A Unique Shafthole Axe from Recent Excavations in the Järavallen Beach Ridge

BY LUTZ KLASSEN & ESBJÖRN JONSSON

Abstract

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Due to the construction of the bridge across the Sound, new excavations were conducted in the Järavallen beach ridge in the vicinity of Malmö. The excavation fields lie directly beside old ones at the Elinelund find location. A stratigraphy with a black occupation layer overlying a sand layer was documented. The sand layer contained only Ertebølle artefacts, whereas the black layer yielded both Ertebølle and Funnel Beaker finds. The preservation of the finds and the relative frequencies of the different artefact types throughout the layer show that the appearance of Ertebølle and Funnel Beaker elements together is not due to a later admixture, but mirrors a real situation. In this layer a shafthole axe was found. This axe was locally made and has no parallels. It shows typological traits of both the imported shoe-last axes of the Late Mesolithic and the flat hammer axes of the Early Neolithic. It is thus possible to argue for the co-existence of Ertebølle and Funnel Beaker types without referring to stratigraphical observations alone.

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Introduction

Closed finds of shafthole axes of Late Mesolithic or Early Neolithic date are still quite rare in Southern Scandinavia. The first really secure closed finds from the Late Mesolithic were only made or published very recently,[1] and comparable finds from the Earliest Neolithic (EN 1) from Denmark, Northern Germany and Sweden (see Zápotocky 1992 for an overview) are very scanty too. It would be important for this reason alone to publish the axe described below, but there are two more points that speak in favour of publication. The first one is the fact that the find obviously represents a type not previously observed in the region under discussion, neither in the few closed finds nor in the much more abundant single finds. The other reason is that it was made in a thoroughly excavated occupation layer which contained finds of both the Late Mesolithic Ertebølle Culture (henceforth EBC) and the Early Neolithic Funnel Beaker Culture (FBC). Occupation layers of this composition have been under discussion especially since Kristina Jennbert published her book *Den produktiva gåvan* in 1984. This is not least because of their importance for understanding the Mesolithic–Neolithic transition in Southern Scandinavia. It is meaningful to publish the new find because it contains some information that helps to evaluate the phenomenon.

The find place: its topography, geological structure and history of research

The find place, which has the official name Skjutbanorna 1A, lies right beside the Limhamn shooting range, south of Limhamn itself and south-west of Malmö in the parish of Hyllie, south-western Scania, Sweden (Fig. 1). Here part of a beach ridge with the name Järavallen, which follows the western and southern coast of Scania, is found. The descriptions available in the literature of the exact position of this postglacial littorina beach ridge in the surroundings of Malmö are not quite identical, but following Söderberg it can be stated that it starts directly south of Malmö and runs 5 to 6 kilometres in a southerly direction to the border between the parishes of Hyllie and Bunkeflo (Söderberg 1884, p. 164). While Söderberg states the distance to the modern beach as between 400 and 1,000 metres, the ridge is placed "200 to 300 metres from the coast" by Kjellmark (1903, p. 13). According to Kjellmark, the width is between 100 and 200 metres, whereas Söderberg only states that it is not below 50 metres. The height is given as 7 metres above the present sea level at the highest point by Kjellmark (1903, p. 13), whereas Söderberg (1884, p. 164) sets it between 1 and 1.5 metres above the level of the surroundings. A reconstruction of the extent of the beach ridge within Limhamn is attempted by Kjellmark (1903, p. 3).

The same author has a description of its geological structure (1903, pp. 16 ff.). This is based on the profiles from his excavation at Soldattorpet and states the existence of the following layers: the base is made up of morainic material from the last glaciation, which is followed by grey and yellow sand layers of approx. 15 cm thickness, overlaid by 8 cm peat. Above the peat there are strata of gravel with a thickness of up to 2.4 metres. The uppermost part of this gravel sequence contains the following layers: at the base, yellow sand/fine gravel and black sand deposited in shifting layers with a total thickness

Fig. 1. Map of Malmö with Soldattorpet and Skjutbanorna 1A marked.

of up to 30 cm is seen. Whereas the yellow layers only contain few water-rolled flint artefacts or none at all, the black ones yielded a rich inventory of unchanged flint, ceramics etc. The dark colour of the black sand is due to fine charcoal particles. At some points of the profile up to three of these layers could be seen, in other parts only one. Above this sequence follows a 5–15 cm thick layer of grey gravel with some artefacts which have been heavily affected by water. At the top there is a 20 cm thick modern plough layer which contains a few artefacts.

The beach ridge was used in earlier times as a gravel pit by the local inhabitants. As a cement factory was established in Limhamn in the 1870s, exploitation accelerated considerably. The first archaeological excavations in Järavallen were due to observations by some of the workers in the gravel pits who made archaeological finds while working. In subsequent years, the ridge was excavated on several occasions. The excavations at Soldattorpet started in 1901 and lasted until 1904. They were conducted by Kjellmark and partly by Otto Rydbeck in 1903 (Kjellmark 1903; Rydbeck 1920). In course of the excavations in 1901 and 1902, Kjellmark noticed the appearance of both EBC and FBC ceramics in the upper occupation layers, whereas the lower layers contained EBC ceramics only (Kjellmark 1903, p. 97). Three ground greenstone axes, a type designated Limhamn axe after the find place, were found, too.

A huge amount of finds from the profiles in a gravel pit from the end of the 1920s just north of Limhamn Rifle Club's pavilion was collected by the amateur archaeologist Carl Stadler and given to the museum in Lund in 1939. This find was published by Carl-Axel Althin (1954, p. 146) as a type site of his period IIId. The find place is now termed "Elinelund".

In 1957 and 1959, Bengt Salomonsson excavated an area of 30.5 square metres 150 metres north of the shooting pavilion in an undamaged part of the beach ridge. This excavation resulted in the discovery of a black occupation layer of between 20 and 30 cm thickness, where EBC and early FBC finds co-occurred. A seminar paper on the find material was written by Gerhard Krämer and Anna Löwe (1973) and one ^{14}C date (5310±210 bp = 4400–3800 BC cal.,[2] U-48) was obtained.

The new excavations in 1996

In connection with the construction of a bridge across the Sound and the facilities connected with the bridge on land on the Swedish side, field surveying was done in 1994 in the area threatened by the building activities. This area is situated on the fields east of the beach ridge in the vicinity of the gravel pit and Salomonsson's excavation fields (Fig. 2). Forty-eight flint artefacts were registered in the surveyed area, most of them towards the ridge, with the biggest

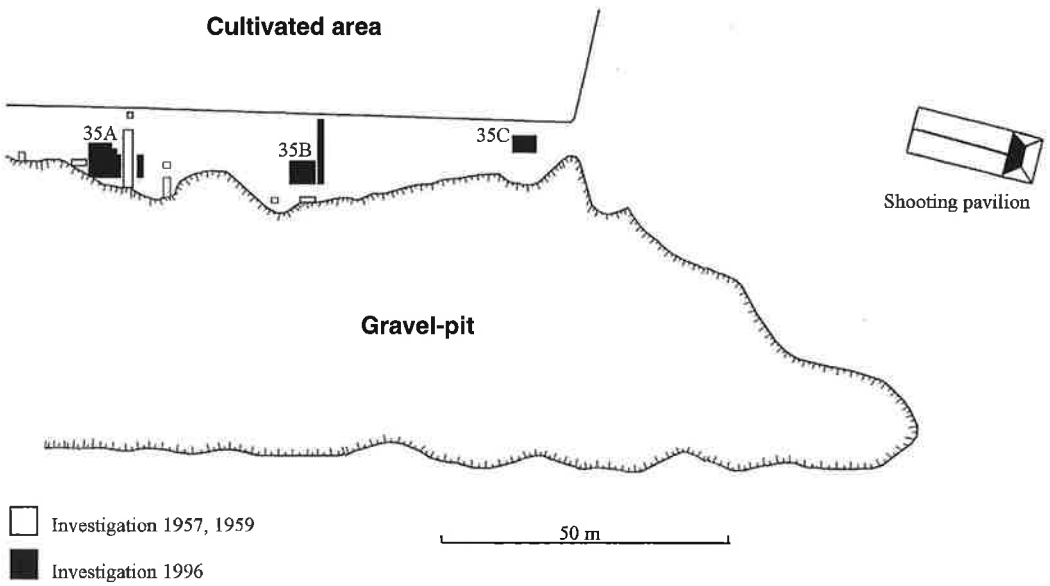

Fig. 2. The situation of the investigation area.

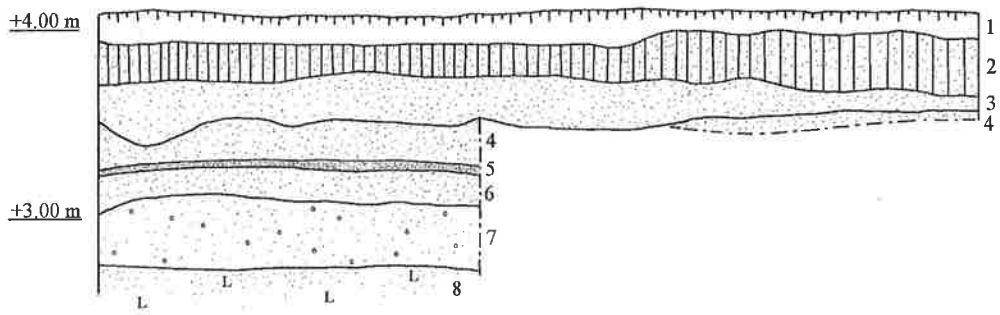

Fig. 3. Stratigraphy of the new excavation 1996 at 35B facing east. 1. Grey humus-mixed sand layer, topped by turf. 2. Black-grey sand layer with beach flint and soot (occupation layer). 3. Brown-red sand layer. 4. Brown-yellow sand layer. 5. Brown-black sand layer. 6. As layer 4. 7. Brown-red sand layer with gravel and stones. 8. Wave-washed till surface. Scale 1:40.

concentration north-east of the gravel pit (Björhem 1995, p. 3, fig. 3). Trial excavations in the next year showed that the prehistoric activity on the beach ridge continued in an area north of Salomonsson's excavation fields. Different archaeological features were also registered in the fields directly east of the beach ridge. It could be concluded that the Stone Age settlement was situated on a 350-metre-long and approximately 10-metre-wide part of the ridge. West of this area the ridge is disturbed by different gravel pits. Two ^{14}C dates were obtained, one of a cooking pit in the field (2870±60 bp = 1120–930 BC cal., Beta-84788), which thus proved to be from the bronze age, and another one from a concentration of charcoal in the beach ridge at an altitude of 3.50 metres above the present sea level. The result of this dating (5440±60 bp = 4350–4230 BC cal., Beta-84791) points to activities on the ridge during the late EBC. The settlement was given the name "Skjutbanorna 1A" (Jonsson 1995, pp. 14 ff.).

During the following excavation in 1996 resources were concentrated on the southern part of the ridge, where it was possible to place the excavation fields in close connection with Salomonsson's from the late 1950s. In total 78 square metres were examined here, divided into three excavation fields (35A,B,C).The following stratigraphy could be observed in excavation field 35B, which is the most thoroughly investigated (Fig. 3): on the top there was medium-grey sand intermixed with humus and topped by grass, under that a blackish-grey occupation layer of 24 to 35 centimetres thickness embedded in beach ridge material consisting of beach flint and sand. This occupation layer contained abundant finds; its top was between 4.09 and 3.95 m above the present sea level, its bottom between 3.81 and 3.65 m. Below this layer there were several sand layers with a total thickness of 90 cm. These sand layers contained considerably fewer artefacts than the black occupation layer above. Following below the sand layers was morainic material which contained bigger boulders. These boulders may have acted as sand traps and may thus possibly be connected with the formation of the beach ridge. The two other excavation fields had a very similar stratigraphy.

The demonstration of a homogeneous black occupation layer of 24–35 cm thickness is well in accordance with the observations of Salomonsson in the immediate vicinity, although he did not observe or at least did not describe the find-carrying sandy layers beneath.

In the vicinity of Salomonsson's best documented area, a field of 37 square metres was examined (35A). The humus layer was sieved with 5 mm meshes and the underlying black occupation layer excavated with fine instruments. All the earth in this layer was sieved with meshes of the same size as used for the humus layer, but

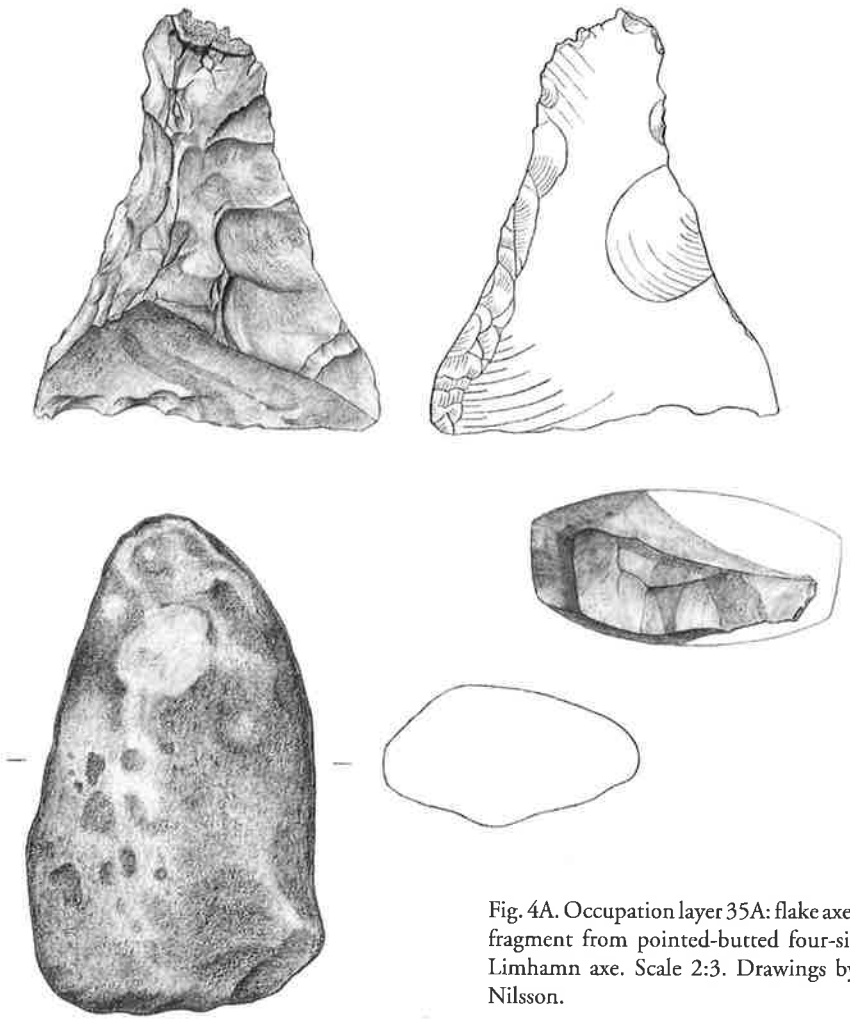

Fig. 4A. Occupation layer 35A: flake axe; ground fragment from pointed-butted four-sided axe; Limhamn axe. Scale 2:3. Drawings by Anette Nilsson.

in those parts where fish bones were found, much finer meshes of 1 and 2 mm were used. The position of most of the artefacts in this layer has been documented in three dimensions by total station and an accuracy of one centimetre.

The sand layers at the bottom of the stratigraphy contained EBC finds only. Besides all the common flint tools and a few ceramics, animal remains were very abundant. A total of 5,500 bones including fish remains were found. They belong to 30 species (11 fishes, 1 batrachian, 5 birds and 13 mammals). Cod predominated, with about 90% of all bones. The only domesticated animal is the dog.

In the black occupation layer within field 35A a total of 157 kg of worked flint and 0.4 kg of ceramics was found. Artefacts were represented by core axes, flake axes and one Limhamn axe, blade and flake borers, blade and flake scrapers, blade and flake knives, burins, transverse arrowheads, a few core borers and flake chisels as well as one pecked round greenstone axe (*trindyxa*) and, last but not least, the shafthole axe (see below). Besides these artefacts three flakes of ground flint axes (two belonging to axes of the pointed-butted type with four sides type III) were found (Fig. 4A, 4B). Ceramics are represented by 68 sherds of the EBC type and 97 sherds of FBC type. Ornamented sherds are very sparse. One piece with Furchenstich in a hori-

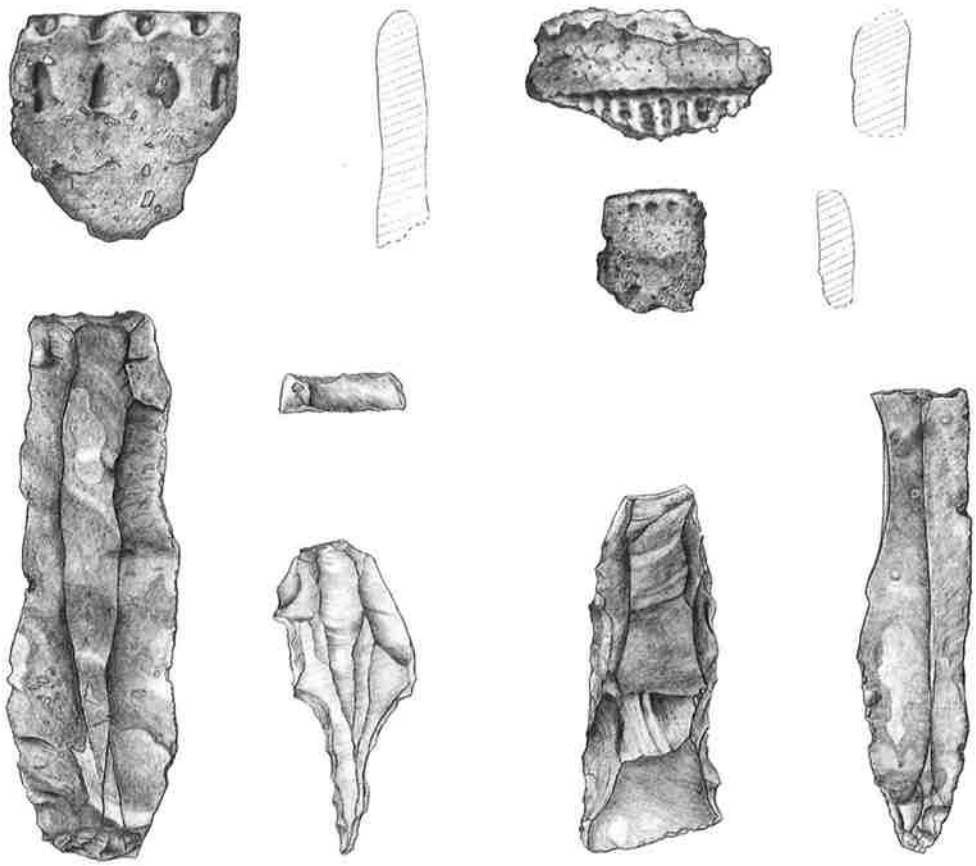

Fig. 4B. Occupation layer 35A: rim sherd with finger(nail) impressions on top of rim and below; shoulder fragment with Furchenstich; rim sherd with horizontal row of round closely-set impressions; transverse arrowhead; blade scraper with straight edge; blade borer; flake chisel; angle burin. Scale 2:3. Drawings by Anette Nilsson.

zontal row and nine vertical rows of impressions (Fig. 4B) has similarities to Svenstorp material (M. Larsson 1984, pp. 120, 160). A second piece with a horizontal row of impressions just below the rim (Fig. 4B) could be from the Svenstorp group (Salomonsson 1963, p. 102, Fig. 21:1) or the Oxie group (M. Larsson 1984, pp. 68, 159). A third piece with fingernail impressions on the rim and a row of fingernail impressions just below it (Fig. 4B) has very close parallels in the Värby settlement belonging to the Oxie group (Salomonsson 1970, p. 63, Abb. 6B).

It should thus be noted that both EBC and FBC types are present in the same layer. There is nothing to indicate that this co-appearance is due to post-depositional admixture. Flints and ceramics have sharp edges and do not show any traces of having been water-rolled or redeposited in any other way. The fact that fish bones are preserved shows that the black occupation layer possibly has not been redeposited since sedimentation, either. Furthermore, some changes in the frequencies of EBC and FBC artefact types throughout the layer could be observed. Whereas FBC ceramics are evenly distributed, EBC ceramics become less numerous towards the top. The same is true for EBC flint types such as blade tools and platform cores. Fragments of polished flint axes first appear in the

upper part of the black layer. The development of the frequencies of EBC and FBC types throughout the layer is thus in accordance with the general cultural development. It shows that the layer has not been redeposited but gradually built up *in situ*.

Three ^{14}C dates in all were processed in Uppsala. All samples come from the black occupation layer and were taken up in the immediate vicinity and around the level of the shafthole axe. The first two datings were made on charcoal and gave the following results:

4740±70 bp = 3630–3380 BC cal. (Ua-13479)
190±65 bp = 1650–1950 AD cal. (Ua-13480)

Both dates are too young compared with the dates expected from the analysis of the artefact inventory of the black occupation layer. The samples have probably been contaminated with younger organic material that may have been transported downwards by minor animals or plant roots. After these disappointing results were received from the laboratory, a third sample was taken. In order to be sure about the relevance of the result, a food crust from an early Neolithic sherd was chosen. The sherd has been found only 20 cm away from the shafthole axe on the same level (1 cm below the bottom level of the axe). This dating should thus be relevant for the shafthole axe. The result is 5030±85 bp = 3950–3710 BC cal. (Ua-13663). The ^{13}C measurement (–29.35 per thousand) shows that the food crust was made up of terrestrial material (in his doctoral dissertation, Per Persson (1998, p. 35) sets the border between marine and terrestrial material in food crusts to –25 per thousand. This means that the dating discussed here need not be corrected for marine reservoir effect and is comparable with datings made on terrestrial material such as charcoal.

The shafthole axe

The shafthole axe (Fig. 5) was found in the uppermost part of the black occupation layer in excavation field 35A, with the lowest part at a height of 3.84 m above the present sea level. In the immediate vicinity and on the same level, three finds of funnel beaker types (one flake from the edge of a ground flint axe, a rim sherd with a row of small impressions just below the rim and a sherd with food crust used for ^{14}C dating) were made.

Description

The axe has a length of 13.5 cm, a maximum width of 6.7 cm and a maximum thickness of 4.4 cm. The shafthole is slightly oval and has a diameter of 2.6 x 2.7 cm on both broad sides. Its position on the axe is not central, but slightly closer to the edge than to the butt. The position of the shafthole is likewise not central in relation to the axis across the axe. It has been drilled vertically to both broad sides of the axe, which appear slightly different. Whereas one side (called the upper side in the following) has an almost even surface, the other (lower) side is more varied. The butt part of this lower side shows a very slight concave form. The edge part, in contrast, shows a more marked depression with a depth of 1.5 to 2 mm, running in the middle of the axe in a longitudinal direction. The edge part is slightly thicker than the rest of the axe, the edge itself is blunt. The outline of the axe is asymmetrical, which is due to slightly different curvatures of the sides. Distinct angles at the transition between the edge and the middle part of the axe indicate a reshaping of the artefact.

There is a distinct difference in the cross-sections of butt and edge part. The transition between broad and narrow sides appears quite sharp in the edge part, giving it a sharp rectangular form (with the described depression of especially the lower side). The butt part shows a different form, with one transition between broad and narrow side being heavily rounded. The transition between the rectangular profile of the edge part and the more rounded one of the butt part appears quite abrupt due to the reshaping mentioned above.

The axe was manufactured of porphyry,

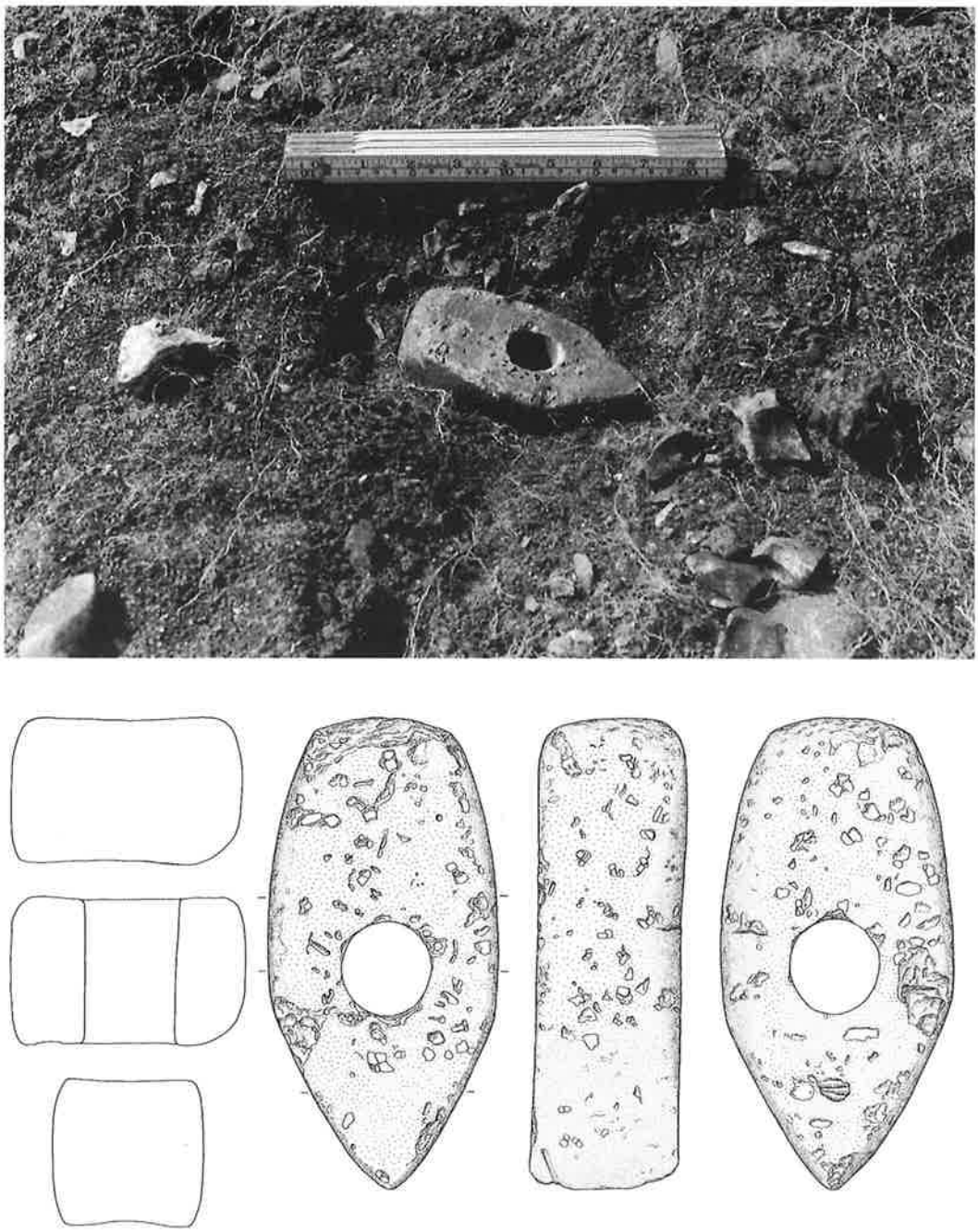

Fig. 5. The shafthole axe from the black occupation layer. Drawing by Eva Koch. Scale 1:2.

which has a green-brown appearance. The yellow-white inclusions with a maximum size of 5 mm disintegrate at the surface with a reddish-brown colour. The state of preservation of the axe is good, with some differences between upper and lower broad side. These differences are probably due to different exposure to weathering.

Comparison of the different typological elements

The object described above has no real parallels in the whole of the distribution area of the EBC and the north group of the FBC, that is, Denmark, Southern Sweden (mostly the provinces of Halland, Blekinge and Skåne) and Schleswig-Holstein and Mecklenburg-Vorpommern in Northern Germany. A different picture arises when the different typological elements of the find are compared with those of the shafthole axes of the EBC and early FBC one by one. It turns out that all the typological elements described above can be compared either with those from the imported shoe-last axes, which in Southern Scandinavia can be attributed to the EBC, or with those of the battle axes of the early FBC (flat hammer axes). In the following, these different typological elements will therefore be discussed one by one.

The stone material

The stone used to make the axe could be identified as porphyry. It is not possible to decide whether the axe is an import or a local product on the basis of this identification alone, because porphyry is regularly found in local morainic boulders but also appears at many places in, for example, Central Europe. A closer look at the stone used for the imported shoe-last axes of the EBC and the locally produced greenstone axes of that culture, as well as at the material used for the local manufacture of greenstone artefacts in the early FBC (axes, battle axes and club heads), allows us to draw a clearer picture of the problem. Not one of the roughly 180 imported shoe-last axes in the distribution area of the EBC is made of porphyry, and the same is true for the much less abundant imported greenstone axes without shaftholes.

For the locally produced greenstone axes of the EBC, that is, rounded pecked axes (*trindyxa*) and Limhamn axes, only a few remarks concerning the kind of greenstone used can be found in the literature. Whereas granite, basalt and gneiss are cited (e.g. Nordmann 1918; Salomonsson 1958, pp. 33 ff.), porphyry is not mentioned and thus probably played no role in the local greenstone axe production. The probable copy of a shoe-last axe from the EBC layers of Ringkloster is made of diabase (Andersen 1998, p. 33). Only one axe in the Southern Scandinavian region which is connected to the shoe-last axes in the literature is made of porphyry, even a kind of porphyry that, at least macroscopically, is quite close to that of the axe from Skjutbanorna 1A. This is a find from Röstånga in the middle of Scania, which is only 7 cm long (L. Larsson 1987, p. 9, Fig. 4). This axe, which typologically is as isolated as the one from Skjutbanorna 1A, is definitely not an import from Central Europe, at least judging by the published find material, where no parallels can be found.[3] It is much more probable that the Röstånga axe was made locally, even if its form shows some clear resemblances to the imported shoe-last axes.

In summary, it can be concluded that the stone material used for the axe from Skjutbanorna 1A clearly differs from that of all axes of the Late Mesolithic, irrespective of their origin.

If we turn to the greenstone artefacts of the early FBC in the Western Baltic, a very different picture emerges. Porphyry, which is optically very attractive when polished, was regularly used to produce at least those types of finds for which the outer appearance obviously was of importance, that is, battle axes and club heads (Brøndsted 1957, p. 180). No detailed descriptions of the stone used for producing the more ordinary working axes of greenstone can be found in the literature.

Summing up, it can be concluded that the stone used for the manufacture of the axe from Skjutbanorna 1A contains information about both the place of manufacture and the dating of the find. The absence of porphyry in the greenstone inventory of the Late Mesolithic and its abundant use in the early FBC in the region under discussion shows that the Skjutbanorna axe probably can be identified as a local artefact of the earliest FBC and thus the beginning of the Neolithic.

The shafthole

Both the form and the dimensions of the shafthole point towards a technique of manufacture whereby two holes were drilled from both broad sides as a first step. These holes met at the middle of the axe and were ground from the inside in a second step, and the oval form of the shafthole was thus produced. As the shafthole was ground after drilling, it cannot be decided whether a solid or a hollow drilling point was used.

The number of known locally produced shafthole artefacts for the EBC is very low. Only two finds of pebble club heads from the eponymous settlement Ertebølle (Madsen *et al.* 1900, pp. 53 ff.; Clark 1936, p. 147, Fig. 53.2), a new find of the same type from Agernæs (Jæger 1998, p. 13) and one shafthole axe, probably the local copy of a shoe-last axe (Andersen 1998, p. 34, Fig. 17), can be cited with certainty. Besides these four finds, two further examples from Kassemose and Vester Ulslev are mentioned, but not illustrated in the literature (Mathiassen 1948, p. 29, no. 113). At least the find from Vester Ulslev (Bahnson 1892, p. 165) can be identified as an import; it is the butt fragment of a shoe-last axe.[4] The technique of drilling/pecking the shafthole from both sides without grinding it after the drilling process, which gives the holes a biconical outline, can be observed on all locally made finds. As this technique was also used to produce the more abundant artefacts with shaftholes of the older periods of the Mesolithic, it can be identified as typical of the whole inventory of locally produced shafthole artefacts of the Mesolithic period in the Western Baltic.

Besides the few locally produced greenstone artefacts with shaftholes, a much larger number (about 180) of imported greenstone axes with shaftholes (shoe-last axes) have been registered in the whole of the distribution area of the EBC (Klassen in preparation). All these finds show a conical shafthole produced by drilling with a hollow drill or (less frequently) cylindrical shaftholes. Most of the finds are single finds, but some have been found on settlements of the EBC. Besides the example from Vester Ulslev cited above and the only certain closed find from Oringe 2 (see note 1), 13 more examples are known from Denmark and Sweden.[5] Unfortunately, none of these finds can be judged to be a closed find. In the North German distribution area of the EBC, some shoe-last axes were found in settlement excavations,[6] but none of them under conditions that would allow any more precise dating.

Summarizing all the information given above concerning the shaftholes of greenstone artefacts of the Mesolithic in the Western Baltic, it can be stated that the biconical shafthole, made by pecking or drilling from both sides of the artefact with a solid drill, is the only technique used locally. Some of the holes were ground slightly afterwards. In contrast to that, the imported shoe-last axes of the Late Mesolithic show conical and in some cases cylindrical shaftholes made by a hollow drill. It can be added that four fragments of imported shoe-last axes demonstrate that no other technique than the pecking/two-sided drilling with a solid drill described here was used in Southern Scandinavia, at least in the Late Mesolithic. Three of these fragments have obviously been furnished locally with new shaftholes, made with the pecking/solid drilling technique; in one case pecking was started from both sides (Fig. 6).[7]

The vertical position of the shafthole in relation to the broad sides of the axe from Skjutbanorna 1A is typical of the flat hammer axes of the early FBC, whereas this positioning is only seldom seen on the shoe-last axes. Most finds of this artefact type have oblique shaftholes.

When the dating and the cultural position of the axe from Skjutbanorna 1A are considered, the statements made above are of some value. The shafthole was made using a technique that obviously was unknown in the Mesolithic of Southern Scandinavia. As the kind of stone used shows that we are dealing with a local product, this means that it must be dated to the Neolithic, and in this case surely to a very early phase of the Neolithic. The drilling technique employed is the same as that used in the manufacturing of

Fig. 6. Edge fragment of a shoe-last axe from Giekau-Neuhaus (Schleswig-Holstein, Northern Germany) with secondary shafthole made in pecking/solid drilling technique (Archäologisches Landesmuseum Schleswig photo).

the flat hammer axes of the Early Neolithic, and the oval outline is even specific for the Western Baltic region (Zápotocky 1992, p. 148). The Neolithic finds not discussed in detail here thus support the conclusions drawn before: the shafthole axe from Skjutbanorna 1A is a local product of the Early Neolithic.

The axe body

The form of the axe body has no convincing parallels, neither in the South Scandinavian nor in the Central European material. This is true for the axe body as a whole, but not for its different parts, as mentioned above.

The butt part of the axe from Skjutbanorna differs from that of the flat hammer axes of the FBC in a number of respects, but shows distinct typological traits that are typical of the earlier imported shoe-last axes. This is true for the non-central position of the shafthole on the axis across the axe. This position of the shafthole is a characteristic trait of the shoe-last axes, whereas the flat hammer axes of the Early Neolithic are symmetrical. The asymmetry is only very slight in the present case, but is striking nevertheless because the two groups of axes used for comparison here differ very distinctly on this point. A typological element that is very typical of the flat hammer axes of the Western Baltic is the heavily rounded broadening of the axe body around the shafthole. This trait is missing on the axe from Skjutbanorna. It thus differs clearly from that of the early FBC axes and is very close to at least some of the butt parts of the shoe-last axes, although these are often characterized by very different curvatures of the narrow sides of the axe.

Another important trait of distinction between shoe-last axes and flat hammer axes is the cross-section. The Neolithic examples almost always show a longitudinally orientated depression on one or both broad sides of the axe and are characterized by sharp transitions between broad and narrow sides. The form of the narrow sides is rounded or folded, which results in a barrel-shaped or six-sided cross-section. In contrast to this, most of the imported shoe-last axes of the Late Mesolithic are characterized by a D-shaped cross-section, whereas other forms (irregular, sharp or rounded rectangular) only appear rarely. The cross-section of the butt part of the axe from Skjutbanorna 1A does not show the depression typical of the flat hammer axes, and one of the transitions between broad and narrow sides is heavily rounded, which results in an irregular "half-D-shaped" cross section.

In summary, it can be concluded that the butt part of the axe under discussion, with its position of the shafthole in relation to the axis

across the axe, the form of the axe body and the cross-section, shows some distinct traits that place it near the imported shafthole axes of the Late Mesolithic and separate it clearly from the flat hammer axes of the early FBC, of which all the typical elements are lacking.

The edge part of the axe differs clearly from the butt where the cross-section is concerned. All transitions between broad and narrow sides are quite sharp and the lower broad side shows a depression in a longitudinal direction. This depression is only very shallow but must have been deliberately made, as the structure of porphyry does not shape a depression naturally. The edge part of the axe thus shows traits very typical of the flat hammer axes of the early FBC in the Western Baltic. Unfortunately, it could not be decided whether the depression was made before the obvious reshaping of the edge part. This is at least possible if we remember that the reshaping probably is not functional in nature. The axe may thus have resembled the shoe-last axes even more in its original form.

The edge

The edge of the axe from Skjutbanorna is slightly thicker than the rest of the axe body, as it is seen in the longitudinal cross-section. The thickening is restricted to the last 2 cm of the edge part and thus resembles a splayed edge, even if it of course would be exaggerated to use this term in connection with the find. The slight appearance of this feature is well in accordance with the slight appearance of the depression on the lower side of the edge part. As it is the case with the depression, the thickening of the edge cannot be accidental, but must have been deliberately made. The edge itself thus resembles the flat hammer axes of the FBC, whereas no thickening of this part of the axe can be observed on the shoe-last axes.

Conclusions

The detailed treatment of the different typological and technical elements of the shafthole axe from Skjutbanorna and the comparison of these elements with those of the axes appearing in the South Scandinavian Late Mesolithic and Early Neolithic allows some conclusions that reach further than those that could be made on the basis of an evaluation of the find circumstances alone. The stone used for manufacture, the technique used in making the shafthole, the form of the shafthole and its orientation in the axe body as well as the form of the edge are typical of the flat hammer axes of the early FBC in the Western Baltic and do not appear before the beginnings of the Neolithic. The axe must therefore be assigned to the early FBC. It is therefore of special interest that the find in no way is identical in all typological details to the flat hammer axes. It is especially the butt part that shows some very distinct traits of the imported shoe-last axes, which can be attributed to the Late Mesolithic EBC in the region. It is thus very probable that the axe from Skjutbanorna has to be dated to the very beginnings of the Neolithic. This is in accordance with the ^{14}C date from the Neolithic sherd that was found on the same level and only 20 cm away from the axe. This ^{14}C date is one of the oldest dates for the Neolithic in Southern Sweden. Shoe-last axes were probably not imported to South Scandinavia after ca. 4000 BC, as their production stopped at around this time in Central Europe. The Skjutbanorna axe may indicate that shoe-last axes already at hand in the Western Baltic were not used any longer with the beginnings of the Neolithic. The people who made the axe under discussion nevertheless knew the form of shoe-last axes and it is therefore of some importance that the nearest find of an axe of this kind was made only a few metres away.

A shoe-last axe from Elinelund

In the magazine of the museum in Malmö a shoe-last axe without inventory number is stored (Fig. 7). The find has only been briefly mentioned in the literature in connection with the find place-name "Bunkeflo" (Lippe 1992, p. 35). The artefact is made of the typical layered

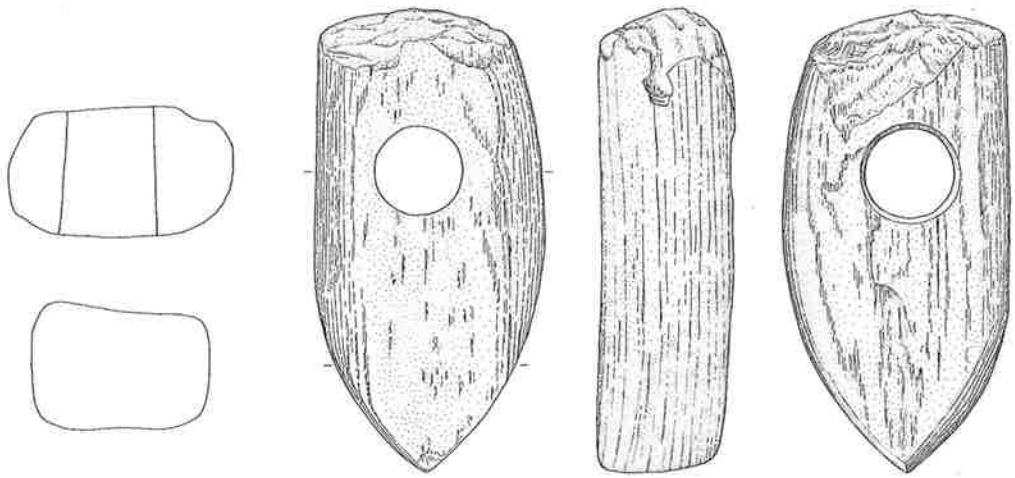

Fig. 7. Shoe-last axe from the Malmö Museum, possibly found at Elinelund. Drawing by Eva Koch. Scale 1:2.

metamorphous rock (amphibolite), with quite thick grey-green and dark grey-black layers. The butt end has been damaged in antiquity and nothing of the original surface of this part of the axe is preserved. The rest of the surface of the axe is smoothly polished and well preserved, only some small parts being rough due to weathering of the softer grey-green layers. The shafthole is conical and measures 2.3 cm on one and 2.6 cm in diameter on the other broad side. The preserved length of the find is 12.0 cm, the maximum width 6.0 cm.

The axe was part of a collection of archaeological finds from the farm Bunkeflo 9:4, which is situated only a few hundred metres east of the Skjutbanorna 1A/Elinelund excavations. On the axe is written "found in meadow 1934" and in another position "Eline". This means that the axe was found in a meadow that belongs to the farm of Elinelund. These meadows are situated just where the gravel pit was opened at the end of the 1920s (see above). It is highly probable that the shoe-last axe from the Bunkeflo 9:4 farm collection was found in that gravel pit and thus only few metres away from the axe from Skjutbanorna 1A !

All shoe-last axes of the Western Baltic region have recently been investigated in detail (Klassen in preparation). The actual find belongs to a group of 18 axes that have been called "Form Böken" after a North German find. This group of axes is actually the best-represented in the investigation area. A comparison of these axes with those from a huge area of Europe shows that they originate in the Mittelelbe-Saale region in Eastern Germany, where they can be ascribed to the latest Rössen or earliest Gatersleben culture on the basis of at least one closed grave find. In absolute terms this means a dating between ca. 4500 and ca. 4200 BC. The axes were probably exchanged along the River Elbe, where a very close typological parallel to the Elinelund find is known from Bleckede south-east of Hamburg (Fig. 8), between the Mittelelbe-Saale region and the Western Baltic (Laux 1993, p. 92, Fig. 7.5). The dating of the axes is well in accordance with one of the ^{14}C datings made on a sample from the ridge during the trial excavation at Skjutbanorna (Beta 84791, 4350–4230 BC cal.). The shoe-last axe from Elinelund can thus probably be ascribed to the late Ertebølle settlement on the beach ridge, which predated the later Early Neolithic settlement to which the axe from the investigations at Skjutbanorna 1A belongs. As the dating of the shoe-last axe is between 200 and 300 years older

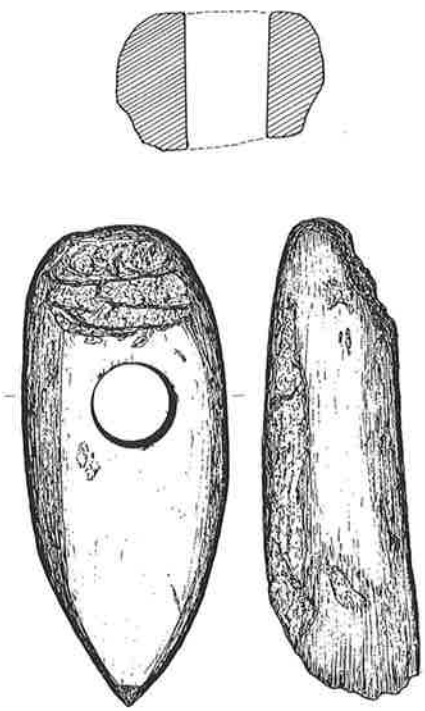

Fig. 8. Shoe-last axe from Bleckede, Northern Germany (Laux 1993).

than that of the axe from Skjutbanorna, this means that the shoe-last axe (or other examples of axes of this type that have not been found) either circulated for a longer period of time, that the knowledge of these axes was kept alive over a longer period of time or that a shoe-last axe was found by the Early Neolithic inhabitants of the beach ridge in the settlement debris of the former (deserted) Ertebølle settlement. Which of these possibilities is the most plausible one is hard to judge. Neither from the recent nor from the former excavations is it possible to decide whether the ridge was inhabited continuously in the period circumscribed by the ^{14}C dates from the recent excavations. It is thus not possible to be sure whether an axe could have been in circulation at the place for some hundred years or not. As there is at least one, but possibly two, shoe-last axes in Scania that were imported in the latest part of the EBC between 4300 and 4000 BC (Klassen in preparation), the obvious knowledge of shoe-last axe forms in the Earliest Neolithic at Skjutbanorna may also be due to a more recent import than that mirrored in the find from Elinelund.

Parallels to the axe from Skjutbanorna 1A

There are no good typological parallels to the axe from Skjutbanorna, as stated above. This may be due to the special circumstances of its production, whereby obviously what are commonly described as Early Neolithic and Late Mesolithic form traditions were both in use at the same time. An overview of the very earliest Neolithic in the Western Baltic shows that we are dealing with a time of great regional variation. This means that we in fact cannot expect to find many axes identical to the one from Skjutbanorna, but that there may be several artefacts where the different form traditions are connected in another way than in that observed for the find described here. If we thus widen our perspective there are in fact some artefacts that at least can be seen as candidates for parallels to the find from Skjutbanorna. As none of these finds were retrieved under conditions that may be described as a closed find, it is not possible to be sure about their dating. In fact, all axes described below are single finds and the only thing they have in common is that they are not like any well established axe type of the South Scandinavian Late Mesolithic and Neolithic, but display at least some traits that resemble shoe-last axes. The conical shaftholes of all the axes show that they date to the Neolithic.

The most probable candidate for a parallel to the Skjutbanorna axe is the find from Röstånga[8] in the middle of Scania, already mentioned above (L. Larsson 1987, pp. 9 f., Fig. 4). The find is definitely not an imported shoe-last axe as suggested by Larsson, but may well be a broken fragment of a bigger axe that was "repaired", although there are no certain traces of any such reshaping. The form of the axe resembles in its asymmetry that of shoe-last axes; the

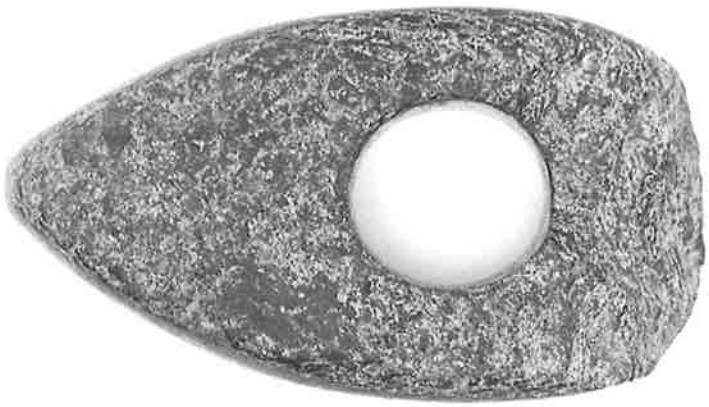

Fig. 9. Shafthole axe from Kluesries, Schleswig-Holstein, Northern Germany (Archäologisches Landesmuseum Schleswig photo).

shafthole is slightly conical and the stone used porphyry.

One more find from Southern Sweden could be compared to the Skjutbanorna axe. This is a find from Alstad,[9] which was published by Salomonsson (1958, p. 41, Fig. 7B). Its form is quite close to that of the shoe-last axes, but the kind of raw material used shows that we are probably dealing with a local product. The same conclusion can be reached if it is realized that the shafthole was drilled parallel to the different layers in the rock, whereas this is never the case with the imported shoe-last axes. The find from Alstad may thus well be a local copy of a shoe-last axe.

An axe from Kluesries LA 79 in North Germany resembles the imported shoe-last axes at least a little, but its conical oval shafthole clearly shows that we are dealing with a Neolithic find (Fig. 9).[10] The axe is only 9.8 cm long and 5.4 cm wide. The shafthole measures 2.8 x 2.5 cm on one broad side and 2.7 x 2.4 cm on the other. As it has been heavily damaged on almost all sides, the original thickness cannot be measured; the preserved thickness is 2.8 cm. The stone used is a metamorphic rock with shifting hard brown and softer grey-green layers that clearly diverges from the amphibolite used for the production of shoe-last axes. The butt of the axe from Kluesries is heavily damaged, too.

Another North German candidate for a local copy of a shoe-last axe was found in the province of Dithmarschen on the west coast of Schleswig-Holstein (Fig. 10).[11] The length is 11.6 cm, the width 4.9 cm. The axe is clearly asymmetrical and thus resembles shoe-last axes very much. The shafthole is conical with diameters between 1.9 and 2.1 cm. That this find is not an imported shoe-last axe is shown by the stone used, a greenish porphyry with white inclusions. One edge of the butt has been sawn off, obviously in order to make a thin section analysis of the mineral composition. It is thus very possible that Schwabedissen, who worked with the shoe-last axes from Northern Germany (Schwabedissen 1967), thought the find to be such an artefact and submitted a thin section for mineralogical examinations, as he did with almost all shoe-last axes from Schleswig-Holstein.

From Denmark one possible copy of a shoe-last axe can be cited besides the find from Ringkloster (note 1). This is an axe from Romvig in Northwest Jutland (Rostholm 1982, p. 16, Fig. 7).[12] This artefact has been mentioned in the literature as an imported shoe-last axe, too (Lomborg 1962, p. 26, no. 17; A. Fischer 1982, p. 10 Fig. 3). The axe resembles a shoe-last axe because of its asymmetrical outline, but the stone used and the orientation of the shafthole (parallel to the layers in the rock, not vertical as

Fig. 10. Shafthole axe from Dithmarschen, Schleswig-Holstein, Northern Germany (Archäologisches Landesmuseum Schleswig photo).

is the case with the shoe-last axes) undoubtedly show that we are dealing with a local product. The shafthole is extremely conical (diameter between 2.7 and 3.4 cm), the length of the axe is 13.9 cm, the width 6.5 cm.

Summary and conclusion

In the present article, an unusual shafthole axe from recent excavations in the Järavallen beach ridge in south-western Scania is presented. The find locality bears the name Skjutbanorna 1A, but the excavation fields lie directly beside those of Salomonsson from the 1950s, which are known under the name Elinelund in the literature. The recent excavations were performed with great precision and resulted in the observation of a stratigraphy with two layers in the beach ridge. Whereas the lowermost one contained finds of the Ertebølle Culture only, both Ertebølle and Funnel Beaker finds were made in the upper black occupation layer, which had a thickness of around 30 cm. Nothing indicated that the appearance of Ertebølle and Funnel Beaker finds at the same level was due to disturbance or later admixture. It has thus to be regarded as very probable that some Ertebølle types (e.g. ceramics) lived on in the Early Neolithic in the region, as postulated by e.g. Jennbert (Jennbert 1984) on the basis of the problematic stratigraphy of Löddesborg.

In the latter layer an unusual shafthole axe of porphyry was found. The axe has no parallels at all in the Western Baltic, but a detailed treatment of its different typological and technical elements showed that we are dealing with a local product of the Earliest Neolithic. This dating is in accordance with a ^{14}C date from a food crust of a Funnel Beaker neck sherd that was found only 20 cm away on the same level (5030±85 bp = 3950–3710 BC cal.). The edge part of the axe shows typical traits of the flat hammer axes of the Funnel Beaker Culture, whereas the butt part is almost a copy of a shoe-last axe. What are commonly interpreted as both Late Mesolithic and Early Neolithic form traditions are thus present in the axe from Skjutbanorna at the same time. This further supports the argument above that the co-appearance of EBC and FBC ceramics in the same occupation layer is a real phenomenon in the case in question and not the result of a disturbed stratigraphy. It should be noticed that it is thus possible for the first time to show with arguments independent of controversial interpretations of stratigraphy, that layers which contain both EBC and FBC finds *can*

reflect a real historic situation. That Ertebølle pottery types continued to be produced after the introduction of Funnel Beaker ceramics was shown a long time ago at Siretorp (Bagge/ Kjellmark 1939) and more recently at e.g. Siggeneben (Meurers-Balke 1994, 243 ff.). It is characteristic that the pottery types are found in typologically "pure" forms, which means that no typological admixture can be observed. This must be stated when the factors behind the Mesolithic-Neolithic transition are to be evaluated, especially when the obvious ideological changes tied to this process are discussed. At first sight, the axe from Skjutbanorna may contradict the picture drawn from the pottery, as we are dealing with a typologically mixed artefact. It is questionable, nevertheless, whether the two cases are directly comparable. Whereas Ertebølle pottery is a locally made part of the material culture, shoe-last axes are imported objects that very probably had a prestige function (at least in the Western Baltic). That imported prestige objects exerted an influence on local artefact production, especially after the supply of these objects themselves came to an end, is no new observation in the South Scandinavian Stone Age (see e.g. Montelius 1898 and Klassen 1996 with the example of the knobbed battle axe of copper from Scania). The two-sided pointed-bottomed flint axe of the earliest Neolithic (type I) is probably another example of this process, as these axes obviously are copies of imported West European prestige axes of jade (Klassen in print). This example demonstrates that the copying of imported prestige objects took place at the Mesolithic-Neolithic transition in e.g. Scania. The survival of late Mesolithic elements in early Neolithic times may thus in the case of the Skjutbanorna axe be of a different nature than in the case of ceramics and hint at the different social functions of pottery and shafthole axes.

The fact that the Skjutbanorna axe shows typological traits of shoe-last axes indicates that these artefacts were still known, but probably at least partly no longer in use in the Earliest Neolithic in the find region. The knowledge of shoe-last axes in the area may be due to a find that is stored in Malmö Museum. This is registered as coming from the farm Bunkeflo 9:4, but it was possible to demonstrate that it probably was found in the area of the old Elinelund excavations and thus in the immediate vicinity of the modern excavation fields. This artefact was imported from the Mittelelbe-Saale region between 4500 and 4200 BC and may thus be attributed to the late Ertebølle settlement below the Early Neolithic one. A ^{14}C date from the test diggings at the site (5440±60 bp = 4350–4230 BC cal.) is in good accordance with that attribution.

A survey of possible parallels to the find from Skjutbanorna 1A demonstrated the existence of five other shafthole axes (two more from Sweden, two from Northern Germany and one from Denmark), which must be Neolithic in date but show typological traits of shoe-last axes. Unfortunately, all five are single finds, and it is thus not possible to be sure about their dating and cultural attribution.

Notes

1. Oringe 2, Southern Zealand, Denmark. Unpublished find of an edge-fragment of an imported shoe-last axe (paper read by the excavator Keld Møller Hansen, Sydsjællands Museum Vordingborg, at the conference "Status og perspektiver inden for dansk mesolitikum", Vordingborg 16/17 September 1998). Ringkloster: probable copy of a shoe-last axe from the Ertebølle layers: Andersen 1998, p. 34 Fig. 17. On the excavation finds of shoe-last axes from EBC settlements in Northern Germany, see below.
2. This and all subsequent ^{14}C dates were calibrated with the Oxcal program, version 2.18, using the data from Radiocarbon 35 (1), 1993 and one sigma confidence intervals.
3. One of the authors had the opportunity to look through several thousand shafthole axes of the shoe-last axe type in a number of the biggest museums in Germany. Here too there were no finds resembling the Röstånga axe.
4. Find in the National Museum in Copenhagen, inventory no. NM A 1938.
5. Finds from Billinge (private property; L. Larsson 1987, p. 6, Fig. 1) and Elinelund (MHM no number;

see below) in Scania and from the following Danish localities: Erikshale (MAM 1464; Skaarup 1985, p. 397, note 775), Svinø (SMV 22/83; Møller Hansen 1997, p. 56, Fig. 16), Karlsgab (SMV KG 88; Johansson 1992, p. 14), Henriksholm (NM A 50743; Vang-Petersen 1982, Fig. 13), Tingbjerggård (NM A 51921; AUD 1985, p. 145), Kagenæs (private property?; A. Fischer 1983, p. 9, Fig. 3), Åmose (private property; A. Fischer 1982), Kruusesminde I (KAM; Rønne 1989), Åle (FHM 3251; Andersen 1995, pp. 61 f., Fig. 25), Vængesø (FHM 1850 A; unpublished) and Brændegård (FSM BØ 2013 TU; Thorlacius-Ussing 1977).

6. Two examples from Oldesloe-Wolkenwehe and one from Satrup-Förstermoor (Schwabedissen 1967, p. 410 with Fig. 1), one from Rosenhof (Schwabedissen 1972, p. 3 and 1981, p. 135, Abb. 7.6), one from Ralswiek-Augustenhof (Gramsch 1971, p. 131) and one from Basedow (Schuldt 1974, pp. 37 f., Abb. 27a).

7. Finds from Skalager Banke (NM A 52193; Pedersen 1989, p. 101) and Gåbense Færgegård (NM A 12083; unpublished) in Denmark and Giekau-Neuhaus (ALM K.S. 11366) and Neuendorf (SUG 1966/49) in Northern Germany.

8. LUHM 24688.

9. V. Alstad sn, Skytts hd: LUHM 23083.

10. Kluesries, Harrislee-Kluesries, Ldkr. Flensburg: ALM KSA 2431.

11. Dithmarschen: ALM K.S. 14445.

12. Romvig, Ørre sn. HEM 775.

Abbreviations

ALM:	Archäologisches Landesmuseum, Schleswig, Germany
FHM:	Forhistorisk Museum Moesgård, Denmark
FSM:	Fyns Oldtid, Hollufgård, Danmark
HAM:	Haderslev Amts Museum, Denmark
HEM:	Herning Museum, Denmark
KAM:	Kalundborg og Omegns Museum, Denmark
LUHM:	Lunds Universitets Historiska Museum, Sweden
MAM:	Søfartsmuseum Marstal, Denmark
MHM:	Malmö Museum, Malmö, Sweden
NM:	Nationalmuseet, Copenhagen, Denmark
SMV:	Sydsjællands Museum, Vordingborg, Denmark
SUG:	Sammlung des urgeschichtlichen Seminars der Universität Greifswald, Germany

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