# Bast Rushes Stinging Nettes

# Textile<br/>Materials<br/>from the<br/>Stone Age

Reconstructions by Anne Reichert



## Bast, Rushes, Stinging Nettles Archaeological Reconstructions by Anne Reichert Textile Materials from the Stone Age by Anne Reichert

# **Bast from Different Trees**

Bark: protects tree from cold, wet and drying out

Bast: fibrous, soft web which carries nutrients from the leaves and later becomes bark

Cambium: single cell layer which gives rise to new wood and new bast

Sapwood: young wood which transports water and nutrients to the leaves



Willow bast was used in the Mesolithic for twined string and woven items as well as for nets.

In the Neolithic, lime bast was the most frequently used bast for all sorts of textile items. But we also see examples which use bast from other trees. Different basts need different periods of water retting.

> Maple saplings are easily stripped during the Spring. When twisted the outer, thicker bark separates from the bast.



Heartwood: (dead) wood stabilizing the tree

While they are still moist, strips of spruce bast can be made into thread or woven into mats.



From:

**Unsere Bäume** 

München (Gräfe und Unzer) 1992

Elm bast does not need to be retted. Before use it only needs to be placed in water for a short time, so the bast layers can be separated.



Poplar bast must only be retted for a short time. It is rather brittle and cords and plain-twined materials made from it are not very durable.





✤ Alder bast can be used after a few weeks retting. Like poplar bast, it is quite brittle.



Oak bast is not suitable for twisting as it breaks after a few turns.













← In the second and third rows from the top, each strand is separated into two bundles to widen the cloak at the shoulders.

**Reconstruction of** a cloak made of lime bast based on an excavated example with three such layers from Hornstaad-Hoernle, Bodensee, Germany (c. 3900 BC). The cloak is warm and waterproof. The water runs off the outer layers of bast. However, in heavy, prolonged rain the water will gradually work its way through the separate layers.

Retting the bark in water releases a stinking slime which must be rinsed away.  $\checkmark$ 

# Lime Bast





↑ The cloak has three sections: the wefttwined body and two additional layers of bast strips hanging from twined strings.



↑ The two additional layers are attached to the second and third rows of the main section.

# Cloak from Lime Bast

Bast from twigs can also be used after retting.

Drying the bast layers



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Fruiting twigs and leaves of the small-





## Bast, Rushes, Stinging Nettles... Archaeological By Anne Reichert Textile Materials from the Stone Age

Twining and weft-twining are the oldest known techniques which show knowledge of thread and fabric manufacture. In contrast to spinning and weaving, neither of these techniques need tools. They can be carried out using only the hands.

> In weft-twined textiles, the 'U'-shaped fibre bundles forming the warp are securely held between the twists of a twined cord.

↑ Two fibre bundles are individually twisted in one direction (z) and then twined together in the other (S). If you change the direction you can make an sZ-cord (right).

In this way you can make thin threads, cords or thick ropes, without using any tools.

# Twining and Weft-Twining

← Closely-worked weft-twined textiles made from thick and thin strips of lime bast

The hanging bast bundles are lightly twisted before being secured by the weft rows. This enhances the stability of the finished textile.



← 'Oetzi's' 12 cm long dagger sheath (with its accompanying dagger) is the oldest completely preserved, weft-twined item made of lime bast (3350-3100 BC). During the rescue operation, it was damaged by a blow from a pickaxe.

> Reconstruction of the sheath made of lime bast

Sheath, dagger and sheath reconstruction from lime bast at original size (only at the poster) ↓



#### Bast, Archaeological Reconstructions by Anne Reichert Resting Rushes, Stinging Nettles... Textile Materials from the Stone Age



Knotted net of twined cords from lime bast **^** 

# Netting



threading a twisted bast strip through a loop of the previous row. The result can be either rectangular or circular and the loop can have single (←), double (→) or triple twists. This technique is known from the Mesolithic period.

Knotless netting is made by

Bag in doubletwisted looping technique made from elm bast

↑ Knotted nets made from twined lime bast strings. 'Oetzi' (the Man in the Ice) was found with the remains of a net like this. Similar nets were used for centuries by mountain farmers to carry grass.

In this example (where the work hangs from a zS-twined cord) the strands are not twisted before being caught into the binding. Patterns can be made by varying the distances between the rows of binding. →



Weft-twining with plaited threads Wefttwining with S and Z bindings

> This narrow band which recreates a find from Wangen, Bodensee, is made with eight active pairs of warp threads.

It is possible to change the direction of the work, as with an example from Hornstaad, Bodensee (c. 3900 BC), reconstructed here as the corner of a bag. ↓ →

# Weft-Twining



#### Bast, Rushes, Stinging Nettles Textile Materials from the Stone Age Archaeological Reconstructions by Anne Reichert

From the Neolithic lake settlements on the Bodensee and the Swiss lakes different sorts of twined items are known, called weft-pile, or 'fur' twining, because of the bast bundles which hang down loosely on the outer surface and resemble fur. This also gives better protection from the rain as the water can run off the hanging strips, just like



#### on a thatched roof.

# 'Fur' Fabrics

↑ **7** Fabric made of thin plaits with loosely-hanging ends, after a fragment from Wangen, Bodensee (3800-3600 BC)

**\** Here the basic fabric is worked and the bundles of bast are added afterwards.

↑ The loosely hanging bast fibres cover the opposite side and give the fabric its 'furry' appearance.

✤ The hat from Sipplingen, Bodensee, which is started from the apex, must have the bast bundles added afterwards.

**7** This fabric, which resembles the hat from Wangen, Bodensee, has the 'U'-shaped bast bundles attached as the work progresses.

Reconstruction of the hat from Sipplingen, Bodensee (3800-3600 BC), with its 'fur' 🖌 🔰







# Bast, Rushes, Stinging Nettles



← 'U'-shaped lime bast bundles are laid round a twined cord and secured with a row of plain-twining.

> From the second row of plain-twining, 1.5 cm from the first, the fabric is worked all the way round.  $\rightarrow$





The Hat from Wangen-Hinterhorn

← From the third row, 15 cm long, hairpin-shaped bast bundles are worked into the twist bindings.



As the hat tapers to the apex, now and again two bast strands are fixed together and partially cut off. At the top the remaining bast bundles are bent and pass inside, being fixed with a twined cord.

> The conical hat with 'fur' covering from Wangen-Hinterhorn, Bodensee (3800-3600 BC)

➤ The weft-twining can only be seen on the inside.

> Photo and copyright: Regierungspräsidium Stuttgart, Landesamt für Denkmalpflege, Ref. 115

> > ← Reconstruction of the conical hat from Wangen-Hinterhorn, with its hanging bast strips



## Bast, Rushes, Stinging Nettles... Archaeological By Anne Reichert Reconstructions by Anne Reichert

Photo and copyright: Regierungspräsidium Stuttgart, Landesamt für Denkmalpflege, Ref. 115 ↘ → The inside of the hat from Seekirch-Achwiesen, Federsee (2900-2600 BC)



The outside of the

# The Hat from Seekirch-Achwiesen



Lime bast strands about 40 cm long are fastened in the middle. One half is bundled into a 'handle', the other is spread and twined all round from the centre.

← The inside of the raised knob at the raised knob at the top of the hat: After five rounds, the strips of the 'handle' had been untied and fastened into the work with four more rows of weft-twining.

hat from Seekirch-Achwiesen is recognizable through the round knob on the top of the cone.



The fine twined rows can be seen only on the outside. On the last row, 'U'-shaped bast bundles are attached so that one half of a bundle is fixed together with one half of the next bundle in one stitch. ↓





← Tied weft-twined rows were covered with new bast bundles which are fixed together in the two following rows as shown here. The last five rows are again covered with hanging bast bundles.

#### ✤ The twining rows can only be seen from the inside.



Reconstruction of the hat from Seekirch-Achwiesen

#### About this Exhibition

The gathering and use of different sorts of bast and bark (lime, beech, oak, elm, poplar, alder, maple, wild cherry, pine, willow, birch) are described. The possibilities for working with rushes, grasses, reeds and stinging nettles are explained. Textile technologies are presented: twisting and twining of threads, cords and ropes, weft-twining in different variations, matting, spiral-coiled as well as basketry and netting techniques.

The process of reconstructing Neolithic and Bronze Age items, principally from lime bast, is illustrated with photographs. 'Oetzi's' dagger sheath, different bags, baskets, nets, containers and sieves, also clothing: a cloak, hats, sandals and the lime bast inner net structures from 'Oetzi's' shoes are among the items reconstructed.

#### The Preparation of Bast

Bast is best gathered when the sap is rising, i.e. May and June. If the tree is cut down during this period, the removal of the bark with all the bast layers will be very easy, after you have cut through as far as the wood. Later in the year, this can only be done on shoots, which in limes grow from the root base. The stripped bark quickly becomes hard. Different sorts of trees need shorter or longer periods of soaking in water to ret, during which the bast layers separate off from the bark. After thorough rinsing to remove the attendant slime and smell, the bast is dried and in this condition can be kept for years. Before using, soak it for a short while in water. With fallen trees which have lain for a long time on the ground, dampness, fungi and small invertebrates will have begun the natural rotting process. Depending on the species of tree and the weather, after a while the bast layers can be removed and processed. If these processes have gone on for too long, however, the bast becomes brittle and cannot be used any more. By soaking stripped bark in water, the rotting process can be controlled and halted when complete.

# Bast, Rushes, Stinging Nettles

- 1 Hat from Seekirch-Achwiesen, Federsee
- 2 Sieve from Hornstaad-Hoernle, Bodensee
- 3 Hat from Wangen, Bodensee
- 4-5 Sandals from Allensbach, Bodensee
- Photos and copyright:
  Regierungspräsidium Stuttgart,
  Landesamt für
  Denkmalpflege, Ref. 115

You can find these posters on the website of the Museum for Archaeology and Ecology Albersdorf, where you can also find more information about Anne Reichert's work, with many references to the academic literature.

The Museum's website is www.museum-albersdorf.de/bast. The Museum address is Bahnhofstrasse 29, D-25767 Albersdorf, Germany.

Anne Reichert specializes in textile and ceramic techniques from the Stone and Bronze Ages. All the reconstructions in the exhibition are made from authentic materials. Most of them were specifically commissioned for museums in Germany, Italy and Switzerland. Anne Reichert is happy to participate in public displays and exhibitions with practical demonstrations of Stone Age techniques, interactive practical sessions with children or adults, as well as teacher training on the theme 'Get to Grips with the Stone Age'.



In Europe, prehistoric plant textiles are preserved only under particular conditions:

- in continuously wet sites (e.g. lake settlements at Bodensee, Federsee and at the Swiss lakes),
- frozen in ice ('Oetzi' the Man in the Ice),
- as impressions on ceramics.

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#### Never twisted and twined before?

All fibrous, reasonably strong materials can be twisted and twined by hand. Rushes and firm grasses that allow themselves to be bent and are not too rough or spiky to hold are eminently suitable, as are genuine tree basts. (You can also use bought 'bast', namely Raffia, maize leaves, shoe laces or small strips of cloth.)

Knot several bast fibres (reeds, rushes, grass stalks, stinging nettle fibres, etc.) together at the end and divide them into two equally thick bundles. Hold the knot tightly between your thumb and forefinger, twist one of the bundles away from you (in a clockwise direction) and lay it over the other bundle (in an anti-clockwise direction). Hold the crossing point between your fingertips. Do the same thing with the other bundle ... and so on. If, after a turn, you spread the twisted bundles slightly, while holding the whole thing securely, the twined string will become tighter and more regular. Important: You must keep to your chosen twisting direction! If you come to the end of a bundle, you need to add in

Drawings of a sieve and a plain-woven item from Auvernier, Neuenburger See, Switzerland, by Jacques Reinhard

Impression of a mat on a ceramic fragment from Michelstetten, Austria. Photo: Niederoestereichisches Museum, Asparn an der Zaya

> Arrow, dagger sheath, dagger and remains of the right shoe of the Man in the Ice, 'Oetzi', along with the inner net structure from the left shoe. Photos and copyright: South Tyrol Museum of Archaeology, Bolzano

additional suitable material. Overlap the ends by 1 or 2 cm and twist together. An sZ-twined cord can be obtained when you hold the work in the left hand and twist with the right, and a zS-twined cord when you work in a mirror-image, holding with the right and twisting with the left hand (see page 4: Twining and Weft-Twining).

Photos and text: Anne Reichert, Ettlingen, Baden-Württemberg Arrangement of the posters: Volker Arnold, Albersdorf, Schleswig-Holstein English translation: Kate Verkooijen, Weymouth, Dorset

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#### Bast, Archaeological By Anne Reichert Reconstructions by Anne Reichert Reconstructions

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On the second attempt, adding and renewing warp threads at the edges resulted in a sieve mesh resembling a square with rounded corners.

Fine, twined threads of lime bast were stretched across a frame and secured by weft-twined rows. As the warp threads easily slid down the frame, the weft-twining process was

awkward and involved and the experiment was abandoned.

The underside of the sieve. The bast strips of the first row of coiled basketry overlap the threads which hold the mesh onto the twig.

Next, a square sieve base was weft-twined with warp threads of 1.2 mm thickness and weft threads 0.8-0.9 mm thick.

The side of the sieve is made in coiled basketry technique with bundles of rush, secured with lime bast strips.

# The Sieves from Hornstaad (1)

Hoernle, Bodensee (c. 3900 BC) **7** 

5 cm

Sieve from

Hornstaad-

5 CM

The sieve mesh was sewn to a bent twig using lime bast thread, with the edges overlapping the twig. 🖌

# and Auvernier (1)

In each row, the warps of the mesh are split into two halves. Each half is fixed together with half of the neighbouring warp, giving a zigzag pattern. Later, this rectangular mesh is attached to a twig frame.

Sketch of the sieve from Auvernier, Neuenburger See, Switzerland

The mesh base is base is enlarged with coiled basketry of rushes and secured with lime bast strips.

The stitches holding the sieve bottom to the birch bark sides of the sieve are placed at different distances to

The sides of the Auvernier sieve are made from bark. In this reconstruction birch bark was used.

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#### the edge to prevent the bark splitting. $\checkmark$



# Bast, Rushes, Stinging Nettles... Archaeological Reconstructions by Anne Reichert Textile Materials from the Stone Age

In 1991, the Man in the Ice, 'Oetzi', was found 3000 m up in the Oetztal Alps, where he had died 5000 years ago. In addition to his fur and leather clothing, which had been preserved by the ice, were many items of his equipment made of lime bast: the dagger sheath, cords and a knotted net of twined strings, as well as the inner nets of his three-part shoes.

Photo and copyright: South Tyrol Museum of Archaeology, Bolzano

✤ From the upper cord of the net-structure hang longitudinal cords of different length.

> Inner Nets of Lime Bast from 'Oetzi's Shoes

The remains

of the right shoe

and the inner net

(3350-3100 BC)

of the Man in the Ice

structure of the left shoe

The longitudinal twined cords of the net structures for the left and right shoes. In a second process they will be knotted together with twisted strips of lime bast.  $\Psi$ 

 $\uparrow$   $\checkmark$  The inner net structure is secured to the bearskin leather soles by a 2 cm wide leather strap, so that there is a space available for the insulation layer. The longitudinal strings of the net for the left shoe are knotted together going around the shoe, those for the right shoe going to and fro. The left net is worked to precisely follow the shape of the foot, the right is kept closed by a cord which laces over the top of the foot.



#### ✤ Reconstruction of 'Oetzi's' three-part shoes:

The (different right and left) inner net structures of lime bast hold a 2 cm thick layer of hay between the net and the deerskin upper. When the shoes are



#### Bast, Rushes, Stinging Nettles Textile Materials from the Stone Age Archaeological Reconstructions by Anne Reichert

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✓ Sandal find 1 from Allensbach, Bodensee (3200-2800 BC)

Four lime bast strips are laid in a 'U' formation  $(\Psi)$  and are plaited together.  $\Psi$ 





↑ Reconstruction of the sandals from Allensbach 1 made from lime bast

Reconstruction based on the find from Sipplingen, Bodensee 🛧

## The Sandals from Allensbach and Sipplingen





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7 The sandals from Allensbach 2 can be made on a fixed frame using half-weaving technique.

 $\uparrow$  The mats are folded in the middle.

Sandal find 2 from Allensbach, Bodensee (3200-2800 BC)





The sandals are comfortable. They only rub a little where they are tied around the ankle. Of course, the sandals do not last very long.  $\Psi$ 



# Bast, Archaeological Reconstructions by Anne Reichert Resting Mathematical Structure Stone Age

 $\leftrightarrow \rightarrow$ Plaits made from three and six strips of lime bast

This technique corresponds to plain weaving in cloth. In both directions there is only one element in the material - by comparison to weft-twining where two horizontal weft threads are worked.

↑ Straight-sided mat: Both directions of the weave are parallel to the edges.

# Plain-weave Materials



↑ Diagonal weaving: Both weaving directions run diagonal to the edges. When the weave is broad enough the free-hanging bast strips are woven back into the fabric.



Reconstruction of a basket found at Sutz-Lattrigen, Bieler See, Switzerland (3200-3100 BC), woven from lime bast strips



## Bast, Archaeological By Anne Reichert Rushes, Stinging Nettles Textile Materials from the Stone Age



lightly twisted into a coil which is sewn securely to the previous coil using strips of bast.  $\uparrow \rightarrow$ 

✤ Soft Rush: abundant everywhere

▲ Baskets made in spiral coil technique from rushes with lime and elm bast bindings

Twined mat from a kind of sedge

# Working with Rushes, Bast and Grasses

![](_page_13_Picture_7.jpeg)

![](_page_13_Picture_8.jpeg)

![](_page_13_Picture_9.jpeg)

Sample of a plain-twined mat made from moorgrass **7** 

Moorgrass (Molinia caerulea): abundant on boggy, poor soils

![](_page_13_Picture_12.jpeg)

of a mat from the base of a clay vessel, Michelstetten, Lower Austria (c. 4300 BC)

Reconstruction of this mat using leaves of Greater Reedmace

Lesser Reedmace ♥

![](_page_13_Picture_16.jpeg)

![](_page_13_Picture_17.jpeg)

![](_page_13_Picture_18.jpeg)

![](_page_13_Picture_19.jpeg)

# Bast, Archaeological Reconstructions by Anne Reichert Resting Mathematical Straining Nettles

![](_page_14_Picture_1.jpeg)

In the Stone Age, many different forms of containers were made from bark. In Northern Scandinavia and Siberia, people still make all sorts of boxes, sandals and handbags from birch bark.

Different sewing techniques were tested on these spruce bark boxes. →

↑ From the Mesolithic to today, birch bark has been the most suitable material for containers of all sorts.

![](_page_14_Picture_6.jpeg)

# Bark Containers

↑ Peeling the stem of a young, wild cherry tree gives you ready-to-use bark and layers of bast. The bark can be made into containers and the bast into cordage.

This piece of beech bark broke while being folded over and stitched together. ->

In this birch bark container, 'Oetzi' transported charcoal embers wrapped in maple leaves for insulation.

Photo and copyright: South Tyrol Museum of Archaeology, Bolzano

The undersides of the spruce bark boxes 7

Birch bark vessels

![](_page_14_Picture_14.jpeg)

#### Bast, Rushes, Stinging Nettles Textile Materials from the Stone Age Archaeological Reconstructions by Anne Reichert

↑ The Man in the Ice, 'Oetzi', bound the feather fletching to his arrows using nettle fibre. As the binding is fixed with birch bark pitch, the fibres can hardly be seen. Very little of the fletching itself has remained. ->

![](_page_15_Picture_2.jpeg)

Stinging nettle fibres can be twisted and spun. Remains of nettles are known from the Middle Stone Age, nettle cloth is known from the Iron Age onwards and was produced until the middle of the last century. (What is today sold as 'nettle' is actually cheap cotton.)

The Stinging Nettle: once a Fibre Plant, now a 'Weed'

While stinging nettles are today widely found on fertile ground, during the prehistoric period they were mainly found around areas of human activity and were harvested as wild plants, without necessitating their cultivation.

> Retted and cleaned nettle fibres (here from what is called Boehmeria or Ramie, an Asiatic nettle) are very fine and soft and can be spun.  $\Psi$

Unretted and retted stinging nettle fibres and their twined strings  $\Psi$ 

Large stinging nettle (Urtica dioica) 🗸

**N** When the stem is broken, the fibres between the outer skin and inner pith are exposed.

![](_page_15_Picture_11.jpeg)

Twined stinging nettle strings are very stable and strong.  $\Psi$ 

![](_page_15_Picture_13.jpeg)

![](_page_15_Picture_14.jpeg)

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