

**Woad - joining art, crafts and science.  
Past, present and future for woad in Sweden.**

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**Abstract**

Woad, *Isatis Tinctoria*, has a long history in Sweden albeit not yet fully researched and documented. Woad was used to obtain blue colour long before the start of indigo import to Sweden. For example it is known that textiles from the Migration Period (500 AD) as well as from the Viking Age (800 AD - 1100 AD) were dyed with woad. Documented by Linnaeus in the 18th century woad still grows wild in coastal areas of the Baltic Sea. Woad was used in the indigo dyeing process (the so called woad vat) until the end of the 19th century but soon after practically all knowledge of woad dyeing techniques was forgotten. However the recent revival of natural dyes has brought a new interest in the dye. We will report on an on-going investigation into the properties of woad.

Jeanette Schäring has been experimenting with woad, carrying on research into environmentally friendly craft methods. Together with Jonas Bergquist, professor in Analytical Chemistry at Department of Chemistry Uppsala University, she has investigated possible applications of woad in biomedical research. The research includes experiments looking at the antibacterial activity of woad. They have found new possibilities in the use of woad pigment for staining fibres used for sutures inside the body and in biomedicine. Woad can also be used as a colorant when studying nerve cells. Furthermore wool and cotton fabrics dyed with woad and indigo by Schäring, were investigated at the Swedish National Heritage Board in 2012 by Doctor Judith Bannerman and Senior Conservator Margareta Bergstrand. There are preliminary results of these comparative investigations into the tensile strength and light-fastness.

The future for woad in Sweden may include cultivation of the plant as well as further research into the use of woad for medicinal purposes as well as for dyeing of high technological fibres. However the most interesting future for woad may be in the joining of art, crafts and science.

Keywords:

Natural dyes, woad, craftsmanship

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## Introduction

*“Joining the time that is all time, future and past, in a “now” accessible from any chosen point in time” “connecting to the real behind the real” “Experiencing that everything is one”*

Woad, *Isatis Tinctoria*, has a long history in Sweden albeit not yet fully researched and documented. For many years the authors of this paper have been interested in woad – its history as well as the practice of dyeing and researching new possible applications of the dye in art and science.

Woad is a biennial plant that grows in small rosette clusters in its first year. It is the green leaves that contain the blue dyestuff. In the second year, the plant grows upwards and produces a bunch of light yellow flowers that in turn bear copious amounts of dark violet seed.

Woad leaves contain indican the same substance as is found in the *Indigofera tinctoria* plant, but in limited concentrations. This is what gives woad its special and unique character as a dye plant. Woad also has much to offer as an alternative to synthetic dye pigments used today, which contain toxins and are a drain on resources. No mordants are required for dyeing with woad and indigo.

### The past of woad in Sweden

Woad was probably the only source for obtaining a true blue colour long before the start of import of indigo to Sweden. As documented by Linnaeus in the early 18th century woad still grows wild in coastal areas of the Baltic Sea. (Linné 1741) It is not known when and how the plant spread in Sweden – according to some scientists it comes from areas around the Black Sea. Many of the woad plants we find growing wild today along the coasts may have spread from ships sailing the Baltic and the North Seas.

Woad and indigo both contain the active ingredient indigotin for obtaining a blue colour in textiles. Indigo was probably not used in Europe until Roman times and it is not documented in Sweden before 1500. Woad however was one of the most common dye plants in Europe and in use until modern times. (Gleba, 2008)

Woad seeds were discovered on the Oseberg ship, a Norwegian Viking burial from the 9<sup>th</sup> century. However we do not know what the purpose of these seeds was but indigo dye has been found in four textiles from the burial. (Christensen, 2006) In Sweden the earliest evidence of woad is from the Migration Period (500 A D). (Nockert, 1991) The wall - hangings from Skog and Överhogdal from the Viking Age (800 AD- 1100 AD) were dyed with woad. (Franzén 1992)

However we do not know the methods the textiles of Oseberg or other blue textiles were dyed with. Probably the urine fermentation vat was the method used for dyeing blue with woad. This method survived into the 20<sup>th</sup> century in Scandinavia in rural areas and in the 14<sup>th</sup> edition of Beda Larsson’s book on vegetable dyeing a urine vat with either woad or indigo was published. (Larsson, 1959)

Over the course of time, many different fermentation processes have been used to extract blue from woad. In Sweden, much mention had been made of the urine fermentation and how the woad or indigo vat would be buried in a dung pit, which kept it at the perfect temperature. Urine ferment works well and there are many theories as to which urine is best. Urine provides a steady fermentation and reducing process. Unfortunately, these processes are pretty smelly. Jeanette Schäring has focused on processes that can be used in a apartment in the middle of the city.

A 16<sup>th</sup> century inventory of the Royal Palace in Stockholm mentions indigo but from customs lists we know that woad was imported mostly from Germany via Hamburg along with other dye stuffs like brazil wood, litmus and saffron. (Billum, 1954) In the 17<sup>th</sup> century dyers workshops are recorded in cities like Stockholm, Norrköping, Gothenburg and foremost of all Borås in the west of Sweden. In the 18<sup>th</sup> century more workshops and small dye-works were established all over the country. The Colours of Sweden – the Swedish national flag was according to some sources dyed with weld and woad as well as the uniforms of the Swedish army. (Törnquist 2008)

In the 18<sup>th</sup> century the import of “expensive” foreign dyestuffs was considered a luxury and the Swedish Government strongly encouraged a national dyeing industry with local dye - stuffs. Linnaeus was sent on several journeys to investigate the local dye plants. One purpose was to establish plantations for dye plants in Sweden. Woad was to be the local substitute for the indigo imported from India. Plantations were actually started, some of them in the south of Sweden but also in Åbo in Finland.

However the plantations failed and the import of woad as well as other dyestuffs into Sweden grew. There is no indication that woad was grown for dyeing purposes after the failed plantations experiment. Imported woad continued to be used in the indigo dyeing process as an aid in the fermentation of the so-called woad vat until the end of the 19<sup>th</sup> century.

In an account from a dye-works in Vollsjö in the south of the Sweden in the 1870's Carl Sahlin describes the warm woad vat. The vat could only be made by especially skilled craftsmen dyers and they were often very secretive about their craft. According to a recipe that Sahlin was able to obtain the vat contained 3 parts indigo, 20 parts woad, 3 parts madder, 3 parts wheat bran and 3 parts “grey ash”. The vat was kept to a temperature of 50 to 60 degrees Celsius. Wool yarn and woollen vadmal cloth were dyed in the warm woad vat.

In 1899 the dye-works in Vollsjö closed. The synthetic dyes and the synthetic indigo had taken over. (Sahlin 1928) Soon after in the beginning of the 20<sup>th</sup> century all practical knowledge of the woad dyeing techniques was forgotten.

## **The art and the craft of dyeing with woad**

Schäring uses colour from nature as a social, cultural and perceptible form of communication between nature, animal and human beings, as well as an indicator of our fragile eco-system. She does not use ready-made recipes. Colour and patterns are mutable, resonances of nature's complexity, sensitive to nature's rhythms, waves and movements. These are place-specific dye processes. A humble and loving approach to the transience of organic material and processes.

The woad fermentation process is a dynamic exploration of alchemy that varies with specific and changeable methods, inputs and time. The woad vat is a organism within itself, reactions that mimic the processes of nature and the abundance and significance of microorganisms to the slow science of colour creation. It is a art, a craft and a science to work with the woad vat that defies the humans' innate reaction to control changeability.

*"I am interested in the human perception and the interconnectedness of things in nature and life in which various elements and matters exist in more than one form. Working with the craft of slow dynamical processes, the transformation of colour and the artistic process using life circles, inter-species communication, microorganisms, organic fibre/material and organic natural colour, engaging between cultural historical methods, craft, art and science; focusing anywhere in-between the micro and the macro. My work emerge from the meeting between the sensations and the intellectual, the boundary between what we know and what we do not understand. It is transforming and unleashing the often forgotten in nature, which thrives by creating colour through photosynthesis, to communicate and by using colour as an indicator for the environment." Jeanette Schäring*



Figure 1: Artwork by Jeanette Schäring  
Wool and flax dyed with woad (Photo: J. Schäring)

### **Woad in science**

Schäring embarked on a visionary interdisciplinary art project between textile art, science and learning processes, together with Jonas Bergquist, professor in Analytical Chemistry at the Department of Chemistry Uppsala University. The start-point for this project was water and pigment in nature – our environment and sensitive eco-system, though it was also to embrace the chemistry of the human brain and interpretations of natural phenomena.

Together they work intuitively and practically within the art and science disciplines collaborating in lab situations, performance, exhibition and lectures. Working with natural colour and woad requires a cross-disciplinary approach and process, together with an appreciation and openness towards each other's knowledge, it demands time space and trust. This experimental process-based collaboration blurs the boundaries between art and science, consequently providing a greater understanding of natural dye for the future and additionally its place in science. Much emphasis has been placed on the various properties of the pigments and the place related environmental effects on these natural colour processes.

This research also includes experiments looking at the antibacterial activity of woad. They have initiated new possibilities in the use of woad pigment for staining fibres used

for sutures inside the body and within biomedicine. Woad can also be used as a colorant when studying nerve cells.

The interest in the properties of natural colour pigments and their potential applications in science provides space for further investigation and the basis for this continuing art, craft and science collaboration.



Figure 2: Woad dyed fibre under water (photo: J. Schäring)

## Tests and investigations into the long-term sustainability of textiles dyed with woad and indigo

Wool and cotton fabrics dyed with woad (*Isatis Tinctoria*) and indigo (*Indigofera Tinctoria*) by Schärning, were studied at the Swedish National Heritage Board in 2012 by Doctor Judith Bannerman and Senior Conservator Margareta Bergstrand. The main purpose of the 2012 investigation was to evaluate MFT - micro-fade testing as a tool in predicting and giving advice on lighting in museums. A micro-fade tester is a tool that allows the user to carry out accelerated light-aging tests. The procedure is rapid and almost non-destructive – it is normally done directly on an artefact and does not require sample removal. In the study consisting of wool samples dyed by Schärning with woad and indigo the results were interesting and warrant further investigation. The results of micro-fade testing on the wool textile dyed with woad and indigo are compared to blue wool standards. The most fugitive was the wool textile dyed with indigo. (Bannerman 2012) Furthermore a comparative investigation into the tensile strength of wool and cotton dyed with woad and indigo using tensile tests was carried out. Tensile testing is executed according to industrial standards and a large quantity of samples needs to be tested. Tensile testing shows how a material will behave under different environmental conditions for example loss of strength over time. Any after treatment of a textile will affect the strength of the material so adding water to textiles as in a dyeing process tends to weaken the material. But in the tests the fabrics dyed with woad did not loose any strength. The dye may even appear to strengthen the material (Bergstrand 2012)

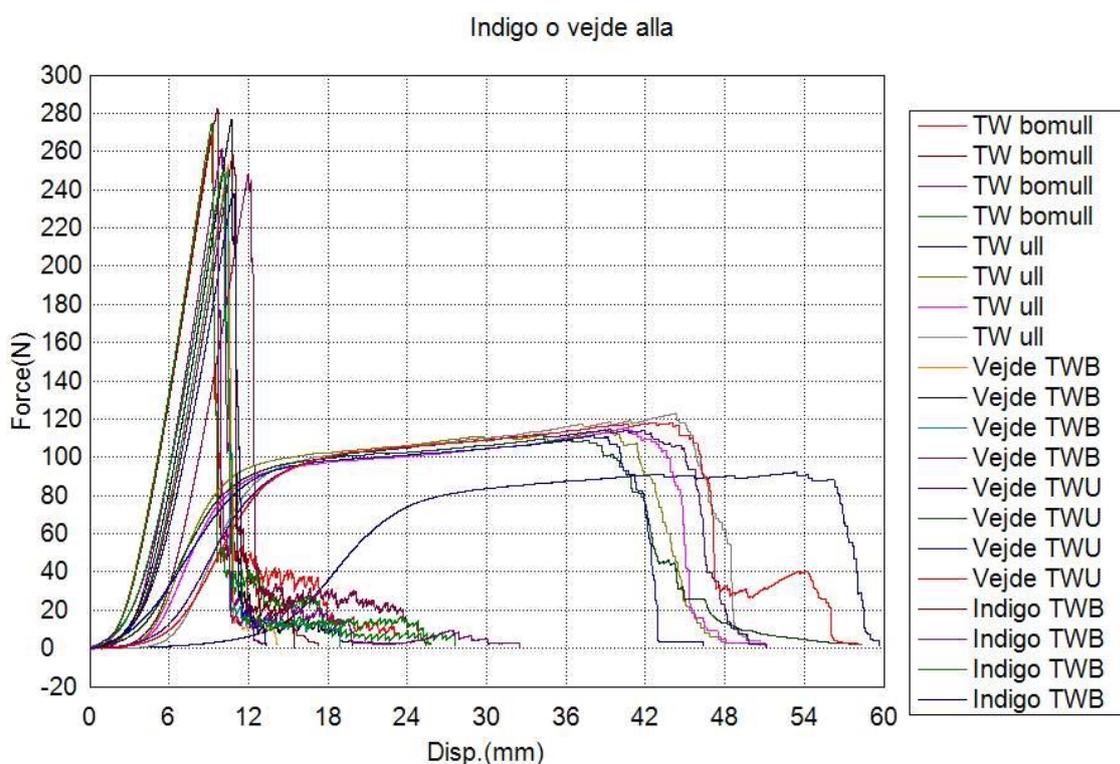


Figure 3: Tensile tests of wool and cotton dyed with woad and indigo.

More experiments with the dye and more comparative tests need to be carried out but the preliminary results of the tensile tests are interesting and should be continued.

## **The future for woad in Sweden**

The future for woad in Sweden may include cultivation of the plant as well as further research into the use of woad for medicinal purposes as well as for dyeing of high technological fibres.

However the most interesting future for woad may be in the joining of art, crafts and science. The skilled master dyers in Borås in the 17th century were called “skönfärgare”. We could translate this into artisan dyers or fine dyers. If woad has survived into the 21st century it may be because of the interest of artisans and of course the beauty of the colour.

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