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TRELLEBORG

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BY

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INTRODUCTION

THE broad valleys which surround Trelleborg developed as glacical valleys at the close of the Ice Age. Two streams now flow through them to unite beyond the promontory of Trelleborg into the Naesbyaa, which empties into the Great Belt. The distance from Trelleborg to the coast is 3—4 km as the crow flies.

During the period of human habitation on the Trelleborg promontory, the natural conditions around it have changed considerably. On the site where the fortress was later constructed have been found numerous traces of a great Stone Age settlement, the largest known in Seeland, from the period shortly before 2000 b. C. At that time a fjord extended from the coast up to the river valleys past Trelleborg, but how far it reached has not been investigated. In the meadows around Trelleborg a layer of sandy cardium-mud up to 4 m thick lies above the moraine clay. It contains numerous sea-shells and the seeds of sea-grasses, thus testifying to salt-water deposits over a long period.

Through emergence and sedimentation in the mouth of the fjord, the sea was gradually excluded and an extensive, forked, fresh-water lake spread over the valleys. This must have occurred at the transition between the Bronze Age and the Iron Age, thus about 500 B. C., and this lake-stage still prevailed at the time when the Vikings built Trelleborg. A

similar condition is seen in these days when the streams overflow their banks in Winter and the water floods the meadows.

Many traces of human habitation have been found also from the first part of the Iron Age, the Pre-Roman Period, shortly before the birth of Christ, but after that time there follows what is apparently a pause of a thousand years in building activity. We are now in the Viking Period. In the 10th century, approximately about 950 B. C., there seems to have been a heathen place of sacrifice here. Certainly, well-like pits have been found with remarkable contents indicating sacrifices, and since many of them lay under the houses in the fortress and must have been filled in before the houses could have been built, we may be entitled to assume that the whole place of sacrifice is older than the fortress. In one of these pits lay two small children and the head and limbs of a young he-goat which had been felled. Similarly, in another were two more children, as well as a large number of the parts of a young cow, a dog and also numerous animal bones at random. In a third was a human skull. Near several of the wells were horseshoe-shaped houses or enclosures (see fig. 10); various house-sites, which are all older than the period of the fortress, belong perhaps to this time, among others a large house about 30 m long with 7 pairs of roof-supports. It stood in the middle of the central square inside the fortress, but just in such a way that its ends encroach upon the sites of the houses belonging to the latter. Here, no doubt, lived the chief who was the priest of the heathen god.

All this was levelled and filled in before the construction of the great fortress could be started. It could scarcely have

Fig. 1. Aerial photograph of Trelleborg by Lund-Hansen 1947. Seen from the East, the outer ward is in the foreground in front of the circular main ward. The angular section is the burial ground. West of the fortress the two rivers Vaarbyaa and Tudeaa join, and their common course can be traced all the way to the Great Belt. In the right foreground the roof of a model house. A similar house must be imagined as erected on each of the 31 large sites in the fortress, which are lightly indicated in the grass.

happened as a result of religious zeal, but most likely because bloody human sacrifices went out of fashion during the latest period of paganism. There is nothing to indicate that Christians built Trelleborg, but the builders were hardly fanatical anti-Christians either. The fortress belongs to the transition period between paganism and Christianity, which in Denmark, as far as we know, was not a time of great conflict.

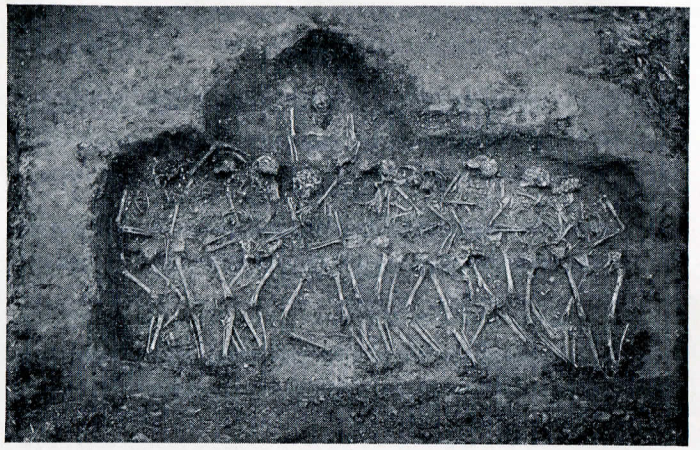

Fig. 2. Grave of ten men from the burial ground at Trelleborg.

THE LAY-OUT OF THE FORTRESS

IT is worthy of note that Trelleborg is situated so close to the edge of the promontory that there was not room enough for the projected lay-out, and to increase the building area an extensive filling-in operation was undertaken on the south-west side. This indicates, among many other things, that no pains were spared to make it possible for the fortress to become exactly what was desired.

It consist of two parts, a main defence work and an outer defence work. The main ward is very strongly fortified,

being surrounded by a massive circular rampart and, around its outer side towards the land, a wide and deep ditch which also describes an arc. The outer ward is more weakly fortified and is surrounded by a low rampart and a shallow ditch, both of which also form an arc on their longest stretch. But to the extreme North the outer work has an extension which in some degree disturbs the regular lay-out.

The visitor comes upon this section first of all after he has entered by the gate near the farm of Lille Trelleborg and has proceeded by way of a causeway and a gap in the rampart. These latter are not original, but constructed in connection with the restorations, in order to make an easy approach to the fortress itself. This can be seen in the foreground of fig. 1 and on the extreme right in fig. 3.

There was a burial ground in this square extension of the outer ward, where about 150 graves were discovered, among them large common graves which are reminiscent of battle (fig. 2). None of them had a Christian character, even though they had an East-West orientation. The grave-goods buried with the dead are few, but such was the case already in the latest heathen times. Some of the oldest objects found on Trelleborg come from here, and when the question is asked why the burial breaks so strangely the consistent geometrical regularity, the most reasonable explanation is that the inhabitants of the fortress took over the older burial ground presumably belonging together with the place of sacrifice. For that reason we may say that there is no strong line of demarcation between what represents the place of sacrifice and what indicates the fortress.

The excavations made by the National Museum in the years 1934 to 1941 showed Trelleborg to be a structure

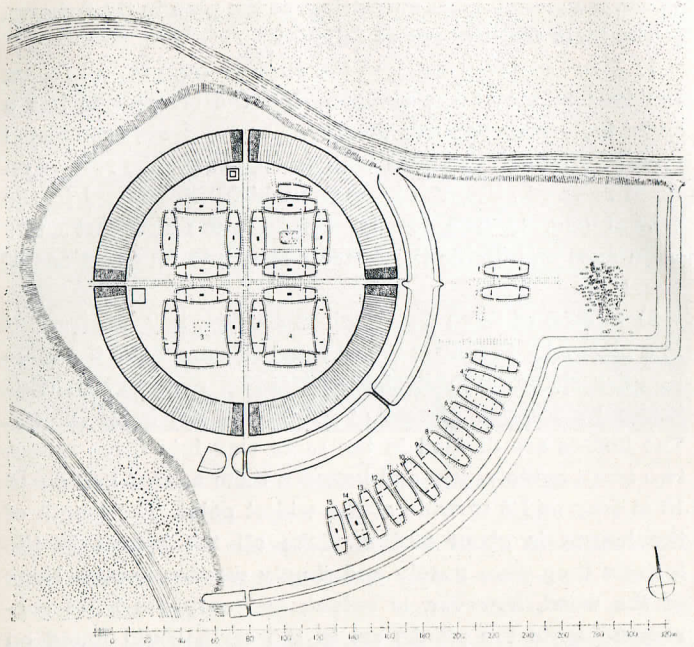

Fig. 3. Ground-plan of Trelleborg showing all the houses in the fortress. Inside the circular rampart the four blocks, separated by the two main axes crossing to link up the gates. Near two of the gates guard-houses. In the centre of the courtyards of two blocks, small houses in which perhaps the chiefs lived. In the north-east block traces of streets were found which connected the side-doors of the houses. North of the same block a supplementary building situated obliquely. In the outer ward the houses are sited radially. To the extreme left the burial ground of the fortress. Ca. 1/4000.

which is in many ways surprising, as the plan in fig. 3 shows.

The main features are as follows:

1) There are four gates in the circular rampart all facing the four points of the compass, but the orientation has a slight inclination towards the East. The gates were connected crosswise by streets paved with wood, the planks resting on three rows of piles, the holes for which were found in the subsoil (fig. 4). The two streets form the ring-fort's two main axes and divide the fortress area into four sections of equal size.

2) In each of these four sections are four houses arranged in a block. All 16 houses are of equal size and have the same peculiar shape, with straight-cut gables and curved longitudinal sides, reminiscent of ships with the bows cut off. The houses are divided in the same way into three rooms, two small gable-rooms and between them a large hall about 18 m long and 8 m wide at the widest point. The length of the houses is about 29.5 m. Like all the houses in the fortress they were purely and simply wooden houses. None of the wood, however, is extant, and only the holes corresponding to the planks set in the earth could found on excavation. But is was fortunate that the most important woodwork and above all the walls were thus set in the ground, for the outlines show up very clearly, and all the earth-filled holes uncovered by excavation—plank-holes and post-holes—in the yellow clay of the subsoil are now marked with cement in the green grass (fig. 1). We have kept strictly to marking only those which be determined with certainty, and when from time to time there is a break or fault in the rows of holes pertaining to the houses, it is because they are continued over older pits—mostly from

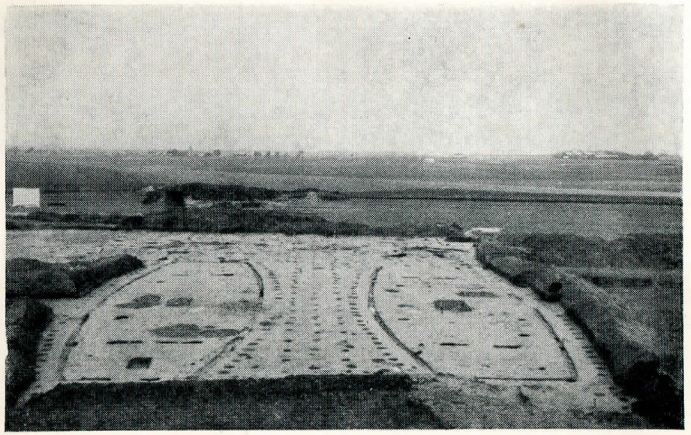

Fig. 4. Street with three rows of holes for piles between two house-sites. Seen from the rampart over the South gate.

the Stone Age-, in the mixed earth of which the holes could not be proved with full certainty.

3) A few other houses were found inside the circular rampart. A house in the shape of a ship, but considerably smaller than the houses in the blocks, lies at the north-east corner, close up against one of the large houses (see fig. 5, on the left). In two of the blocks a little rectangular house was situated in the middle of the yard. Perhaps the chiefs had their quarters here. At two of the gates there are small square houses which were certainly intended for the sentries on the gates.

4) In the outer ward were 15 small houses in all, of the same shape as the houses in the blocks but somewhat shorter, about 26.33 m long. These houses are situated

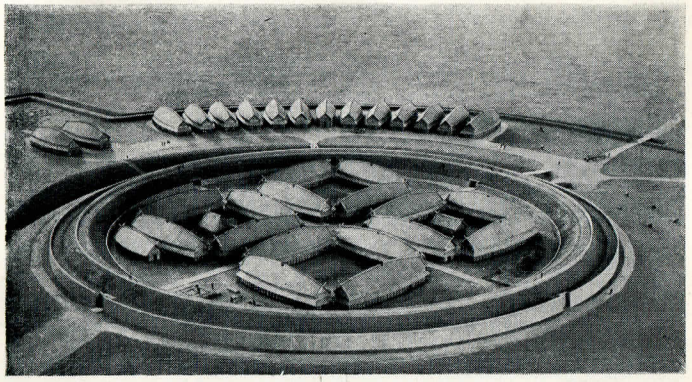

Fig. 5. Model of Trelleborg, seen from North-West. Constructed by the architect P. Willadsen.

radially, with their gables facing the centre of the fortress. The two most northerly ones, which are separate from the others, do not lie radially but parallel with each other, and on careful examination it will be noticed that they lie on either side of the continuation of the gate-street and at the same distance from each other as the corresponding houses along the street inside the ring-fort. It is as if originally the construction of a couple of new blocks outside in the outer ward had been considered, but that later the plan had been changed.

It has already been mentioned that the present entrance to the fortress from the East through the outer rampart is modern. The only entrance to the outer ward in ancient times was to the extreme South, where the remains of the piles for a bridge were found in the outer ditch. Along

the continuation of this there was also a bridge over the inner ditch, and by it one could reach the South gate. The latter must be regarded as the main gate for intercourse with the outside world. Furthermore, ships presumably lay-to off the bank below this spot, although no indication of quay or wharf was found. It may be noticed that there was no bridge outside the East gate to connect the main ward with the outer ward, merely a causeway from a later period used since the 18th century by farmers from the nearby village of Hejninge in carting their crops home from the fortress site. On the other hand there was a bridge in the place where is now the only way of crossing over the wide ditch, just about in front of the middle of the long row of houses in the outer ward and about midway between the two gates.

Inside the fortress there was no doubt a rampart-street as well as the two axis-streets or gate-streets, and often doors facing each other were connected by paved paths, both in the southern part of the central square from East to West and in the yards belonging to the blocks, where the side-doors lie diagonally opposite each other. So much paving is a clear witness to the fact that many people moved about inside the fortress.

THE CONSTRUCTION OF TRELLEBORG

THERE is such a great regularity in the lay-out, both in its disposition and in its dimensions, that a project worked out beforehand must lie at the root of it, and the tracing out of this project in the field is executed with an amazing accuracy. Some very experienced engineers must have been in charge of Trelleborg's construction. The Roman foot is used as the unit of measure. This can be proved in all the main dimensions and most clearly in the houses inside the ring-fort, which are 100 Roman feet long. The two small houses in the middle of the blocks measure 30×15 Roman feet, the houses in the outer ward 90 feet, and the thickness of the circular rampart is 60 feet. The great ditch has the same width, and between rampart and ditch is a berm measuring 20 feet in width. The foot used has a calculated average length of 29.33 cm, or 2.4 mm shorter than the normal Roman foot of 29.57 cm.

In the construction of the lay-out a centre must have been chosen first of all, from which, among other things, the arcs to determine the position of ramparts and ditches were described. The same point is also the point of intersection of the two main axes, which at right angles to each other divide the space inside the circular rampart into four equal parts, and which are continued out through the four gates. In order to construct the two right-angles, presumably a cross with arms exactly at right angles must have been used, a simplified form of the "groma" or "stella" of the Romans, with plumblines hanging from the ends for

sighting. These two main axes are set out with great care and precision and no departure from the exact right-angle can be demonstrated. The strict position of the four blocks of houses within the circular rampart in exact relation to the axes is also very striking, although it has been possible to discover small irregularities.

The curved longitudinal sides of the houses are always symmetrical about a middle axis and they must have been constructed on ellipses. Two houses lying at an angle to each other had a common focal point, and therefore for the establishment of a block's four ellipses it was only necessary to determine four focal points in all, which form the corners of a square with length of side about 36.40 m or 124 Roman feet. The whole lay-out within the circular rampart is constructed on squares.

Of the 16 houses in the blocks, all 100 Roman feet long, the shortest measured by the Geodetic Institute was 29.21 m, the longest 29.59 m, while 11 of the houses lie between 29.33 and 29.49 m, thus with differences within 16 cm, or little more than ½ % of the length laid down. The radius to the inner edge of the circular rampart is 68.4 or 234 Roman feet. This measurement is repeated several times. It is the distance between the two ditches and, similarly, the distance from the centre to the nearest gables in the outer ward is twice the amount, or 468 Roman feet. The precision with which these gables lie on the circumference of a circle is quite astonishing, if the two most northerly houses are excepted, having as they do a special position (see p. 12). For 21 of the 26 corners the distance from the centre lies between 137.21 and 137.45 m. These measurements too were determined by the Geodetic Institute.

THE CIRCULAR RAMPART

THE enormous thickness of the circular rampart, as it lies now with green slopes, makes it very impressive, but it has also been a structure of great ingenuity. Both its sides were covered with palisades, and also its interior was traversed with timber as an actual reinforcement to stabilise the heavy masses of earth. Along the inner edge of the rampart was a compact row of upright, semi-circular palisades, two per metre, standing edge to edge. At the gateways this row of palisades turns outwards through the gates (fig. 6), where it forms the side walls and no doubt once bore a ceiling, so that the gates had a tunnel-like character. Perhaps there was some sort of building on top, but it cannot be proved that there were gate-towers. In order that the palisade-work of the gates should not collapse under the great lateral pressure of the masses of earth in the rampart, behind it is a setting of stones, some very large, to a depth of 6 m for the whole thickness of the rampart. This is seen best in the East gate where the settings, which had collapsed in the course of centuries, have been built up into their old shape (fig. 7). Like all the other wood, the palisades have rotted away, apart from a few charred stumps, but the holes corresponding to them stand out clearly in the subsoil, when the layer of mould is removed. The gates originally could be closed at their outer openings by two wing-doors. Both gate-rings and large keys have been found at the spot where they were.

The outer facing of the rampart is constructed in a far more complex manner than the inner, where it was only a

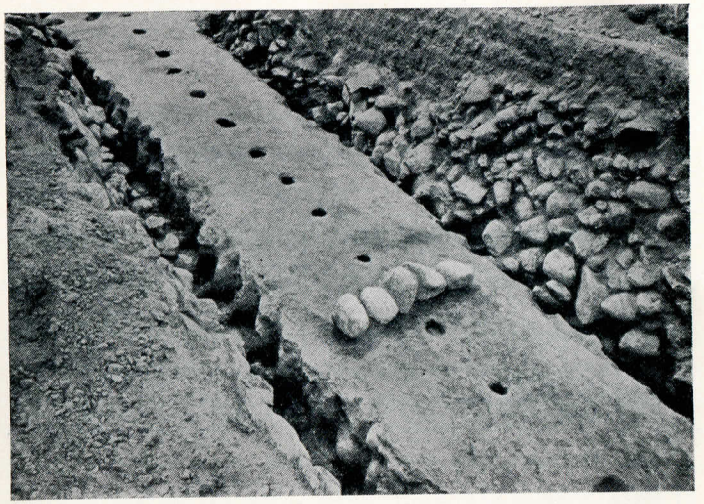

Fig. 6. The West gate during excavation, seen from outside. In front of the piled-up stones of the side walls can be seen two deep runnels in which semi-circular palisades stood. Along the middle axis of the gate a single row of post-holes. The five boulders lying across the gate are the remains of a barrier.

matter of holding the earth in its place so that it did not slide down into the rampart-street and restrict the traffic. Outside there had to be defensive measures as well. First and foremost the rampart had to rise up, steep and inapproachable, to as great a height as possible. On the land side the stiff clay dug out of the ditch was used to cover the face of the rampart in a thick coating reinforced with tree-trunks and branches. On the other sides was built up a footing of stones piled between wattle walls supported by thick posts. Furthermore, the face was covered with upright

Fig. 7. The East gate, seen from inside the ring-fort, after the massive stone setting was restored.

planks or palisades held up by close-set and very strong props standing obliquely. Above the footing of the rampart there was a defensive position covered by palisades, forming a ledge at a height of a couple of metres. A further covered defensive position stood no doubt on the crown of the rampart, but it could not be determined.

The most important timber in the core of the rampart is a layer of planks arranged radially and fixed to posts behind the outer foot of the rampart. They go straight through it, but they can never be traced right up to its inner edge. Outside they are 1.5 apart, but inside this grows less, of course.

THE TRELLEBORG HOUSE

IT must be rather difficult to imagine how the boat-shaped houses looked and how they were arranged inside, when the large sites, now outlined with cement in the grass, are considered. The Danish National Museum therefore ventured an attempt at constructing a model house in full size near the entrance, at some distance from the fortress area proper (fig. 8). This was done after much painstaking comperative study and deep consideration. The architect of the house is C. G. Schultz, and the carpentry was carried out in the old-fashioned way with great care by Jens E. Pedersen. Naturally it cannot be denied that there are several unknown factors and various details which can give rise to doubts, but on the other hand there was a good basis to work on in the 32 uniform house-sites which were closely examined. The house which has been built corresponds to the houses in the outer ward, all of which are 90 Roman feet long, being thus somewhat shorter than the large houses inside the circular rampart. The visitor is advised to look at this house both before and after an inspection of the fortress itself. In the imagination a house of similar shape and appearance should be erected on each of the marked sites.

The outline of the sites as they lie in the field is formed by two rows of holes, on the outside round post-holes, on the inside oblong plank-holes sometimes fusing together to form a long unbroken runnel (fig. 9). The distance between the two rows is just under a metre, and as a rule each plank-hole has a corresponding round post-hole. The actual wall of the house stood in the plank-holes. This

wall is made of upright planks, slightly curved on the outside, sunk into the earth, thus forming a palisade-wall or primitive sort of stave-wall; in the true stave-buildings the wall-planks stood on a sill, a horizontal piece of wood with a groove on the upper edge. As is known from the oldest Norwegian stave-church of Urnes (c. 1050), apparently every other plank was thick and had a groove or slot along both edges, while the planks in between were thin and tapered of at both edges as well, so that they could fit into the grooves. The thick planks are the deciding factors in the construction and as such had to be sunk most deeply, while the tongued planks were only fixed superficially into the ground without leaving behind them any considerable trace.

In the outer row of round holes stood the posts for a gallery which had its own little roof, the rafters of which were fastened above the grooved planks. The purpose of the gallery was to protect the walls from the weather, so that the planks did not rot too quickly, especially at the danger point, just above the surface of the soil.

During the excavation it was found that certain holes were nearly always deeper than the usual holes for the walls and therefore must have held timber for a special purpose. This was not the case usually at the corners, which had no special importance in the construction. On the other hand, it was mainly the case at the many doorways, the two jambs of which had to be very firm so that they should not fall down when the doors were slammed.

There were doors in both the gables and usually in both transverse walls as well, providing that these were complete. Judging by the holes, however, such was not always

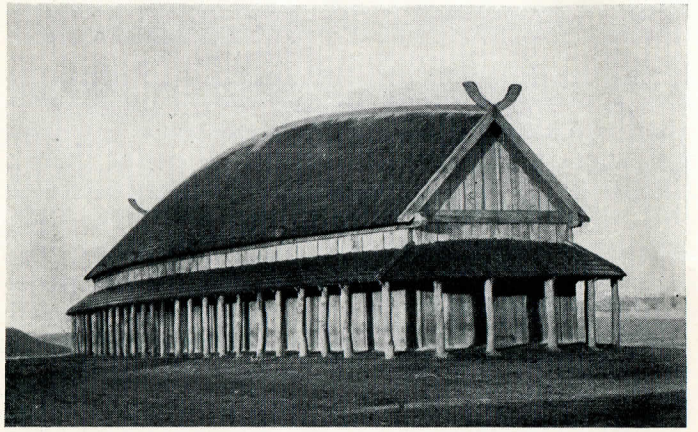

Fig. 8. Trelleborg house. Model in full size constructed outside the entrance to the fortress.

the case. On the other hand, there were two side-doors in the large hall, one in each side-wall and always quite close to the transverse wall. The two doors in this position were diagonally opposite to each other. Like the many gates in the circular rampart, the many doors are an unusual, but for Trelleborg a very characteristic, feature, which must have aimed at making a swift turn-out possible. It may be noted here that the side-doors are placed so as not to open opposite each other on to the street. Otherwise crushing and crowding would result when the alarm was sounded. The doorways can also be recognised by the fact that there is a little gap or break in the outer row of posts for the gallery. In fig. 10 the side-doors to the middle room are top left and bottom right.

The largest and deepest holes in the whole house are meanwhile usually a couple of plank-holes in the transverse walls, situated outside the door-holes of these walls and close up to them. Without doubt they must have had some connection with the construction of the roof. The great problem in the Trelleborg house with its curved walls is how the roof looked, and how it was supported. The Nordic houses of the Iron Age most often had posts on which the roof rested, uprights, between the walls, and this is true of five of the houses in the outer ward. These had no transverse walls, but instead five pairs of uprights on which the purlins for the roof rested. The same houses have also another system of doors, and instead of the two side-doors there is only one which is always on the south side, slightly east of the centre.

But in all the other houses the great hall is completely free of posts bearing the roof (fig. 12). To compensate for this, the very large plank-holes in the transverse walls must have held the main supports for the purlins of the roof. The deeply sunk longitudinal walls, too, were able to bear their part of the burden, and it must be realised that the roof over the houses, which were up to 8 m wide, was of great weight. It would be a considerable reinforcement to the house if crossbeams were spaced out from wall to wall, and on these there probably stood short posts, so-called queen-posts, to support the purlins. Indeed, it must be considered as quite necessary that the beams had one support or another in the span of 18 m between the transverse walls.

In order to realise clearly how the roof looked, we must examine some similar material. Houses of this type have never before been found, either in Denmark or, as far as

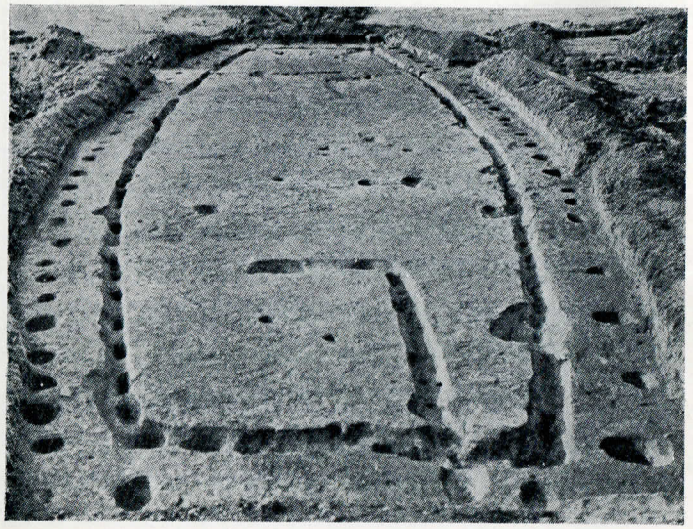

Fig. 9. House-site in outer ward after final excavation. In the runnel for the walls every other plank is sunk more deeply than the next. The outer row of round post-holes supported a gallery with a separate roof. The long runnel in the foreground, which cuts through the gable of the house, comes from a later period.

is known, anywhere else in the world. But we know copies of houses corresponding to them and these have always had a convex ridge to the roof. A casket representing a house of Trelleborg type, made of plates of elk-horn held together by work of gilded bronze, belongs to the treasure of Kammin Cathedral in Pomerania. From its ornamentation it is Nordic and no doubt Danish work of just the same period as Trelleborg. The purlins project as usual from the gables, where they are shaped like animals' heads, but strangely enough the ends of the crossbeams, shaped like birds' heads, jut out

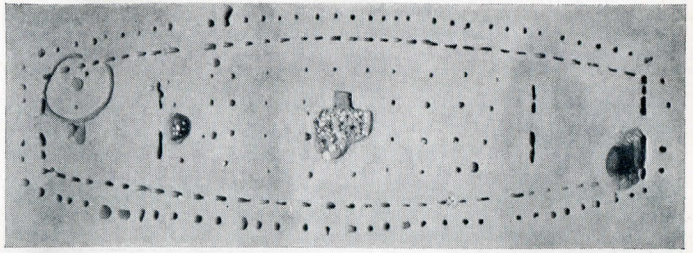

Fig. 10. Plan of a house-site in the main ward, ca. 1/350. Photographed from a model kept in the Danish National Museum. In the large room in the middle, separated off by the two transverse walls, can be seen four rows of holes for piles to carry a plank floor. In the centre of the room a stone-lined hearth. The top right corner of the house is built over an older pit. A horseshoe shaped runnel in the corner bottom left is likewise older than the house and belongs perhaps to a heathen place of sacrifice (see p. 4).

through the roof. Both these features are imitated in the model house at Trelleborg, although the ends of the beams are not carved.

Similar houses are seen represented on the Bayeux Tapestry, too, but most important and most ancient are some house-shaped grave-monuments of stone from the North of England and from Scotland which go back to the 9th century, the so-called "hog-backs". They have curved longitudinal sides and an arched roof, and the Trelleborg house was also given such a roof. What the houses in the fortress were roofed with we do not know for certain, but many things speak for the fact that shingles were used, as in the Norwegian stave-churches. Of course, there was a layer of boards underneath.

The arrangement of the rooms was very simple, no doubt. What the gable-rooms were used for we do not know. In

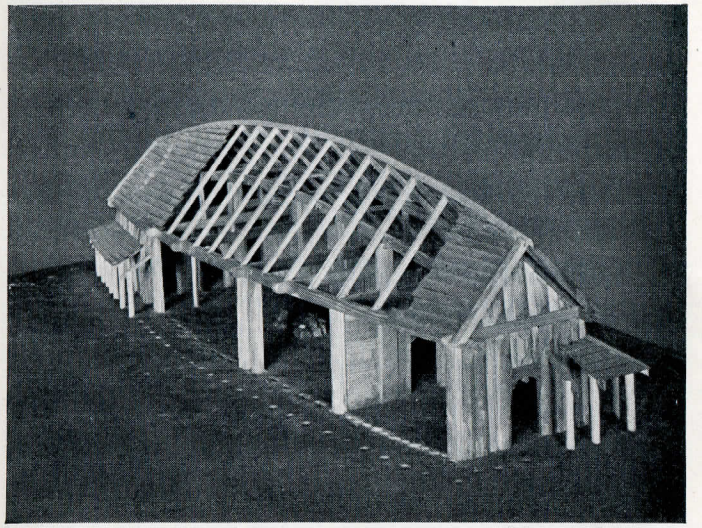

Fig. 11. Trentative model of a Trelleborg house and holes for wall-planks and gallery-posts. The peculiar ground-plan of the house requires a strongly arched roof-ridge. The rafters are supported by purlins resting on the strong posts of the side-walls.

one of them was a deep cellar of the same area as the room and probably covered in with planks. Perhaps it was a dungeon. Other smaller pits, apparently lined with boards and covered in with planks, lay outside in front of the gables or else inside the gable-rooms, always very precisely and regularly, even pedantically, arranged. They are presumably cellars for food-storage or refuse-pits. It is possible that vessels for salted foods were let into some of them.

In the great hall (fig. 12) the central point is the stone-

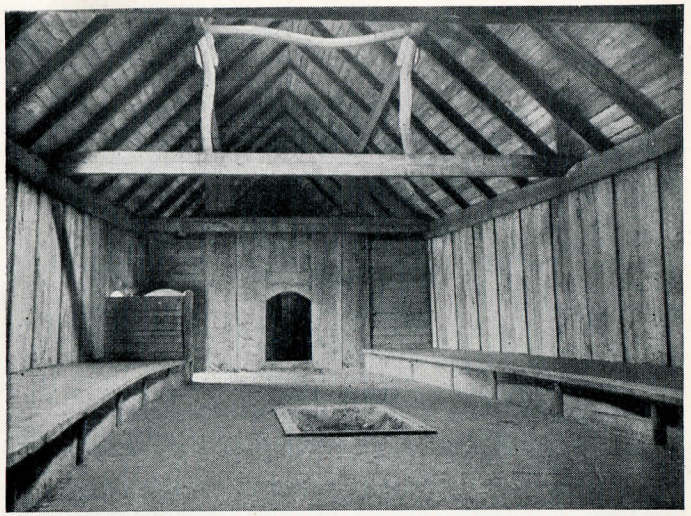

Fig. 12. Interior of Trelleborg house showing hearth in the centre and wide benches along the side walls. Above the hearth is a vent in the roof through which the light comes.

lined hearth depressed somewhat below the level of the floor. Here food was prepared, and people gathered round, especially in the evening, when the fire on the hearth lit up the room. By day, light came through the vent in the roof, and it is surprising how well it could brighten the large room. Furthermore, it is not impossible that there were apertures in the planks of the side-walls. In a couple of the houses were found the piles for a plank floor (fig. 10), but we do not know what the floor was like in the others. In the model house a clay floor has been laid on practical grounds, but anything similar has not been discovered.

Along the walls were wide sleeping-benches, so wide that the people could lie side by side with head or feet to the wall, just as we know they did in Iceland. In this way about 75 men could sleep comfortably in each of the halls, when they were packed well and truly. This makes 1200 men in all in the whole fortress.

The houses in the outer ward were perhaps used in another way. Stone-lined hearths were found in only two of them, and in any case it is clear that the five houses with roof-supports inside were not places of habitation, but rather barns or warehouses. Only quite few antiquities were found in the whole of the outer ward to show that human beings lived there. The phosphate content of the soil is also very small.

Of the small houses found in the yards belonging to the blocks, one had an open gallery facing East, where the entrance was. As far as can be judged from the holes, these houses were most likely built with log-walls, that is, with horizontal planks between the upright staves which are arranged with a fairly big distance between them, about 150—170 cm.

HOW CAN TRELLEBORG BE EXPLAINED?

WE must first settle the question of Trelleborg's age. It can be stated quite definitely on the basis of the many finds of antiquities that it was built in the first decade before the 1000, and was presumably in use until the middle of the following century.

Further light is thrown on the subject by the burial ground. It can be seen that most of the bodies were those of young men between the ages of 20 and 40 years. It is true that there were many skeletons of which the sex could not be determined, but in any case there were certainly few old people and even fewer children. The fortress was inhabited by warriors with the necessary addition of some women for assistance and entertainment.

The antiquities discovered strengthen this point. There is quite a lot of women's articles, both jewellery and things for weaving and spinning, and also a quantity of weapons, e. g. the longhorned, broad-bladed axe inlaid with silver seen in fig. 15. Otherwise there are few, if any, treasures, but on the other hand numerous articles for use of all kinds, including blacksmiths' tools and also agricultural implements, both a ploughshare and a whole series of scytheblades of the type used for reaping in the Viking Period and the Early Middle Ages (fig. 14).

Thus the fortress was not—at least, not exclusively—organised on the basis of requisitions from the peasants of the district, but a certain amount of farming was carried on. Thus the inhabitants must have had a certain area under

Fig. 13. Pottery vessel decorated with combed zig-zag lines and stamped impressions. 2/5 size.

their control, even if no special home-farm proper was connected with Trelleborg, as far as we can see. The fortress has the character of a military establishment, where a large body of warriors was garrisoned in the large barrack-buildings. It is natural to conclude that a ship's crew lived in each of the boat-shaped houses.

The visitor to Trelleborg must wonder at its remote position, lying as it does at some distance from the main thoroughfares. But water-traffic was far more important at that time than road-traffic, and although it was not possible to sail freely on the lake by Trelleborg, ships could certainly be towed up through it from the Great Belt. The

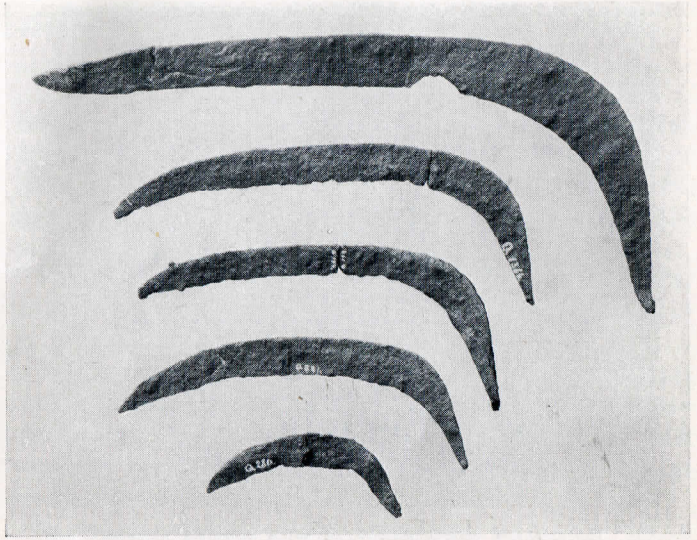

Fig. 14. Scytheblades for reaping, found in the fortress. At the bottom a leaf-knife. About 2/5 size.

Vikings loved to protect themselves in this way, close to the great sea-lanes. The way in which finds of antiquities are distributed shows that the west coast of Seeland, the east coast of Langeland and the south coast of Lolland covered a main sea-route. And while Roskilde and the Roskilde Fjord distinctly come first in importance in Seeland after 1000, in the preceding period it was the west coast with its ways and watercourse which plays the greatest part, presumably with its cultural centre in Slagelse.

The professional skill with which Trelleborg is constructed already indicates to us that it cannot have been a

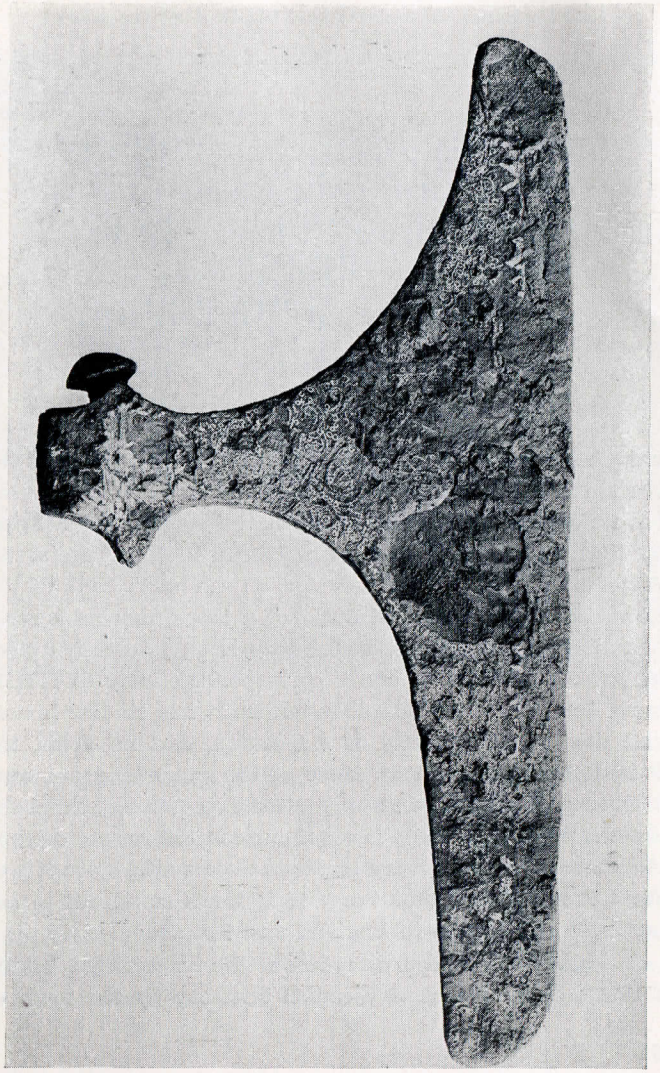

Fig. 15. Long-horned axe from about 1000, found in a grave. Decorated with silver inlay at the sides. About ⅓ size.

Fig. 16. Axeblade from about 950, found in a grave. ½ size.

unique phenomenon, but that the same builders must have erected other works of a similar kind. Some of them may have disappeared without trace in the course of centuries, so that only chance can bring them to light again. At Aggersborg, not far from Løgstør, on the north bank of the Limfjord in the North of Jutland, a large fortress lay-out has already been discovered. There is an impressive circular rampart round it, and it corresponds closely to Trelleborg, being even considerably larger. It has similar houses and the same regularity of disposition, and no doubt too it had the same purpose. More of the same kind are considered a possibility, but only after excavations have been undertaken will we able to see if our conjectures are correct. Aggersborg lies on a very important sea-route, since it was from the Limfjord that the Viking fleets stood out to sea on their expeditions to England and France.

In saga and legend are reports of the magnificent Viking fortress of Jomsborg in Wendish territory by the town of

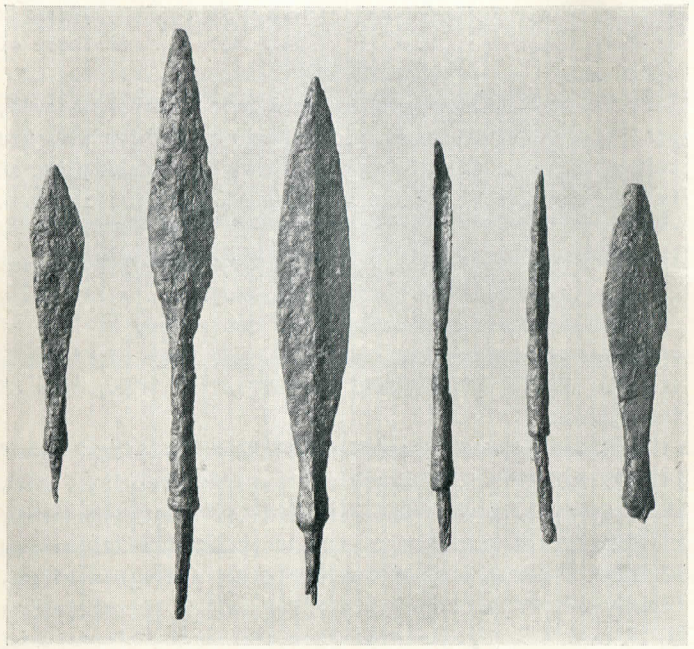

Fig. 17. Arrowheads. ½ size.

Jumne (presumably Wollin near Stettin). The descriptions of how the young warriors were trained under strict discipline and fixed regulations have not gained much credence from modern critical workers in historical research. But it is now proved that the Vikings really did build magnificent fortresses to hold strong garrisons, and after seeing Trelleborg with all its pedantic regularity and accuracy, nothing is more obvious than that order and di-

scipline of the strictest kind held sway in it. The fortress is as if created for regulations of the same sort as those of Jomsborg.

Trelleborg—with Aggersborg, and even Jomsborg as well, for that matter—must be understood in connection with the recrudescence of the Viking campaigns which took place at the close of the 10th century, culminating in the conquest of England by Sweyn Forkbeard, and Canute the Great's dominion of the North Sea. King Sweyn was the great military organiser, and he certainly prepared his campaign of conquest for years and years, not merely by his expeditions and reconnaissances in different parts of England, but also with a systematised training of the young men of the kingdom.

We must therefore assume that either the king himself or else one of his trusted subordinates had Trelleborg built, and only the greatest chieftains could master an undertaking of these dimensions. The amount of timber used alone was so tremendous, that more than 8000 great, well-grown trees, mainly oak, had to be brought to the spot. In the estimation of an expert that means that about 200 acres of forest-land were cleared of the whole of the mature growth.

Where the king got the idea for this peculiar lay-out we cannot say with certainty, until archaeological investigations outside our own country, namely in the East or in Western countries have given us the parallels which we lack at the moment. But it must be emphasised that Trelleborg contains essentially Nordic elements.

The stave method of construction itself is certainly not a Nordic invention, but in the period about 1000 it was a style characteristic of the North, and we have found the earlist

Fig. 18. Bowl-shaped buckle of gilded bronze, before 950. Found in one of the houses' refuse-pits. About ¾ size.

prototypes of the boat-shaped houses in the North of England and in Scotland, areas occupied by Nordic Vikings. Neither is the remarkable set-out of the work completely lacking in original patterns within the Nordic area. One of the remarkably large fortresses of ancient times, the fortress of Ismantorp in Öland, which according to M. Stenberger is from the 5th century A. D. and is built of stone like all the other fortresses in Öland, shows striking parallels with Trelleborg. It is roundish without being exactly circular, and around the inside of the rampart are small houses arranged radially, 50 in all. Furthermore, clusters of houses lie in the centre of the fortress, and these can with a little imagination be separated into four blocks or quarters, divided by streets ending in the four main gates (the fortress has no less than 9 gates in all).

In fact, all the main elements of Trelleborg are here in a more primitive form: the radially placed houses of the

outer ward, wich in Öland are merely set up inside the encircling rampart, the four blocks and the four streets ending in the gates. Perhaps in the construction may be found also some relationship with that inclination towards the mysticism and magic of numbers which the heathen Northmen had. But on the other hand the regularity in the work is new and completely without previous parallel in the North, and also the strict precision and Roman unit of measure. In some way or another the traditions of the camps and settlements of the Roman Empire must have spread up to Denmark.

The Byzantine Empire is the place where it is most probable that Roman traditions lived on in military engineering. It is hardly credible, however, that Scandinavian, and Danish chieftains into the bargain, should have had the opportunity of making the acquaintance of the military works of the Byzantines, being still heathen in the period before 1000. The Byzantines kept all foreigners strictly away from such things, in order to prevent spying. It was only shortly before 1000 that the special Varangian corps was formed in the bodyguard of the Byzantine emperor, and not until well into the 11th century did Scandinavian chieftains in the Varangian corps attain a certain prestige for a time, though hardly so high as they claimed when they returned home (Harald Hardrada).

If no surprising discovery e. g. from the country around Kiew, which was the Northmen's most important centre in the East and also the mediator between the North and Byzantium, should bring us further enlightenment on this subject, then we must turn to the Danes in England to find a solution to the puzzle.

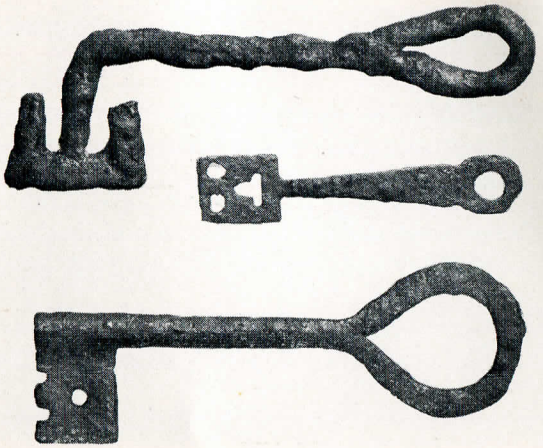

Fig. 19. Different types of keys used in the fortress. ½ size.

We know in any case that among them, as already mentioned above, the peculiar type of house was known and perhaps invented. Ever since the close of the 9th century a part of the Danish army of Vikings had been settled as peaceful farmers, after decades of ceaseless roving and mighty exploits; but their existence was not easy, and they had constantly to deal with military problems. They built large fortresses to protect themselves, but we do not know how these latter looked or how they were constructed. It will be surprising if the art of military fortification under Roman influence was still in being at that time in England. But the Danish warriors, who had settled there and who themselves were among those most experienced in military matters at that time, had rich opportunity to acquaint themselves with Roman works, even if these were more or

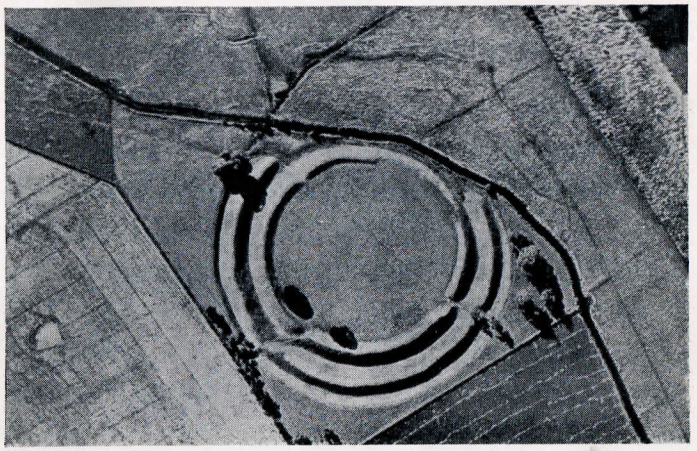

Fig. 20. Aerial photograph of Warham Camp, Norfolk. It was laid down in Roman times, but perhaps used by the Vikings.

less in ruins by then. Some of the renowned Five Boroughs, which were to protect the Danelaw from the Anglo-Saxons, were built on Roman foundations. That is true anyway of Leicester and Derby. In Norfolk there are a couple of ring-forts of the same shape as Trelleborg. One of them, Warham Camp near the sea-port of Wells, has double ramparts and ditches, very well preserved and almost circular (fig. 20). The similarity of this work with Trelleborg is striking to the observer. But on excavation only traces of habitation during the 2nd century A. D. have been found, and nothing of a later period. Perhaps it is a Roman-British work. The building plan of the fort or camp has not yet been made clear, however, and the preliminary examination can hardly be considered as final. It is not unlikely that the Vikings

made use of it, and indeed it would be very surprising if they had not.

Throughout the whole of the 10th century there was a lively contact between the Danes in England and their homeland. Up to now we have mainly been able to see this in the realm of decorative art, where, as Johannes Brøndsted shows, a constantly changing, reciprocal influence reigned. The great Jelling Stone, Harald Bluetooth's monument to his parents Gorm and Tyre, is one of the indications of this. It is certainly not English, but there is something distinctly English in its style. It is very probable that the inhabitants of the Danelaw, who, even after having had to submit to the Anglo-Saxon kings, kept a great deal of independence, acquainted their compatriots at home with their military experiences. Thus it is possible that the impulses for Sweyn Forkbeard's great campaign against England came from dissatisfied Danes in that country.