Bows from the Netherlands [1]

J.N. Lanting, B.W. Kooi, W.A. Casparie and R van Hinte

1 Introduction

The main goal of the paper is to give a survey of ancient bows from the Netherlands. A detailed description of the finds including radiocarbon dates is given. For a description of radiocarbon dating with reference to archaeology the reader is referred to Lanting and van der Plicht[1]. Dr.W.A. Casparie, Rijksuniversiteit Groningen, the Netherlands, compiled reports with detailed physical characteristics of the bows. A discussion of the finds and a comparison with other bows found in Europe is not given and will be the subject of a forthcoming paper.

Recently a series of good papers appeared in German journals[2–5]. In a two page-note Deichmüller[2] describes a prehistoric bow found near Koldingen, Germany. This bow was scrupulously studied by Beckhoff[3]. He provides a detailed description of the dimensions of the bow. From the shapes of the cross-sections at seven spots along the limb he reconstructed mathematically the original shapes taking shrinkage into account. Based on these results he calculates the mechanical features of the limbs and obtains estimates for the most interesting bow-parameters such as the length of the bow, the draw-length and the bow-weight. Beckhoff used methods developed in a series of excellent scientific papers[3,6–12] in which he studied bows found in Germany. These papers are not cited in the Anglo-Saxon literature, probably because they are written in German. Beckhoff did, however, pioneering scientific work on *A*rchaeology of Archery. We hope that the short summary in this paper will inspire interested people to take notice of his work and that it gets the attention it deserves. Based on Beckhoff's results Paulsen[4] made a replica and performed experiments in order to assess the performance of the "Koldingen" bow. Finally, in a very interesting paper[5] Schümann compares the two different approaches methodologically, namely experiments with replicas versus calculations using mathematical models as research tools.

At present eight prehistoric or early historic bows, or parts of bows from the Netherlands are known. In order of radio carbon age:

- Hardinxveld-Giessendam (prov. of Zuid Holland): c. 6000 B.P. Literature: Ref.[13]
- Hazendonk (Molenaarsgraaf, prov. of Zuid Holland): c. 4300 B.P.
- Spijkenisse (Hekelingen III) (prov. of Zuid Holland): c. 4000 B.P. Literature: Ref.[14]
- Stadskanaal (Onstwedde, prov. of Groningen): 3970±65 B.P. Literature: Ref.[15] and Ref.[16].
- De Zilk (Noordwijkerhout, prov. of Zuid Holland): 3500±100 B.P. Literature: Ref.[17,18] and Ref.[16].

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- Leeuwarden-Heechterp (prov. of Friesland): 1870±160 B.P. Literature: Ref.[16].
- Aalsum (Oldehove prov.of Groningen): 1210±50 B.P.
- Wassenaar (prov. of Zuid Holland): 1165±45 B.P.

2 Descriptions of the bows from the Netherlands

In this section we give an survey of the finds of eight bows that have been found in the Netherlands.

Hardinxveld-Giessendam

Broken and incomplete Elm bow, the cross-section is flat-round. Presently: Archeologisch Instituut, Leiden. A photo of the incomplete bow is published in Ref.[13, page 428].

Provenance During digging for future train rails in the Middle Netherlands called the "Betuweroute", Leiden archaeologists found the oldest skeleton and the oldest but one canoe of the Netherlands[13]. Furthermore a number of axes from bone and antler, and a piece of a wooden bow were found. The bow is found in 1997/1998 during archaeological excavation of the 'Polderweg'-site, on the edge of a late-glacial river dune, in the refuse layer of a late mesolithic camp site, several meters below peat and clay layers.

Description Incomplete bow, made of elm (pers. comm. Louwe Kooymans), broken over the grip. Remaining length c. 1 m. The grip is well-defined, and constructed in front view. The limb is broad near the grip, but tapers considerably towards the tip. The cross-section is flat D-shaped (pers. comm. Louwe Kooymans). The extreme end of the limb is shouldered, to engage the string.

Date The first radiocarbon results for this site suggest a date around 6000 B.P, which is in agreement with the traditional date of the archaeological remains. Calibrated age: c. 4900 B.C.

Hazendonk

Fragment of Yew bow. Rijksmuseum van Oudheden, Leiden, excavation nr. H33.

Provenance Found during archaeological excavation of the Hazendonk in excavation trench 8, in a refuse layer containing material of phase 1b of the late neolithic Vlaardingen Culture.

Description This is a fragment of the limb of a Yew bow, broken over the grip and halfway the limb and split length-wise. The remaining part is 44 cm long, and shows the beginning of a defined grip. The cross-section is D-shaped. A detailed wood report is not available at the moment.

Date Radiocarbon dates for Vlaardingen 1b material both from Hazendonk-site and from other sites suggest a date of c. 4300 B.P. Calibrated age: c. 2900 B.C.

Spijkenisse

Broken and incomplete Yew bow. Rijksmuseum van Oudheden, Leiden, excavation nr. 226. Half of the bow is shown in Ref.[14, page 44].

Provenance Found during archaeological excavation of the Hekelingen III-site near Spijkenisse, in a filled-in prehistoric gully, containing material of phase 2b of the Vlaardingen Culture.

Description Incomplete bow, broken over the grip. In front view the limb is widest in the middle and tapers markedly towards the extreme and to a smaller degree towards the grip. In side view the differences are far less pronounced. The cross-section halfway the limb is D-shaped, towards the extreme more-or-less rounded. The tip shows two lateral knobs just below the end, to engage the string. Maximum width is 3.5 cm and the remaining length is 90 cm. A detailed wood report is not available at the moment.

Date Radiocarbon dates for Vlaardingen 2b material suggest a date of c. 4000 B.P. for this bow. Calibrated age: c. 2500 B.C.

Stadskanaal

Complete Yew bow. Drents Museum, Assen, reg. nr. 1887/IX[3] but since 1964 on loan in the Groninger Museum, Groningen.

Provenance Found in August 1887 on plot no.7 at the 'Boerendiep' peat bog near Stadskanaal, province of Groningen, 1.4 m below the bog surface and 0.15 m above the locally slightly higher sandy subsoil. Donated to the Drents Museum by Mr. J.H. Hiskes of Stadskanaal, probably the finder.

Description Complete bow, made of Yew. The limbs are narrow, with D-shaped cross-section, and taper slightly towards the ends, which are shouldered to engage the string. No defined grip. Length 171 cm, maximum width 2.55 cm, maximum thickness 2.55 cm[16, page 92].

Made of very regularly grown trunk, 50 to 70 years old. The bow shows 19 rings of side branches. The side branches are carefully cut off. The other cutting works shows as well a great carefulness. Most side branch rings are at a regular distance of 9 to 11 cm, except nrs. 15-16; 4.5 cm underneath ring 3 there is possibly an extra side branch.

In the annual rings a “bad period” (minimal growth, brittle wood) is visible, formed 10 to 20 year before cutting down the tree. The tear between the side branch rings 14 and 15 follows this bad period. It was almost certainly a weak spot in the bow. The thicknesses of the annual rings are 0.2 to 0.5 mm. The heart of the tree is present in the bow between the side branch rings 4 and 14; that is over a length of c. 85 cm.

The slit lower ends of the bow to attach the string do not show any remarkable wear. The bow has not been used intensively. The bow seems to have had string like windings between the side branch rings 5 and 7 (width at least 6 cm) and the side branch rings 11 and 17 (width possibly 45 cm). If that has been the case, the bow must has been treated with a kind of glue. The lower winding has only left traces on the round side of the bow, the upper winding has only eft traces on the flat side of the bow.

Date Radiocarbon dated to 3970±65 B.P. GrN.4069. Calibrated age: c. 2600-2400 B.C.

De Zilk

Broken, but almost complete Yew bow. Rijksmuseum van Oudheden, Leiden, reg. nr. h1986/1.1.

Provenance Found c. 1937 in a layer of sandy peat on the edge of the Old Dunes, west of De Zilk, comm. of Noordwijkerhout, province of Zuid-Holland. Sold to the Rijksmuseum by the widow of Mr. W.A. van de Wal, the first owner.

Description Both extremes of this largely complete bow are missing. The intact middle portion shows a well-defined grip constricted in front view and flattened laterally. The limbs are broad, relatively flat and tapers only slightly towards the extremity. The estimated length of the complete bow is 160 cm. Present length is 154.5 cm. Width 5.2 cm (limb), 1.85 cm (grip). Thickness 1.85 cm (limb), 3.9 cm (grip)[16, page 92].

Made of slightly irregular and curly trunk, 50 to 60 years old, with a diameter of c. 5 cm, locally 6.5-7 cm, however. This irregularity was used to produce the grip. The number of side branch rings is 16, with distances of 9 cm on average. The trunk was split lengthwise and cut into shape. During this process most of the sapwood rings were removed. The heartwood rings received the main tension. At the break, in the lower part of the trunk, the annual rings show regular growth, although some slower trajects are recognizable.

Date Radiocarbon dated to 3500±100 B.P. GrN.4070. Calibrated age: c. 2000-1700 B.C.

Leeuwarden-Heechterp

Broken and incomplete Yew bow. Fries Museum, Leeuwarden, reg. nr. 14j–253.

Provenance Found in or before 1927 during the leveling of a terp (an artificial dwelling-mound in the coastal areas), called Hoogterp (Dutch) or Heechterp (Frisian), North-East of Leeuwarden, province of Friesland. This terp contained no older archaeological material than Late Iron Age and Roman period[16, page 86].

Broken bow, made of Yew. Present length 151 cm, diameter c. 245 cm. No defined grip, slightly tapering towards the tips, circular to rounded triangular on cross-section. Of one of the limbs the end is missing, probably 15 to 20 cm. The broken end was partly reshaped and provided with a groove. The intact end of the other limb shows both a perforation and a oblique, lateral groove.

Made of a Yew trunk, 15 to 25 years old. Of the former side branch rings 10 or 11 are still visible. The trunk was cut into its present rounded-triangular to circular shape. During the process the centre of the trunk moved away from the centre of the bow.

Date Radiocarbon dated to 1870±160 B.P. GrN.14781. Calibrated age: c. 50 B.C.–250 A.D.

Aalsum

Broken and incomplete Yew bow. Groninger museum, Groningen, reg. nr. 1920/II 195.

Provenance Found between 1902 and 1914, at the occasion of the levelling of the terp of Aalsum, comm. of Oldehove, province of Groningen. Sold by the owner of the terp Mr. E.Tj Haak to the Groninger museum.

Description Incomplete bow, without defined grip, and tapering towards the tips. Circular cross-section over the full length. The intact end has a wide and shallow groove all around, 3 cm below the tip.

The bow is broken, the lower end of the trunk is missing. The preserved part of the trunk (length 126 cm, diameter 2.8 cm) shows 10 rings of side branches. Originally 14 or 15 may have been present. The originally length of the bow may have been 155 to 165 cm in case the centre of the bow was situated between the side branch rings 4 and 5. In case the centre was situated between the side branch rings 3 and 4, the bow was 175 to 185 cm long.

The bow was made of roundwood. Since the side branches grew perpendicular to the bow a trunk instead of a branch was used. The tree was at least 20 years old and grew regularly. The distance of the side branch ring varied from 10.0 to 17.0 cm, averaging 13 cm. The side branches of ring 4 were at least 7 years old; those of ring 8 at least 4 years.

The thickness of the annual rings varied from 0.5 to 0.8 mm/year. The last year was not fully grown: possibly the tree was cut down in the early summer.

With a length of the bow of c. 160 cm, the diameter of the lower end was at least 3.0 cm, judging by the gradient of 5 mm per 80 cm in the preserved part. The missing end of the bow, containing this lower part of the trunk, was almost certainly cut to reduce the bow mass, and to move the center of gravity of the bow towards the centre of the bow. From the side branch rings 2-3 upwards some traces are visible which indicate this. There are no traces present which indicate the use of bindings. The thin end of the bow has 2 slits to attach the string. The bow shows some traces of wear, indicating use. These traces are scarce, however.

The bow shows a pattern of cracks, enhanced by dehydration, which shows that the bow has been braced. One may assume that the bow broke during use, in braced condition. Size and direction of the rupture indicate this. It can not be demonstrated that the wood contained a weak spot locally. It is possible, however, that the rupture originated at the outside of a bend near a side branch. This is a natural weak spot, because of the somewhat irregular growth of the wood. The reshaping of the lower part of the trunk may have accentuated such a natural weal spot, In any case it is remarkable that the bow broke in its thicker part.

Date Radiocarbon dated to 1210±50 B.P. GrN.14776. Calibrated age: 700–900 A.D.

Wassenaar

Broken and incomplete Yew bow, Rijksmuseum van Oudheden, Leiden, S.v.D. B.V.3.

Provenance Found in or before 1856 on the Backershagen estate near Wassenaar[19], province of Zuid-Holland during sand digging operations in the neighbourhood of the 'Koepel'. The bow was found on top of a 1.2 m thick peat layer, below 4 m of dune sand. Donated to the Rijksmuseum by Jonkheer N.J. Steengracht van Duivenvoorde.

Description Bow of which the tip of one limb has broken off. No defined grip, slightly tapering towards the ends. D-shaped cross-section over the full length. Remarkable is the different state of preservation of both sides: The curved side being smooth, the flat side irregular, full of cracks and showing protruding bits of cut-off side branches which are not visible on the smooth side. The intact end has a oblique, lateral groove.

Although the Leiden inventory book claims this bow to be made of ash, in reality a fairly irregularly grown Yew truck or branch was used. This trunk/branch was at least 35 to 40 years old. The bow is incomplete; part of one limb is broken off. Originally its length was 180 to 190 cm. In the preserved part 19 side branch rings are visible. Originally 23 or 24 of these rings will have been present. Quite a few of these side branch rings show irregularities. The broken off part contained the lower end of the trunk/branch.

Of a number of side branch rings not all the branches survived till the trunk/branch was cut; somewhat thicker branches are present in 12 to 15 of the side branch rings. The mutual distances between the side branch rings are regular, too. This may in fact be an indication for the use of a branch instead of a trunk. The heart of the trunk/branch is still present in the central part of the bow, but probably not in the tips.

The diameter of the trunk/branch was almost 4 cm. Shaping the bow involved cutting away considerable amount of wood. It is remarkable that the side branches are carefully cut away on the well-preserved smooth outside, but protruded very clearly on the less well preserved inner side. This difference in preservation is almost certainly the consequence of using the bow, resulting in structural damage on the inner side. At some places the smooth outside of the bow shows imprints of thin windings. The tip of the intact limb is decorated with short longitudinal zig-zag lines, closed off by a shallow groove.

Date Radiocarbon dated to 1165±45 B.P. GrN.6254. Calibrated age: 800–950 A.D.

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