

# THE MEDIAEVAL FENCE

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A simple experiment was carried out to build a short length of fence based upon the evidence of rock cut stake/post holes from a number of sites in Catalonia and from the abundant illustrations of mediaeval fences especially in the Books of Hours. The primary objective was to make an assessment of the quantity of materials necessary for such a fence, and the implications of those materials for specific husbandry practices, along with an evaluation of the tools required by such an operation. A secondary objective was to record the time taken to amass the materials, manufacture the rock cut stake holes and to build the fence itself. The experiment was carried out as part of the overall research programme into mediaeval agriculture at the site of L'Esquerda, Roda de Ter under the aegis of the Department of Mediaeval History of Barcelona University.

There are a number of sites of the mediaeval period which show quite clearly that a large part of the occupation area was situated on the bare rock without any cushion of soil separating the denizens from the rock itself. This is, of course, a huge problem for the archaeologist in that there is no layering and, therefore, no sequences but only phasing insofar as building foundations are at variance with any superstructure. Similarly, it is extremely difficult to establish phasing of disparate rock cut features which do not interact with other features. In these cases, it is critical to think in three-dimensional terms especially with regard to features represented solely by post-holes or stake-holes. Where rock cut features are set within a building and respect the limits of the building, it is possible to interpret them as integral elements within the structure. Notably is this the case with the granary excavated at L'Esquerda where a line of tightly spaced stake-holes clearly indicates an internal penning arrangement. Other examples indicate the presence of post sockets within structures which argue for internal roof supports. In the great majority of instances, there are no indications whatsoever and given that the building itself is resting on the bare rock there is no constructional need since a support post can be lodged in place by the sheer weight of the superstructure. In this context, there are two particular features which can be extracted from the archaeological data as discrete units. The first is the circular watchtower evidenced at a number of sites; the second is the line of stake or postholes not specifically associated with any building or structure. It is the latter feature which is the subject of the present investigation.

There is little doubt that a linear feature of post or stake holes represents a simple fence. The closer the post-holes are set the slighter the fence, the further apart the stouter the fence. This observation is a simple appreciation of the nature of the materials used in fence construction. From the many illustrations in the mediaeval manuscripts the typical fence within the immediate environs of the farmstead was one of stakes interwoven with hazel (*Corylus avellana*) or willow (*Salix* sp.) rods. Such a fence depends upon the tension of the interwoven rods around the uprights for its rigidity and strength. If the spacing between the uprights is small, between twenty and forty centimetres, only very flexible wands rather than rods can be used. In the case of hazel, such wands would be no more than two or three years old. The resulting fence would be very closely woven and quite dense but would have a relatively short life span because the wands would dry out quickly and become extremely brittle. The life of such a fence might be only as long as three years if unprotected from the elements especially in a region like Catalonia where extremes in humidity are the daily norm for much of the year. Within a building, if unstressed, it could well last considerably longer. In the case of greater spacing between the uprights, sixty to one hundred centimetres, the rods must be proportionally thicker and much longer. To manufacture a fence of this scale, the hazel rods average seven to eight years old and have a similar functional life span in the fence. Traditionally, hazel is coppiced on a seven to eight year rotation both because after this time the rods become too

thick to be flexible enough to use in fencing and co-incidentally hazel fences become brittle and unreliable after the same time span.

The iconographic or illustrated evidence is a little inconclusive as to the exact nature of the fences shown, whether they are of the former or latter category. Of all the illustrated manuscripts one of the most celebrated is that of the Duc de Berry, *Les Tres Riches Heures*. Commissioned by Jean de Berry in 1409, the *Tres Riches Heures* was executed by Paul, Hennequin and Herman de Limbourg, undoubtedly the best miniaturists of the period. The manuscript begins with a monthly calendar depicting scenes at the Duke's court and in the neighbouring countryside. It is these latter scenes which are of particular interest insofar as they allow an insight into the management and organisation of the countryside in the late mediaeval period. Although the artists were depicting the contemporary scenes, there must be a general *caveat* to take account of artistic licence, since the intended audience was not the artisan class and precise detail would not necessarily be brought into question. The artists primary concern was to create a beautiful and satisfying picture which would be immediately recognisable in its message but which had within it artistic devices which did not deliberately seek to mislead but were accurate enough to be unconsciously forgiven by the viewer. For example, the scene for February is a landscape covered with snow with a farmyard in the foreground. The farmhouse is portrayed with a roaring fire warming both mistress and servants. Outside in the yard are detailed representations of a sheep pen, cart, casks, beehives and bundles of faggots. The farmyard is enclosed with a wattle fence as is the sheep pen. Closer examination of the wattle fence illustrates it as an artistic device, the painter had probably never examined a fence in detail and certainly had never made one. As illustrated, it is the dream of a fence maker, the rods are never ending and of a consistent thickness and flexibility. All the uprights are perfectly vertical and exactly similar. Would that this were the case in reality. One detail of the fence completion is accurately rendered in detail. The final rods at the top of the fence are put on in pairs from either side of the fence posts and as they are interwoven around the posts they are themselves interwoven with each other. This same detail is shown in the fence around the byre in the scene of the Nativity.

In this picture, and elsewhere in the rural scenes, it is interesting to observe that in the countryside at large there are virtually no fences at all. The field areas are generally not contained by any specific boundaries. For the month of March a ploughing scene is depicted with a two wheeled turnover plough executed in splendid detail but the ploughed area is unfenced. In contrast, two vineyards appear to be surrounded by quite substantial walls. The September scene of the grape harvest, this time in an unwallled vineyard, depicts an odd length of fence which has no discernible purpose whatsoever. The fence itself is rather different to the stylised wattle fences elsewhere in that it shows the rods interwoven at an angle rather than horizontally. In fact it is altogether a more accurate depiction of an ordinary fence.

Frequently pollarded willows are shown, either planted around a field boundary as in the scenes for June and July, or along the banks of a river, their more usual habitat, as in April and October. Clearly, the rods used in the fences here are willow rather than hazel rods. Woodland management is evidenced throughout the scenes showing usually oak trees grown in thick plantations, ensuring straight trunk growth and consequently useful timber for building.

The major import of these illustrations is the confirmation of the archaeological evidence of simple interwoven wattle fences. In addition, they also confirm that the use of such fences is confined to the environs of the farmstead itself. In terms of useful detail of construction methods there is little beyond the arrangement of the final layer of rods which in artistic terms becomes a stylised feature of all such fences. The perfect horizontality of all the rods in the fences depicted denies the reality of the taper to be found in the natural state, a taper which has to be taken into account during building.

Incidentally there is little real evidence for the wattle hurdle in the illustrated manuscripts, although occasionally rods in the round are shown completely encircling an end

stake of a length of fencing. The question arises because it is practically impossible to encircle the end stake unless the hazel rod is split longitudinally. In order to encircle the end stake of a fence or sail of a hurdle to hold it into the fence, the split hazel rod is twisted through three hundred and sixty degrees as it is bent around the upright. The fibres in the half or split rod twist around each other without snapping the rod. In a complete rod in the round the opposing forces of the fibres cause the rod to snap.

Hurdles have, in fact, been made since the Neolithic period and their presence in all succeeding periods is unquestioned. However, it is not clear exactly when or where the traditional building style of the hurdle of the eighteenth and nineteenth century actually began. In effect, the hurdle is a simple portable fence panel usually c.1.80m long and 1.00m to 1.50m high. Normally, they are used for making temporary pens especially for sheep at lambing time. The rest of the year they are carefully stored in barn or byre and can be serviceable for up to twenty years.

Hurdle manufacture is a relatively skilled process. The foundation is a curved log or former just over two metres long laid horizontally on the ground and pegged securely in position. Holes, about three centimetres in diameter are drilled into the surface of the log about twenty-five centimetres apart following the curve of the log. Into these holes are set the upright rods or sails of the hurdle, their ends having been previously sharpened. The curve of the former faces away from the hurdle maker. Split hazel rods are interwoven between the sails, the overlapping rod ends being twisted around the end sails as described above and woven back in between the sails. The split face of the hazel rods is always towards the hurdle maker, the half rounds facing away. Each succeeding course interweaves around alternate rods in exactly the same way as in a simple woven cloth. Fine hazel wands are used to complete the hurdle, the ends being tucked into the weave in an idiosyncratic manner similar to a signature. It is said that each hurdle maker finishes off his work in his own particular way and can always recognise his own hurdles. The final stage is the release of the hurdle from the curved log or former. Because of the manner of weaving with the split faces always against the curve exerting slightly less pressure than the outward facing half rounds, when the hurdle is released it immediately straightens under tension.

With regard to the encircling of the end stakes of fences in the illustrations, it is hard to determine whether the artist has exercised his licence in order to please the eye simplistically or to avoid the uncompromising difficulty of representing the butts of the rods ending on either side of the end stake. It may even be that the artist is combining the features of a wattle hurdle where the rods do encircle the end stake with a more permanent wattle fence where they don't because it looks more finished. On balance it is most likely to be the first of the above options.

The neolithic hurdle was nowhere near as sophisticated. It may well have been made on a former though none has yet been found or identified. Probably the sails were simply stuck into the ground during manufacture. Because all the rods were in the round there was no curve in the base line. The rods were interwoven between the sails in alternate fashion but were not twisted around the end stakes. Instead they were simply cut to length. The resulting hurdle was twice as heavy as its ultimate successor and fundamentally unstable unless some extra binding like *Clematis vitalba* or bark bast was added to tie in the end sails.

In the event, the archaeological source evidence for the experimental fence was drawn from a number of sites but in essence it became a simple synthesis. A linear arrangement of rock cut stake-holes set sixty centimetres apart was decided upon as the overall model. Because of the nature of the building material, especially the sheer quantity required, a fence length of 6.6m was determined. This involved the manufacture of twelve rock cut stake holes five to seven centimetres in diameter and ten centimetres in depth imaging as closely as possible the archaeological evidence. In all the cases examined by the writer, the stake and post-holes had vertical sides and a flat bottom. This surely has to be the intentional result firstly of manufacture and secondly of the removal of debris from the hole. It is a truism that in

earthbound post-holes the length of the human arm dictates the depth. Otherwise it is impossible to remove the spoil from the bottom of the hole.

The materials for the construction of the fence comprised twelve stakes 1.50m long by an average eight centimetres in diameter. A total of two hundred hazel rods averaging 2.50m long by 23mm in diameter were cut in a coppice adjacent to the site of L'Esquerda. The average age of the rods was eight years. Cutting and trimming the rods was carried out with a traditional axe and took just over three hours. The cutting and trimming of the stakes took one further hour. No time was recorded for the transport of the materials from the coppice to the site although it would have represented the better part of a day in an ox-drawn cart. Although the coppice is located no more than five hundred metres away by line of sight from L'Esquerda across the river Ter, actually getting there involves a long detour of some four kilometres.

The site chosen for the fence was an area of bare rock, free of any archaeological trace evidence, located within the area adjacent to the site of L'Esquerda given over to an agricultural research programme investigating the crop yield performance of the typical mediaeval cereal crops under differing treatment regimes. The rock, known locally as 'marga', is a sedimentary deposit. At L'Esquerda it appears as two distinct layers, the upper, a yellow-ochre colour, is friable and splits readily into layers. Most of the buildings surviving on the mediaeval site as well as the more recent buildings in the town of Roda were built with this rock from the upper layer. The lower layer, blue-grey in colour, is much denser and extremely difficult to work. Generally it is regarded as the bed rock though a number of the anthropomorphic tombs are cut into it. Local artisans refer to it as 'living rock' and prefer to have no dealings with it at all! The fence line was carefully situated in the upper layer. The holes were cut using a large and small cold chisel and a heavy hammer. First, the circumference of each hole was carefully pecked out with the smaller chisel and the interior chipped away to a depth of three or four centimetres. The purpose of this process was to preserve the exact shape of the upper portion of the hole as in the archaeological exemplars. Stronger treatment could well cause lateral fracturing of the rock surface. Once this depth had been established, it was possible to use the heavier chisel and greater power. The process was the same. The stone was carefully chipped away around the circumference of the hole until the ensuing bulb in the middle could be dislodged by splitting it across. The deeper the hole became the more difficult it was to remove the stone chips and powder from the hole. At a depth of ten centimetres it was impossible to extract the debris by hand and a spoon had to be used. Even at this depth, the angle available to manipulate the spoon was extremely limited. To go any deeper would have required the creation of a special tool with a long shank and a dish or bowl set at right angles to it. Each of the twelve holes took some forty-five minutes to manufacture. While this is a simple time statement, it was not possible to work continuously at the task because the sheer effort of hammering through the stone took a physical toll upon the operative. A total of six stake holes were completed in a seven hour working day, giving a more realistic time average per hole of just over one hour. The completed rock cut stake holes differed slightly one from another only in diameter ranging from five to eight centimetres. All, however, had vertical sides and were ten centimetres deep. One reflection that can be made is that the mediaeval fences with rock cut stake holes were created quite deliberately and would have had a long-term role to play. They were hardly the result of a seasonal whim or fancy.

The construction of the fence itself was in contrast relatively quick and straightforward. Each stake was shaped with the axe to fit its respective hole and hammered into place. The result was an absolutely rigidly fixed post with no lateral movement at all. In effect, such rock cut holes are ideal and far superior to any earthbound stake or post hole which inevitably deteriorates through time and use and ultimately requires packing or complete renewal along a different line. The preparation and insertion of the stakes took just one hour.

The interweaving of the hazel rods, given that the fence was only 6.60m long, required careful attention especially at the ends. The rigidity of the stakes obviated any problems of the end stakes being forced outwards even as the tension increased in the upper part of the fence.

The pattern of building required each end to be built up first to a height of eight rods alternately set either side of the end stake. Thereafter the middle of the fence was built up to the same level by setting each rod butt against successive stakes until the further end of the fence was reached and then reversing the process to the start point. The two hundred rods were sufficient to make a wattle fence 1.25m high. The actual building took two hours to complete. A fence built in this way does, in fact, have an inside and an outside face. Because the butts of the rods are always laid against the inside of each stake they are invisible from the other side of the fence which presents a completely smooth finish. Perhaps it is this effect which gave rise to the artistic stylisation so commonly depicted in the illustrated manuscripts.

The building of this short length of fence spanned a period of four days, one spent cutting the material in the woods, two manufacturing the rock cut stake holes and one actually building the fence itself. The actual hours of work recorded came to a total of nineteen, not including the transportation time of materials from woodland to site. This represents approximately three man-hours per metre length of fencing. To add validity to these figures, the writer has been building fences like this but with earth bound stakes for the past twenty-five years. Without the complication of rock cut stake-holes, the average per metre length is approximately one man-hour including cutting time but excluding transportation time.

The only tools used in the building of the fence were an axe, a hammer and one small and one large mason's chisel and a teaspoon. The axe was of the traditional design for the region of the Plana de Vic, being no more than a simple axe head similar in form to a mediaeval one found near to the church at L'Esquerda itself but unfortunately before the modern scientific excavations began and is, therefore, not exactly provenanced. The beauty and efficiency of any axe lies in its balance when it is hafted. There are a great many representations of axes of many different forms from the mediaeval period, including the Bayeux Tapestry but, beyond the outline form of the axe, it is impossible to draw conclusions about their functional efficiency unless one can actually feel the tool in the hand. That they were efficient in the hands of their users in their time is beyond question. The hammer similarly is well represented as is the more subtle round-headed mason's mallet. Chisels are more difficult to isolate except in very occasional illustrations and without any detail. By their very nature, a narrow length of metal, sharpened at one end and hammered at the other, chisels are unlikely to survive in a form which could definitely be identified. Many must exist in the archaeological record as unrecognised corroded metal objects with no distinguishing features. That chisels were an integral part of the mediaeval tool kit is proven beyond all doubt, simply by virtue of the abundant products of their work. For the anachronistic teaspoon, any similar shaped implement would have served the purpose not least of which might have been a child's hand.

Finally, it is of interest to reflect upon the husbandry practices implied by such a simple structure as a wattle fence. Firstly, it is important to appreciate the sheer quantity of material needed to make a wattle fence. In the experimental short length of fence, two hundred rods and twelve stakes were used. A simple calculation can be employed to translate these resources for greater lengths of fences with a similar height (Fence Length divided by 6.6 multiplied by 200). For example, a two hundred metre fence which would barely have encompassed the perimeter of the average small mediaeval farmstead would have required over six thousand hazel or willow rods. Therefore, a critical element of winter husbandry had to have been either the maintenance of a quite extensive hazel coppice or the pollarding of a large number of willow trees. In the case of the former, the average yield of hazel rods is approximately ten thousand to the hectare but only once every seven years. For pollarded willows, the calculation is much more difficult since they are not grown in a managed woodland context. It would not be unreasonable to hypothesise that the average small farm would need a coppice area of at least three hectares, harvested in a seven or eight year rotation cycle, to provide a regular supply of useful rods for maintenance purposes alone.

Similarly ash (*Fraxinus* sp.) and oak (*Quercus* sp.) woodland would have had to have been carefully managed in order to supply the stakes and posts needed in the running of a farm. The rotation is over a much longer period, since the average age of a fence post is at least twelve to fifteen years. Undoubtedly, these standard trees would have also been coppiced in the sense that the main stem is felled usually for building timber and the suckers which sprout from the stump were carefully nurtured as a future supply of stakes and posts. It must also be stressed here that such management involves long term planning for the future and not necessarily the future of the planner. Rotation periods of seven and fifteen years can span generations.

In such woodland management nothing was wasted. Once the actual materials were obtained, all the off-cuts, twisted branches and brash would have been carefully collected and bundled up ready for transporting back to the farm. Here was the kindling wood and firewood. Fine hazel wands and willow osiers, too thin for fencing, were cut and set aside for basket making. Even the bark and lichens were used for dyeing purposes. It is most likely that the mediaeval woodland was a well-ordered and extremely tidy place, not the tangled unwanted and unneeded mess which is the norm with modern woodland.

This tradition of total woodland management and utilisation is evidenced from the remote past not least in the classical literature. Hesiod of Boeotia in his 'Works and Days' of the eighth century B.C. advises wasting nothing from the woodland and includes the need to search for special shapes and forms of wood for making into implements like ploughs. Similarly in Virgil's Georgics of the first century B.C., there is advice to the farmer to train trees to grow into a particular shape in order to make a plough beam. One is immediately reminded of the ubiquitous two and three pronged wooden forks to be seen everywhere in the countryside in the recent past. These traditional tools were made by training trees and their origin must lie in the remote past well before the mediaeval period itself.

It is somewhat ironic and not a little disturbing to consider that a modern assessment of the needs of a farmer in the mediaeval period would be a supply of fuel for the domestic hearth whereas in reality, such wood for burning was the waste product of a much more serious management process.

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