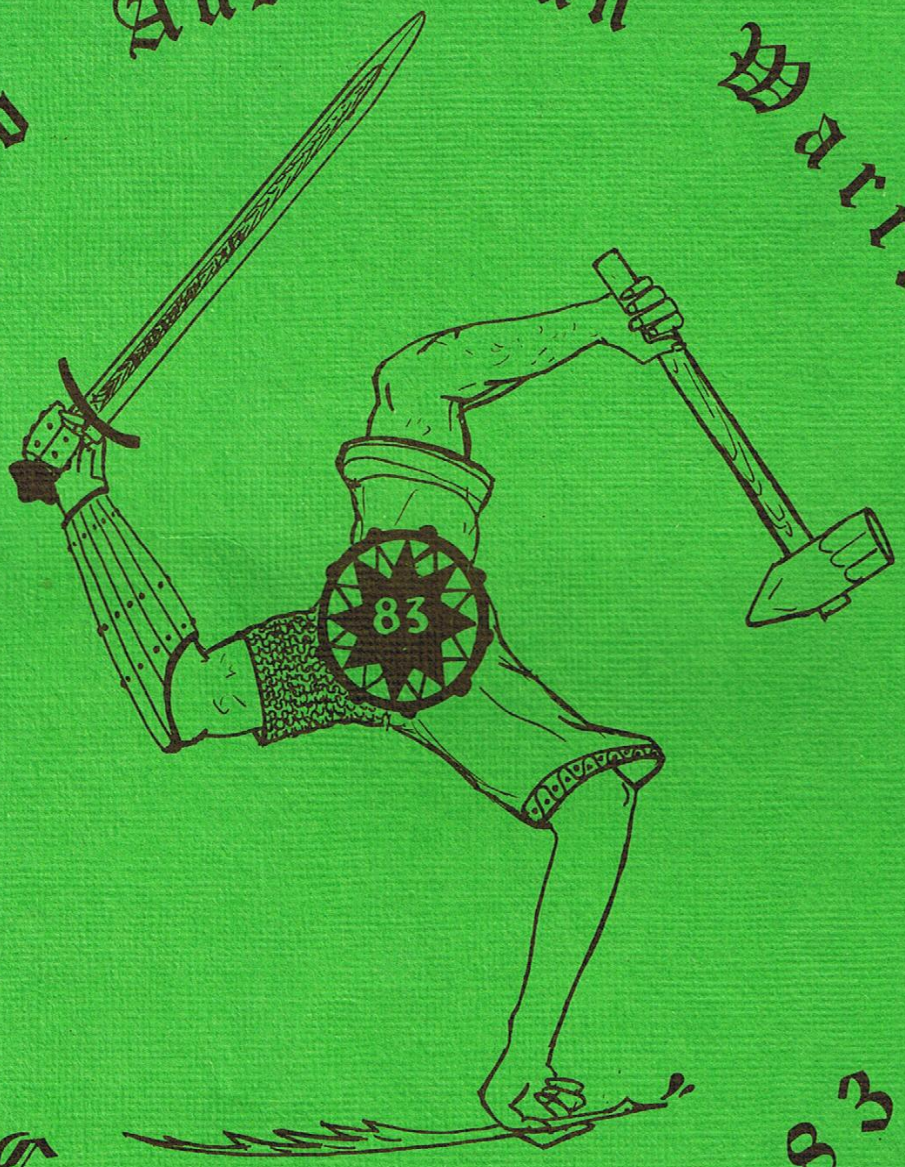
The Second Australian Warriors' Conference 1983



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INTRODUCTION

This by no means is an attempt to survey the entire field of Medievalia. Many sections have been left out for want of complete information, others because of deadlines.

We hope, soon, to be able to prepare such a document, as a result of the conference itself, and to include material from all the clubs in Australia and not just the few represented in this volume.

What we have here, is a beginning: a guide to some select areas of our endeavours: those that will be of most practical use in the development of the movement.

If there is anything which you wish to add, or correct, please see me, so that the next volume can be complete and accurate guide to the movement.

In the meantime, sit back and enjoy what's going on around you. Its like has not been seen for many years.

Stephen Rowland

P.S. For further information read New Hedeby.

A SHORT HISTORY OF THE MEDIEVAL MARTIAL ARTS MOVEMENT IN AUSTRALIA, AND RELATED SUBJECTS

By *Dave Robinson*
Past President A.M.M.A.S. and Co-Founder

As a lad I can remember having an avid interest in weaponry of all kinds. I spent several years in the R.A.A.F. fostering a practical interest in antique firearms and armour, so it was more or less inevitable that after my discharge I began to experiment with the manufacture of mail armour, crossbows, swords and all the other medieval paraphenalia we know and love so well.

It came as quite a surprise to be told by a friend "that there was another guy *he* knew making mail, and even plate armour." I could hardly believe my ears, that someone would be as crazy as me to actually try and *make* the stuff, and after assurances that this was correct, a meeting was arranged by this mutual friend...

So on the appointed day, we progressed to a small, unpretentious house in Isis Street, Wahroonga (on Sydney's North Shore). I was introduced to John and Peter Harris, two brothers, originally from Narrabri, N.S.W. I found to my delight that they had been actively making and *using* all kinds of armour and weapons for some years. Well, to say that I was impressed was an understatement. These lads, with very limited research material, and very basic workshops, had created a quite impressive array of mail and plate armour, swords, spears and other weapons. So it was that we became friends. I worked with them and we had a vigorous interchange of reference material and technology.

As I could see vast potential in this activity for both sporting and educational uses, I suggested to John that we should form a society or club, devoted to the martial arts and so forth, and thus it was after canvassing some of our friends we found a handful of interested lads, drew up a charter, and it came to be that the Ancient and Medieval Martial Arts Society was founded. The year was 1972, I believe.

Unbeknown to us, Brian Poke and Ken Morgan, along with various other now famous lads, were simultaneously forming the Viking Society of Australia in Melbourne, based at Brian Poke's home in North Carlton. Their aims were similar to the AMMAS though limited more to Viking period combat etc.

The AMMAS expanded its activities to encompass periods ranging from late bronze age Greek, through Roman, Migration Period, Medieval and into Renaissance fields of arms and armour. It was active in the field of educational displays to schools and on various occasions featured in local press and TV coverages as well as providing action in several commercial theatrical films.

Following an article I wrote for *Pix* magazine in 1973, Brian Poke and the Vikings contacted the AMMAS and regular correspondence followed, eventuating with the convening of the *first* Medieval Warriors Convention on June 5-7, 1973, when the leading members of the Viking Society flew to Sydney (in full

costume too). They were greated by the AMMAS in costume at the airport!

Three days of good cammaraderie and combat followed. This led to many good and lasting friendships being developed, and a good interchange of ideas and inspiration.

Each group progressed, and had its ups and downs, but interest stayed high, and in March 1975 a group of members of the AMMAS visited the Vikings in Melbourne, shared several combat displays with them at Bendigo, Ballarat and Kryal Kastle (the world's biggest concrete block incinerator) where the proprietor, Keith Ryall offered the AMMAS work jousting and performing for his tourists. But as the high standards of authenticity achieved would have suffered, the offer was declined and the AMMAS returned to Sydney.

The years that followed led to further historical research by the AMMAS with active technological correspondence being maintained with such noted experts in the field of arms and armour as Mr H. Russel Robinson FSA, Keeper of HM armour, Tower of London (decd.) and Helmut Nickell, Keeper of Armour, The Metropolitan Museum of Art, New York, USA. With the advice and constructive criticism of these and other experts, a very high standard of technical and historical excellence was achieved within the limitations of the ability and available technology of the members.

However as the technology required to achieve 99% authenticity in arms and armour manufacture was not then available to us, and as I felt in need of a break from the pressures of the club scene, I withdrew from the AMMAS. A short while later I travelled extensively in the country studying under blacksmiths, to learn more of the technology required to upgrade my ability as an armourer and weaponsmith.

Subsequently the AMMAS moved from its base at Sydney to a property near Camden, NSW, where it continued in a reduced form and latterly divided into several other groups, each being formed by former AMMAS members: there was Peter Harris with Warrior One, and Peter Lee with 1066 groups. A group is reported at Cudmirrah, NSW, formed by Brian Barret, an ex AMMAS chap also.

Down south, the Viking Society also wound up operations. Brian Poke moved "up the Bush". Later several splinter groups formed as had happened in NSW. A very keen ex-Viking Society member, Bill Payton, and his wife Rose, formed a club. There is, we believe, a group at Henty, NSW, formed by Emil Sorenson, also an ex-Viking Society guy. There is, or was, a group in Melbourne called the White Company formed by the infamous Karl Bracher, who had been black listed from various Melbourne clubs, for excessive violence, including the New Varangian Guard. It was formed in Melbourne by Bev Lane and still currently active in the field.

Kim Peart founded the Tasmanian Viking Society in 1975, and this group has progressed from humble beginnings, with various ups and downs, and now is also quite active. After having various problems with Kim, it has now apparently stabilised, and will be represented at the Conference.

The Host group, the Macquarie University Ancient and Medieval Armourers' and Artisans' Society (bloody names bigger than the club!) was formed by an* ex-AMMAS guy, Greg House, whilst a student at Macquarie, in about June 1979. With the usual bags of enthusiasm and bugger all else, they approached me to act as technical consultant to them, which I agreed to. This society has forged ahead quite well, until it has reached the stage of being able to convene and host the Second Medieval Warriors' Convention.

* Two ex-AMMAS guys, Greg House and Ross Reid, whilst students...

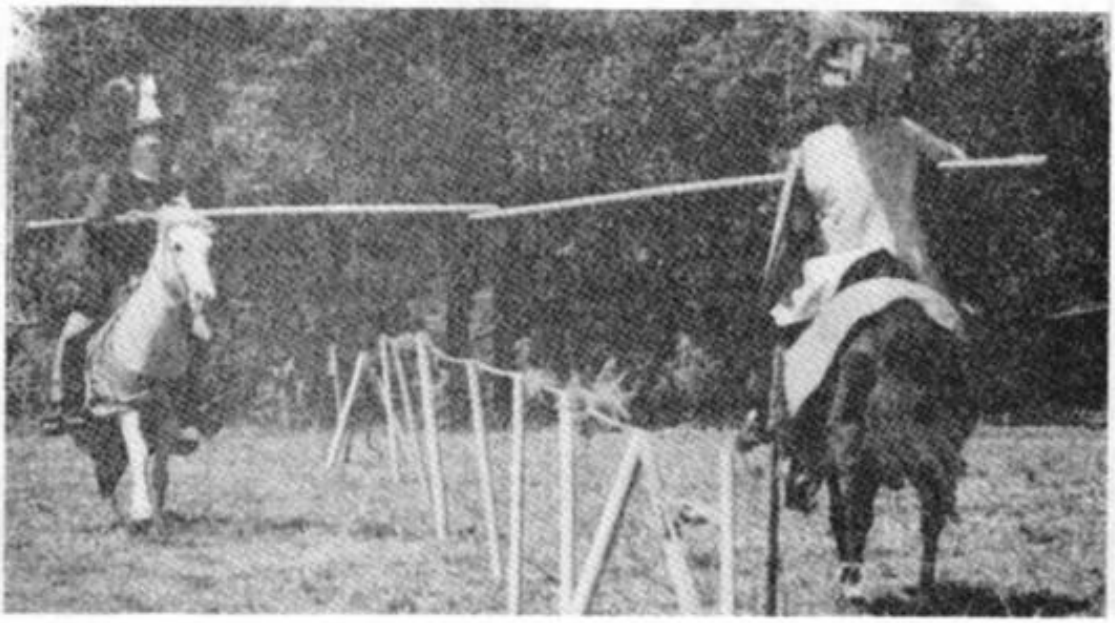
This group, though they don't always realize it, are perhaps the luckiest of all being in a situation where they have been provided with land and facilities at no cost by the Uni., and have at their access vast amounts of excellent research material. They were one of the venues for the recent ANZ Medieval Studies Conference held in 1981 and have undertaken various life style projects such as dark age buildings construction and, in cooperation with the School of English and Linguistics and myself, the manufacture of a dark age pattern welded sword to original specifications.

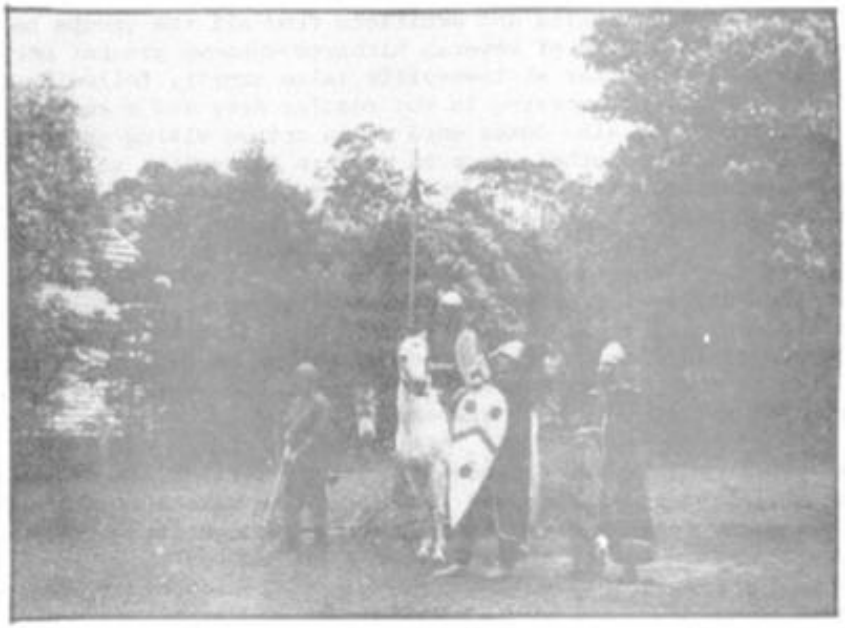
Through the efforts of Brian Poke, now resident in Tassie and the custodian of a collection of memorabilia and artifacts from all the groups he has had contact with, word has come of several hitherto unknown groups: one at Enoggera (army?) and another at Townsville (also army?), following the work of Brian's son Kevin, now serving in the regular Army and a keen medievalist. From Brian also comes word of an active Viking group in South Australia and possibly another group in Western Australia; all of this not including whatever branches of the Society for Creative Anachronism SCA that lurk in the mists of medievalia around us.

Quite probably there are many individuals and groups that I (we) do *not* know of and we sincerely apologise to any person or group if we have neglected them or misrepresented them. The information here is based purely on my personally available data, which may or may not be up to date or accurate. I should like to thank Brian Poke for his *invaluable* assistance with this and other tasks related to the conference.

As can be seen from this brief resumé of club activities, there now exist sufficient societies and interested individuals to make worthwhile some attempt at greater inter-society intercourse and cooperation. This can lead to the mutual advancement of medievalia as a whole, and to active channelling of public interest and support into the legitimate historical re-enactment movement.

Obviously space does not allow a full and detailed account of every society's activities and history. If possible, the author should like to obtain a full account: dates, names and places (with photos if possible) of other societies' and individuals' activities, so that in the not too distant future a full, accurate and unbiased history of the movement can be written.





"TAKE TWO COMFREY LEAVES AND CALL ME IN THE MORNING"

A broad light look at Medieval Surgery compiled by Brian Poke, RSD 147, Preston, Tasmania 7315 (004) 29 1206, and dedicated to John Harris, Sydney and Bill Payton, Melbourne - medieval surgical instrument makers extraordinaire.

WISE ADVICE TO SURGEONS

SKULL SURGERY

This requires a trephining drill spun by centrifugal force, bow action or hand action, also a curved blade cranial saw. First remove the hair by flame or shaving, operate, then seal with pitch, cautery and oil. To trace a fractured skull, pour ink or resin over the patient's bare head. Briskly rub off and the line of damage or depression will show. Some patients will become insane after these forms of treatment, therefore wisdom is assured by keeping your sword within reach.

EYE SURGERY

If it is of a delicate nature, remove the mist film, slowly to one corner of the affected eye. To mix a suitable ointment use charcoal, honey, salt, castor oil, copper and alum. Should the eye become blind through wound or nature, sew the lids together.

EAR TREATMENT

Should the ear part from the head, sew it back on, or leave and treat as a wound. Ears serve no real purpose and restrict the placement of helms. In patched battle, if you lose your helm, it allows your opponent an extra appendage to grip.

TOOTH CARE

This is important. Place potassium or sodium carbonate in a ladel and burn. Remove residue and instruct patient to rub upon teeth. This action will remove stain. To fashion a false tooth, carve from an ox bone and affix with tree resin and wire. Pain of the tooth is common and should be treated with a mixture of wine, castor oil and the powdered clove bud. Should this fail, use opium and if this is of no avail, remove offender by cutting gum and drawing out with forceps.

WOUNDS

These should be cleansed with rose water, white of egg and wine, then sewn with horse hair, linen, human hair, bow string, thin leather, hemp or animal sinews. Burn incense to purify the air and, should fever be evident, remove patient to a cool place (a fountain is ideal). For a local external pain reducer, use oil of roses and vinegar; opium; henbane and mandrake crushed and in equal parts. Hold this to the patient's nose to alleviate severe pain. The black ant with the large head is ideal for internal "sewing". Have the insect bite across the wound then snip off its head at the neck and the jaws will remain tightly closed. It is found a successful poultice to be green bread, salt, garlic and honey. It is wise to add a drain wick to oil and pitch, very hot or very cold water, boiling oil, forceps or alum.

FRACTURES

These are of a common nature. Apply traction by drawing by hand, using a wheel knave and large stave with leather thonging or by a windlass at each end of the patient. Treat wound if evident, then bandage prolifically using starch, resin or pitch to stiffen. If the fracture will not reduce, cut a notch in bone and use a stone mason's metal bar as a lever. Wooden splints and untreated wool can prove worthy for immobilisation. Fresh wine applied to the linen bandages, particularly in a hot clime, will stop the skin from drying. To treat dislocation of the spine, lay the patient on a table, attach a large plank horizontally to nearby wall, lay plank across patient and jump up and down on the other end. Heavy weights can be attached to rope and hung over end of bed to increase and hold steady traction to a fracture. But a similar system, windlass at head end or vertical groin pole must be used to stop patient sliding down bed.

CHILDBIRTH

It is well cared for by women trained in this matter. But should the child die, to save the mother's life, remove quickly with a traction hook.

ENEMA

This is most suitably achieved by using a hollowed cow horn and warm water.

LITHOTOMY

This is best left to the itinerant men with this specialised knowledge. But if you need to operate, use a dilator or speculum in the anus then place finger in and press forward and attempt to crush stones. If this fails, make an incision in the peronium and bladder, then remove with forceps.

INSTRUMENTS

Those necessary for the field, hospital, military and ships surgeon: forceps, scoops, speculums, spatulas, measuring spoons, scales, tweezers, probes, arrowhead retractors, cannulas, dilators, traction hooks, cauteries, knives, scalpels, tongue depressors, scissors, bone plates, insufflators, bleeding cups, cow horns, mail link retractors, caustic application forceps, splints, cranial saws, saws, earthenware bowls, suturing thread and needles, ladels, windlass or similar, mortar and pestle, tooth instruments, listening horn, trephines, excision instruments, instrument guides.

RETRACTION

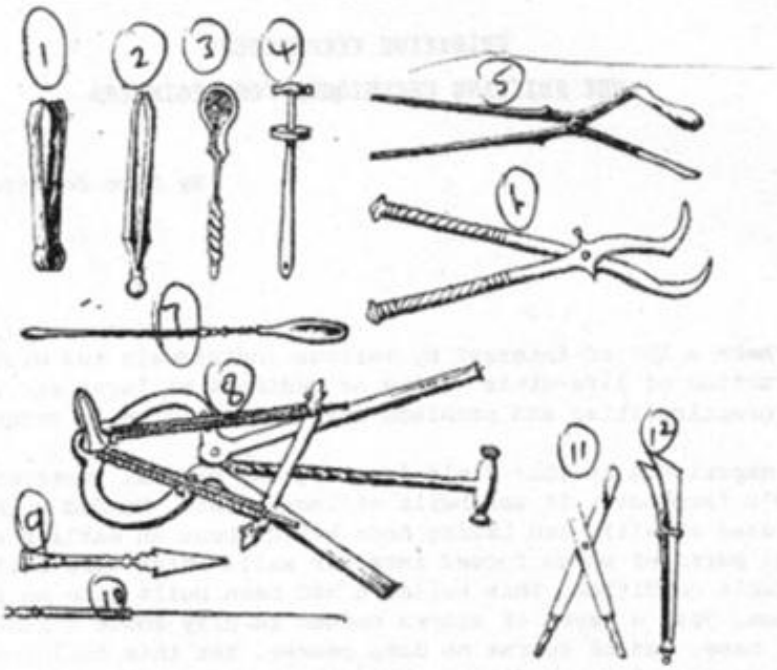
For retraction of foreign bodies, have the patient placed in the same position for removal of lance, spear, arrow, mail link, etc. as that for which it/they entered. If a small object cannot be removed without great damage, allow it to remain. Many a good man has lived long with internal accoutrament.

BLOOD LETTING AND PURGES

They achieve the following: make the mind sincere, purge the brain, reform the bladder, warm the marrow, open the hearing, check tears, remove nausea, benefit the stomach, invite digestion, evoke the voice, build up the senses, move the bowel, enrich sleep, remove anxiety and nourish good health.

DIAGNOSIS

This is assisted not only by observation and questioning the patient, but also by placing him in the Public Square, so that all passing can discuss his ailment.



1 and 2: are clippers, but what application would they have in medieval/ Roman surgery?

3: occultist spoon?

4: Help! Is it a suturing awl?

5 and 6: Dilators and forceps.

7: obvious.

8: Is a ripper - speculum? Clamp? If so, how does it work?

9, 11 and 12: I give up.

10: Probe and/or hook, no worries!

PRIMITIVE TECHNOLOGY:
HUT BUILDING TECHNIQUES FOR BEGINNERS

By *Dave Robinson*

As there has been a lot of interest by various individuals and groups of late in the construction of life-style Viking or medieval villages etc., a few words on the practicalities and problems involved would be in order.

Initially my experience in this field involved the partial restoration of an historic 1830's farmhouse. It was built of local slate, bonded with clay (no cement being used at all), and having been built about an earlier wattle and daub building, parts of which formed interior walls which were still standing and in reasonable condition. This building had been built with *no* foundations as we know them, just a layer of stones bedded in clay about 1 foot wider than the wall base, and of course no damp course. Yet this building was habitable and in very fair condition. This gives testament to the longevity of these styles of building, if looked after and kept rooved to keep the rain off.

Of course, certain modifications to suit local conditions etc. will be required. Keeping within the general style of mevieval or colonial, one may have to adapt one's design to meet local council requirements. This can be a hassle as most councils have no idea of what this sort of thing is all about, but with perseverence you should be able to win out on the authenticity problem.

WATTLE AND DAUB

Firstly assuming a suitable site is available, away from areas liable to flood, but close to water, on town water at least, with soil of a suitable consistancy, a wattle and daub building should be quite easily produced. The soil available is quite important and should be a clayey loam, but not too much clay, but not too sandy either. The test should be that a quantity of soil should be mixed up with water and some straw or grass to a consistancy of a cake mixture (not too sloppy, not too crumbly). It should be able to be moulded or domed without slumping too much, so that when it is applied to the wall it does not drop off.

Assuming the local soil is suitable, or clay or sand available to adjust its consistancy, the first job is to level the site. Ideally raise the floor of the hut level slightly above the ground level so water will not run in. The floor should be formed of (A) a clay rich mix of loam, cow dung and water, free of big stones, and rammed down well and allowed to dry. If dung in quantity is not available, chopped straw will suffice.

Using squares and cord, lay out the size of your hut, dig holes for the main poles (B) (being forked ironbark poles of at least six to ten inches thick). The other forked top uprights (D) should also be of iron bark or other suitable in-ground timbers. Ideally the in-ground parts of the poles should be

charred over a fire, coated with tar, bitumen or creosote (also if available) to prevent rot. In fact, if it is available, tar etc. could be painted on all timbers used in the wall construction, and tar could be spread on the floor level in the post line to act as a damp course if required (or plastic sheet could be used also).

Here at Macquarie we did not damp course our hut as we wanted to keep the building as authentic as possible and gauge its decay rate so that archaeology students would have an accurately dated wattle and daub building to use as a control for later studies.

The lintels and roof beams can all be of Stringybark or box, both suitable for such above ground usages. They can be treenailed (dowelled) to the uprights, or hand made spikes can be used, or failing all else, wired on with a "Cobb & Co." hitch.

Treenails are preferred as they can easily be made from 1" hardwood dowelling with short cuts in each end in which wooden wedges can be driven when placed in holes bored in the poles. This method is actually stronger than steel as the wood grows together. Some old buildings and ships have been entirely built with treenails, not an iron nail being used, and have a life of some hundreds of years!

Between the main uprights, thinner (2" approx.) saplings can be planted in the ground. They should be spaced at 12 to 18 inches (G) and notched into the horizontal beams (E & F). Some buildings have a squared beam at floor level that the uprights (G) slot into, but they can be tarred and put into the ground as was more common in medieval Europe.

Next, a large number of thin or split saplings about ½" thick by 1" or so wide (split bamboo works well here) is *woven* or wattled in and out between the uprights. These wattles (H) are tied or nailed at the ends and should be spaced fairly closely but *not so close as to make daubing difficult*.

The wattles need not be all put in at the one time. Depending on the work force available it can go on concurrently with the *daubing* which is the next stage.

Ideally the best way to put the daub onto the hut is to dig a small pit close by the hut, line this with clay or plastic (ugh) to make it waterproof, then one finds out how keen one's friends are. Picks and shovels are needed then to dig out large quantities of loam. This should be broken up and ideally should be sifted through a one inch screen to remove all stones and other sharp objects. (As you will see.)

Into the pit (I) will be placed a fair quantity of soil, plus a bit of extra clay or sand to make the mix suitable. Add to this some straw or grass, and then sufficient water to make a mixture which is of a nice gooey consistency. The best and only way to mix this efficiently is to strip to your shorts (J) and get into the pit and trample the mixture. Ideally several folk at once can do this. Ideally, one team shovels dirt into the pit, another team tramples it, a third team carries it in buckets or wheelbarrows to the walls where another team (K) plasters it simultaneously on the inside and outside of the walls, pushing the mix in between the wattles so as to make a solid wall free of holes.

The tramplers (J) in the pit (I) should be alternated every hour or so. Care must be taken to keep sharp stones etc. from the mix so tramplers feet do not get cut.


1
2
3
4
5
6
7
8

The daubing should be done over a period of several days or weeks, ideally to allow the lower parts to dry out a bit, so that it does not slump or fall out. It can be covered with plastic sheeting etc. to protect it from the weather. When the entire wall is covered with daub, allow it to dry partially and then give the inside and outside another coat, smoothing it well off with the hands. If this is done at a later period, one must wet the existing wall somewhat to give the new daub a grip.

The wall when finally finished can be whitewashed to make it look nice, or left its own dun colour if preferred. *Do not* cement render as it will fall off and is *not* medieval.

ROOFING

The hut can be rooved in several ways, depending on available materials, of course. First the rafters must be erected (L), preferably of stringybark or box. A simple A-frame roof will suffice, depending on the size and style of the building. More elaborate strutting (M) would be needed for a really big hall etc. The rafters etc. can be wired, nailed or bolted into place, but preferably treenailed, which is cheaper and more authentic. Thinner battens (N) should be affixed at about 18 inches spacing up the rafters. These will support the roofing of thatch or shingles etc. These battens should be strong enough to support the weight of a man standing on them to allow work to be carried on upon the roof. Bamboo poles are very good, split stringybark saplings also; whatever is available.

THATCH

Thatching was by far the most common roofing method of the middle ages, and though it is a skilled trade in itself, a reasonably long-lasting and water-tight roof can be made by anyone with a little patience and care.

Two materials are traditionally used: wheat straw and Norfolk reed, or bullrushes. Wheat straw is now broken up by combine harvesters, meaning a crop of wheat would have to be especially hand harvested by scythes etc. to get unbroken straws (hardly practicable). Rushes are found in creeks and swamps all over the country, and have the advantage of being easy to harvest and work with, and have a longer life than straw. So the first requirement is a handy swamp of reeds. These should be harvested with sickles (when they are green is the best time). The best way is to wade into the swamp with sickles, or machetes, wearing swimmers and sandshoes or something to protect the feet from sharp objects.

Cut the reeds as close to the roots as possible. Do not pull them up. Leave the roots to allow reeds to grow up again next year for more thatching.

Helpers on shore should tie the reeds into bundles, about ten inches thick, with the bulb, or stem ends of the reeds, together the same way. They should be tied tightly so as to be an easily handleable bundle (O).

Transport these to the building site and they can be thrown up to the thatchers or passed up on the end of a long forked pole.

Ideally you would have two teams of thatchers, one on each side of the roof. Each team comprises a sewer, and helper on the *outside* of the roof, and a needle man on the *inside* of the roof, in the rafters.

Several thatching needles are required. These can be of wood or metal, with a hole at the point end like a sewing machine needle. This is used to pass the rope through and around the bundles and the battens on the roof.

Beginning at the bottom right hand corner, a row of bundles of reeds is laid and tied on, being packed *tightly* together. They are sewn on to the batten nearest their mid point. The sewing is a series of rolling hitches (P) tied off every four bundles. The next layer of bundles is begun about the right hand end, also in such a way that the *ends* of the reed bundles *cover* the sewing of the layer below completely by about 18 inches or so. The next bundle covers that sewing also, so that *all cordage is covered by reed.* This is vital, so water will run off reed ends onto other reeds below, and run off unobstructed (sub diagram 1). The thatching needles are used to force their way through the layers of thatch, where the cord is looped around the batten by the needleman and then pushed back up to the thatchers on the roof (careful you don't spear him). The roof goes up in a diagonal fashion, the lower area thatched first but going upwards as well until the last area to be done is the *top left hand corner.*

The cord is ordinary hemp or coir cord about ½ inch thick which has been previously soaked in a mixture of stockholm tar and methylated spirits. This stops the string rotting in the weather.

One must ensure the thatching is tight, trimmed evenly, etc. Pull all ropes as tight as possible for, as it dries, thatch shrinks slightly.

The ridge of the roof is thatched by *bending* bundles over the centre beam or ridge pole and sewing *through* from side to side. This can be also held in place (Q & R) by small logs slung on ropes over the ridge (S).

If the bundles are tight and well sewn, such a roof will be quite waterproof and long lasting. It was often common practice to place netting (old fish net or in modern times chicken wire) over the thatch to keep birds and (here possums) vermin out. The net would be held down by stones on the ends.

Care must be taken with fire as the thatch when dry is *highly inflammable.* It can be treated chemically before assembly to fireproof it to a degree, but the cost could be prohibitive. Keep all fires in the hut small, and use hardwoods that do not send up much sparks or embers. If a fire starts in the thatch, unless the fire can be put out at once with a bucket of water, get out immediately as it burns fast and fiercely. No possessions are worth your life, so in case of fire *get out right then.*

SHINGLES

The use of shingles dates back to Roman times. It is an alternative where reeds or straw cannot be obtained. Billets of wood are split with a froe into thin planks about ten inches by two feet, usually pointed at one end. These are nailed on to the battens of the roof, overlapping like scales. Several Danish churches still have roofes of this kind dating to the 1100's and even earlier. Each shingle covers some two thirds of the one below it, and is slightly to one side (Y). It could be laid over tarred paper etc. and the ridge is usually of wooden planks (Z) as per illustrations. Shingling is still practised today, and plenty of advice on woods etc. should be available from building information centres etc.

BUILDING IN STONE AND PUG (CLAY) OR SOD (TURVES)

An alternative to building in wattle and daub, is to utilise locally available free stone. This was done by the Irish, Nordic and other races in areas where timber was scarce or soil not suitable.

The two methods here were used either separately or in combination, and traces of buildings using these techniques still exist in England, Ireland and Greenland.

Walls can be erected entirely of drystone, with no bonding material, as was done by some Neolithic races. Total drystoning requires considerable expertise to ensure a stable wall. A better approach is to use stones bedded in a clay or loam compound. In this case the higher the clay content the better. Ideally the stones are laid without dressing (U) in wet clay/earth against wooden forms or shuttering. Two layers of stones forming an inner and outer layer are best. The *outer* layer can taper to the top, or remain parallel (the space between being filled with rubble and dirt, or sods or a mixture of both) (V). No foundations are needed if the walls are not to be supporting a great load or not very high, though a pit with laid foundations is always best. Tar can be used as a dampcourse then. But on good solid earth no foundation is required for short walls.

Sometimes *sods* or *turf* was used. A shovel was used to cut or lift slabs of grassy sod and these were laid like bricks in layers, with alternate courses at right angles (X) to bond the wall together. A wooden lintel was placed atop the wall in both cases (W) to bear the rafters, or part of their stress, if the rafters were continued to the ground as in some Anglo Saxon and Nordic styles of building.

Rooves of sod were also used, as were stones and slate. In this case very heavy beams would be needed to support the weight of sods. A knowledge of stone corbelling for stone rooves, without beams, or with beams using thin slates, would be needed. All this is dependent upon locally available materials, personal expertise, labour force, etc., etc.

The only way one can succeed with these types of projects is to ensure ALL materials are available before starting and to have a guaranteed and willing work force to see the job through, and remember, one boss (too many chiefs and not enough Indians is the curse of any group effort).

GOOD LUCK.

TRANSITION ARMOUR

By *Stephen Hand*

Before discussing transition armour as such, a reference to lamellar and scale armour must be made. Both these are made of small plates: lamellar laced together, scale rivetted or sewn onto a leather shirt. Lamellar is fairly rare in Western Europe, but scale armour is well represented throughout the period under discussion. These shouldn't be confused with true plate armour, but throughout the period both scale and lamellar armour have played a large part as substitutes for plate.

Despite this, the story of transition period armour is really one of mail and plate, and the interaction between the two. The first reference I have been able to find of some form of plate armour is to "plates of worked iron" being worn between *aketon* and *hauberk* by King Richard I and William de Barres in a combat. This is dated at being any time up to 26 years before the author's death in 1225. However, whatever this armour was, it was very rare; the only account of it being this one. Another early reference to hardened reinforcement of mail is the *curie*. This was almost certainly of *cuir bouille* - hardened leather - and took the form of a breastplate between *hauberk* and *surcoat*. This is referred to from 1250 onwards as *poleynes* attached to the knees of *chausses*. By 1270 these *poleynes* had extended to protect the sides of the knee as well as the front. On the effigy of William Longespée the younger, c.1260, circular *couters* are shown laced to the elbows of the *hauberk*. This pre-dates the same feature on other effigys, by some forty years. Another rare feature in the third quarter of the thirteenth century are *demi-greaves*, covering the front of the shin. A variation on this is seen on an English drawing of c.1250, showing greaves of cloth studded with small metal discs.

Also during the third quarter of the thirteenth century, there are several references to some form of reinforced surcoat. The best reference is a statue of a sleeping guard in Hanover. There is a clear outline on his surcoat of rectangular plates with rivet heads also in evidence. Another statue showing this feature is one of St. Maurice which is dated between 1250 and 1300. This shows the classic poncho style coat of plates. The sides of the front flap wrap around the back where they cover the back flap and buckle together. From 1300 onwards, the coat of plates became far more common, and by 1320 it is rare not to find it on funeral brasses of wealthy knights. The first plate gauntlets on record are in an ordinance issued to the armourers of Paris in 1246. They were made in a similar fashion to coats of plates; that is, iron plates rivetted between layers of cloth.

Around the turn of the century the *gorget* came into existence. This was a cylindrical collar extending to just below the nose. However, its use appears to have been limited mainly to Spain where some 20 years later the *beuor* of classic shape covering the neck and chin was developed.

As early as 1302 closed greaves had been developed. They are rare during the first quarter of the fourteenth century and came increasingly into use past 1325, being common by the time of Crecy in 1346. Accompanying these are

cuisses. These are mostly of the gamboissed type but occasionally, from 1320 onwards, of solid plate. There is also a term used: cuisses of plates. It seems that from the original padded gamboissed cuisse, it became studded and then began to have plates rivetted internally. This was developed into the cuisse of plates, being large plates rivetted between layers of canvas or heavy cloth, as in the coat of plates. The cuisse of solid plate was very rare before Crecy, where it appears to have been used in considerable numbers.

Another feature rare before 1320 was the *sabaton* or foot defence. The word *soleret* is frequently used for these, but appears to be a later name and of German origin.

Sabatons of a coat of plates construction are seen frequently after 1314 and up until 1330. The first classic sabaton of overlapping lanes to a pointed toe occurs in 1323 on the brass of Sir William Fitzralph. After this they are fairly common, except in Germany where they are rare until after 1340.

Arm harness of plate followed much the same pattern as leg harness, that is, two guttershaped plates with a globular cap over the joint. As previously mentioned, *roundels* or disc shaped couters were laced onto the hauberk to cover the front of the elbow, from 1260 onwards. Queen Mary's *Psalter*, a manuscript of c.1300, shows similar roundels known as *besagews* attached to the front of the shoulder, covering the armpit. From the second decade of the fourteenth century onwards, gutter shaped plates are shown attached by a strap and lace to the upper side of the forearm, and the outer side of the upper arm. These plates are known respectively as *vambrace* and *rerebrace*, although vambrace is the name later given to the armour for the whole arm. Along with these is a cup-like couter with the disc-like roundel rivetted to the edge to cover the inside of the elbow. By 1325 vambraces are shown made of two hinged plates. These often replace the lower part of the hauberk sleeve, which becomes loose and overlaps the top of the plates.

Between 1276 and 1350 a feature of many *brasses* and *effigies* are *ailletes*. These are rectangular plates laced to the side of the shoulders, standing up on either side of the head. From references to their construction of camas, soft leather and other flimsy materials, their role appears to have been heraldic, with the arms being displayed on them.

During the years leading up to the transition period, the coif of the hauberk had mostly been attached to the hauberk itself. After 1250 it began to be made detached, and instead of having an aventail laced at the brow, it began to be tight around the jaw and have an opening at the back, which was laced. The dominant head protection to 1300 was mail mufflers, being mittens attached to the end of the hauberk sleeve. As plate gauntlets began to be used from 1300 onwards, mufflers disappeared. Also from 1320 onwards, the hauberk tended to be shorter at the sides and longer at front and back. The collar of the hauberk also becomes rigid and solid during the early part of the fourteenth century. This was done by increasing the wire thickness in the collar links. A detached form of this, the *fizaine*, was found in many fourteenth century inventories.

Helmets also changed during the early transition period. Around 1250 the barrel helm began developing a taper to the section above the eyes. This brought the front away from the face and gave better glancing surfaces. This taper increased up to 1300 and the front of the helm deepened to give a point extending towards the chest. Worn under the helm was either a mail coif or a *cervelliere*, a steel skull cap over a coif, or with a *camail*. This later developed into the *bascinet*. Another feature of the early fourteenth century was the general acceptance throughout Europe of the crest, which had been popular, though far from universal, in the thirteenth century. Yet

another feature was the introduction of guard chains on swords and helms.

In 1300 the cervelliere was more and more used with a camail rather than over a coif. With the tapering of helms, the cervelliere came to match the helm worn over it. The conical cervelliere became known as the bascinet.

At this point I would like to quote Claude Blair from *European Armour* on the arming of an up-to-date Knight, c.1330: "The knight having donned a close fitting shirt, short breeches and hose, proceeded first to the arming of his legs with mail chausses, gamboissed cuisses with poleynes, greaves or demi-greaves, sabatons and spurs. After these he donned his aketon, his hauberk or *haubergon*, with the armharness and besagews attached to the sleeves and his coat of plates. Sometimes the coat of plates and the lower cannons of the armharness were put on before the hauberk but the reverse arrangement seems to have been more usual. A surcoat or gambeson was then put on over everything, followed by a narrow waistbelt and the sword belt which usually hung fairly slackly around the hips. Finally, but probably not until action was imminent, the gauntlets and the bascinet with its camail were put on. If the bascinet was visorless it was usually supplemented by a helm with a crest. Our knight might have also worn aillettes, a plate beror and a pizaine although with the exception of the last named these seem to have been comparitively uncommon at this date."

The surcoat referred to may have been of the long variety of the previous century or of the so called *cyclas* variety, that is, cut away at the front. Later in the century the back was also cut away to leave a short *jupon*, common till the second decade of the fifteenth century.

As the bascinet began to be worn alone, visors were developed. These visors often had a pointed nose piece, hence "pig faced". The English and French seem to have favoured visors hinged on both sides of the helmet, while Germans and Italians favoured a single hinged *klapvisor*.

From the early "coat of plates" style gauntlets developed the hourglass gauntlet. This was a cuffed gauntlet pinched in at the wrist. It often had mail fingers though from "Crecy" onwards fingers of overlapping plates are almost universal.

The poncho style coat of plates, as excavated in such large numbers at the site of the battle of Wisby (1361), was only one style. Two coats of plates were excavated from the site of the castle of Kussnach in Switzerland. This was destroyed in 1352. The coats were more of a *brigandine* construction composed of small plates formed into a *cuirass* which buckled at shoulders, and one side. From 1340 onwards some coats of plates had the chest plates joining together into a one piece breastplate. By 1370 this had been extended into a hip length breastplate with a skirt of hoops known as the *fauld*. At this point the construction was still fabric covered, but had much the same form as the later cuirass. There are several early references to a breastplate separate from the rest of a coat of plates. However, the first independent breastplate was the one on the effigy of Albert von Limburg, dated 1374. This was a crude reinforcing plate covering the chest, but by 1376 we see a well formed rounded breastplate on a similar effigy. The Churburg harness of 1390 has a small 9-piece breastplate which extends partly around onto the back. This has a lance rest and a V-shaped stop rib at the neck to prevent blades sliding up into the throat. Several effigies of around 1400 suggest the presence of a backplate beneath the jupon, but the brass of John Ruggewyn dated 1412 is the first concrete example of a backplate. This cuirass also had the fault extending right around the body.

Around 1330 Sabatons are first shown completely enclosing the foot. They remained unchanged for the next 120 years. From 1340 gamboissed cuisses are rarely seen without some sort of studding or inlaying with plates. They were often reinforced with longitudinal metal strips at various intervals. Also from 1340, poleynes narrow and develop side wings. By 1370 solid plate cuisses were generally used. At this time too, the greave had become lower at each side, forming an arch over the instep. Similarly, during the period from 1330-70, the armharness of plate completely supplanted mail. An armharness would consist of an hourglass gauntlet with articulated fingers, a hinged vambrace and rerebrace with an upper and lower lame at the elbow, covered by a globular cap. The circular besagew was replaced with a wing, often heart-shaped. The shoulder was now protected by a set of overlapping lames, known as a *spaulder*. A besagew still hung over the front of the armpit. Around 1350 the besagew fell out of fashion, but returned by 1410. About 1400 the laminated spaulder began to be replaced by a one piece shoulder guard extending onto the chest and back. This was known as the *pauldron* and gradually supplanted the spaulder and besagew. Throughout the later fourteenth century the hourglass gauntlet remained popular, and was often given low spikes called *gadlings* over the first knuckle of each finger.

Up till the end of the century the bascinet became slowly deeper, covering more and more of the back of the neck. Also the point of the helmet was moved steadily back till by 1400 a profile view showed the back as almost a straight line. From 1330 the camail became universal. The method of attachment was by vervelles. These were small staples on the inner lower edge of the helmet. A wire was passed through both vervelles and the upper row of the camail and was secured at each end. Thus the camail was held in position but could easily be removed. While the English and French favoured visors, the Italians and Germans preferred a detachable nasal, which was attached to the camail and was hooked up to the bascinet in combat. Around 1360 the Germans switched, in general, to the klapvisor. It was also around this time that the breath holes on visors became restricted to the right side of the helmet (the left side facing the opponent's lance). During the period 1330-70, a rare sight is a bascinet with a plate bevor reinforcing the camail. By 1400 the bevor is often found replacing the camail completely, in what is called the *Great Bascinet*.

With the development of the bascinet to such a degree, the great helm was relegated to the tournament. During the last decade of the fourteenth century the eye slit lost its central division and the helm became higher in the skull with a rounded skull. The lower edge of the sight tended to curve forwards to form a lip. These quickly developed into the true frog-mouthed helm with its huge protruding lower lip. Another helmet worthy of mention is the *barbut*. This was an Italian form of bascinet modelled on the Ancient Greek Corinthian helmet, with a Y-shaped gap in the front. It covered the entire head and was worn with a coif.

During the final quarter of the fourteenth century, the crest was added to, by the *orle*, a circular roll of embroided padding around the top of the helm.

Despite the invention of plate cuirass, mail continued to be worn underneath it, right up until Agincourt. About this time, the jupon too was generally discarded, leaving the plain Alwyte armour. The transition period is usually thought to have ended about 1410 when mail was relegated to the role of reinforcing patches, at joints, on the arming doublet. It is at this point therefore that I will leave my discussion.

BASIC WEAPONSMITHING

By *Dave Robinson*

Naturally enough it is difficult to condense a decade of practical experience and research into these few pages. Ideally one should obtain as much literature on blacksmithing as is available, and seek out an old-time blacksmith who can *show* you the *right* way to do some of the trickier operations such as forge welding. But, trial and error is also a good teacher, so even if you just follow these notes and *learn* from your mistakes you will eventually be able to master the techniques.

Start with something simple, master the basics first before attempting the difficult. We know *everyone* wants a sword, but even in the middle ages not everyone could afford one or was simply *not entitled* to wear a sword by virtue of rank etc. So aim for arming up initially with spear and shield, and maybe a belt axe for in fighting.

THE FORGE

To do any kind of smithing, obviously a forge will be needed. This can be as simple or as elaborate as you can afford or require. A simple hole in the ground, lined with clay and with a clay air pipe from a set of hide bellows, would suffice. A quite serviceable forge can be made by cutting down a 44-gal. drum into a portable forge (Fig. U). Pipe legs can be welded on, the interior lined with clay (preferably fire clay) and a 1½ inch "T" pipe piece fitted to the bottom (Y). At the top of this is fitted a plate of ¼ inch steel with ½ inch holes drilled in it (W). A simple thin steel disk (X) is pivoted in the side branch of the pipe. This will control the air from a blower (if a proper hand cranked blower is available, this can be omitted). Some form of flap valve (Z) is usually fitted at the bottom of the pipe (Y) to allow ashes to be dumped out periodically and cleaning of the air holes in (W).

Sometimes small commercially made forges of this kind can be found at country clearing sales or second hand stores, and are well worth buying. Ideally though, a Martial Arts Society should have a proper permanent forge if it is to do any quantity of work. This type of forge illustrated is typical of a proper professional blacksmith's forge. It is quite simple: a brick wall (A) of about 3 feet square and two foot six high is built, then it is filled with earth and rubble to within six inches from the top, and a layer of *fireclay* (B) (or any local clay really) about 2 inches thick in the middle and thinning off to the edges. It is a good idea to set into the front of the forge a steel bar (D), which will allow you to hang tongs on it heady for use.

The air blast into the fire comes in through a *tuyre* which must be of clay pipe or preferably a water cooled steel type (C). This works on the same principle as a car engine block. The water tank (about 4 gals.) of ¼ inch steel plate has a cone of steel protruding some 12 inches from it. This tapers to about 3 inches diameter at the business end. Through this cone and

through the water tank passes a 1 inch or 1¼ inch steel pipe through which the air passes. To provide the air blast a good method is to hook up an air pipe to the *BLOW* outlet of an Electrolux type vacuum cleaner and run a pipe from this to the blast control valve (I). This is just a wooden box with a sliding wooden plate (J) with a tapered hole in it. This is slid across the hole and thus controls the blast. The hose from it continues to the rear of the water tank and plugs onto the protruding air pipe. A little Aussie ingenuity here will lead to a satisfactory job. Of course the water in the tank gets hot and may even boil. Just top it up (use rain water to minimise rust) and she'll be o.k.

Ideally there should be a sheet metal hood (E) with a good big (12 inch) flue pipe over the forge to lead away fumes and smoke (carbon monoxide can be dangerous). But if working in a semi open shed or big area, it can be dispensed with. Though I do recommend that it is best to have a flue, even if made only from old roofing iron etc.

Also an anvil (F) will be required. These come in all sizes from 56 lb. to 6 hundredweight; a good size is one hundredweight as it can be moved around easily. The anvil should be bolted or spiked to a wooden block (G), which ideally should be sunken into the floor of the smithy to a depth of two feet or so. But a free standing block is also o.k. as one can move the anvil around the workshop. Whatever is chosen, remember this rule of thumb: that when the bloke who is to use the anvil stands beside it arms by his side, hand clenced about a hammer, his knuckles should just be level with the face or top of the anvil. A rammed dirt floor is traditional in a smithy for many reasons, mostly it is fireproof and not so hard on legs as concrete.

A big water trough or drum (H), an old bathrub, or a 44 gal. drum etc. will be needed, and some buckets and a container for fuel etc., as well as a poker and a slice to control the fire (these can be made of ½ inch rod to get the feel of working hot iron).

If no anvil can be bought, a good substitute can be made from a 15 inch length of 330 lb. type railway line. Get it oxy cut to size and shape and then use an angle grinder to true it up and finish it. The *face* of the anvil should be smooth and flat. There is a hole (N) about ¾ inch square for a small anvil (bigger in big ones) called the *Hardie hole* for plugging tools into, also another hole (O) called the *pritchel* which is used in conjunction with a punch for making holes in steel etc. In your small anvil, this would be hard to site, so could be eliminated.

Tongs of various types are needed; a basic set of at least one flat (Q) and a couple of round or square (P) jawed types could be obtained (second hand places or clearing sales). But to start off with a really big pair of pliers might do, or some multi grips or vice jaws etc. Ideally a collection of hammers would be needed. A proper blacksmith's hammer with a cross peen (R) is best, or a large engineer's hammer (ball peen) will do ideally, either about 2½ pounds in weight, with an eight or ten pound sledge hammer, too. For cutting metal hot on the anvil, a tool called a *hot set* (S) is used. It is just a type of chisel with a long rod handle (improvise with a big chisel and a ½ inch rod handle welded on). In use, the smith holds the work in tongs in one hand, the *set* in the other on the spot to be cut. His offsider, *the striker*, hits the set with the sledge.

Similarly the *hot punch* (T) is used. Holes are punched over an anvil hole, using a similar technique to hot cutting. Punch half way through one side and turn over to punch all the way through the other side. The waste bit drops down the hardie hole or pritchel hole. The tapered hole can be trued up with a parallel sided punch called a *drift* (home made).

BEGINNING WORK

Probably the easiest thing to start with is a typical Norse/Anglo Saxon spear head. This will teach you the main processes. Always plan your moves before you do them, as metal will not stay hot for long.

Firstly, light a small fire of wood in the hearth of the forge, pile some coke, or charcoal, around it (either fuel is good), and turn on a little blast. As the fire picks up, gradually add small pieces of coke, slowly increasing the blast to about half way. As the coke fire catches, it will smoke for a few minutes at first, this goes goes away and leaves a nice clean fire. Pack coke around and onto the fire, using the slice, and soon a good even fire will result.

Take a piece of $\frac{5}{8}$ inch or $\frac{3}{4}$ inch mild steel rod about 10 inches or so long, and place one end of it in the fire (not in the air blast but *under* the coals in the bright part of the fire). Adjust the blast to suit, and soon it will get hot. When the metal is at a bright orange colour, withdraw it with tongs or such from the fire and lay it on the anvil face (2). Begin to hit it smartly, turning the rod 90 degrees every few alternate blows, so that the round rod becomes square (3). Hammer the rod with blows that are square on. Don't try and "push" the metal; it will flow of its own accord. By *slightly* elevating the cold end of the rod, this will assist the drawing out of the metal. You may need to heat it several times to achieve a nice even taper, but the metal will, if properly worked, flow to as long or short a taper as you may require. For a spear head, taper about 6 inches evenly, but not too pointy.

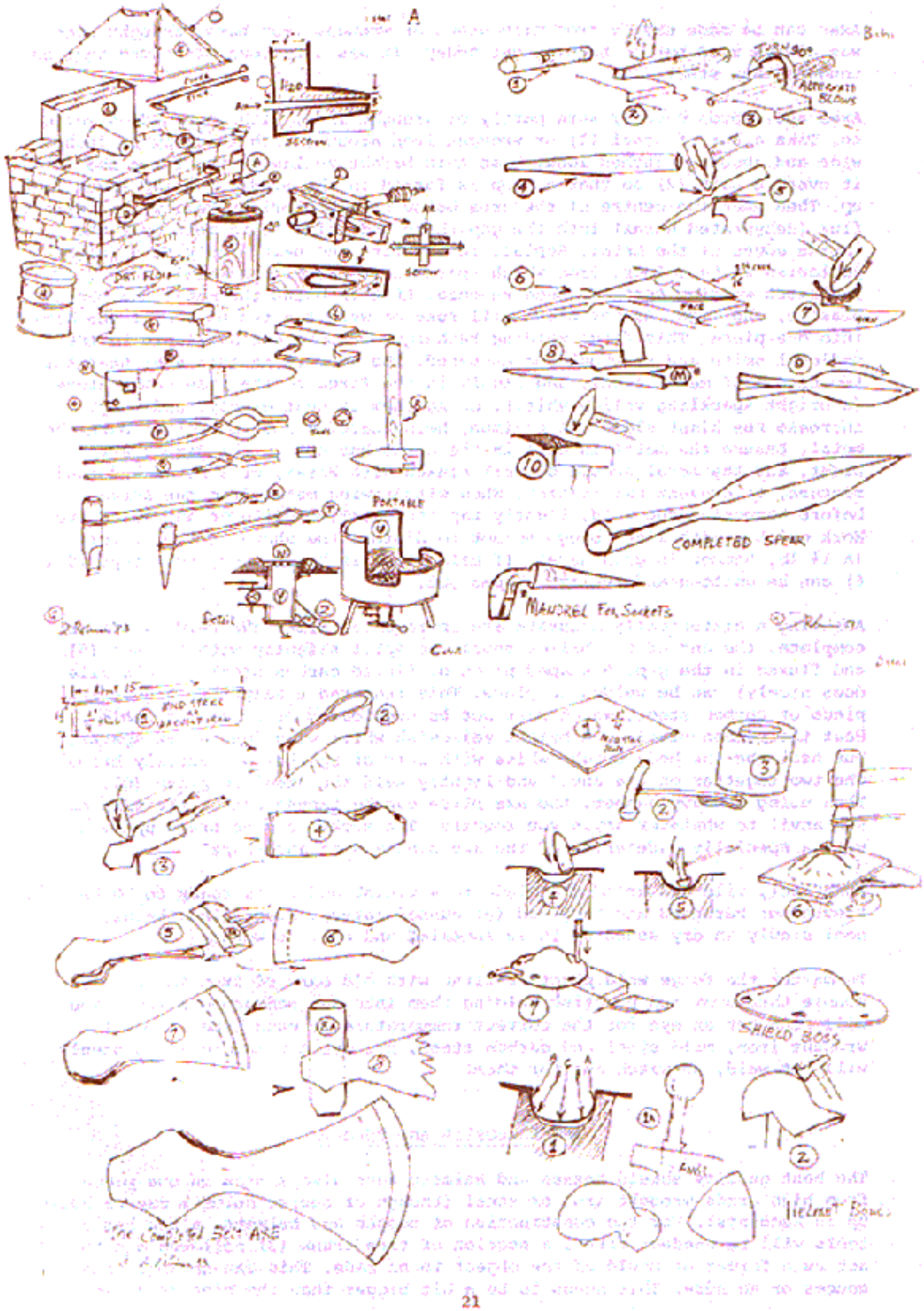
When it is drawn out (4), heat the point just behind where it reaches full diameter. Using the edge of the anvil and the pein of the hammer, neck the metal slightly about 1/8th or so (5). Rotate the rod so there is a shallow groove formed as you hammer it.

Check your fire from time to time; add more fuel from the edges, don't just dump fuel on the fire. Check if slag has collected under the air pipe. This slag or *clinker* can interfere with the air blast and the work. If it is there, cut the blast back and rake the fire out a bit. Lift out the semi-molted slag with the poker and a small shovel, rake the fire together again, increase blast, and continue.

Heat the other end of the bar to a bright orange heat and on the face of the anvil, begin to flatten it out (6) in a fan-like shape, flat and tapering from about $\frac{1}{2}$ inch at the point of the groove you made to about $\frac{1}{16}$ inch thick at the extreme end. Work carefully and keep the taper even both ways.

Then with another heat, using the step at the end of the anvil face/horn junction, or a piece of angle iron, hit the fanned out metal down into the angle (7) so it will curve. Do the curving gently and it can be rolled in such a way as to form a socket, or cone. It will take practise, but it is simple enough. Then using a mandrell, or tapered round bar, shape the socket to size and shape required. This can be made as an exercise or turned up by a machinist. Next, heat the tapered pointed area to a bright heat, and somewhat flatten it out so it assumes a leaf shape, and is about $\frac{1}{4}$ inch thick at the socket. This operation (9) forms the blade. Keep it true with light blows to the edges, and don't get it too thin. The edges are shaped by hammering along the edge of the anvil (10) on the edge of the blade turning it over alternate blows, to form a diamond shape section.

Then the finished article can be filed or ground smooth and trued up. A hole drilled for a nail to hold it on the shaft, completes the blade. Don't worry if the first one is a disaster: try and try again - you can do it.


A
PORTABLE
COMPLETED SPEAR
MANDREL For Sockets
The Completed Stone AXE
SHIELD BOSS
Helmet Boss

AXES

Axes can be made easily from mild steel or wrought iron bars. Wrought iron was always used but is hard to get today. It has a fibrous structure that is tougher than steel.

Axes and swords usually were partly of wrought iron, with steel edges welded on. Take a bar of steel (1) or wrought iron about ¼ inch thick by 1¼ inches wide and about 15 inches long. Heat this bright yellow in the forge and fold it over in half (2) so that a loop is formed in the middle and the edges line up. Then heat the centre of the area below the loop bright yellow, sprinkle a flux (dehydrated Borax) into the gap there and allow it to melt over the inside edges of the metal. Replace in the fire and heat slowly to a bright yellowish white colour, from which sparks dart out of the metal. This indicates *welding heat* has been reached. At this point the metal has become plastic, and light hammer blows will fuse or weld the two halves of the bars into one piece. This forge welding technique was the one available to the medieval smith and so should be mastered. The secrets in this are: heat the two pieces of metal evenly and slowly in the forge to the same temperature (a bright sparkling yellow white). Bring them to heat evenly, and only increase the blast slowly to maximum, being careful not to melt or burn the metal. Ensure the metal is well in the coals but *not* in the direct air blast, and the metal should be well fluxed with Borax, or a borax and sand mixture, to prevent oxidisation. When withdrawing metal from the forge before hammering the weld, lightly tap the metal to dislodge any scale etc. Work quickly with light blows so not to distort the shape of the article (a 1½ lb. hammer is good here). If mild steel is being used, the steps (5 & 6) can be omitted and the axe shaped out.

Assuming a historically accurate axe is required after the welding (4) is complete, the end of the billet should be split slightly with the *set* (5) and fluxed in the gap. A shaped piece of fluxed carbon steel (an old file does nicely) can be welded in place. This required a helper to handle the piece of carbon steel, which must *not be overheated or it will crumble.* Heat the carbon steel to a bright yellowish white with just a few sparks, but heat the axe body bright white with lots of sparks, and quickly bring the two together on the anvil and lightly weld the steel in place (6). Then using a heavy hammer, the axe blade can be fanned out on the face of the anvil to whatever style you require. The socket can be trued up to size with a specially made *drift* of the axe handle size and shape.

When cool, file and grind the blade to a finish and it is ready to be heat treated or hardened and tempered (discussed later). Just allow the axe to cool slowly in dry ashes so it is annealed and easy to work.

To master the forge weld practise first with old bars of iron and steel, double them over and practise welding them into one homogeneous lump. You will soon get an eye for the correct temperature of each type of metal, wrought iron, mild steel and carbon steel, but certain modern *alloy* steels will *not* weld, so watch out for them.

SHIELD BOSSES AND HELMETS

The best quality shield bosses and helmets were always made in one piece from high grade wrought iron or steel (though of course helmets may be built up in segments). For the construction of bosses and helmets, a few basic tools will be needed: first, a section of tree trunk (3) hollowed out to act as a former or mould of the object to be made. This can be done with gouges or an adze. This needs to be a bit bigger than the size required.

A special heavy round faced hammer is needed, but this can be made from a large round headed bolt 1½" dia. or so, welded to a steel handle. Ideally it should have its shank curved slightly.

The procedure itself is quite simple. The steel plate (1) (about ¼ inch plate with do) of a suitable size to overlap the mould, should be heated to a good bright yellow in the centre area. With tongs laid over the hollow in the block, with good heavy blows around the edges of the mould(4), begin to sink the metal down, starting from the edges, working the metal down a bit at a time, being careful *not* to tear it. Then when the metal is stretched nearly to depth, complete it by working the centre with the round faced hammer, trying to keep the metal smooth without excessive hammer marks.

When the domed shape is nicely smoothed with the hammer, it can be trimmed to size around the outer edge with the *hot set* (6), leaving about a 1 inch rim around it. Into this rim is punched holes (7) for the rivets or bolts to attach the boss to the shield. The holes can be drilled later with a big electric drill if preferred.

The finished article can be ground or filed smooth, with a brass overlay fitted with embossed patterns. A little practice will enable one to make quite good bosses.

HELMETS

Basically, a serviceable one piece helmet can be forged in a similar manner to the above. Starting with thick plate about ¼ inch thick, it can be hammered down hot into a former (either a hollowed out log (1) or a cast iron former if many are to be done). The hot drawing down can be done from the edges (A) working around the periphery, thinning the metal down carefully so as not to tear it. Do *not* work areas that are not hot.

The work progresses downwards (B) finishing with the centre (C), by which time the metal should be approaching ⅛ inch thick at the rim, tapering to 1/16 inch thick at the crown, or a little thicker if carefully done. In all this a *round* faced hammer would be used.

Next, the bowl would be planished over a round or dome stake (a stake is a forming tool that fits into the hardie hole of the anvil). A round iron ball (shotput, etc.) welded to a bar makes a good substitute for a stake (1a). Work is done on the *outside* of the helmet over the stake (2), using a *flat* faced planishing hammer to even out the hammer marks and smooth the surface ready for grinding and polishing. The interior is left rough as was with original armour (a sure sign of properly made armour is hammer marks on the interior surface). When trimmed and any holes for fittings drilled, the bowl can be made hard by having it commercially case hardened (or doing it yourself in the trad way). A helmet bowl can be *raised* using thinner sheet, and was done this way, using techniques akin to copper and tin smithing, but requires great skill.

SWORDSMITHING

This is the most difficult aspect of armouring and weaponmaking. To make a sword which will cut well but will not break easily was always a challenge. Without going into the reasons why and the historical details etc., suffice to say that in my experience the *only* blade you can trust is a composite blade made of combined hard and soft metals.

A little reading on the subject will show you how the pattern welded blade was valued. Even today damascus blades are still prized.

So, a good compromise blade can be made by taking a bar of *wrought iron* somewhat thicker than the finished blade is to be, and a bit wider and shorter (say ¼ inch thick, 18 inches or so long and two inches wide). Shape it to a round ended bar with a handle (A) and also shape a piece of ½ inch round or hexagonal *carbon steel* bar (about 75% carbon) so it fits closely around the iron bar. Groove the iron bar with a grinder (B), or use top and bottom fillers (C) to hammer (hot) a groove into the bar. These can be made by the smith himself either as two separate things, or as a spring loaded type. The end result is to be as in (D): a grooved bar. Heat both bar and rod red hot, and flux them well with borax flux. Wire the steel in place with tie wire. Then carefully, a section at a time, starting at the point, slowly heat the composite bar to a welding heat and forge weld the steel edge to the bar, working back down the blade. *Remember, you only get one go at this.* If it doesn't take first go, forget it and start again.

If all goes well you will be able to forge out the composite bar as in (E) into a blade some 30 inches long by 2½ inches wide, and under a ¼ inch thick. The edges can be formed by forgeing (F) and grinding, and the fuller or groove in the middle can be ground out (G). The blade can then be ground, filed and polished ready for heat treatment later.

The ideal and most accurate dark ages and early medieval sword is the proper pattern welded blade. In this, a number of thin rods, $\frac{1}{8}$ inch thick or thinner if possible, of both wrought iron and carbon steel (have three times the amount of wrought iron in each), are used. Probably the wrought iron will be only found in bigger bars and would have to be drawn out into rods, but make or scrounge them. Take (say) a number of wrought iron bars and a few steel bars. Make two bundles: (1) tied with wire, weld the ends together, and then in turn heat each bar, grip one end and carefully twist; (2) one stack right, one stack left, twist only at a bright yellow heat, flux the rods before twisting, the tighter the twist the better. Beware, they can break here. To get an even twist takes practice. Make a bar with a square hole in it to use as a twisting lever with both hands. This fits the pre-squared ends of the bundles.

When bundles are completely twisted, weld them into tight homogeneous bars with care, and forge them to an equal square section (say ½ inch square finished by 24 inches long). Then wire the two bundles of rods together (3) and weld them carefully together so you have a right and left hand twisted bar meeting. The resulting composite bar is then treated like the iron bar as described above, fullered (4), and an edge made up (4a) and welded on. The end result, when welded together and drawn out slightly, should be a blade some 30 to 33 inches long, 2½ inches wide and $\frac{3}{16}$ inch thick.

This blade would be filed carefully, polished, and then heat treated, after which it would be repolished and the pattern brought out by *etching* it in a bath of acid. Usually, standard commercial strength *hydrochloric* acid will do (not too strong). When the blade is immersed in a trough (a wooden trough lined with plastic does nicely) of acid about 1 inch deep, the metal fizzes gently and gives off bubbles. About ½ hour of this should bring up the pattern, after which the acid is neutralised by treating the blade with another bath of a strong *bicarbonate of soda* solution. This is followed by a long wash in running water (hose). The blade is cleaned, dried, and mounted with hilt etc., and *must* be kept lightly greased with a rust inhibitor, preferably lanoline, not mineral oils.

HEAT TREATMENT

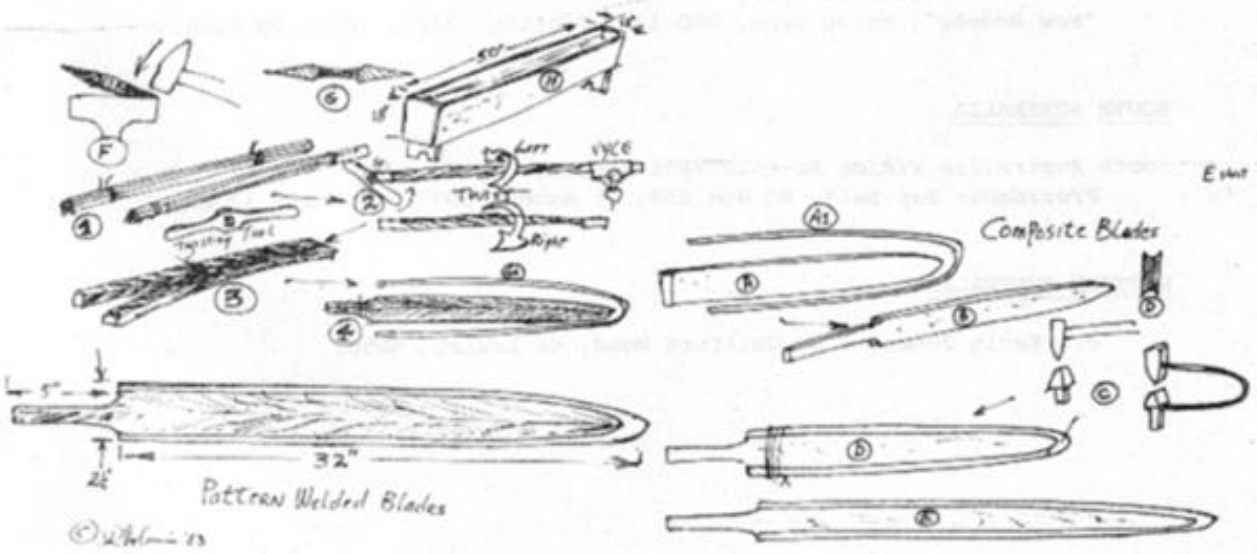
Any blade, or tool, of carbon steel can be heat treated to bring out its maximum hardness. Any steel with a carbon content of .6% or more can be hardened. Different alloys have things like chrome, vanadium, tungsten, etc. in them too, but for blades a plain carbon or nickel steel is best. About .75% to 1% is o.k. Care must be taken in welding these, as too much heat ruins the steel by burning out the carbon.

Hardening is simply achieved by taking the finished blade and heating it in a long fire or forge, so that it can be uniformly heated to a nice *dull red* colour. The heat must be even along the blade, then it is quenched in a bath of oil (H) or brine. Brine is water with rock salt added, 1 lb per gallon at 80 deg. C; oil being preferable for modern steels. Brine will suffice if sufficient oil cannot be found. The blade should be swiftly plunged into the bath, and held there till cool. This process then *hardens* the steel, but leaves it *brittle*. If it was used like this, it would break. To stop this and give the steel *flexibility*, it must be *tempered*, so the hardened blade must now be quickly polished again, and

Tempered by heating it over a low flame or coals on the long fire, until metal oxide colours form on the metal. A progression of these will show: straw, yellow, brown, blue, etc. A brown through to a blue will suffice for a sword; the nearer to a blue the more flexible it will be. A bit of study at a library and enquiry from metal dealers will tell one what suits a particular type of steel, so when the blade shows an even blue colour, it must be quenched again in water or oil quickly. This process tempers back the hardness and gives the steel flexibility. The blade is now ready to mount with guard and pommel etc. *Note:* if in tempering, the blade goes past blue, the process will have to be repeated again, beginning with heating the blade red, and so on.

Of course these brief notes cannot explain fully. Some books on the subject are: *The Art of Blacksmithing* by Alex W. Bealer, Funk and Wagnals, N.Y. $23.75 (very good); *Decorative and Sculptural Ironwork* by Donna Z. Meilach, Crown Publishers, N.Y. $10.50 (good); *The Edge of the Anvil* by Jack Andrews, Rodale Press, U.S.A. about $10 (good).

Take care, good luck and success to you all. And don't give up till you succeed.



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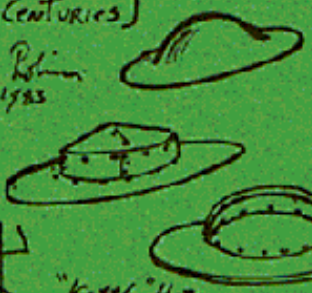
ARMS & ARMOUR

MIGRATION PERIOD TO HASTINGS

[3rd To 11th Centuries]

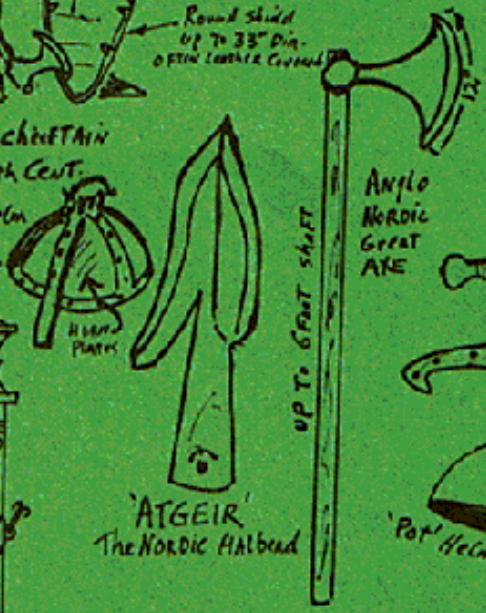
By Dave Robinson 1983

BASIC HELM OF PLATES IN FRAME
200 – 1200 A.D.
Germanic Tribes, Vikings, Normans

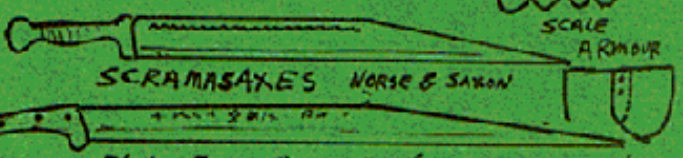


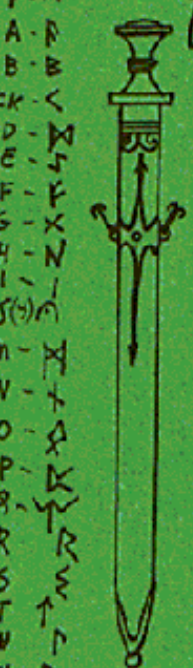
"Kettle" Hats Worn From 11th Cent →

PARDO



Belt & HAND AXE styles





'Pot' Helmet

Pommel & Cross Styles Norse/Anglo Saxon & Germanic

The RUNES
USED By Vikings & Germanic Tribes

held at

MACQUARIE UNIVERSITY

AND the

MACQUARIE MEDIEVAL VILLAGE

from September 30

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