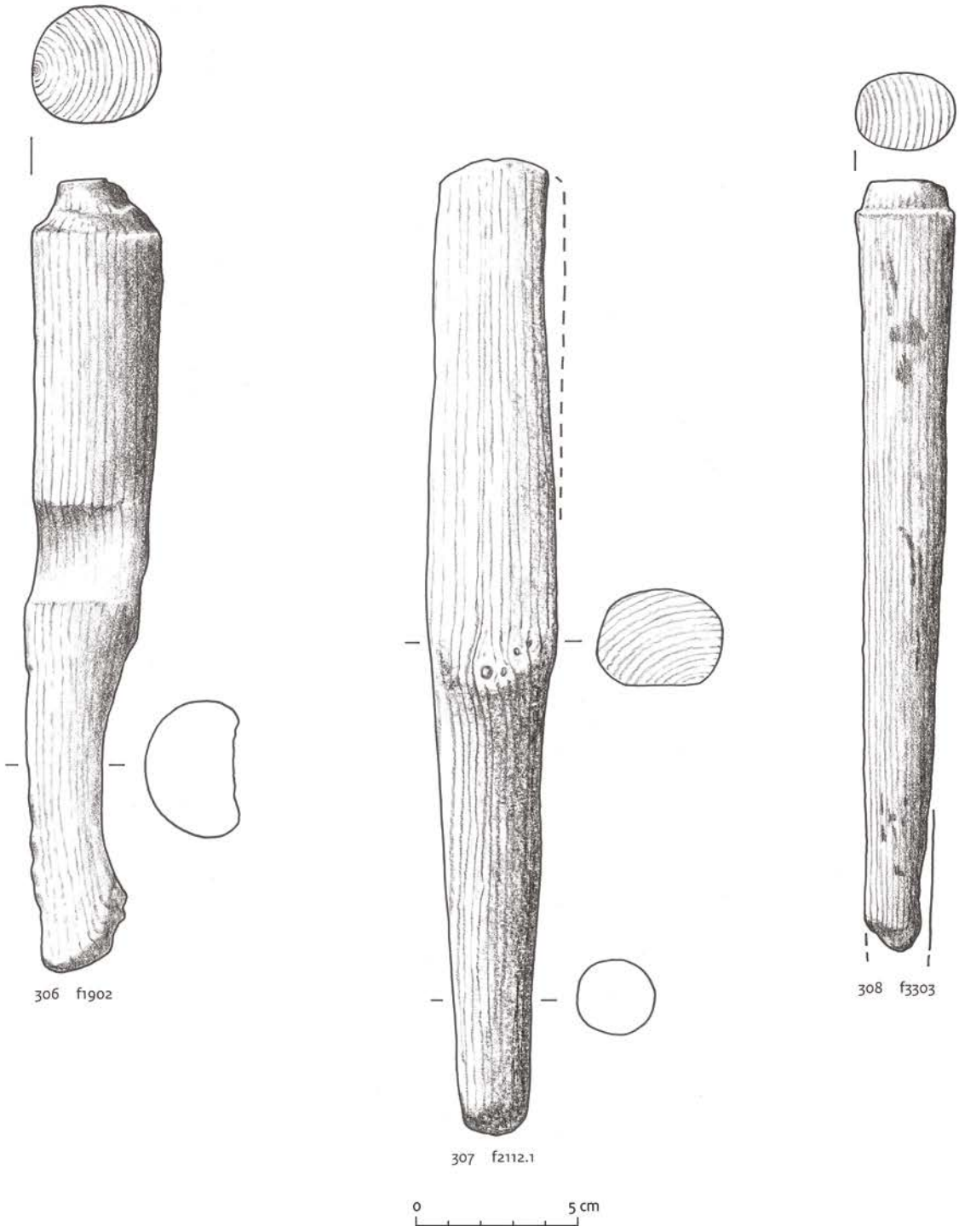


Furniture
Furniture legs and spindles. Legs of chairs or stools (297 and 298: ash), bed leg (299: alder).

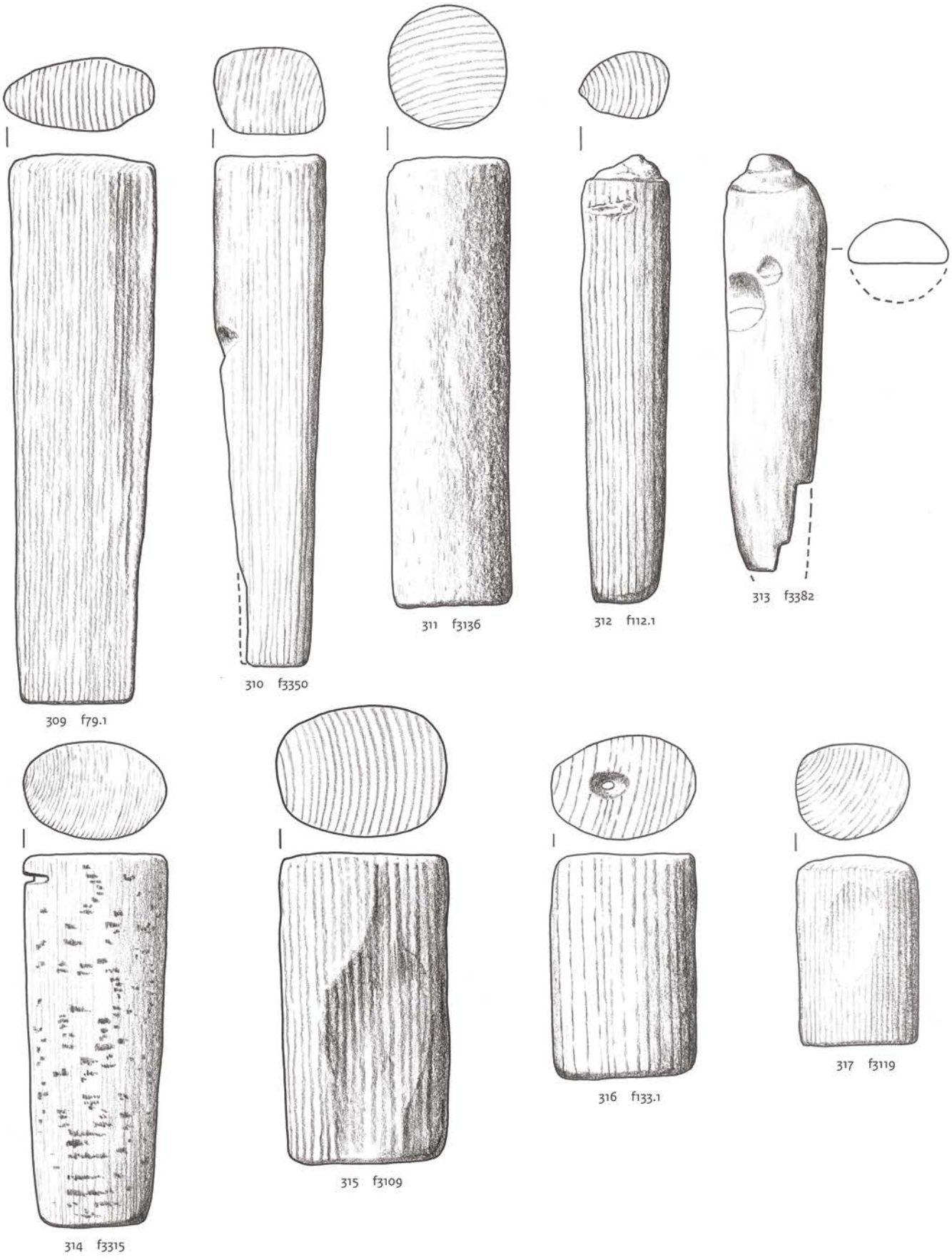
Furniture

Furniture legs and spindles. Spindles (300: spindle tree, 301: beech, 302: Maloideae, type apple/hawthorn/pear, 303: alder), parts of furniture legs (304: indeterminable, 305: Maloideae, type apple/hawthorn/pear).

Plate LXX.306-308



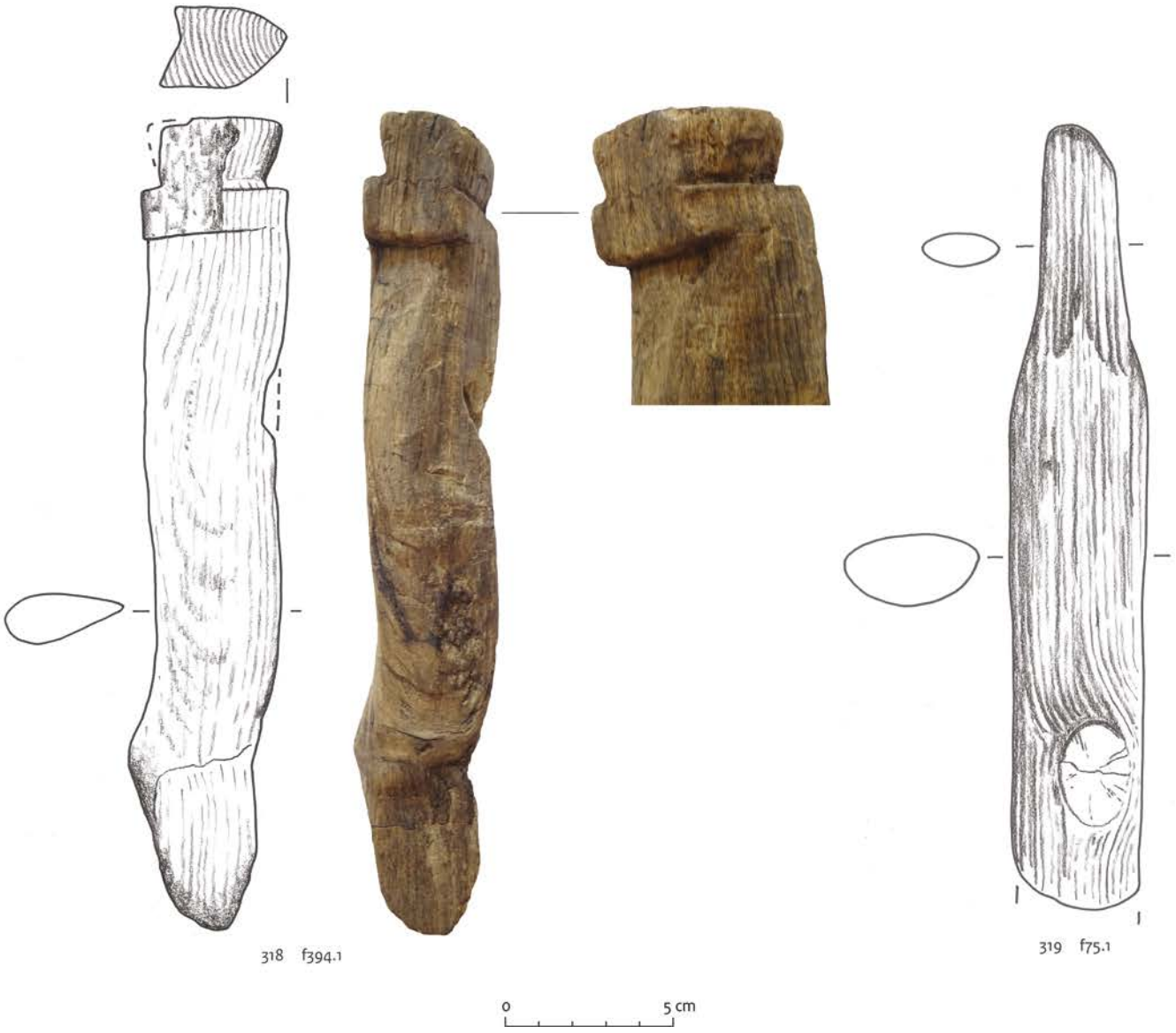
Furniture
Furniture legs and spindles. Stool leg (306: Maloideae, type apple/hawthorn/pear), chair legs (307 and 308: oak).



Furniture

Furniture legs and spindles. Furniture legs (309: alder, 310 and 311: beech, 312 and 313: field maple, 314 and 315: beech, 316: ash, 317: Maloideae, type apple/hawthorn/pear).

Plate LXXII.318-319



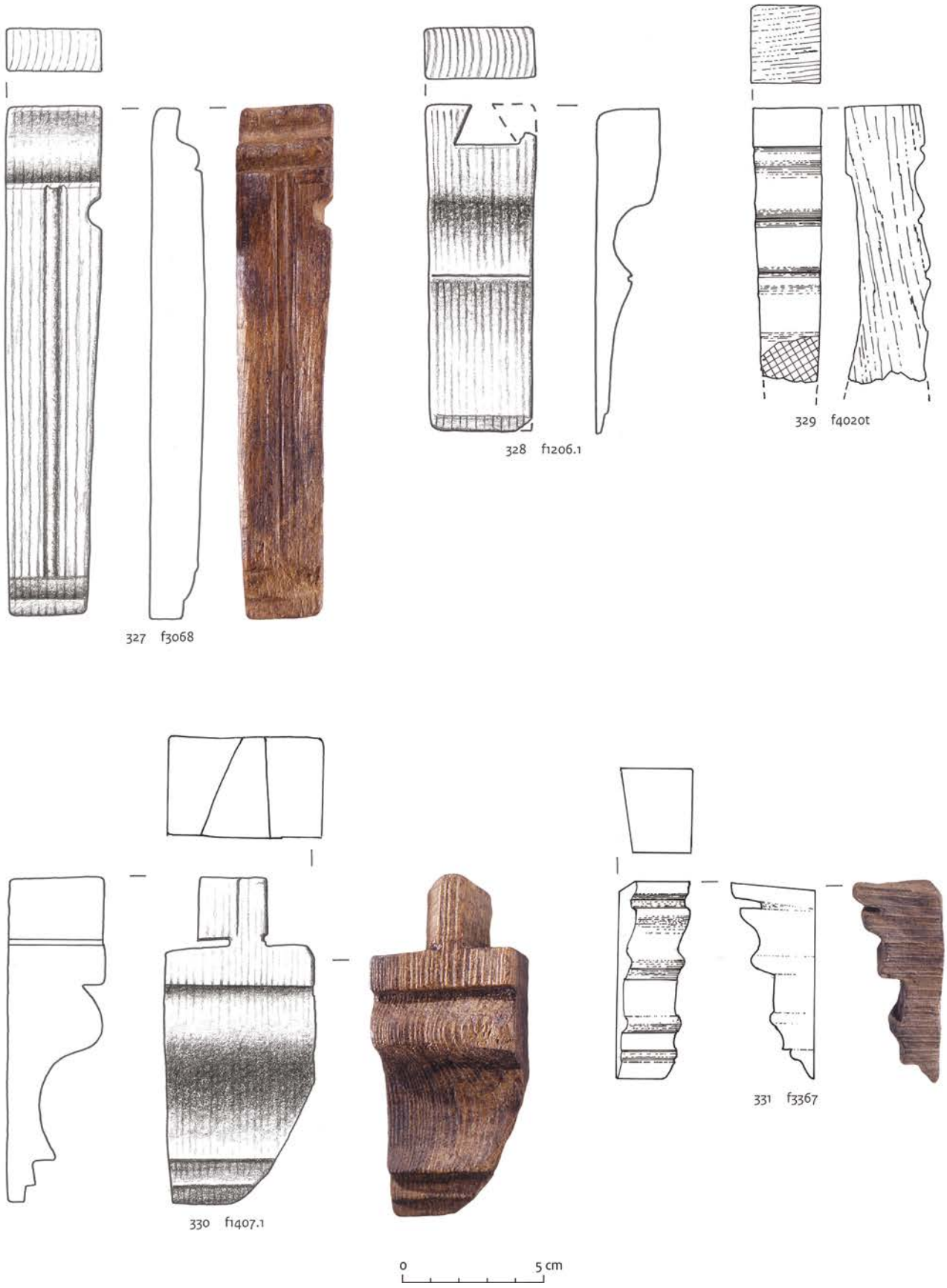
Furniture
Furniture legs and spindles. Table leg (318: field maple), stool leg (319: oak).

Furniture
Furniture legs and spindles. Table leg (320: alder).

Plate LXXIV.321-326

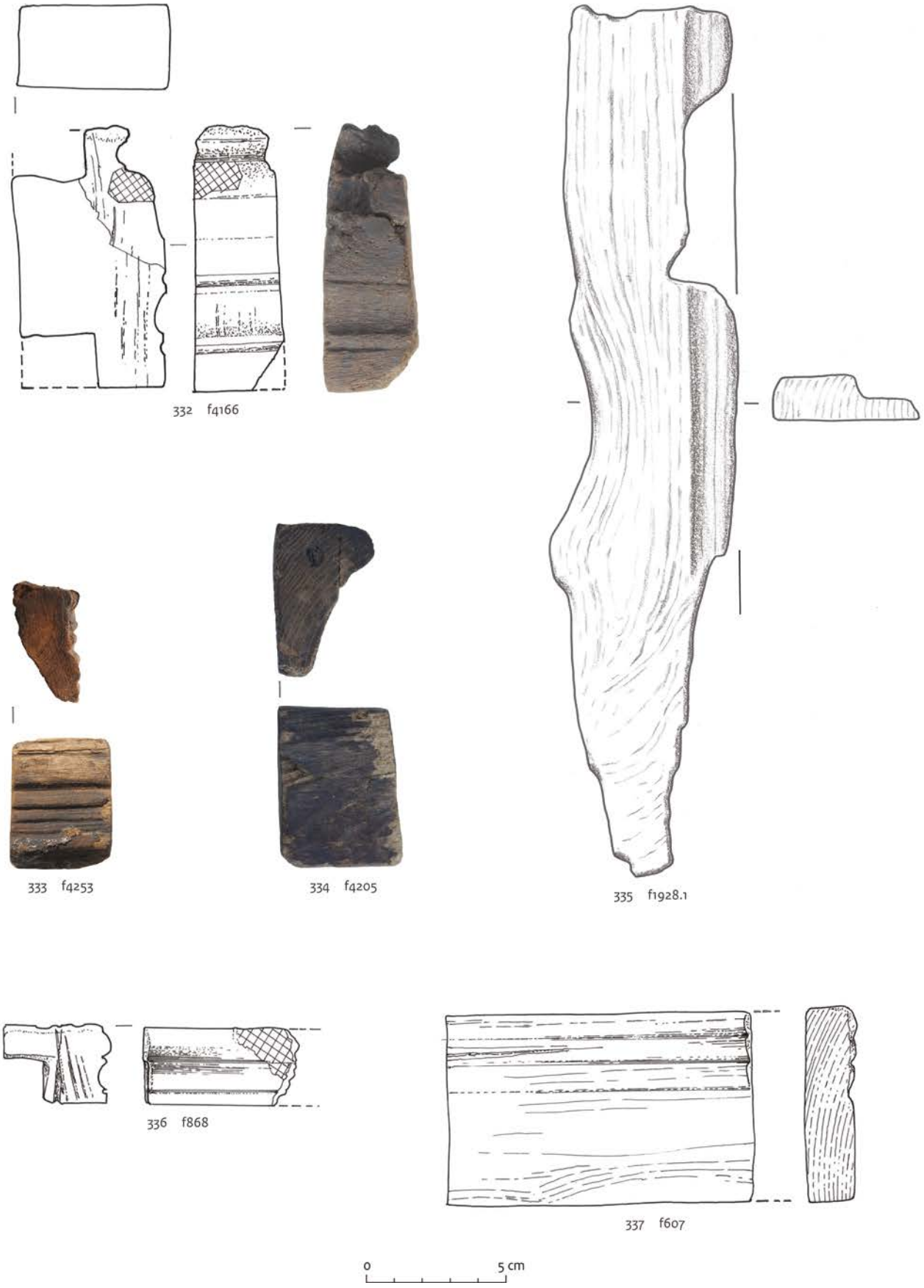
Furniture

Furniture legs and spindles. Possible furniture legs (321: Maloideae, type apple/hawthorn/pear, 322: boxwood), furniture legs (323: Sycamore maple). End pieces (324: Maloideae, type apple/hawthorn/pear, 325: oak, 326: beech).



Furniture
Cornices and mouldings. Cornices (327 and 328: beech, 330: ash), moulding (329: oak), moulding of a house shrine (331: alder).

Plate LXXVI.332-337

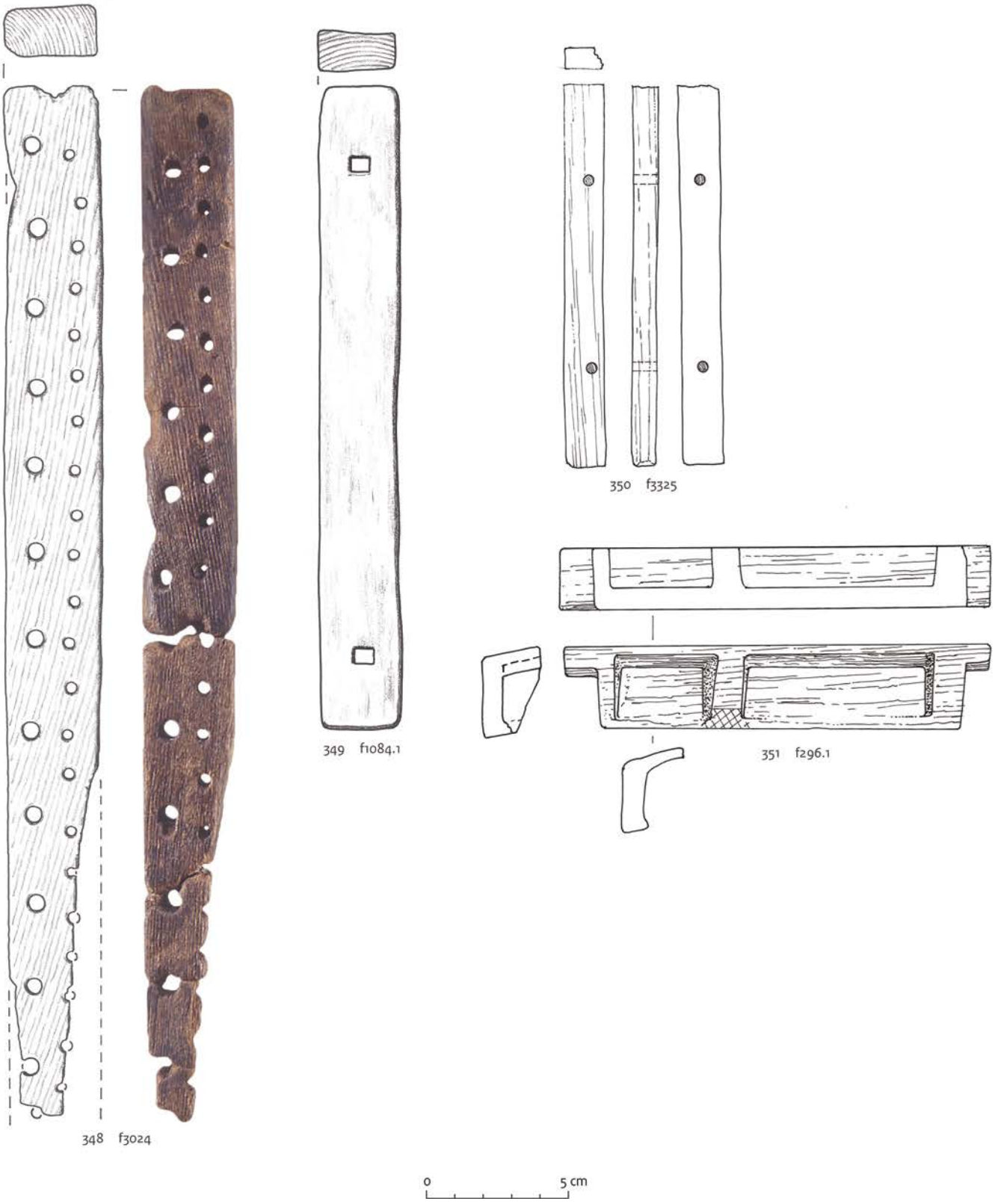


Furniture
Cornices and mouldings. Cornices (332: oak, 333 and 334: ash), mouldings (335: beech, 336 and 337: wood species not identified).

Furniture
Ornamental slats (338: ash, 339: boxwood).

Plate LXXVIII.340-347

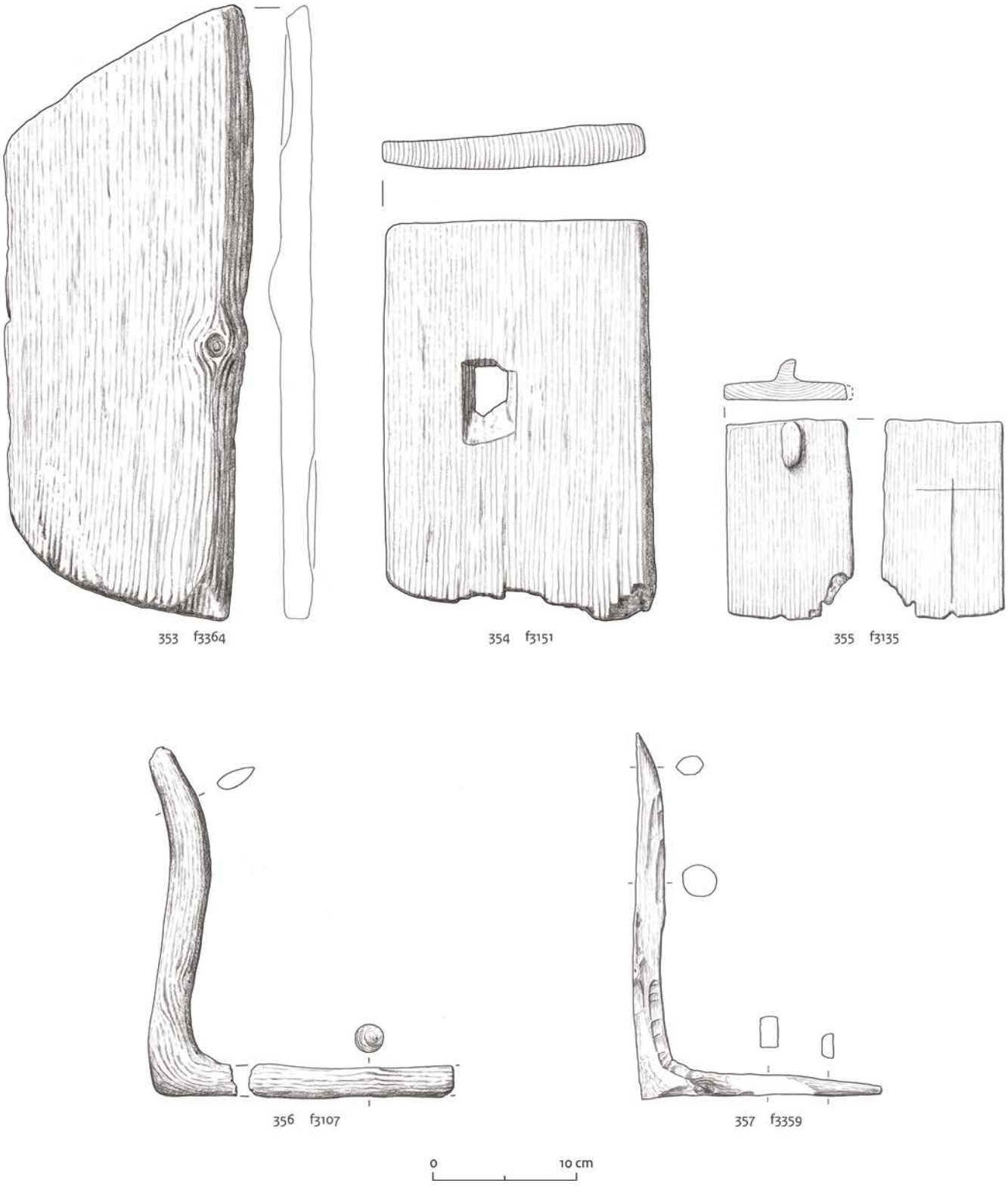
Furniture
Stretchers at ground level (340: alder, 341: beech, 342 and 343: alder). Battens with a notch (344: ash, 345: alder, 346: coniferous wood, 347: alder).



Furniture
Possible base of a wicker chair (348: ash). Parts of small boxes. Slats (349: alder, 350: boxwood), removable insert (351: wood species not identified).

Plate LXXX.352

Furniture
Plank of a chest (352: oak).



Furniture
Boards of seats and of a lid or a door (353: beech, 354: silver fir, 355: alder). Wall hooks (356: elder, 357: juniper).

Plate LXXXII.358-363

358 f4011a

359 f4641

360 f4642

361 f4643

362 f4644

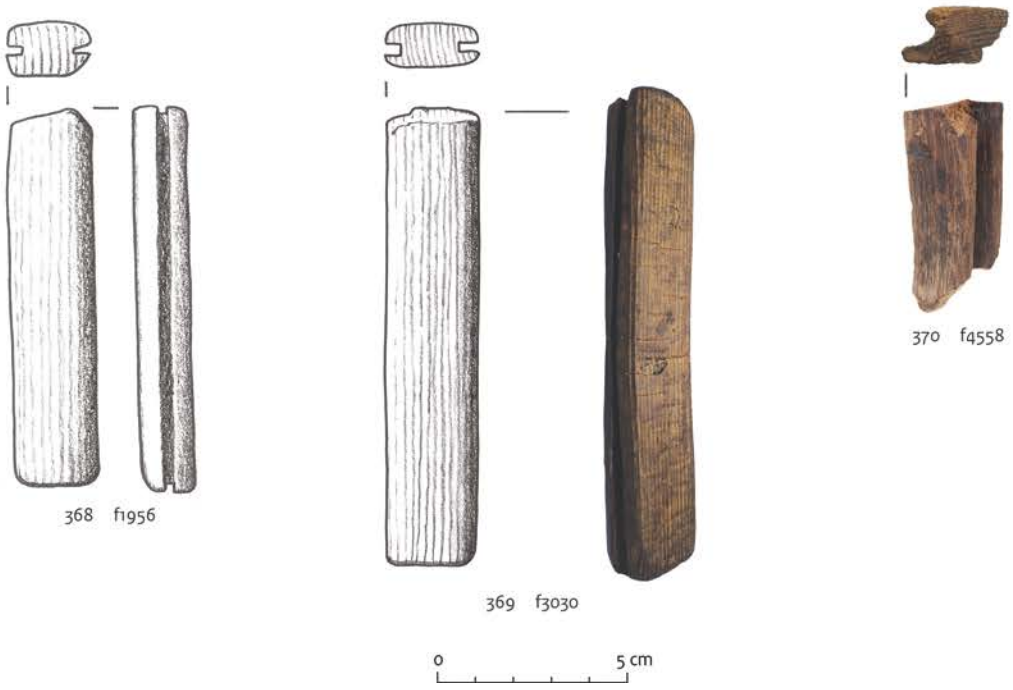
363 f4001a

0 5 cm

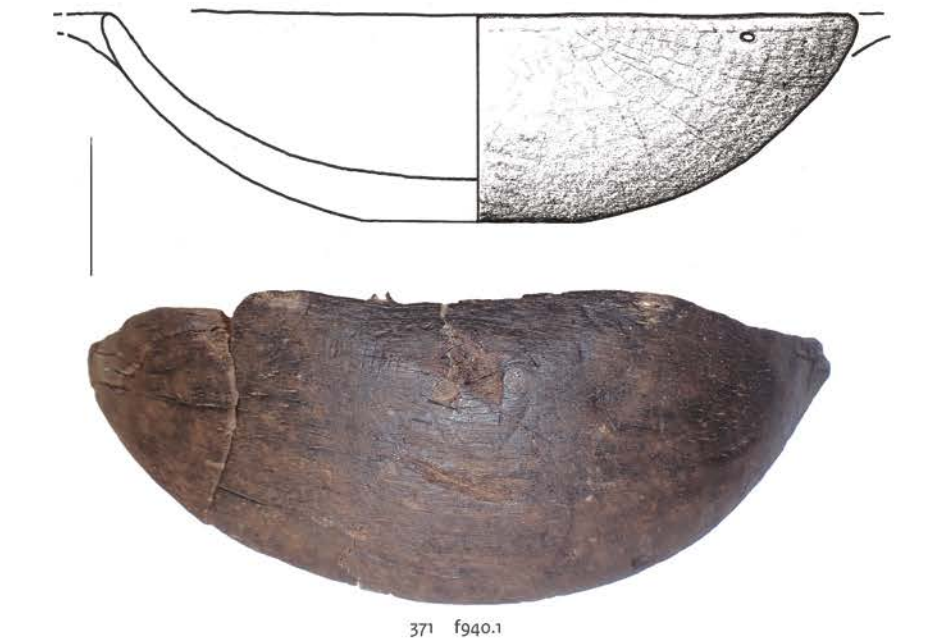
Furniture
Interior boards or boards from cupboard doors or hatch covers (358-363: oak).

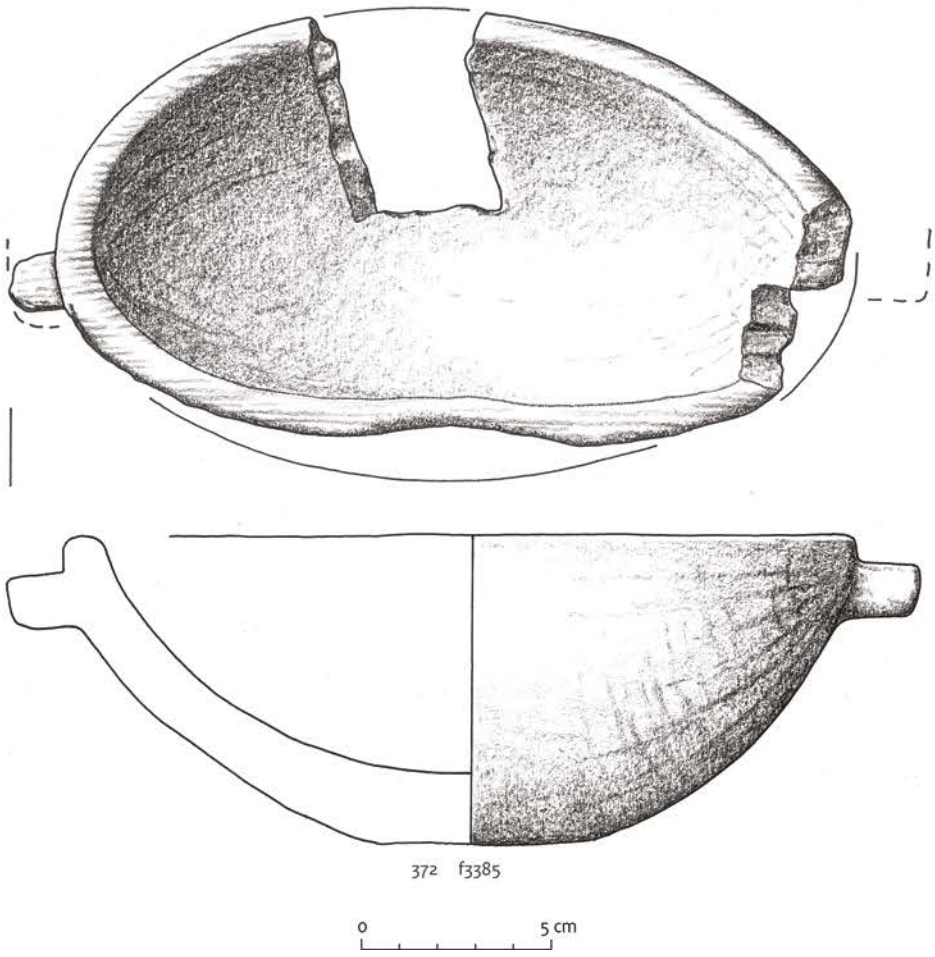
Furniture
Interior boards or boards from cupboard doors or hatch covers (364-367: oak).

Plate LXXXIV.368-370



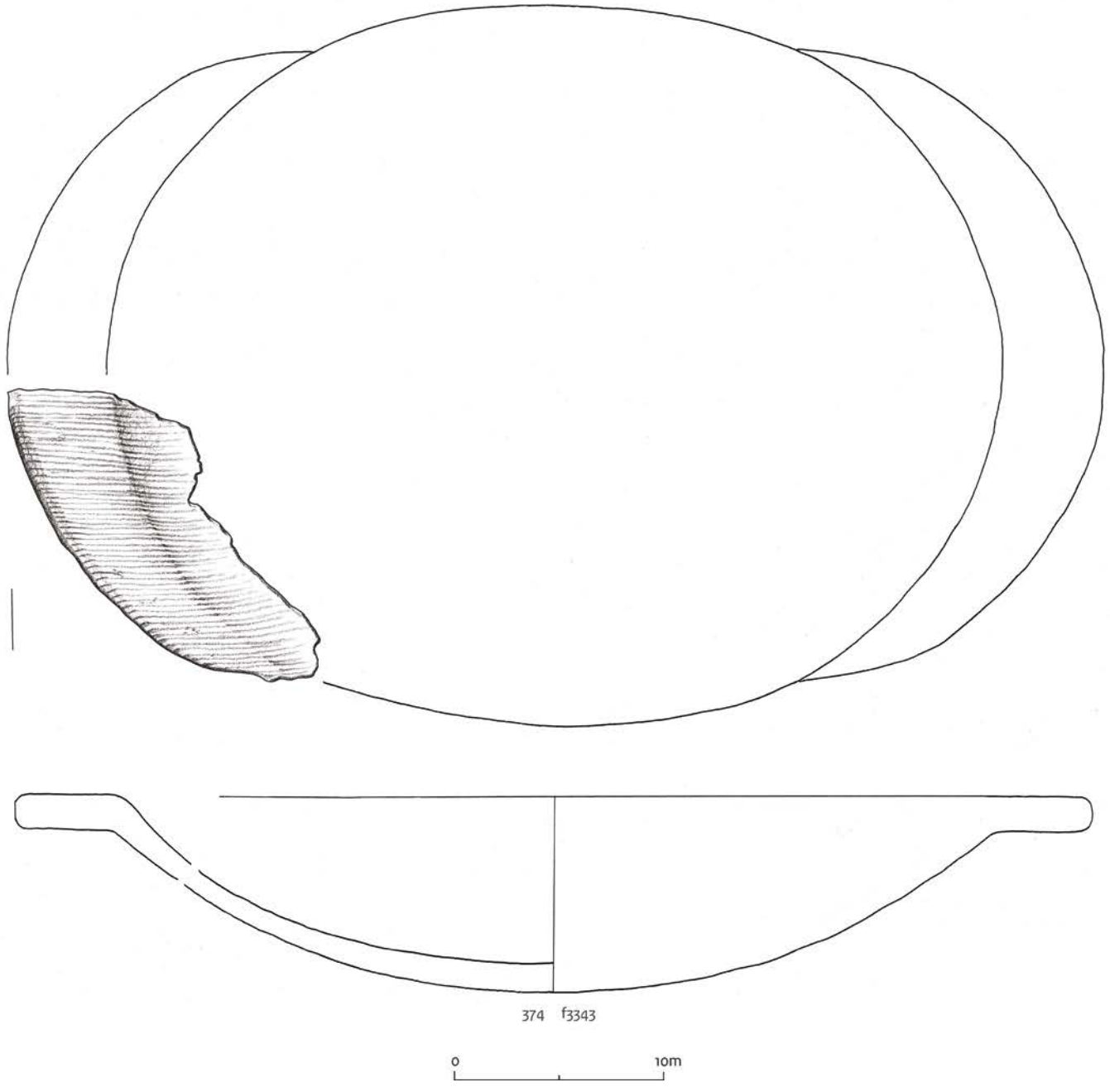
Fenestration
Muntin bars (368: indeterminable, 369: silver fir, 370: ash).



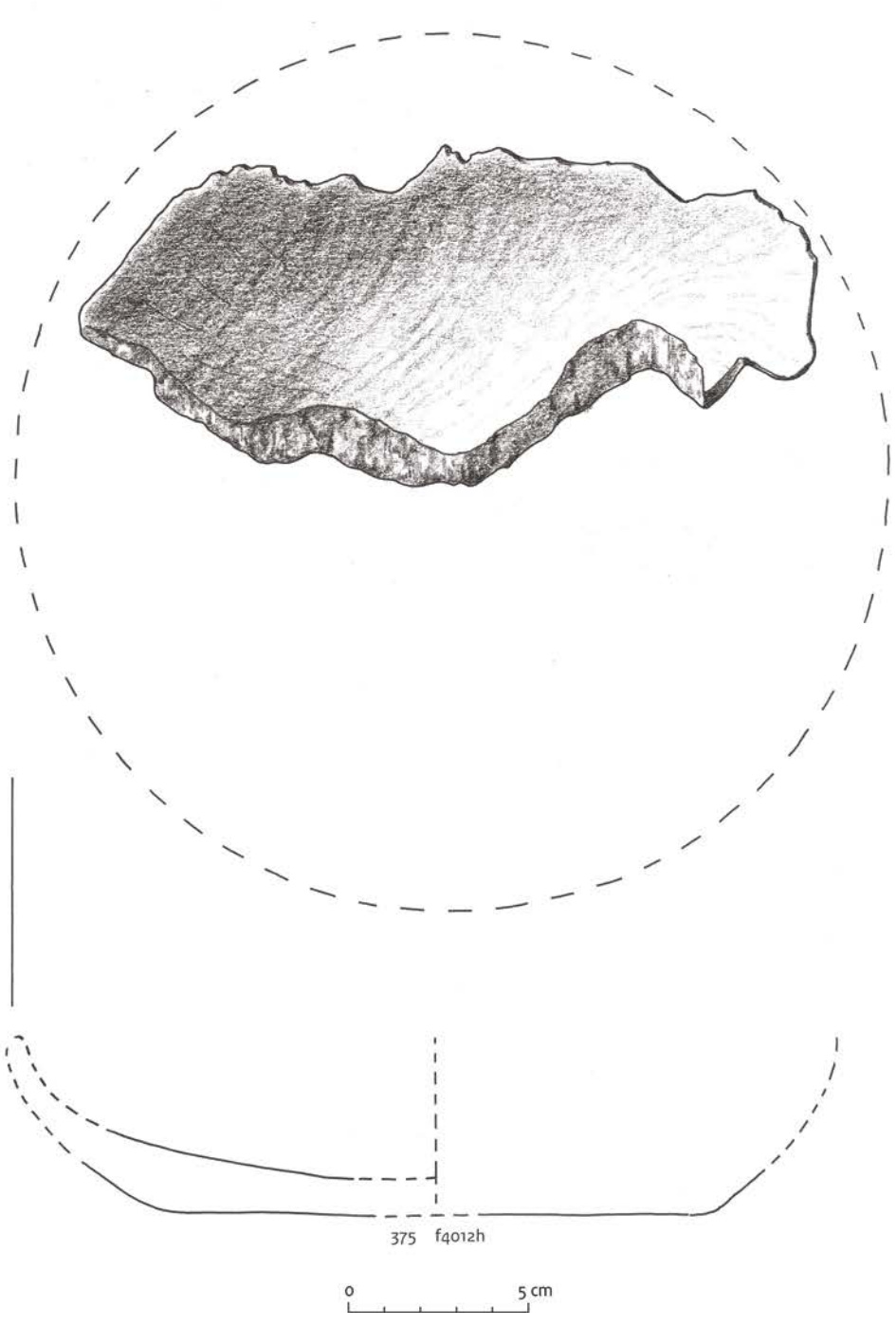


Domestic Utensils
Carved bowls (371 and 372: alder).

Domestic Utensils
Carved bowl (373: alder).

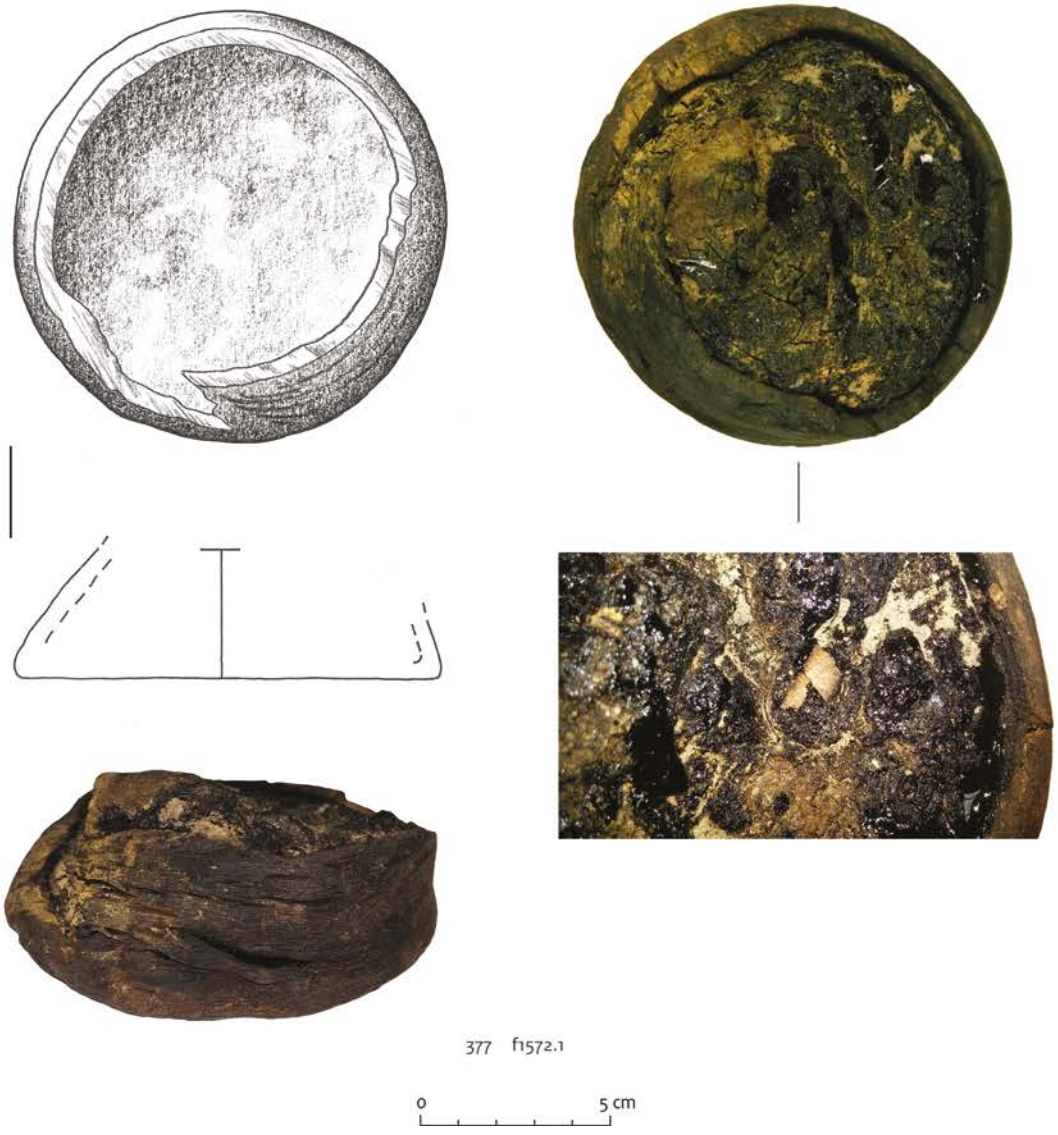


Domestic Utensils
Carved bowl (374: alder).

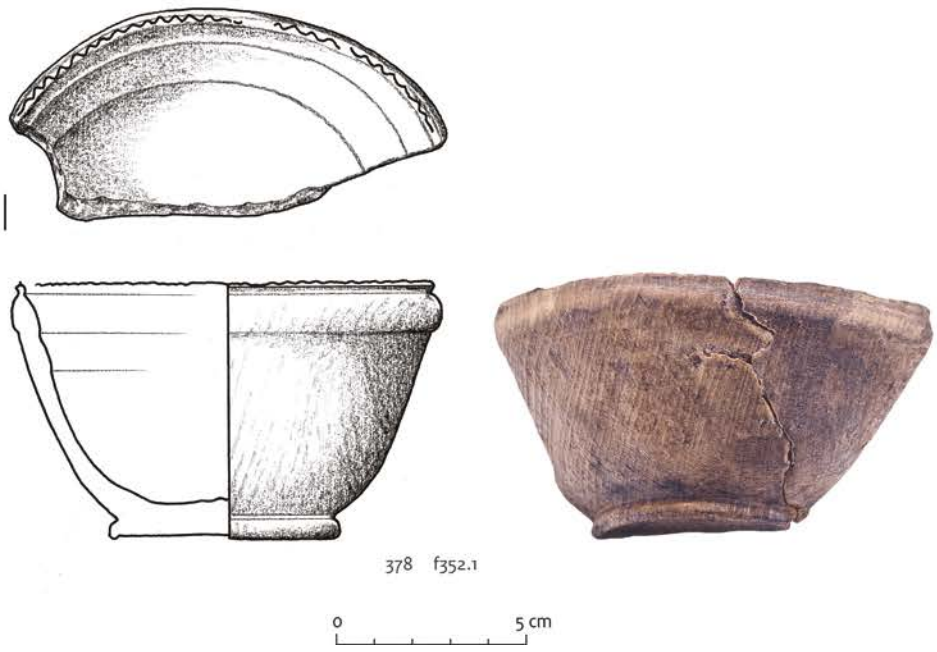


Domestic Utensils
Carved bowl (375: alder).

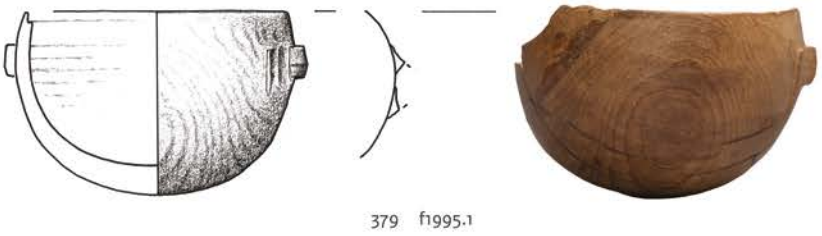
Domestic Utensils
Carved bowl (376: Sycamore maple).



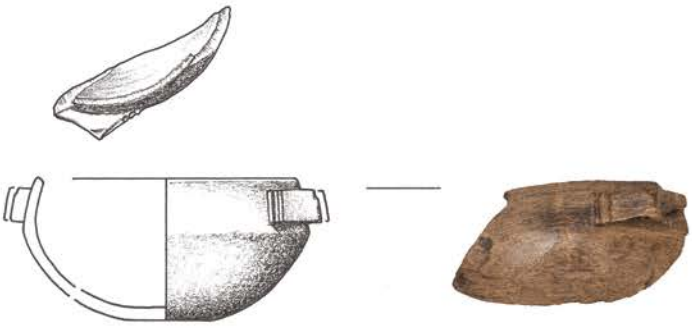
Domestic Utensils
Lathe-turned bowl containing bitumen (377: Sycamore maple/Norway maple).



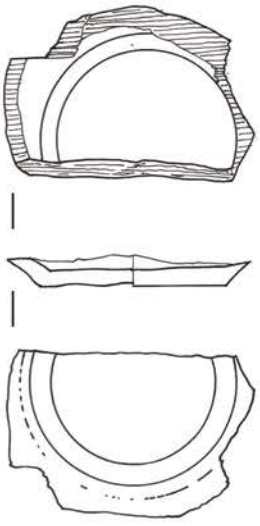
Domestic Utensils
Lathe-turned bowl (378: Sycamore maple/Norway maple).



379 f1995.1



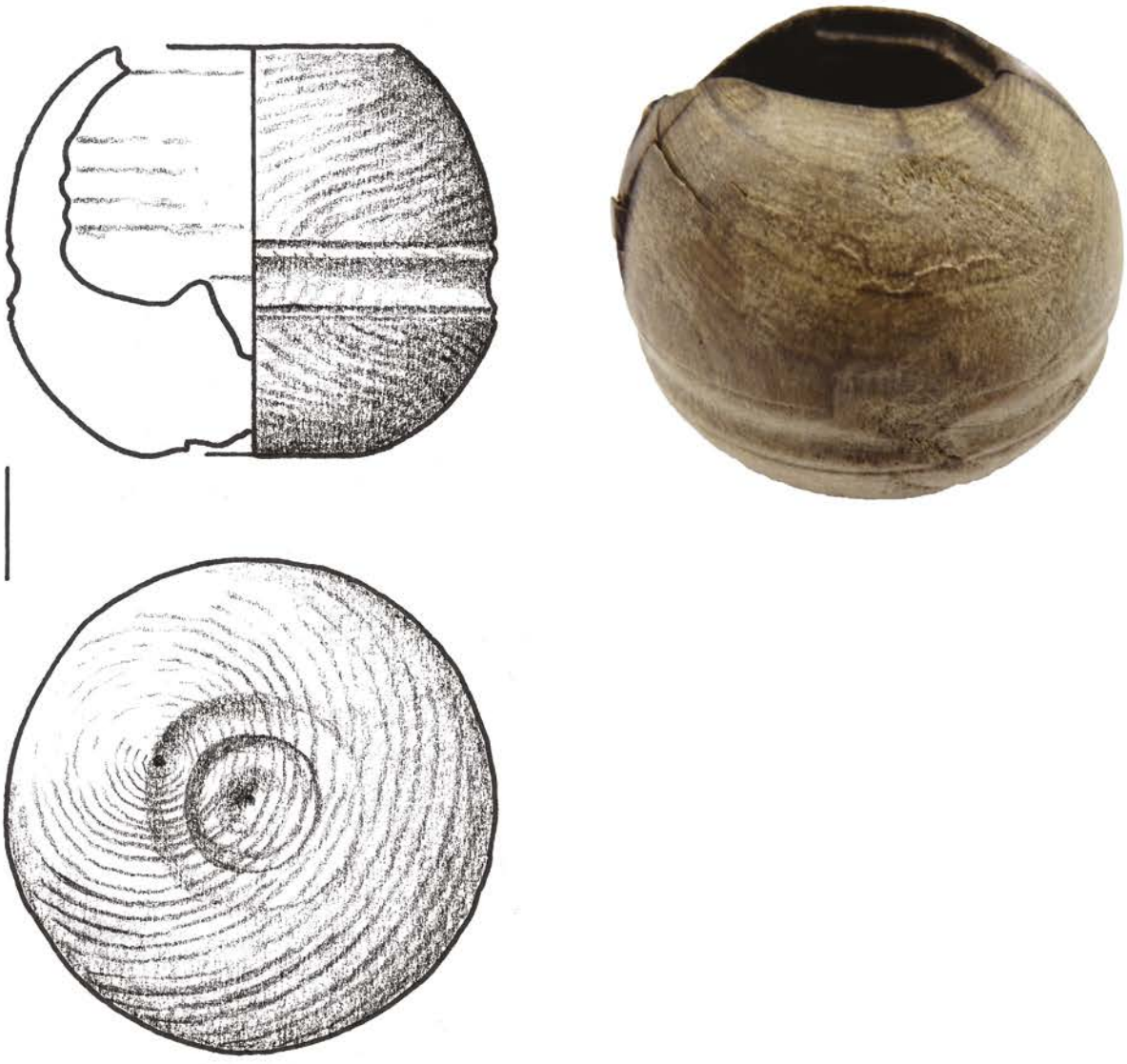
380 f3308



381 f298

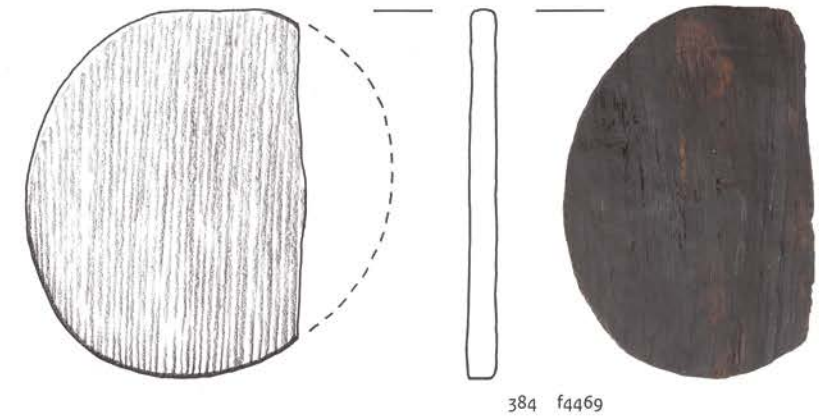
0 5 cm

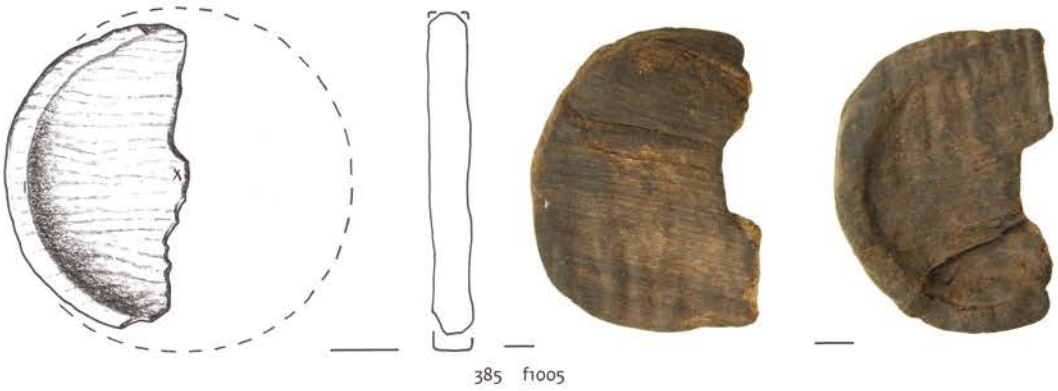
Domestic Utensils
Lathe-turned bowls (379 and 380: boxwood, 381: wood species not identified).

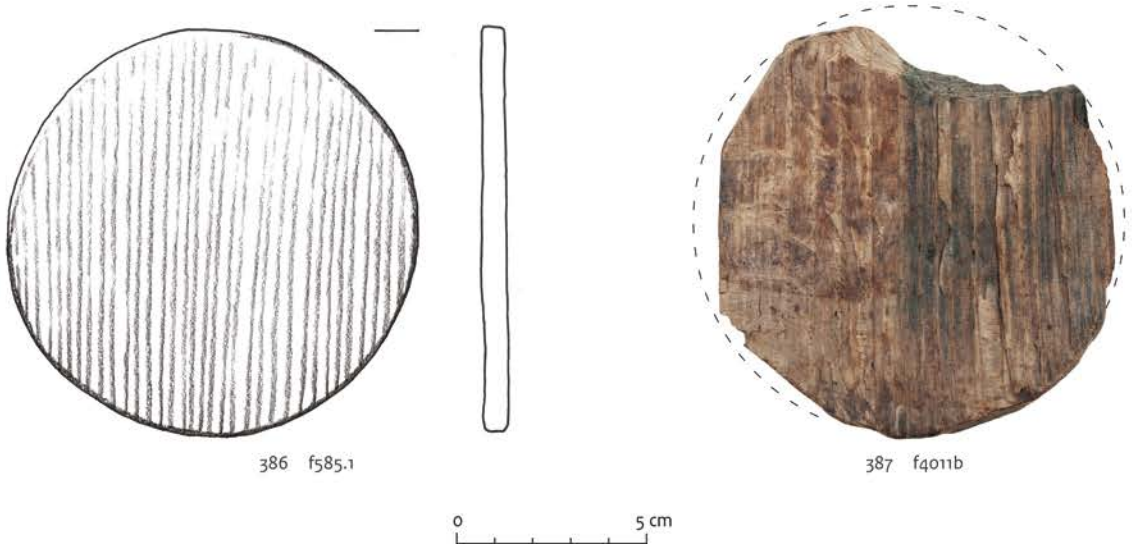


Domestic Utensils
Pyxides. Spherical *pyxis* (382: boxwood).

Domestic Utensils
Pyxides. Lid of a *pyxis* (383: boxwood).

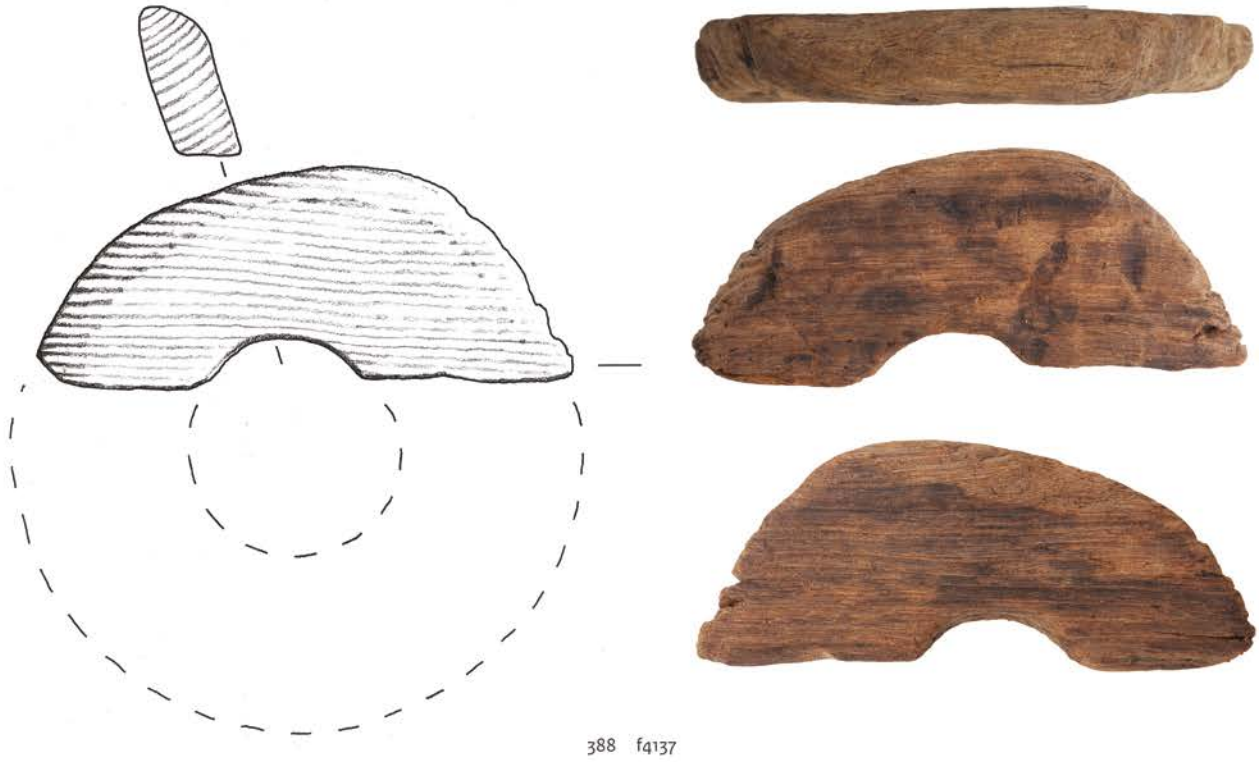




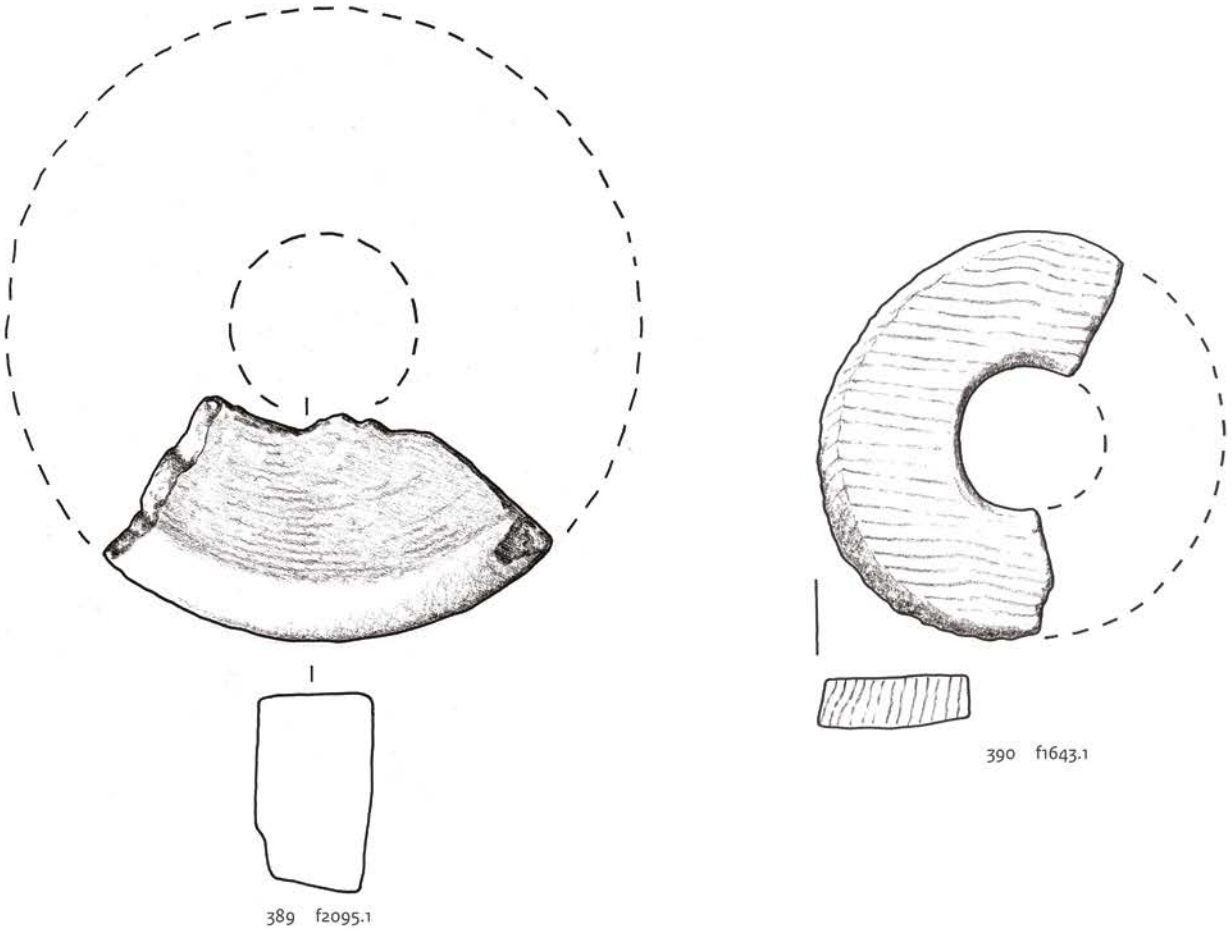


Domestic Utensils
Discs and lids. Discs (384: alder, 385: wood species not identified, 386 and 387: oak).

Plate XCVI.388-390



388 f4137

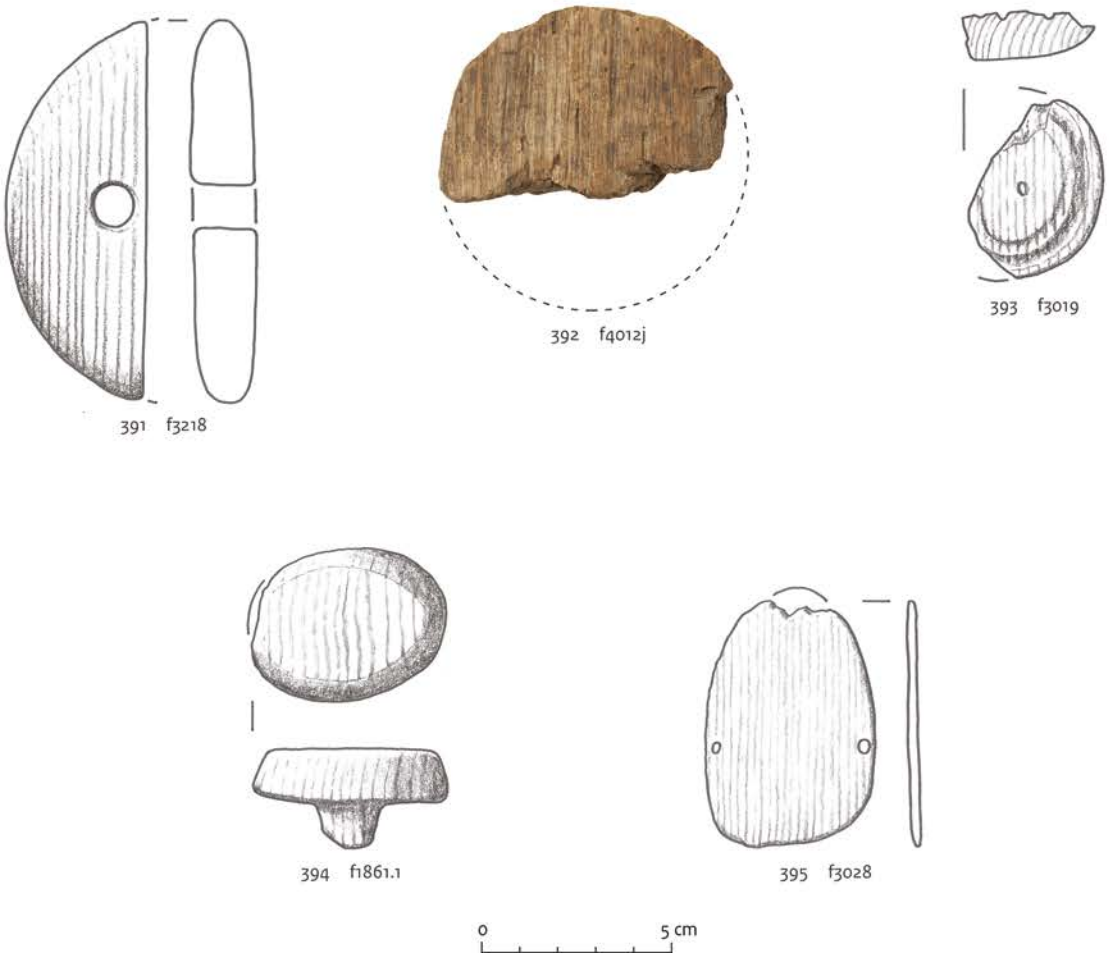


389 f2095.1

390 f1643.1

0 5 cm

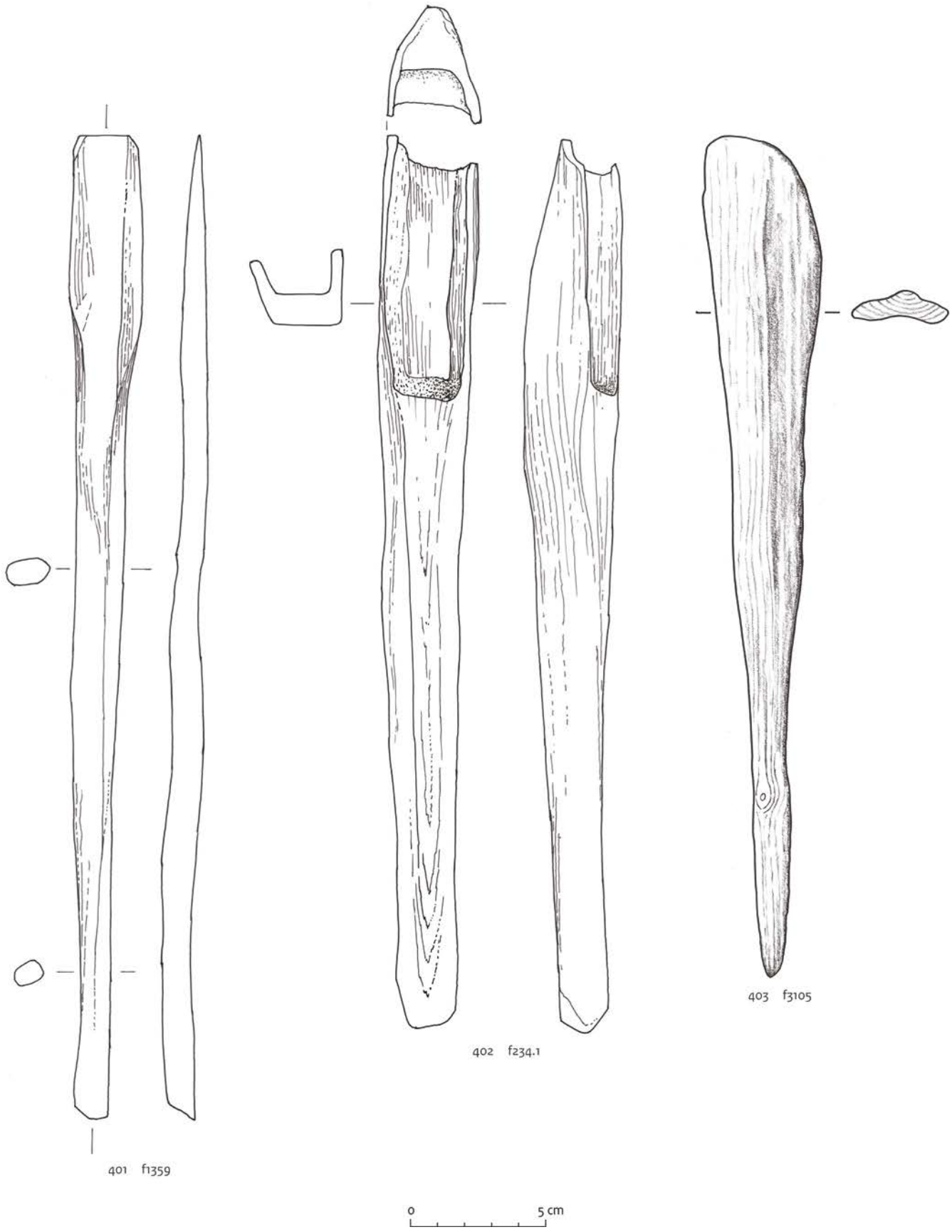
Domestic Utensils
Discs and lids. Perforated discs (388: elm, 389 and 390: ash).



Domestic Utensils
Discs and lids. Perforated disc (391: silver fir), disc (392: oak), lids (393: ash, 394: maple, 395: beech).

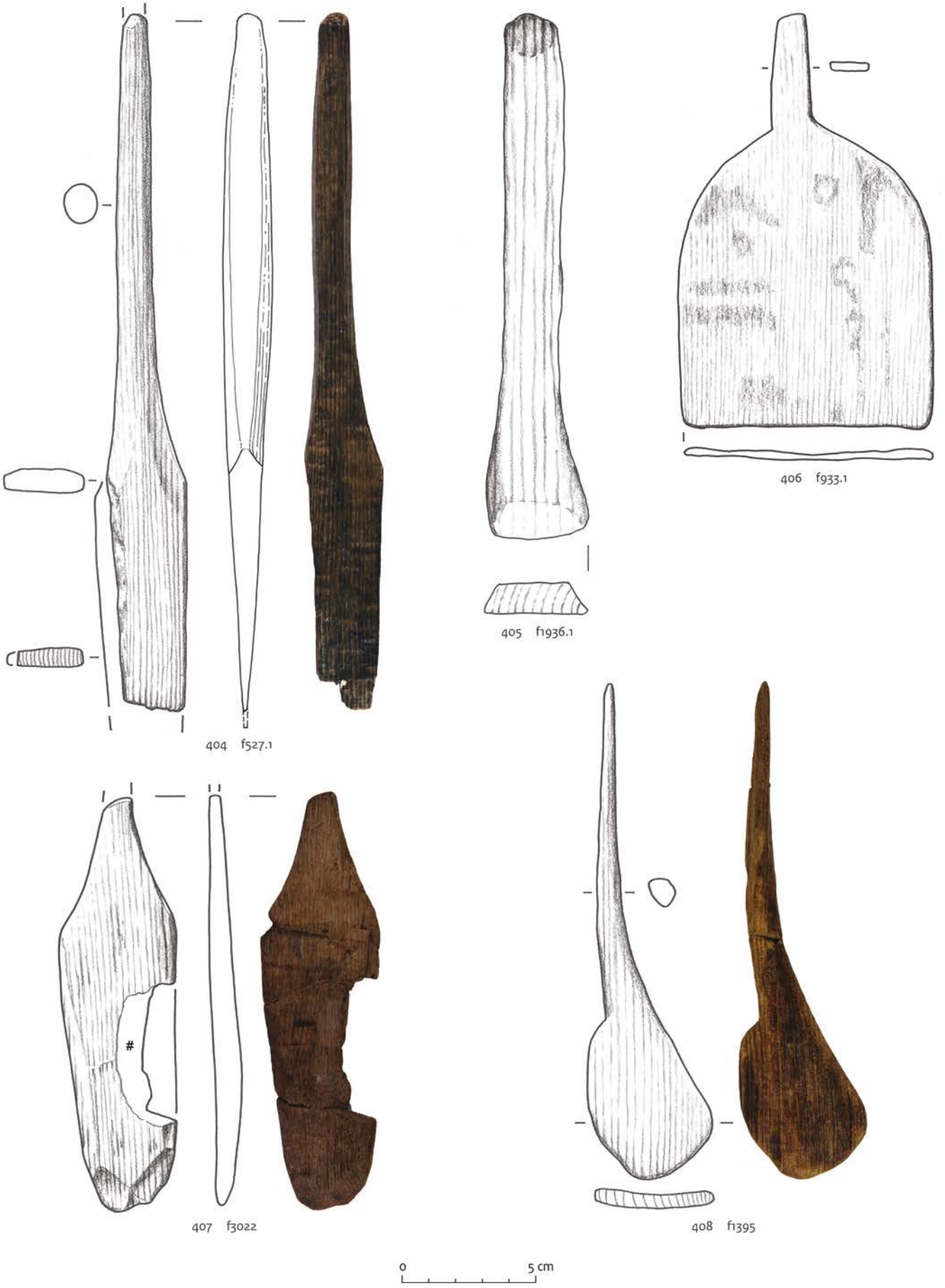
Plate XCVIII.396-400

Domestic Utensils
Spoons (396: ash, 397: alder, 398: oak, 399: beech), handle of a spoon or a spatula (400: beech).



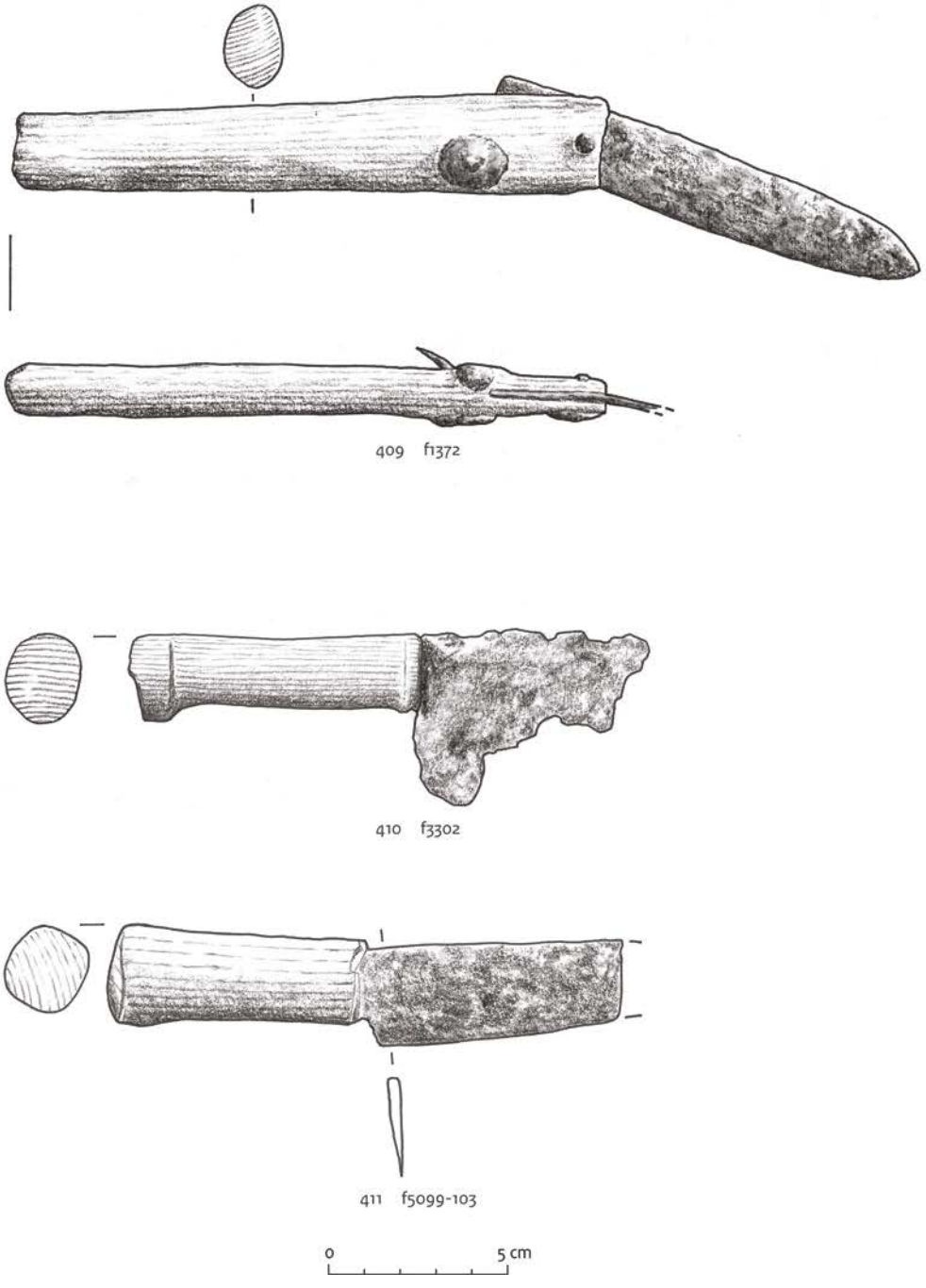
Domestic Utensils
Spatulas (*spatulae*). Spatula (401: wood species not identified), spoon-like spatula (402: ash), spatula (403: ash).

Plate C.404-408



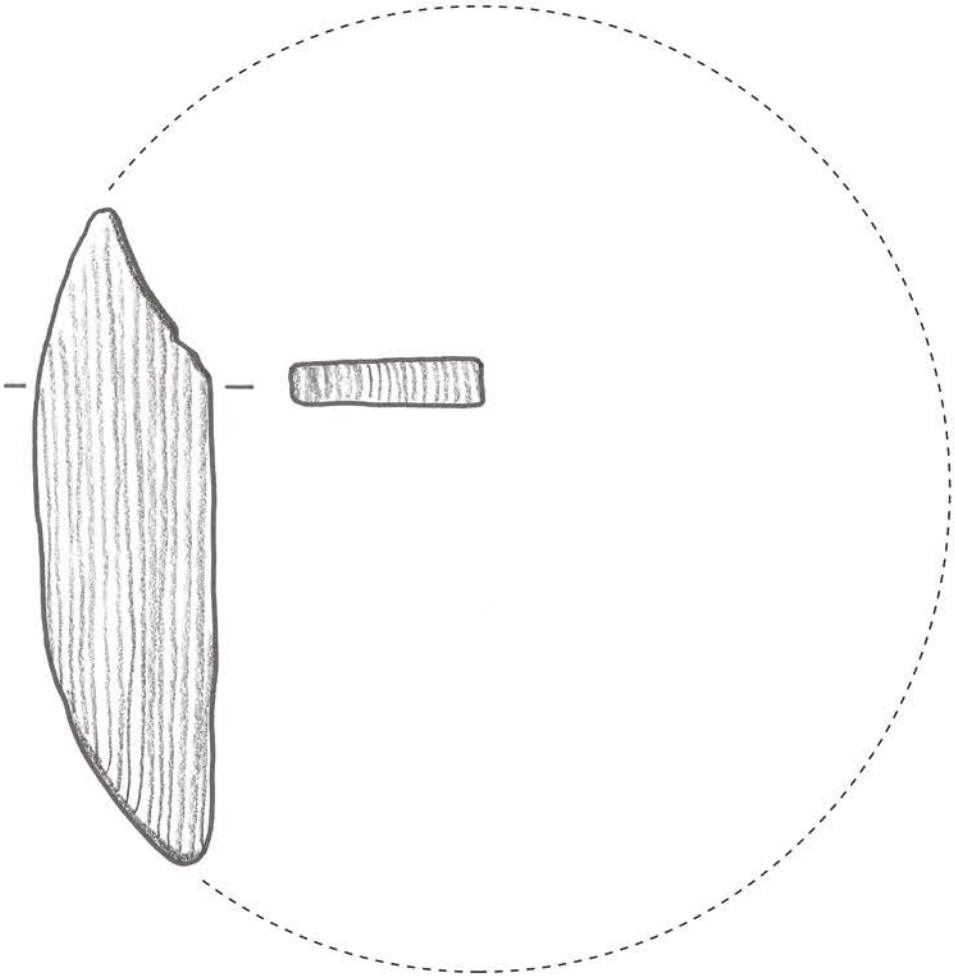
Domestic Utensils

Spatulas (*spatulae*). Spatulas (404: silver fir, 405: alder, 406: oak, 407 and 408: ash).

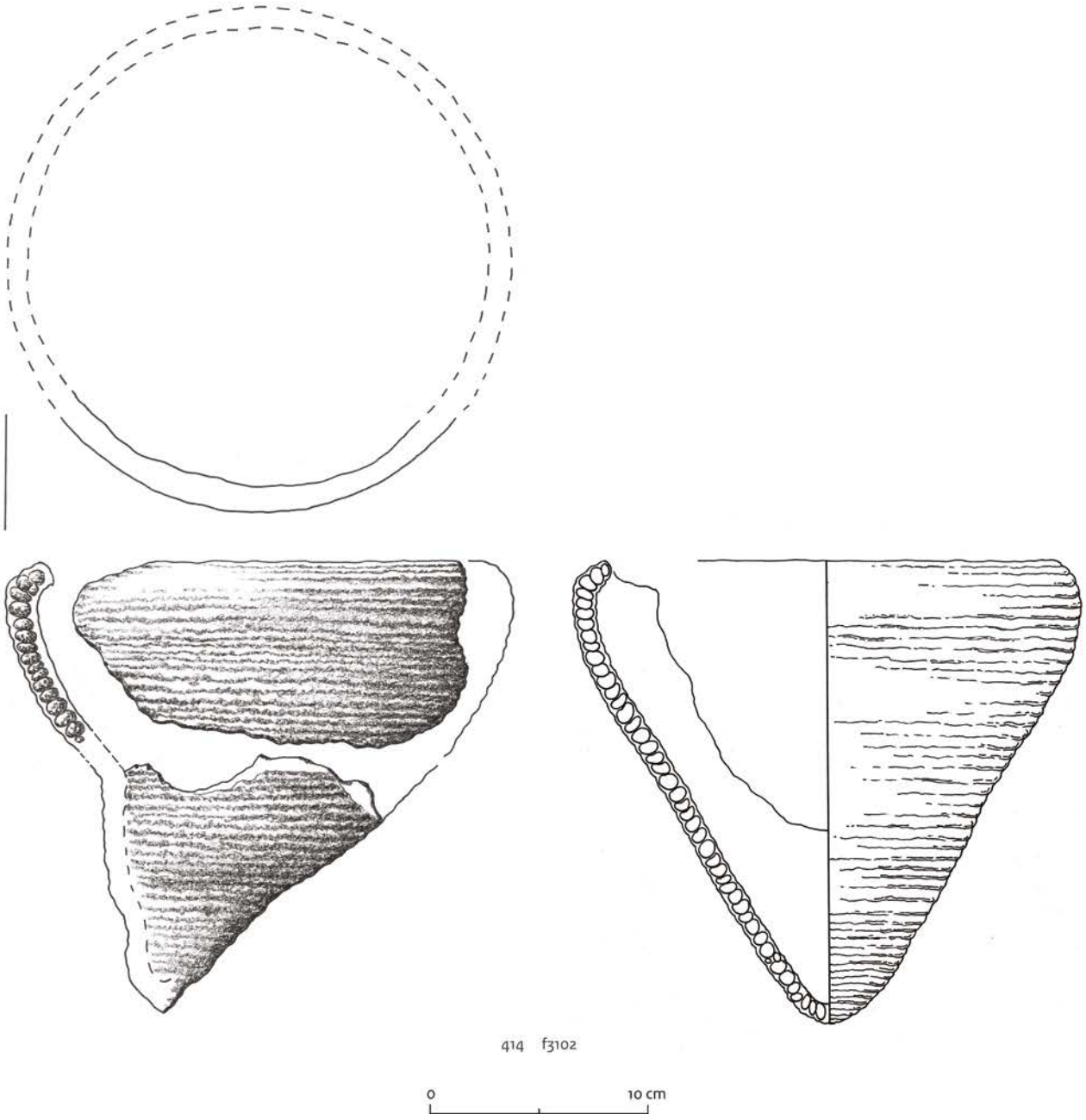


Domestic Utensils
Knives (409 and 410: wood species not identified, 411: maple).

Plate CII.412-413

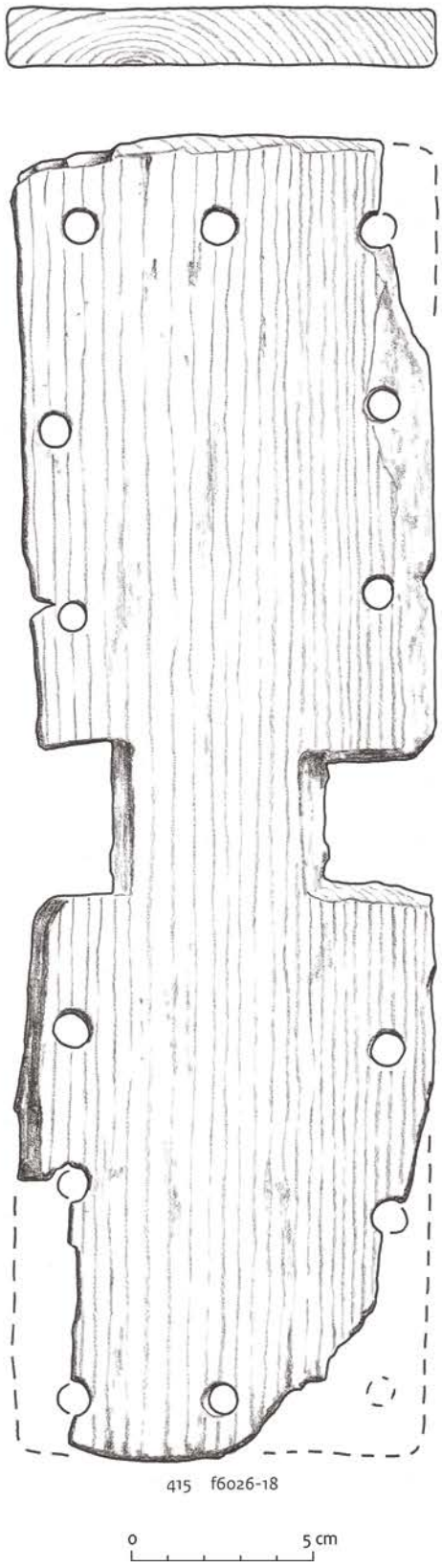


Domestic Utensils
Base of a stave bucket (412: oak), base of a lath-walled box (413: wood species not identified).



Basketry
Coiled basket (414: broom).

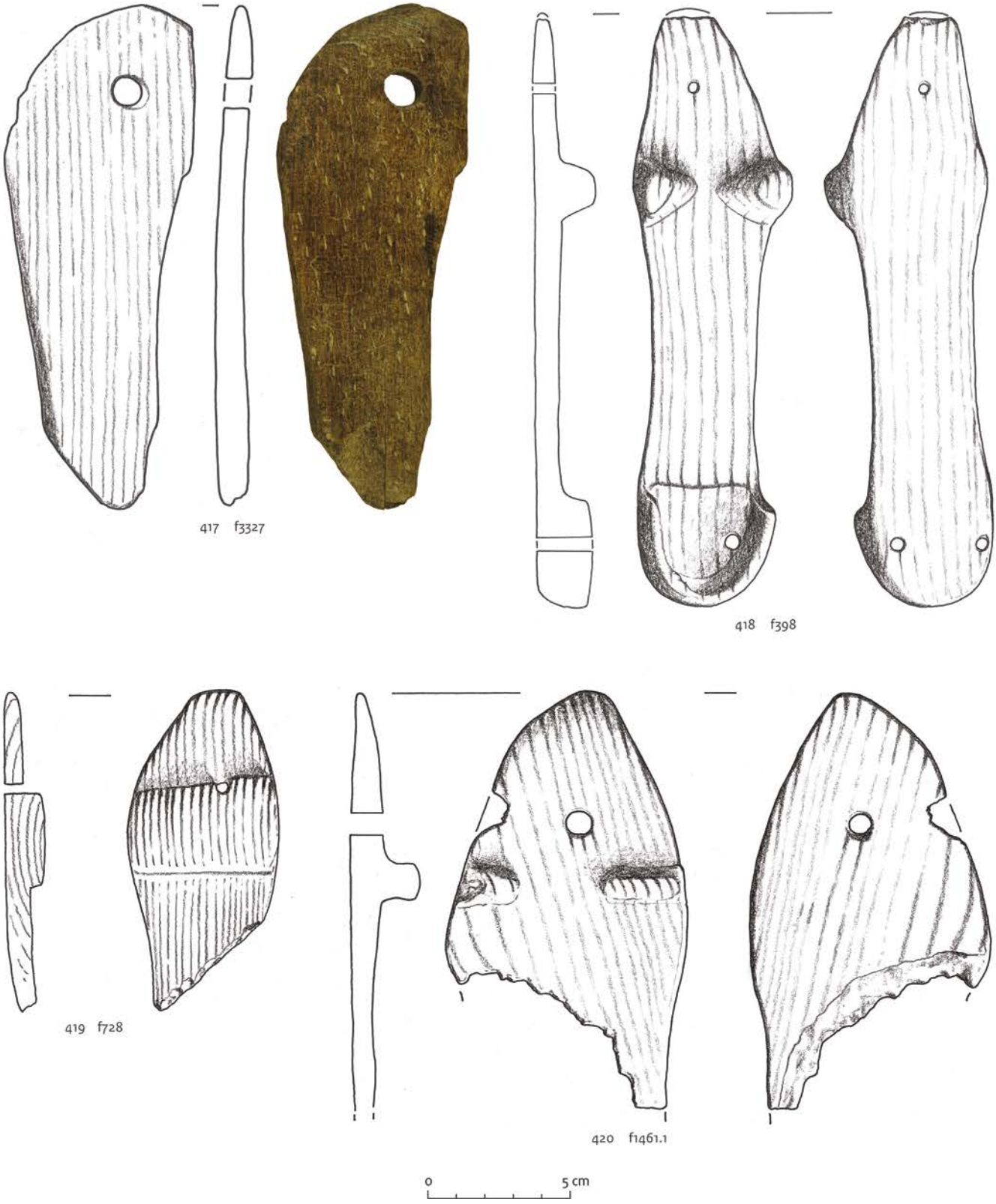
Plate CIV.415



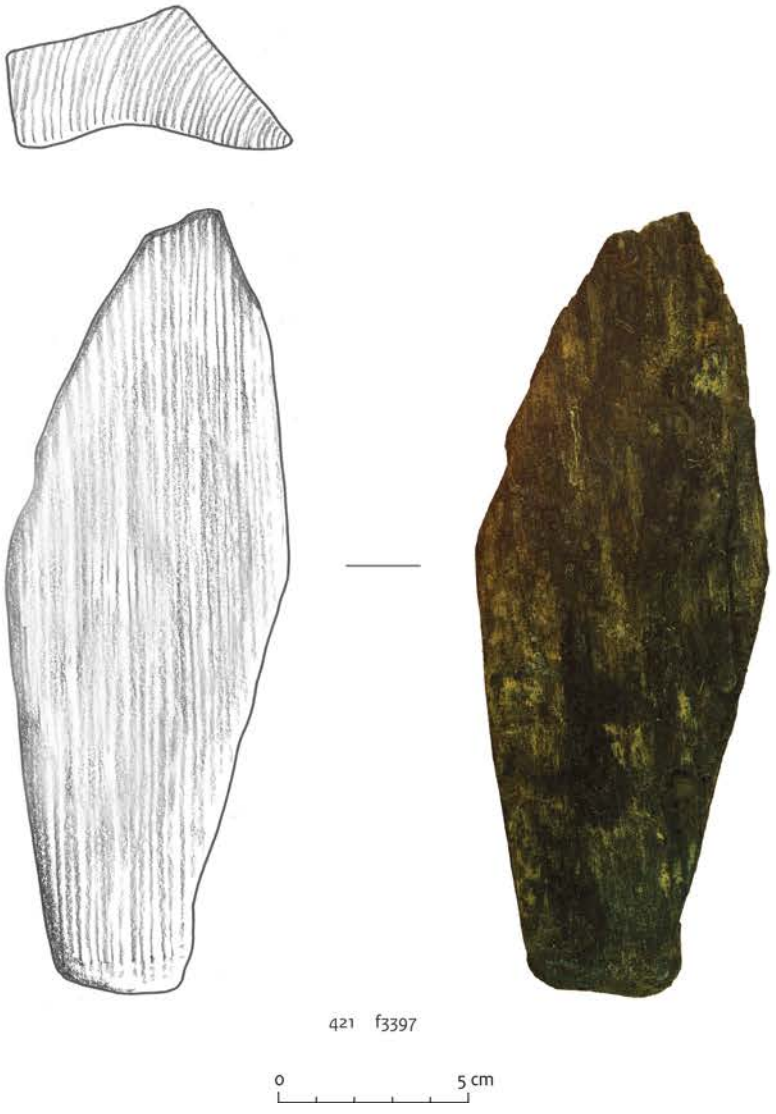
Basketry
Base of wicker work (415: ash).

Personal Belongings
Wood-soled footwear. Left-food sole with bite marks of a dog (416: ash).

Plate CVI.417-420



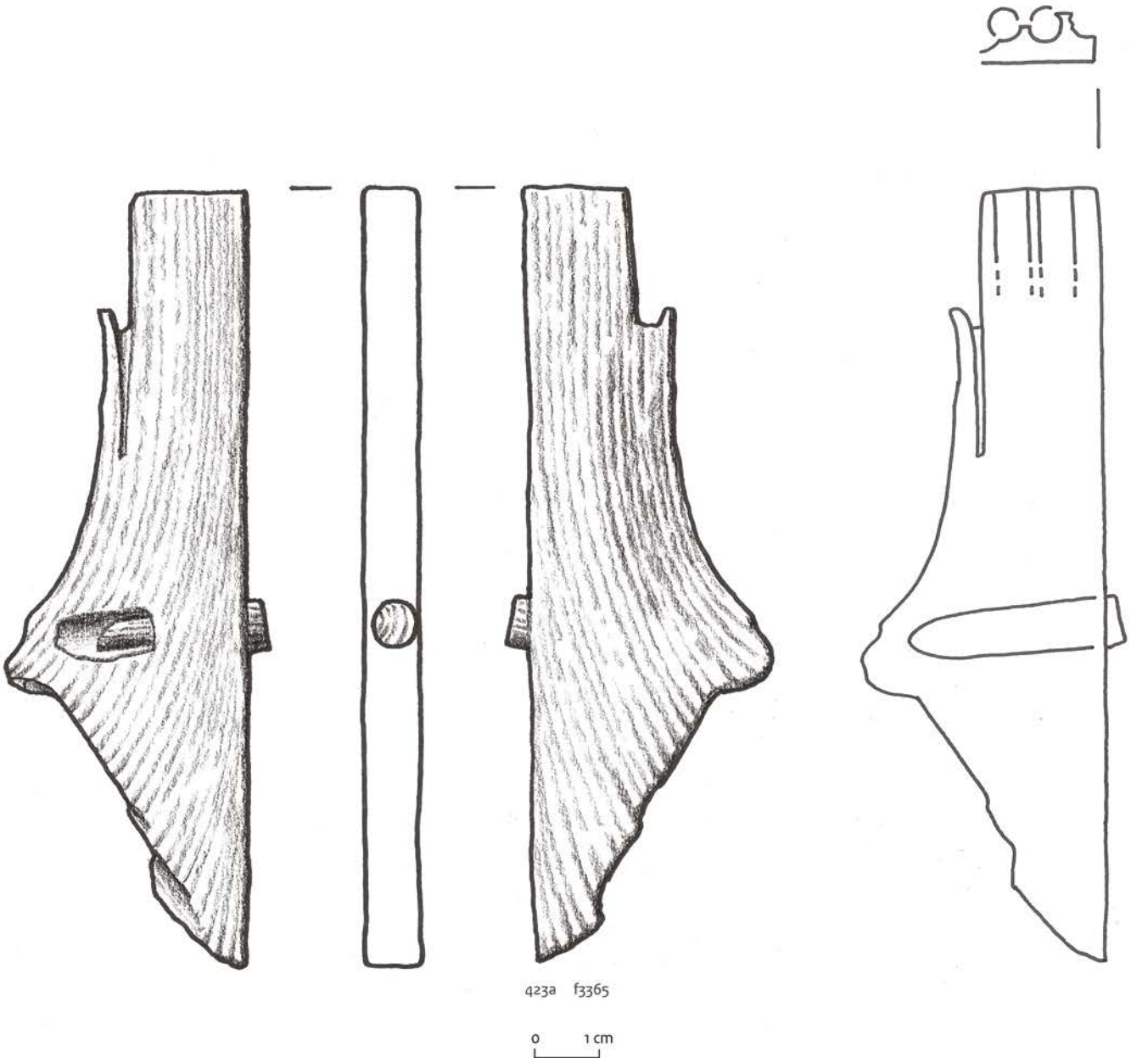
Personal Belongings
Wood-soled footwear. Right-foot sole (417: beech), left-foot sole (418: wood species not identified), right-food sole (419: wood species not identified), left-food sole (420: ash).



Personal Belongings
Roughout for a sole (421: alder).

Plate CVIII.422

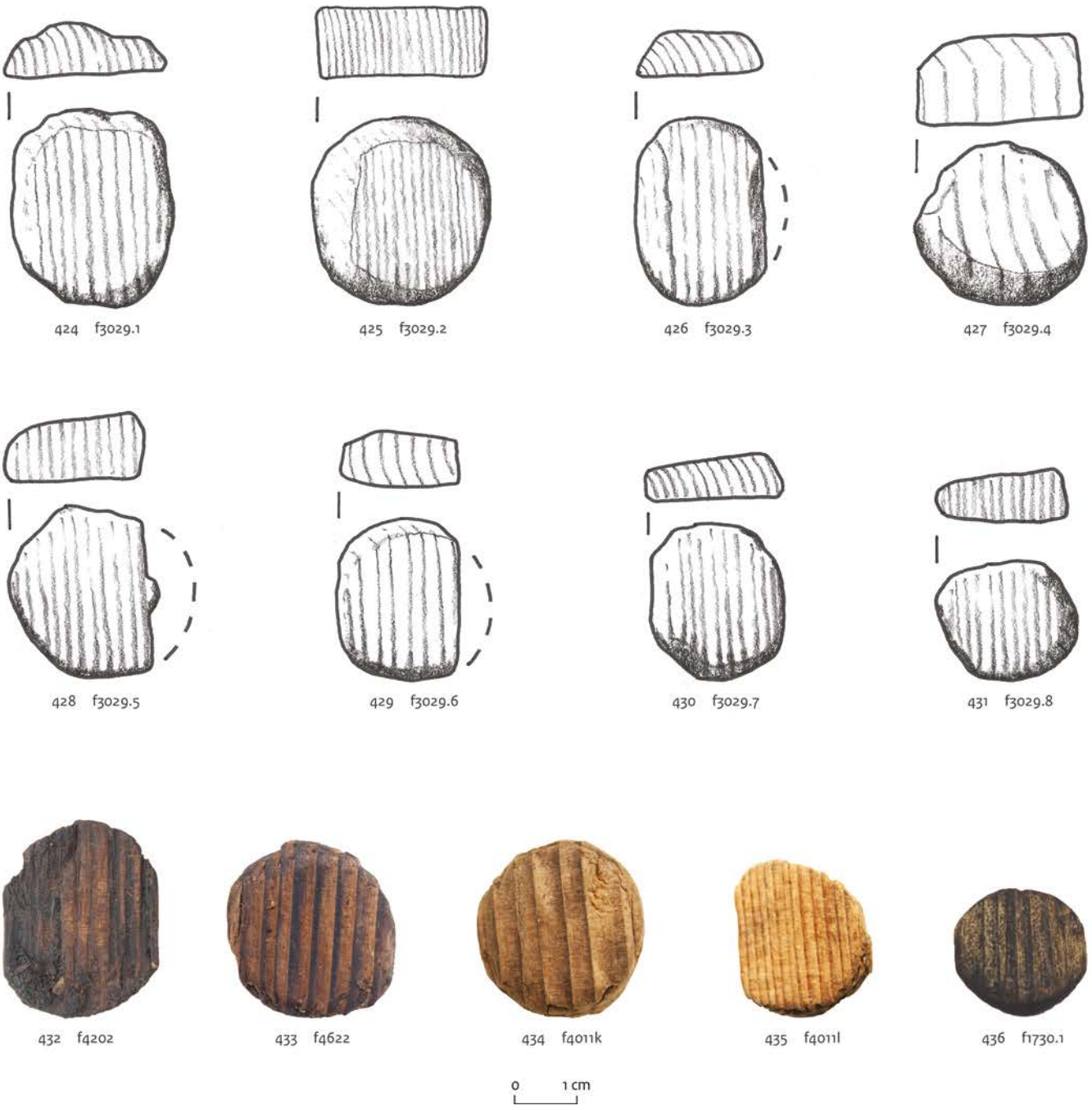
Personal Belongings
Comb (422: boxwood).



Entertainment
Panpipe (423: boxwood).

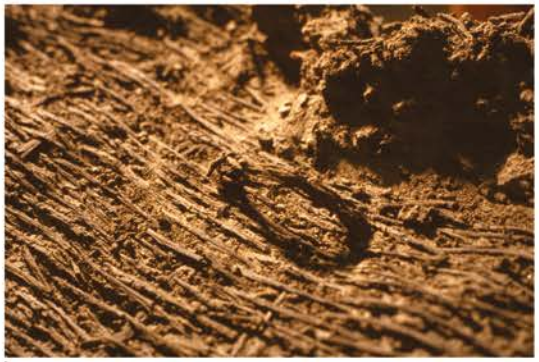
Plate CX.423

Entertainment
Plate CX.423. Panpipe (423: boxwood).

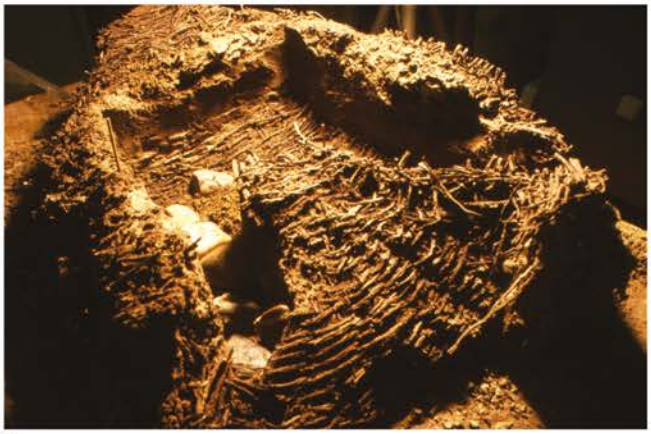


Entertainment
Gaming pieces (424: silver fir, 425: pine, 426: alder, 427: maple, 428 and 429: alder, 430: silver fir, 431: Norway spruce/European larch, 432-435: silver fir, 436: ash).

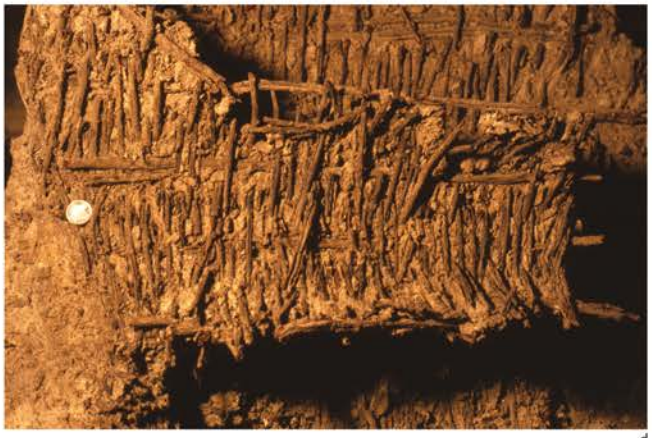
a



b



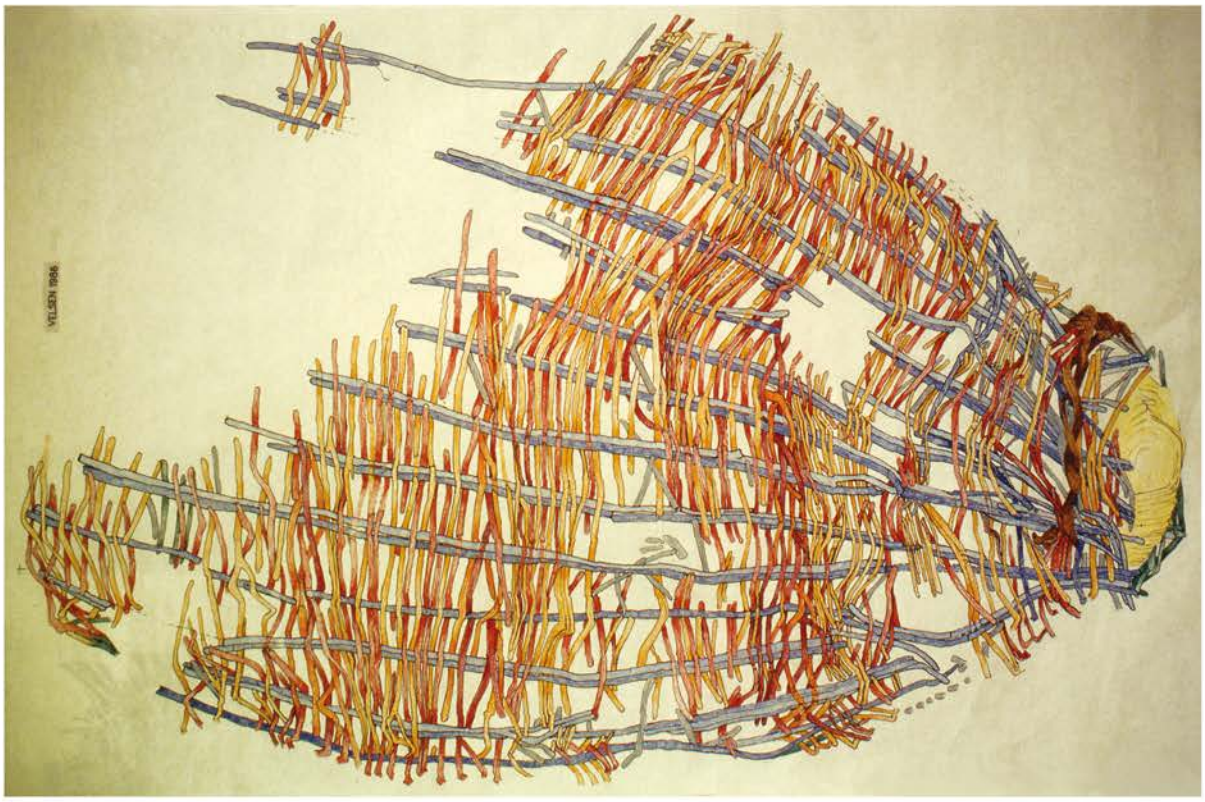
c



d

437 f1988-1

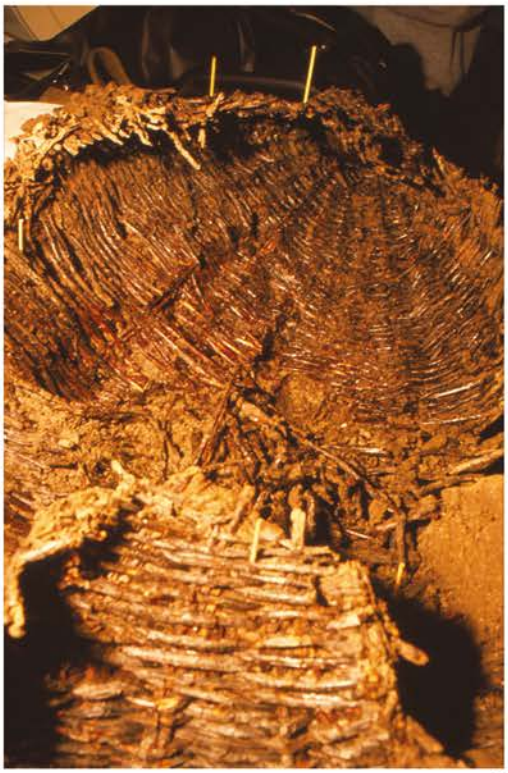
Fishing and Fowling
Fish traps (437: willow).



a

b

d

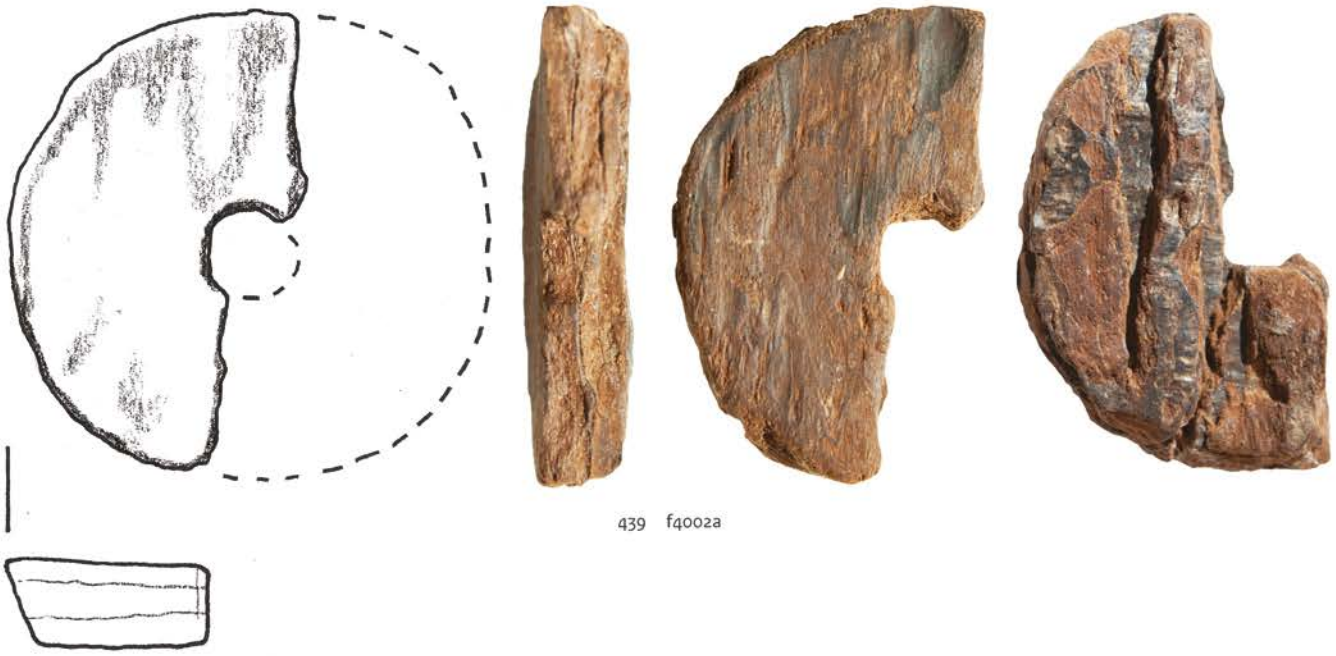


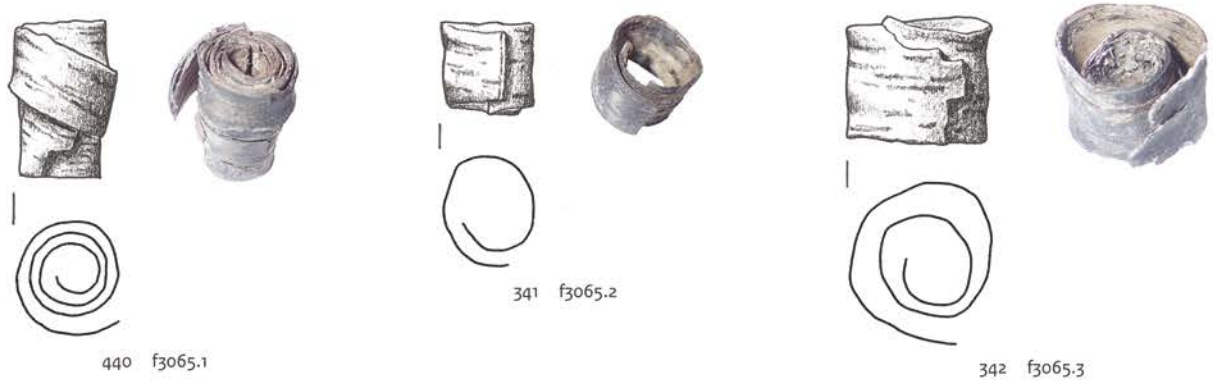
c

438 f1988-2

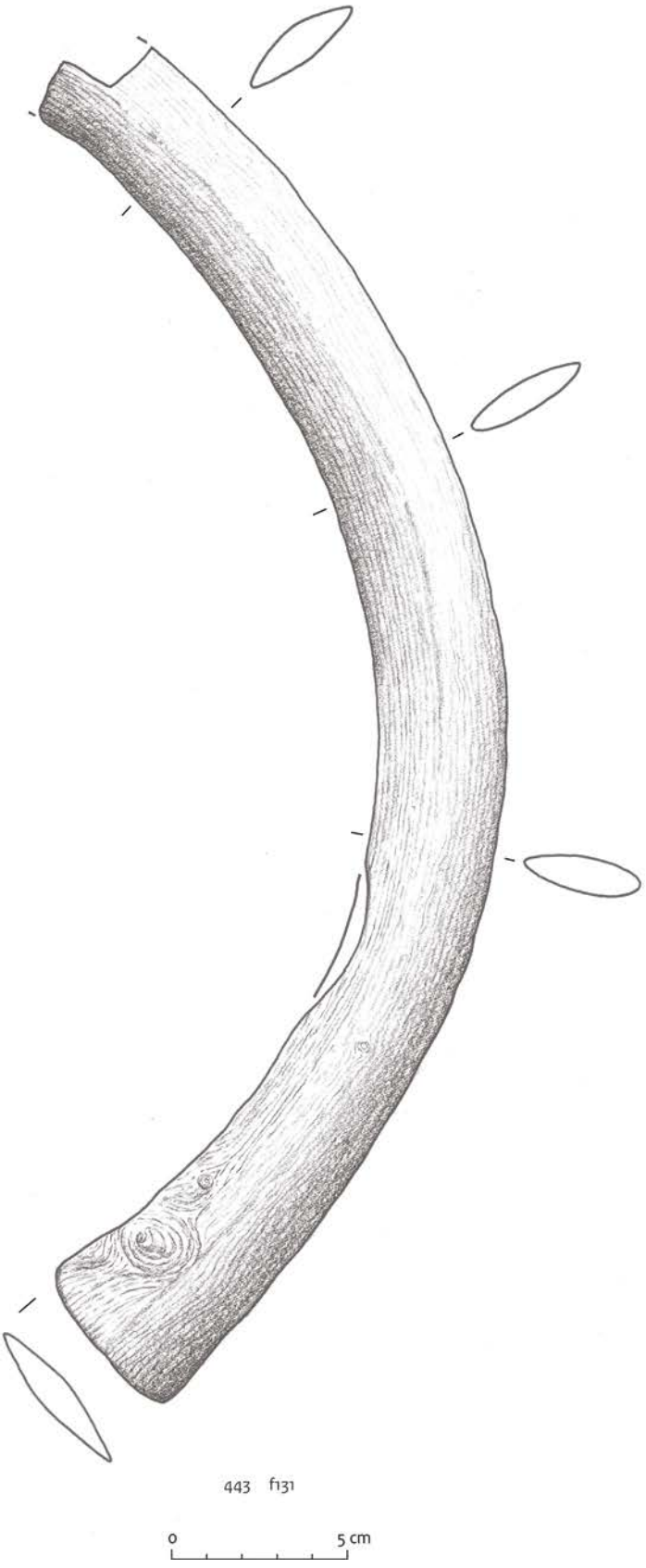
Fishing and Fowling
Fish traps (438: willow).

Plate CXIV.439-442



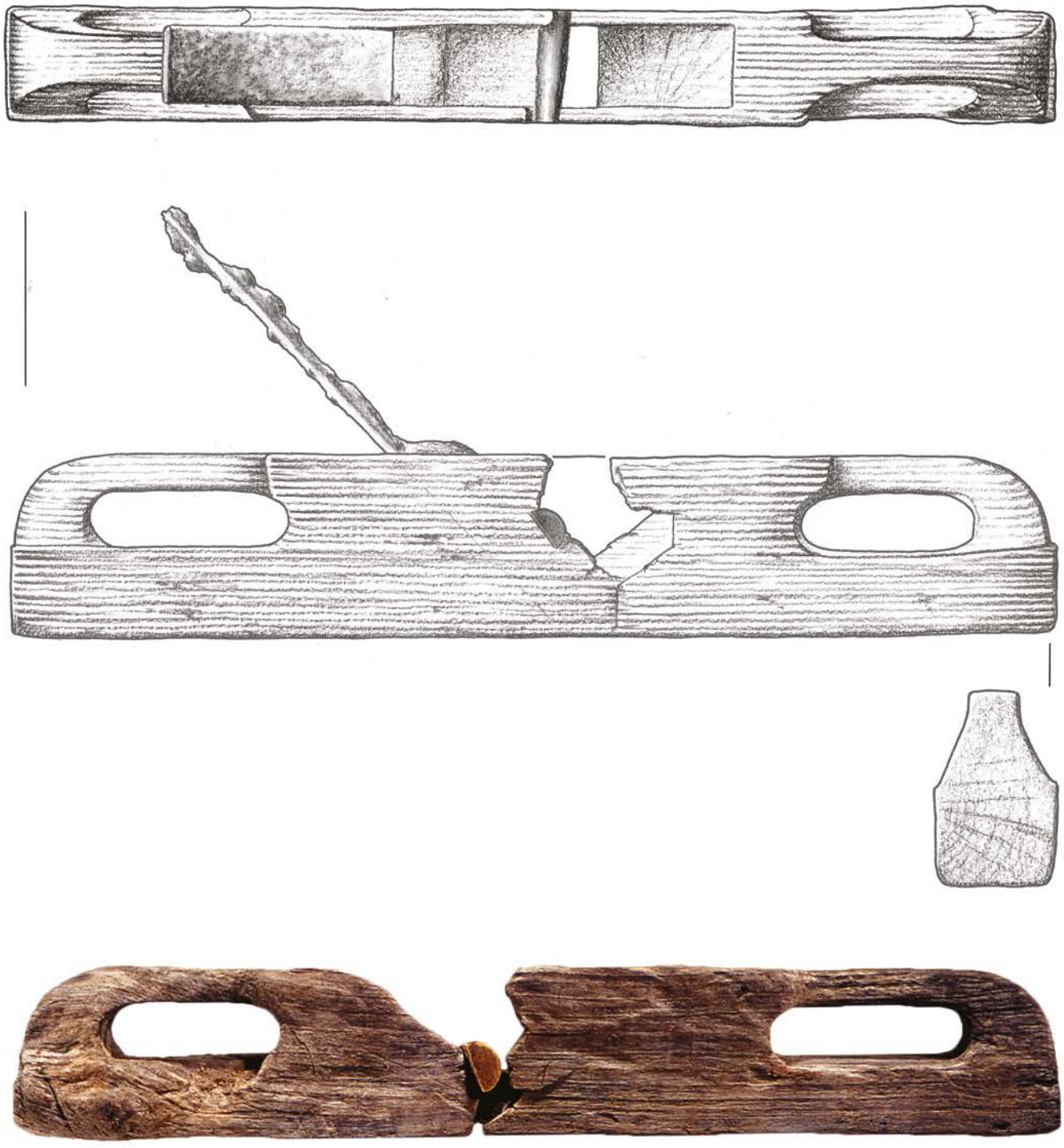


Fishing and Fowling
Other fishing gear. Net floater (439: bark of poplar or willow), floaters (440-442: birch bark).

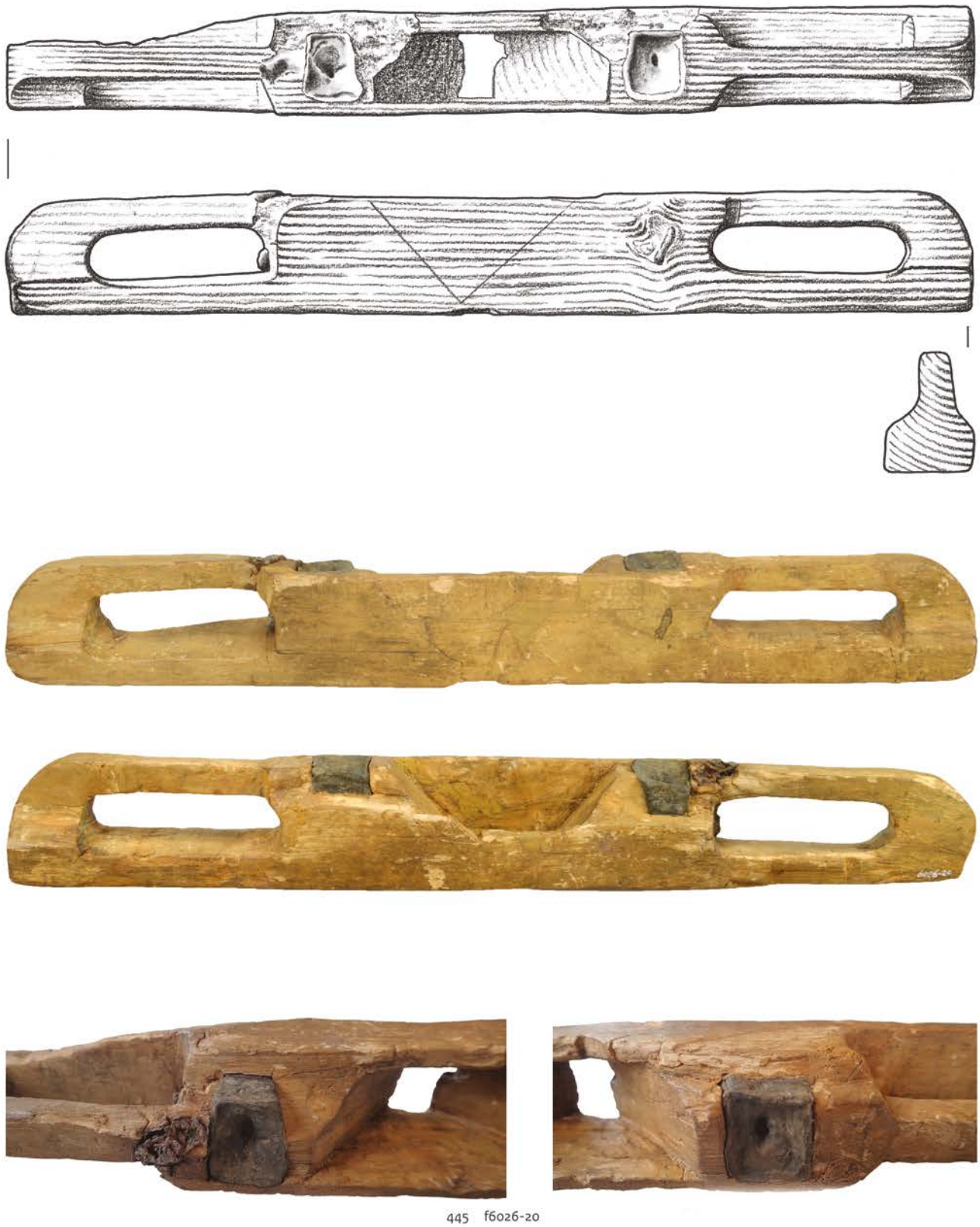


Fishing and Fowling
Throwing stick or boomerang (443: wood species not identified).

Plate CXVI.444

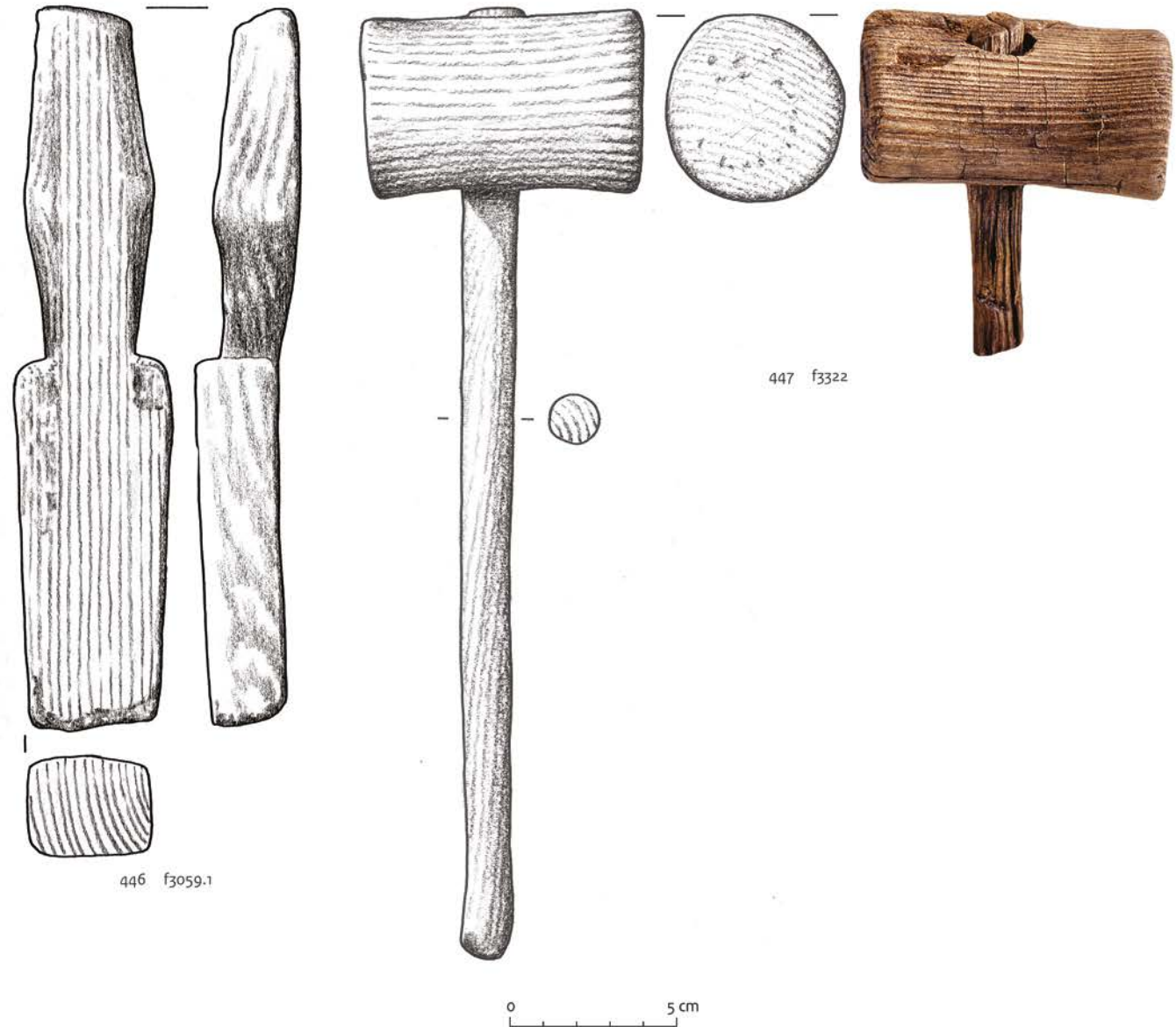


Woodworking
Planes. Plane (444: Sycamore maple/Norway maple).

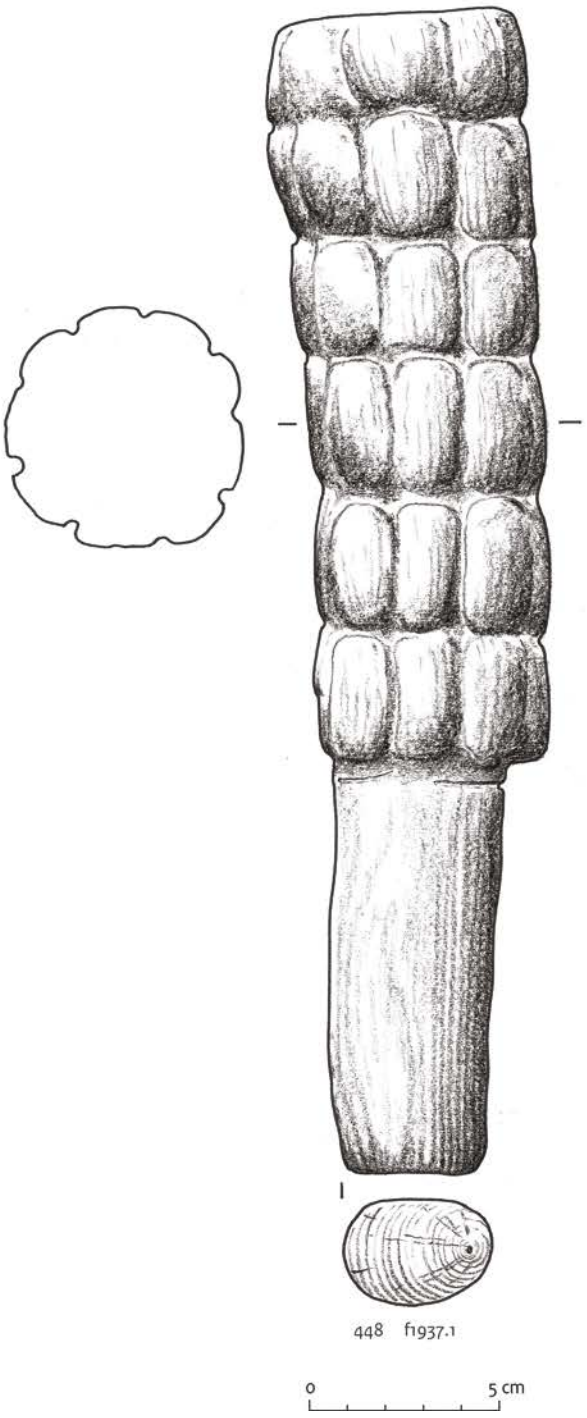


Woodworking
Planes. Plane (445: maple).

Plate CXVIII.446-447

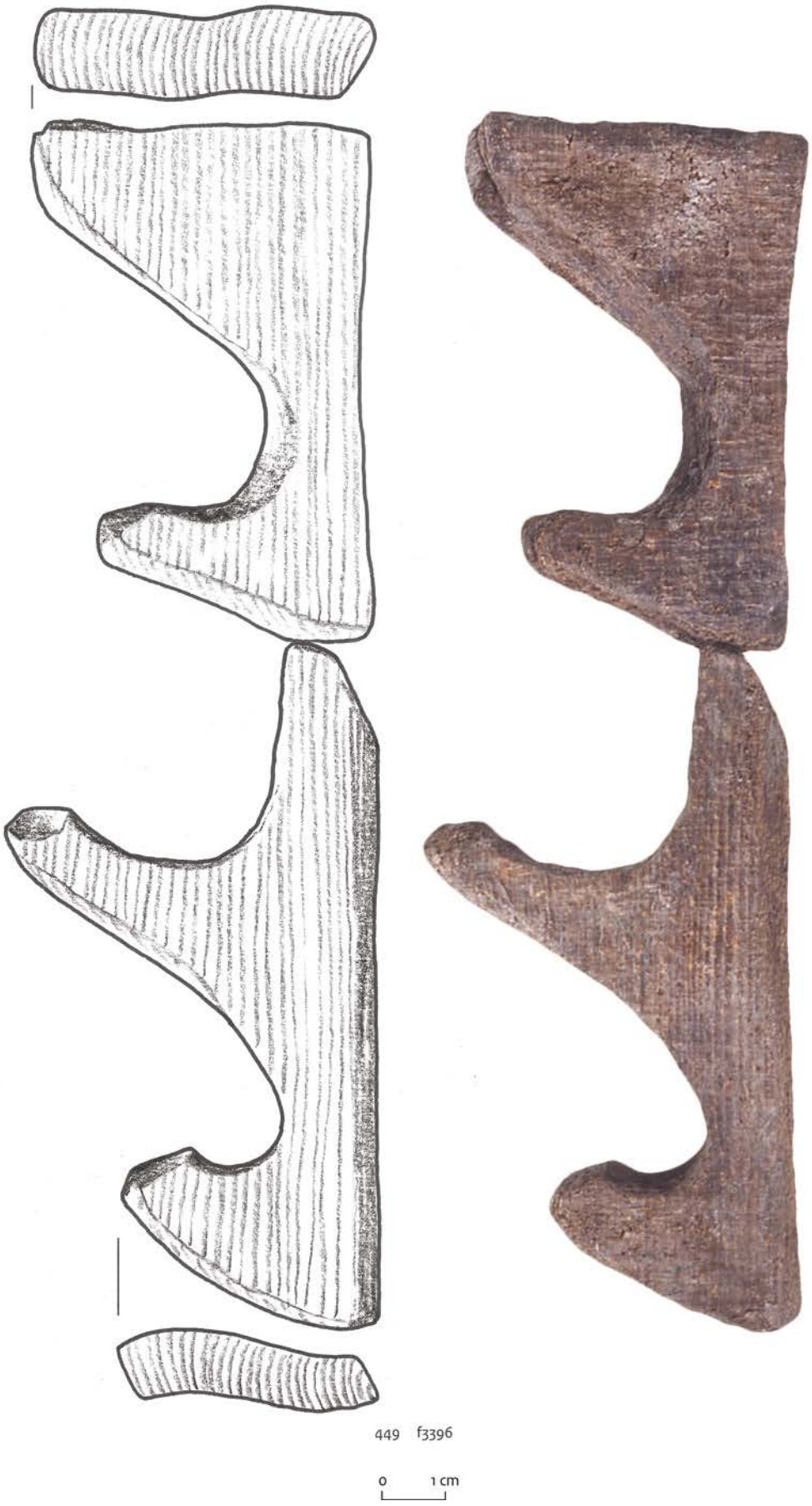


Woodworking
Mallets. Mallet or maul (446: oak), mallet (447: ash).

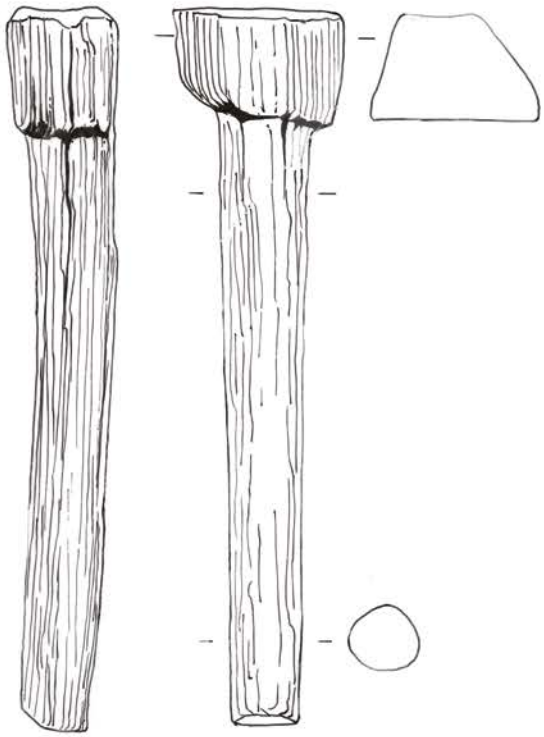


Woodworking
Mallets. Mallet (448: oak).

Plate CXX.449



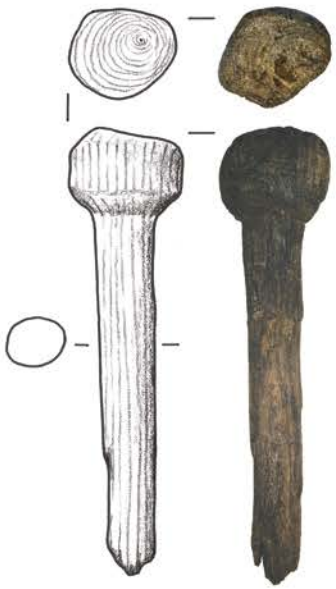
Woodworking
Possible tool-rest support (449: oak).



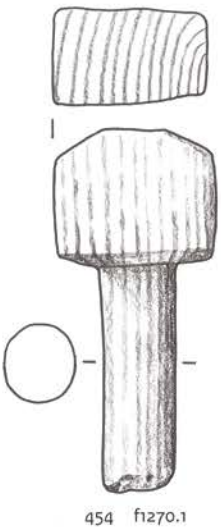
450 f3362

451 f3070

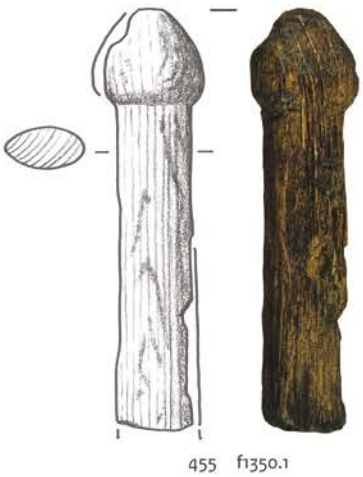
452 f2182.1



453 f3387



454 f1270.1

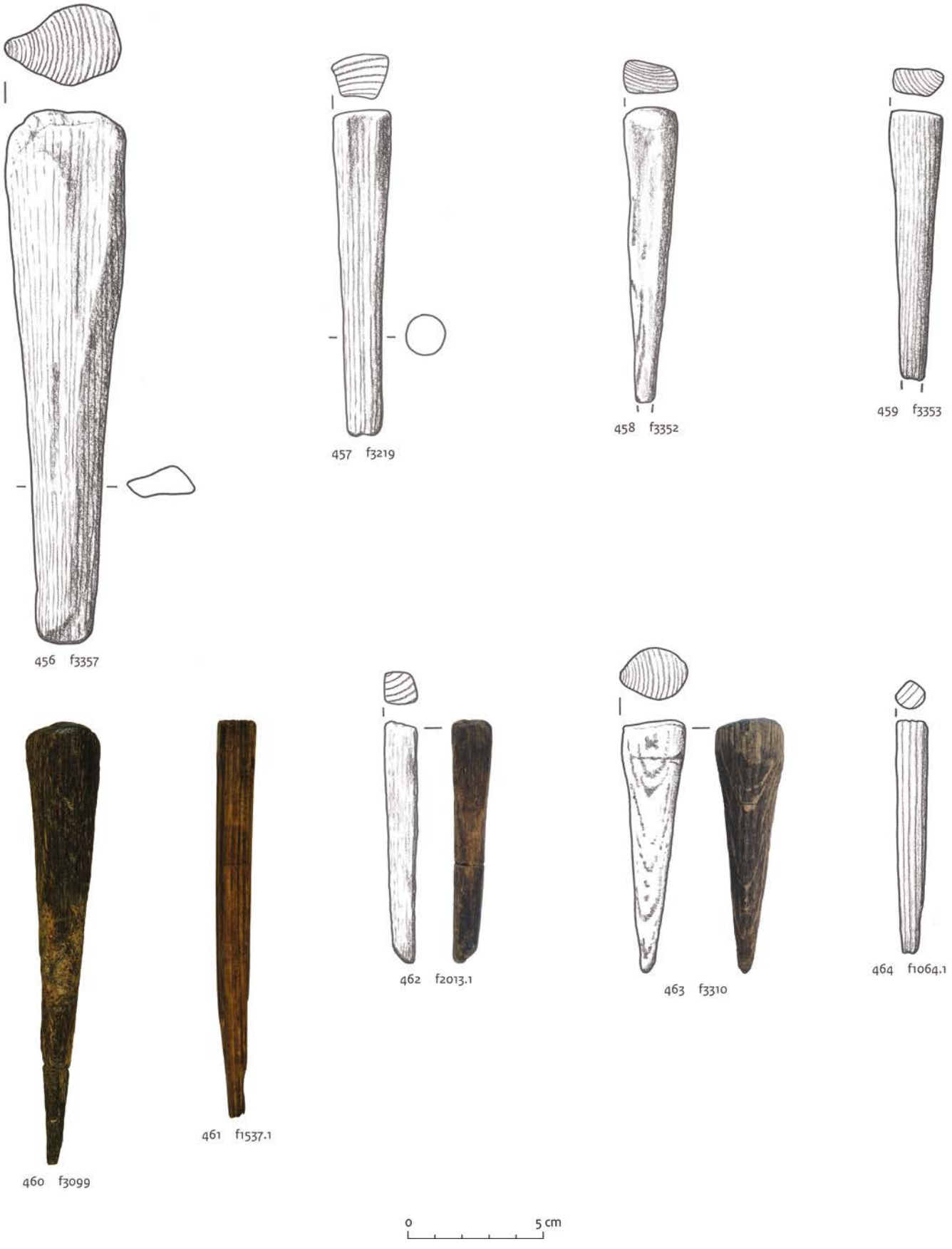


455 f1350.1

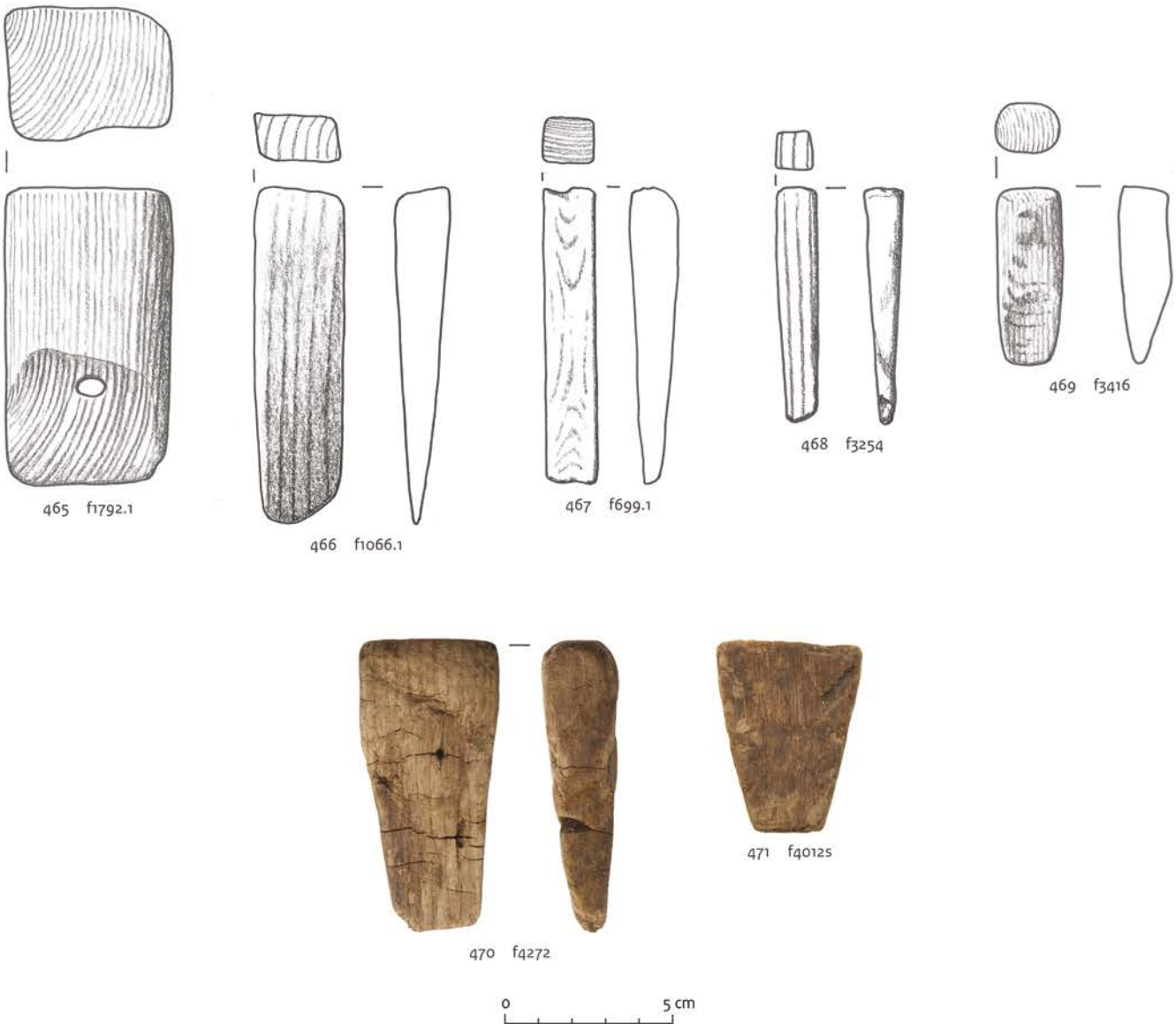
0 5 cm

Woodworking
Pegs and wedges. Pegs with a head (450-452: oak, 453 and 454: ash, 455: oak).

Plate CXXII.456-464



Woodworking
Pegs and wedges. Pegs without a head (456: alder, 457: ash, 458: alder, 459: spindle tree, 460: oak, 461: silver fir, 462 and 463: oak, 464: ash).



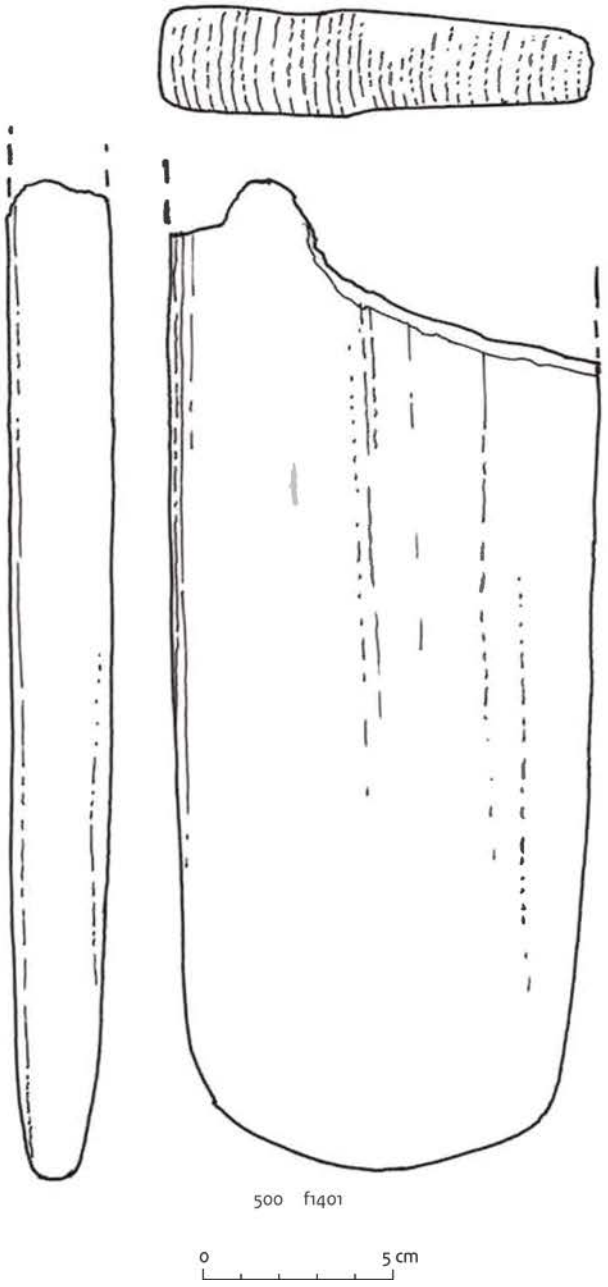
Woodworking
Pegs and wedges. Wedges (465: ash, 466: alder, 467: elm, 468: field maple, 469: oak, 470: ash, 471: oak).

Plate CXXIV.472-489.

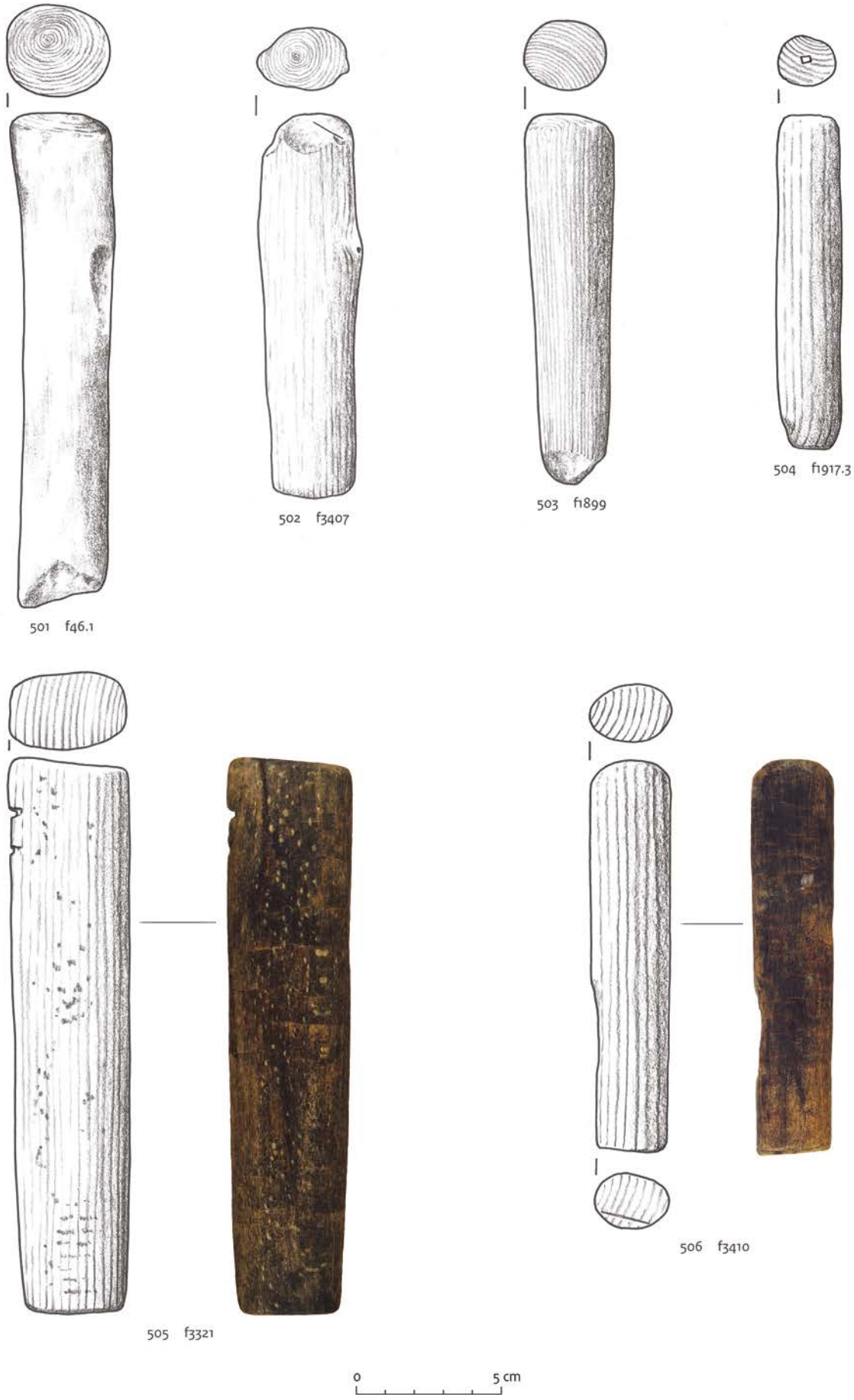
Woodworking
Processing waste. Sawn-off pieces (472: ash, 473: silver fir, 474-476: ash, 477 and 478: oak, 479: silver fir, 480: oak, 481-485: ash, 486: beech, 487: alder, 488: oak, 489: alder).

Woodworking
Processing waste. Sawn-off pieces (490: oak, 491-493: ash, 494: silver fir, 495: ash), cut-off piece (496: silver fir), turning waste from lathe-turning (497: boxwood, 498 and 499: maple).

Plate CXXVI.500



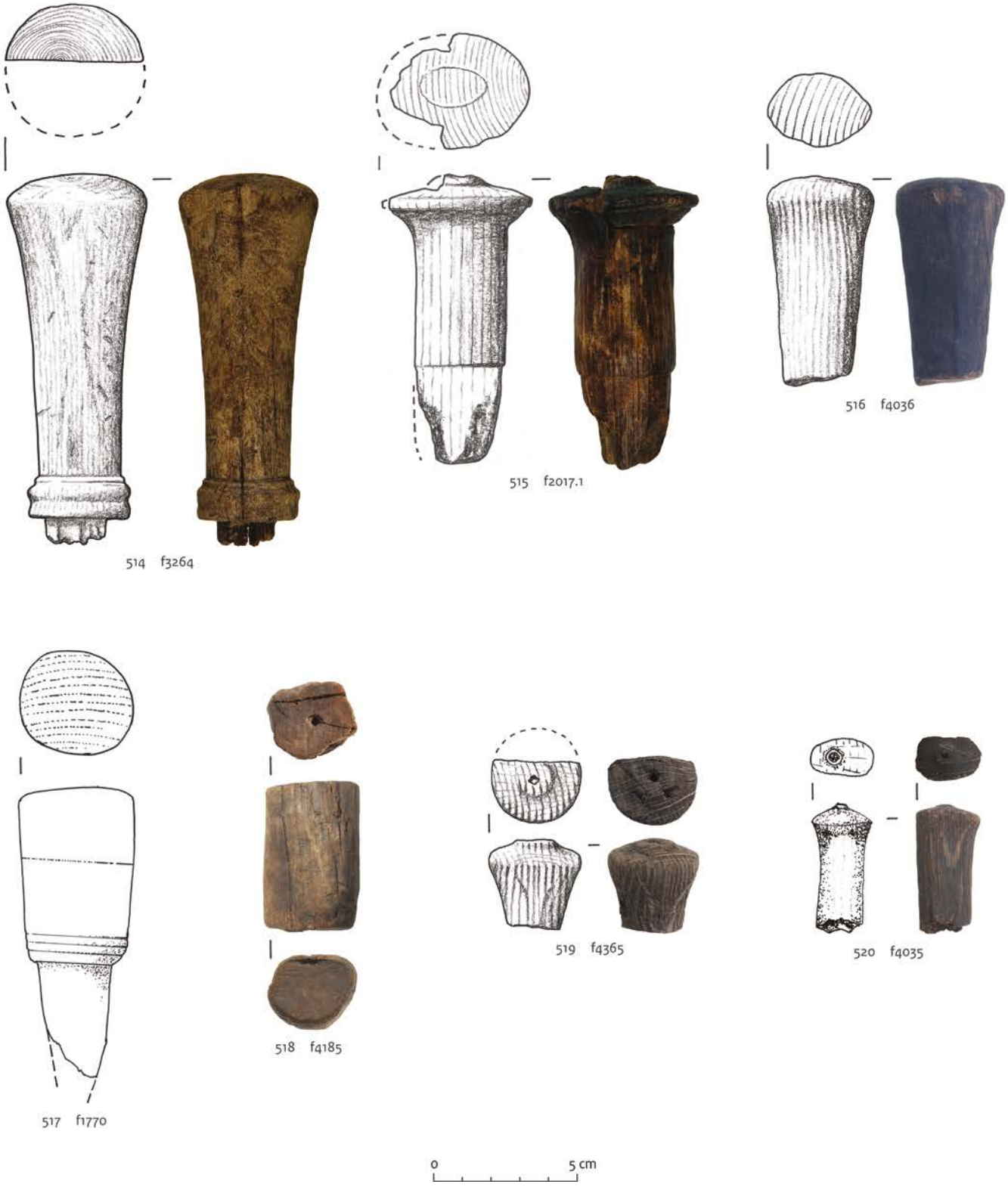
Other Tools
Spade (500: alder).



Other Tools
Handles (501 and 502: ash, 503: Maloideae, type apple/hawthorn/pear, 504: ash, 505: beech, 506: boxwood).

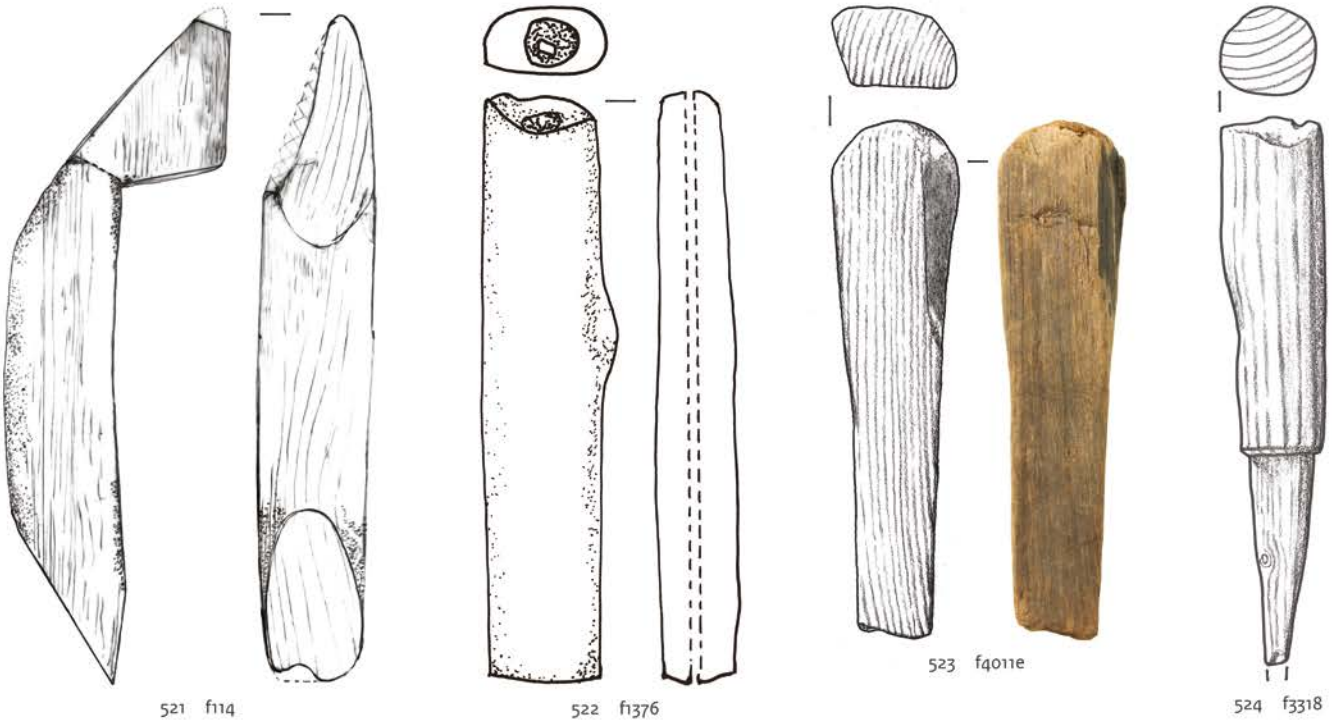
Plate CXXVIII.507-513

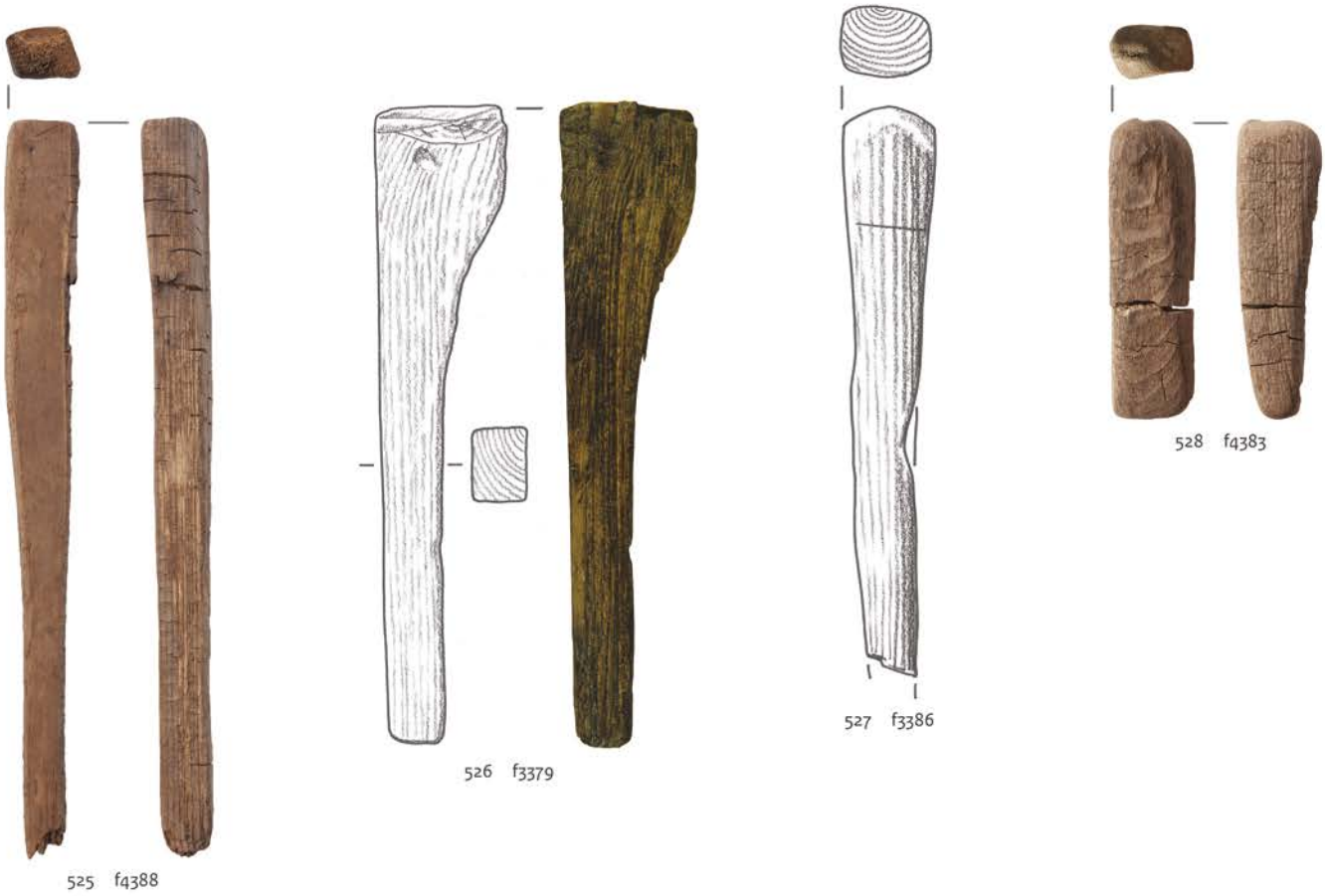
Other Tools
Handles (507: beech, 508: oak, 509: maple, 510 and 511: oak, 512: field maple, 513: oak).



Other Tools
Handles (514: spindle tree, 515: wood species not identified, 516: maple, 517: Maloideae, type apple/hawthorn/pear, 518: maple, 519 and 520: oak).

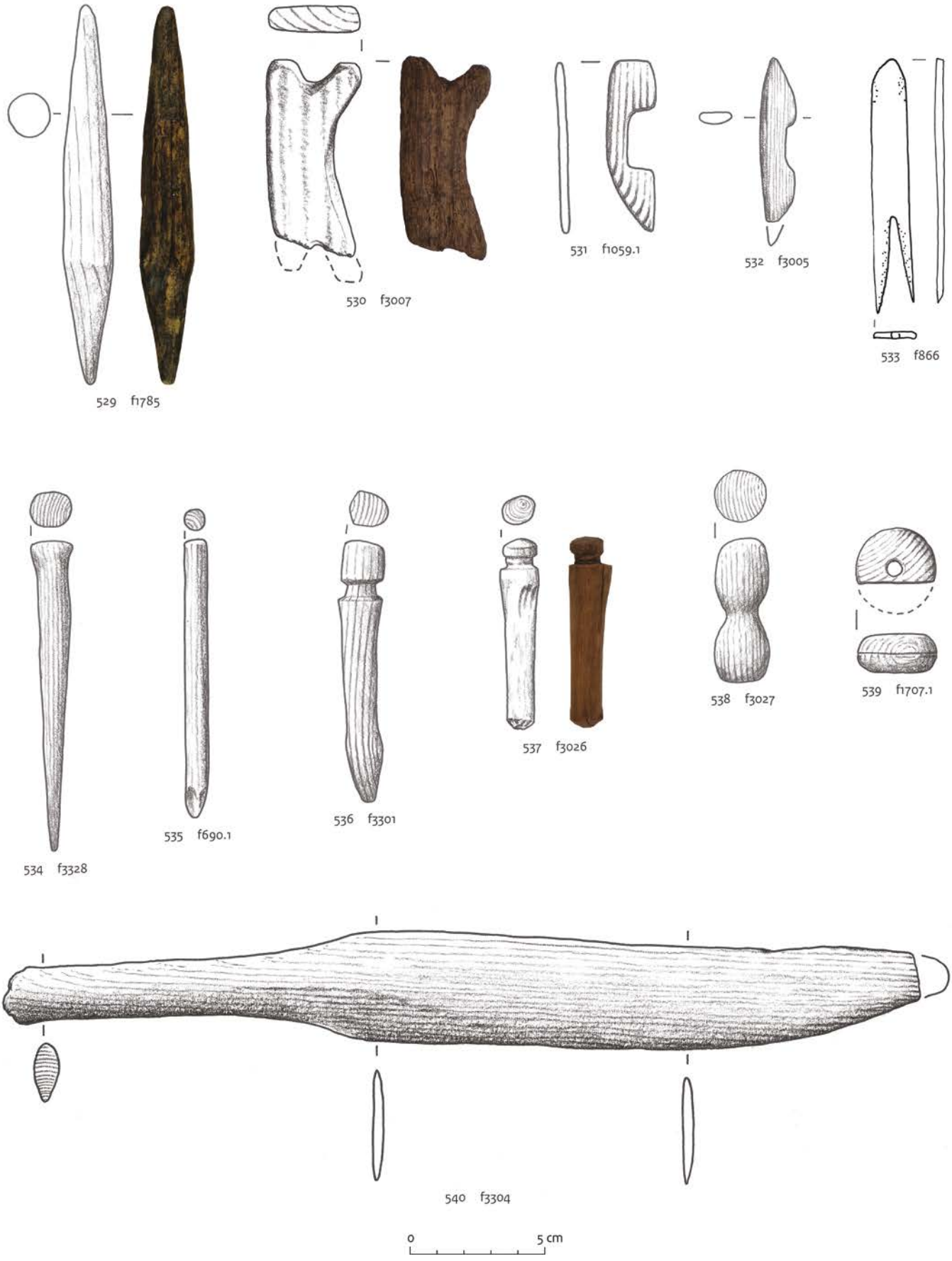
Plate CXXX.521-528





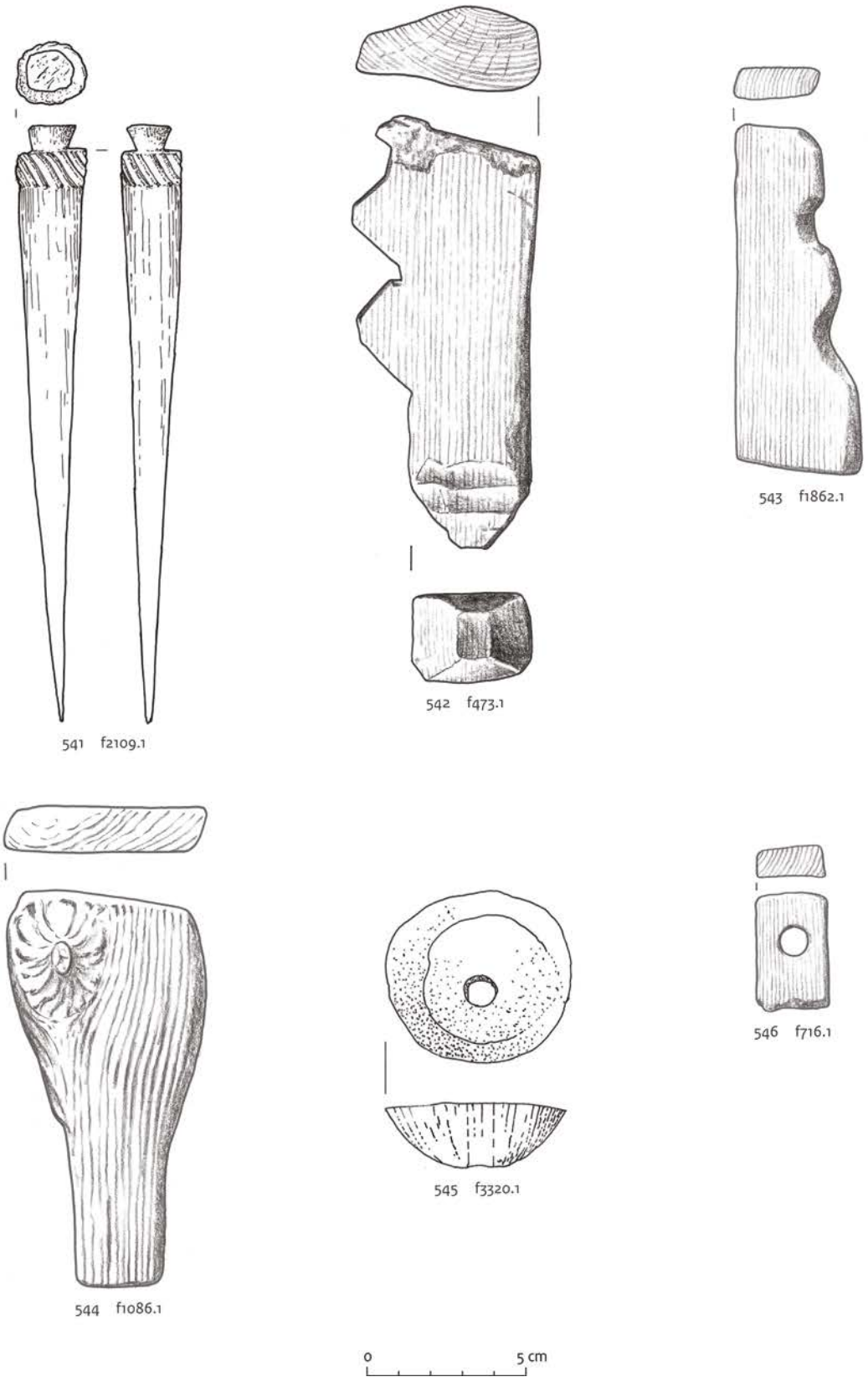
Other Tools

Handles (521 and 522: wood species not identified, 523: alder, 524: Maloideae, type apple/hawthorn/pear, 525 and 526: silver fir, 527 and 528: ash).



Textile-processing Implements
Spindle (529: ash), thread winders (530: ash, 531: field maple, 532: silver fir), needle or netting tool (533: wood species unidentified), pin-beaters (534: boxwood, 535: elder), weft bobbins (536: ash, 537: pine), toggle (538: Maloideae, type apple/hawthorn/pear), whorl (539: boxwood), weaving sword (540: oak).

Plate CXXXII.541-546



Miscellaneous
Possible hair pin (541: alder), battens with notches (542: oak, 543: alder), possible roughout (544: alder), perforated half sphere (545: ash), perforated batten (546: ash).

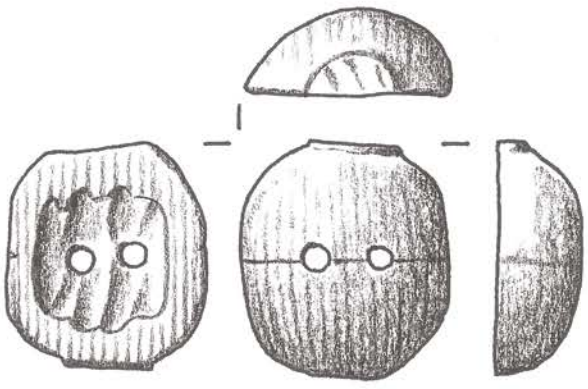
Miscellaneous
Slat with a notch (547: alder), slat with a leather strip (548: wood species not identified), object with a hole (549: European hornbeam), rhombus (550: ash), possible flap (551: alder), object with protuberances (552: elm), stick with grooves (553: boxwood).

Plate CXXXIV.554-560

Miscellaneous

Branch (554: ash), forked branches (555 and 556: hazel), pointed branch (557: oak), forked branch (558: hazel), tubes (559: indeterminable, 560: ash).

561 f3031



562 f1574.2

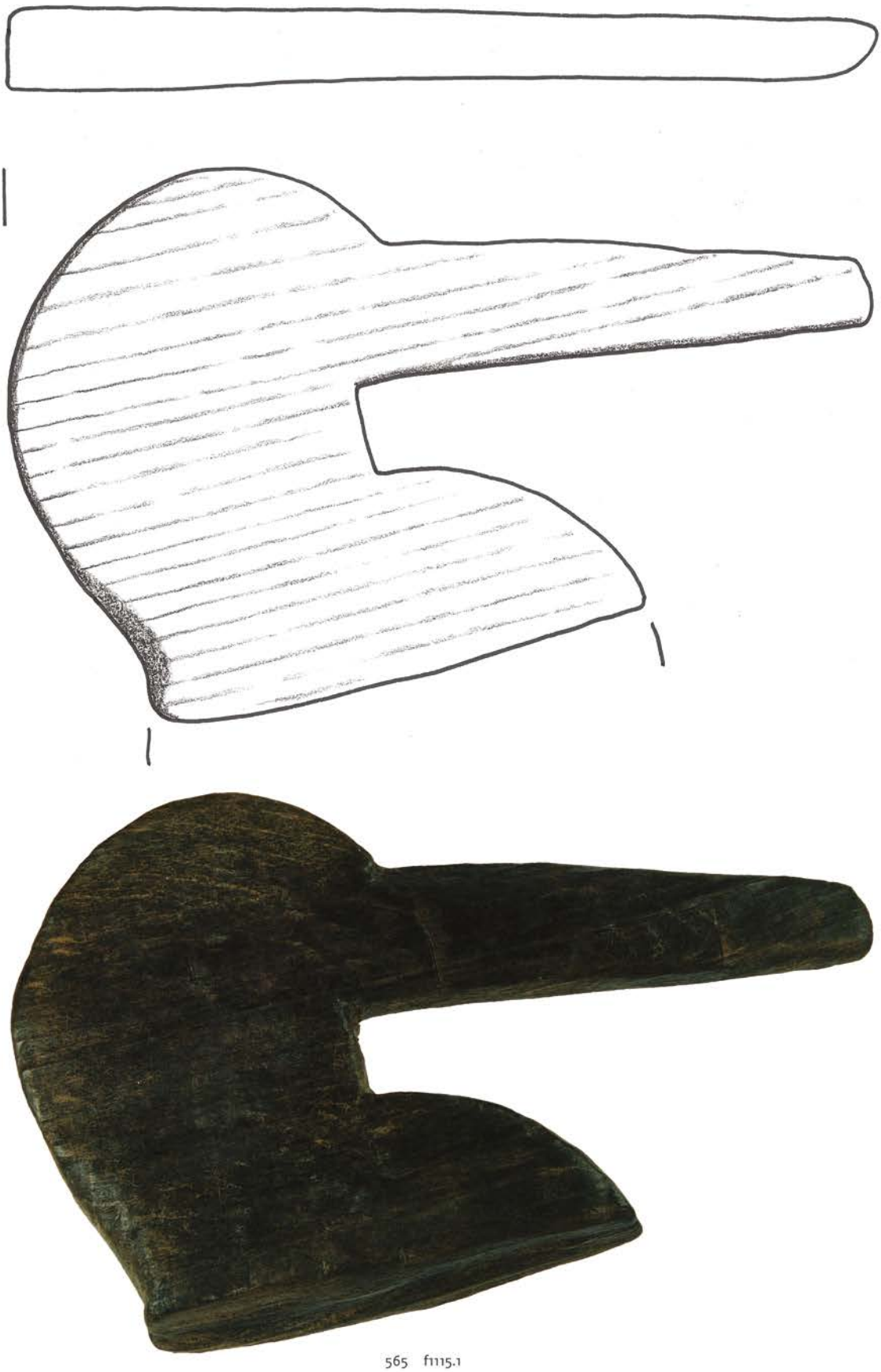
563 f4005b

564 f4001z

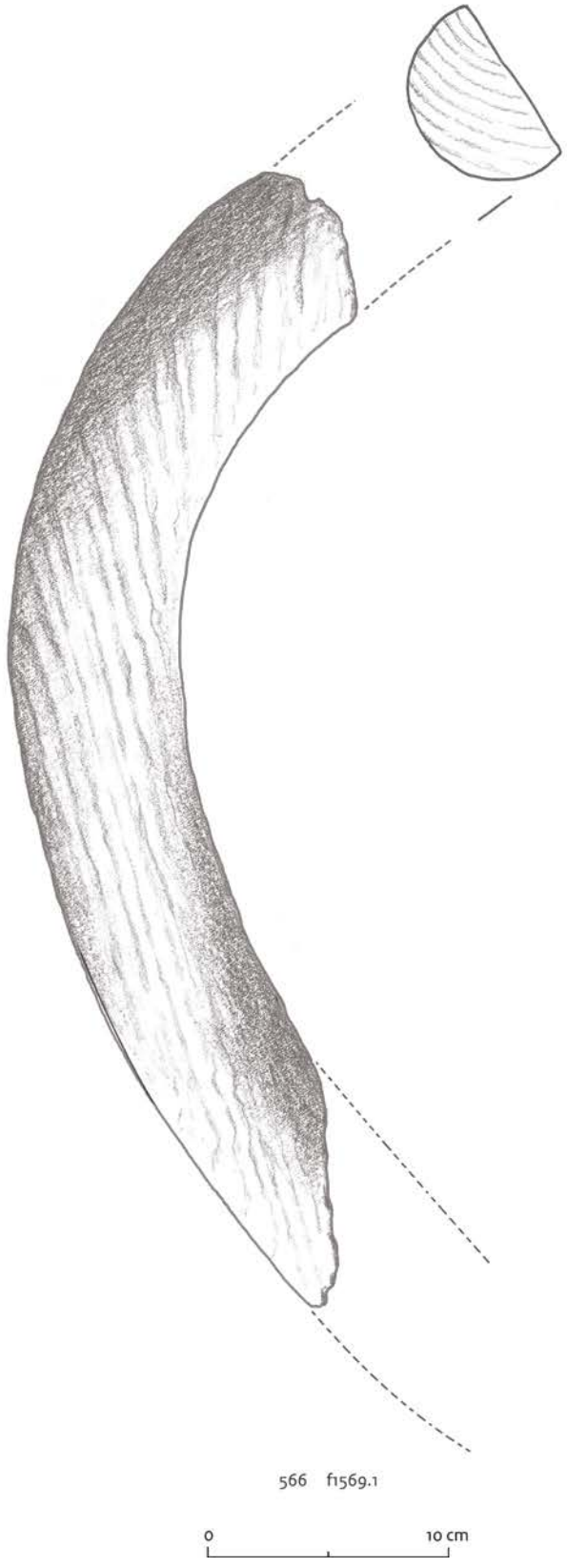
0 1 cm

Miscellaneous
Possible candle stick (561: boxwood), button-like object (562: alder), knob-like objects (563: maple, 564: Sycamore maple).

Plate CXXXVI.565

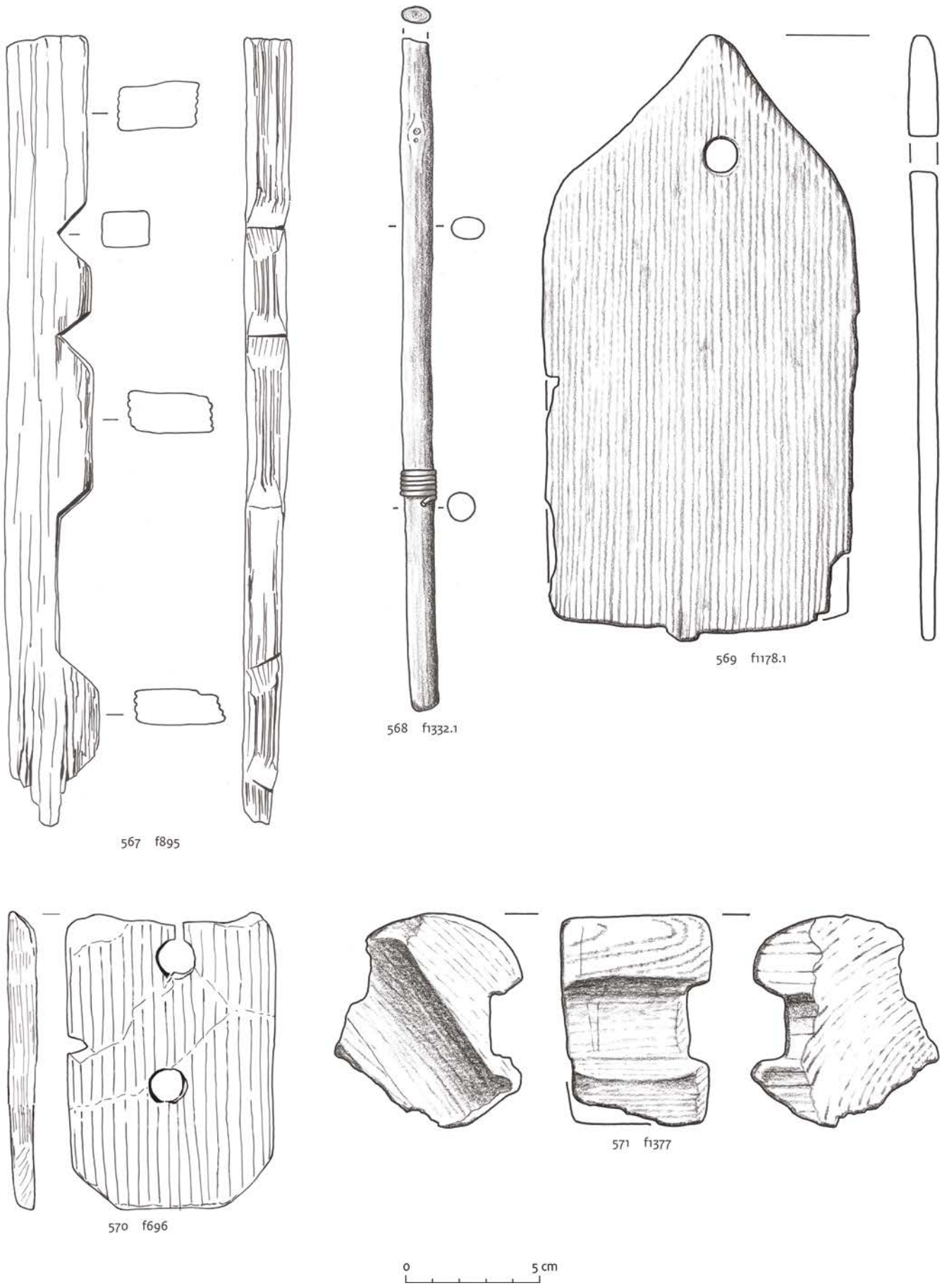


Miscellaneous
Head of a bird (565: alder).



Miscellaneous
Arched object (566: elm).

Plate CXXXVIII.567-571



Miscellaneous

Slat with notches (567: wood species not identified), rod with metal thread (568: honeysuckle), possible flap (569: beech), perforated batten (570: wood species not identified), possible part of a machine (571: ash).

This report presents the results of the study of wooden artefacts from the early Roman outpost and harbour of Velsen 1, situated in the Oer-IJ estuary on the most northernly side branch of the Rhine. Velsen 1 probably corresponds to the fort Flevum mentioned by Tacitus. Roman soldiers were stationed here between AD 15 and c. AD 30. Due to the waterlogged conditions, the wooden objects once used in the fort have been remarkably well preserved. From tent pegs, footwear, bowls, writing tablets and tools to a panpipe, the wooden artefacts provide a glimpse of life in the fort and its inhabitants.

This scientific report is intended for archaeologists as well as for other professionals and amateur enthusiasts involved in archaeology.

The Cultural Heritage Agency provides knowledge and advice to give the future a past.