

Byssus with Embroidery, or Embroidery with Byssus?

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Abstract

In antiquity, byssus was thought to be a fibre, which was used to manufacture very exclusive, lightweight fabric. As with so many things which fall into disuse, the origins of this material became somewhat of a mystery. The dictionaries consulted regarding the meaning of the word byssus state that it was probably a very fine type of linen. As a result of this, I.M.Diakonoff, in his in-depth article “The Naval Power and Trade of Tyre” refers to the sails of the Phoenician ships in Ezekiel 27:7 as made of “byssus with embroidery”. In this article, the real source of byssus is investigated to come to a better understanding of what it was and whether it could possibly have served as material for sails on Phoenician ships.

Keywords: byssus; linen; Phoenician sails; embroidery

Introduction

Byssus is the name of a material believed to have been manufactured and used in antiquity, more specifically by the Phoenicians. In modern times, however, what it was and what it was made of seems to be mired in confusion. This article sets the record straight on what byssus was and what it was used for, and also that byssus probably is not the same as a very fine quality of linen. In order to clarify the differences between byssus and linen, an analysis is given of the various words used for linen in Hebrew, followed by an explanation of the origin of byssus.

Linen and its Uses

Linen is made from the fibres of flax (*Linum usitatissimum*) which is a wetland plant. It was cultivated abundantly along the Nile, and the best quality linen came from Egypt, due to the fact that cultivation with irrigation produces longer fibres. In order to produce linen from flax, the stalks first had to be soaked in water to soften and separate the fibres.



This process is called “retting”. Then the fibres had to be dried, crushed, beaten, and hackled (combed), as well as bleached in the sun, after which they could be spun into yarn, which was used to weave linen cloth. Flax was also grown in Israel and linen was in use in the ancient Near East for millennia (King and Stager 2001, 148–149).

Different Words to indicate Linen in Hebrew

In Hebrew there are at least three different words used to indicate linen. The word *bād*, which is used more than twenty times in the Bible, probably indicates ordinary linen. It was the prescribed material for the garments that were to be worn by the priests. Besides a linen robe, they also had to wear an undergarment, and were not allowed to wear garments made of linen mixed with wool. This was to prevent sweating. These rules are found in Exodus 28:39–42 and Ezekiel 44:18 (King and Stager 2001, 151; Klein 1987, 63).

Several Hebrew dictionaries confirm this meaning of the word. Brown, Driver, Briggs, and Gesenius (1980, 94) state that *bād* is white linen for priestly vestments. Clines mentions both linen and linen garment (Clines 1995, 93). Jastrow, however, states that it is chosen, fine linen and as such must be byssus, but does not give a rational explanation (Jastrow 1950, 138).

A second word used for linen in Hebrew is *šēš*. This is the word used to describe the material of which the ephod of the high priest was to be made, as well as his tunic and turban (Exod 28:6, 39). It indicated “fine linen”, probably a higher quality material (King and Stager 2001, 151). The word *šēš* is pre-exilic and is considered to possibly be a loan word from Egypt (Klein 1987, 684; King and Stager 2001, 150).

The third word used for linen in Hebrew is *būš*, which also indicates “fine linen”. It is a late Hebrew word and may be an Aramaic or Akkadian loan word (Klein 1987, 67). It is used in the account of David when he brought the ark into Jerusalem and was wearing a robe made of fine linen (King and Stager 2001, 150). Brown, Driver, Briggs, and Gesenius (1980, 158) also state that this word is a later synonym and is the linen thread and the material woven from it and used for garments.

When one analyses these words with the help of a number of Hebrew dictionaries, it becomes clear that they do not agree on which Hebrew word was the possible equivalent of byssus. Brown, Driver, Briggs, and Gesenius (1980, 101, 1058) equate both *būš* and *šēš* with byssus, and so does Clines in his concise dictionary (2009, 42, 481). Unfortunately the last volume of his multi-volume Hebrew dictionary was not available for comparison. Over against the previous two dictionaries mentioned, Jastrow equates *bād* and *būš* with byssus (1950, 138, 147), and Alcalay only equates *būš* with byssus (1990, 128), as do Green and Robinson (1987, 30).

King and Stager do not mention another term for linen in this overview as summarised above. It is probably fair to state that the diverse origins of the different words used in Hebrew may be an indication of the wide-spread use of linen in the ancient Near East. Besides that, it probably also shows how Israel, as an area through which much trade flowed, adopted the foreign words into the Hebrew language. The question may be asked whether the use of the two loan words *šēš* and *bûš* could be linked to an indication of quality in the same way, as these days a distinction is made between Egyptian cotton, for instance, as used for high quality bedding, and Indian cotton, which, generally speaking, is mostly used for clothing of a lesser quality.

Only Green and Robinson (1987, 340) also add לְבָשׁוֹת (linen or yarn [of Egypt]), used in Proverbs 7:16, but this appears to be a *hapax legomena*.

Linen was widely used for clothing of all kinds in antiquity, but due to its high cost, was mostly worn by the wealthy and the elite (King and Stager 2001, 150). Linen was also used for the sails of the Phoenician ships, according to Ezekiel 27:7. They did not use cotton, which entered the Near East at a much later date (King and Stager 2001, 152; Casson 1995, 48).

Is Byssus a Further Variety of Linen?

The question this article answers is whether or not byssus also was a variety of linen. King and Stager state that the sail of the ship Tyre was made of fine embroidered linen; the Hebrew term used is *šēš-bēriqmâ* (King and Stager 2001, 151). Further along in this book under the heading “Ezekiel and Tyre” however, they use a translation of Ezekiel 27:7 which renders the Hebrew text regarding the sail of the ship Tyre as follows: “Byssus with embroidery (?)” (*sic*). The text in Hebrew in *Biblia Hebraica Stuttgartensia*, however, clearly states *šēš-bēriqmâ* and not byssus (1984, 944).

The question which now needs to be asked is why the word “byssus” came to be used here. In a footnote to the “Ezekiel and Tyre” entry, King and Stager refer to the article “The Naval Power and Trade of Tyre” by I.M. Diakonoff, which they consider to be the best analysis of Ezekiel 27 (King and Stager 2001, 182–183). In his article however, Diakonoff uses the words *šēš-bēriqmâ* as the original Hebrew text, but then in Footnote 18 states the following: “*šēš* was the Egyptian variety of byssus, a very thin, semi-transparent linen fabric” and adds to this “*riqmâ* might mean ‘motley, multi-coloured,’ or following the Septuagint, ‘embroidery’ (*poikilia*).” In his translation and interpretation of Ezekiel 27:7 Diakonoff substitutes the word *šēš* with byssus and considers these two words to indicate the same material (Diakonoff 1992, 172).

Further investigation in a number of Hebrew dictionaries produced the following: *bûš*: a fine, costly white fabric (only in Ezekiel and later); byssus, probably a fine linen, Exod 27:16 (Holladay 1988, 35). In this instance byssus is used as an equivalent of *bûš*. For

šēš the lexicon only states “(Egyptian) linen Gen 41:42” with no reference to byssus (Holladay 1988, 384).

A search in the Hebrew dictionary section of a large concordance still supplied silk as a secondary meaning for šēš (Strong 1890, 122, entry #8336). Furthermore Brown, Driver, Briggs, and Gesenius (1980, 101) state that byssus is “fine white Egyptian linen and cloth made of it” and specify that the word byssus is only used in Exod 27:16, but is translated there just as “article of trade”.

A Greek dictionary gives for byssus (bussos) the meaning “fine linen” (Bartelink 1961, 57), and a Latin dictionary states that byssus is fine linen or cotton (Muller and Renkema 1963, 109).

Webster’s English dictionary gives a surprising meaning for byssus. Besides tracing the word in English back to Latin and via Greek to its Semitic origin, meaning a fine, white, probably linen cloth of ancient times, a secondary meaning is provided: “a tuft of long, tough filaments by which some bivalve mollusks (as mussels) make themselves fast” (Webster 1977, 152). If this latter reference is anything to go by, is byssus yet another word to indicate linen in Hebrew or is it something else altogether? And if byssus is not a word indicating fine linen, is Diakonoff’s interpretation of “byssus with embroidery” for Ezekiel 27:7 correct, or could it possibly be the other way around: linen (šēš), embroidered with among other colours, byssus? Moreover, could byssus have been used to manufacture the sail of a ship?

Byssus

The journalist Max Paradiso gives an account of his visit to Chiara Vigo, a woman who lives on the small island of Sant’Antioco, where she has a studio, which also is the Museum of Byssus (Paradiso, 2015). Sant’Antioco is found off the south-west corner of Sardinia (Wolters 1971, 75). Chiara Vigo is one of very few people, or possibly even the very last person, who knows how to make byssus, or sea silk. This is made from the solidified saliva of a clam (*Pinna Nobilis*), a protected species still found in the sea near Sant’Antioco in a protected marine reserve. Chiara Vigo has obtained special permission to dive and collect this material and does so in spring and under the protection of the Italian coastguard. It takes between 300 to 400 dives to collect 200 grams of material. She was taught by her grandmother, by whom she was brought up, to spin yarn from the hair-like extrusions of this large, cone-shaped clam, which can grow to a length of up to 90 cm. This yarn made of filament is then treated with lemon juice and spices, which causes it to shine when it gets exposed to sunlight. The spun thread is feather-light and as fine as silk, and can be used to weave a translucent fabric, or as gold-coloured thread for embroidery. The article by Paradiso contains images of both products, and they are amazingly beautiful.

Chiara Vigo does not sell the material she produces and has signs in her museum cum studio clearly indicating this. She uses byssus to bless people, for instance in her counselling ministry, or to embroider an image on the baptismal dress of a child. She blesses newly-weds with it, or just anybody who comes to visit her in her studio. Her product has never been for sale and as far as she is concerned it never will be. The scarcity of the *Pinna Nobilis* clam would prevent commercial exploitation or large-scale production in any case. Others have tried this but failed miserably. She recounted to Max Paradiso how this skill of making byssus was brought to Sardinia by Princess Berenice, the great-granddaughter of Herod the Great in the second half of the first century. As Berenice was the mistress of Emperor Titus and living in Rome from 69–71 A.D., this may very well have been the case. The manufacturing of byssus has been a tradition handed down from mother to daughter or granddaughter for generations. In antiquity, emperors wore byssus, and it is also mentioned on the Rosetta Stone.

Byssus thread is extremely fine and the Egyptologist John Gardner, who discovered pieces of cloth made of byssus in Egypt in the 19th century, calculated that the density was 152 threads per inch. The diameter of byssal threads is 12 to 44 microns. This is thinner than human hair, which on average is about 50 microns. Byssus allegedly was the most expensive material in ancient times (Jaworski, 2010:1).

Interestingly, Chiara Vigo discovered that she is Jewish, and she regularly goes to certain places on the island to pray and is very aware of the fact that byssus is a God-given natural product, which is sacred. She considers byssus the soul of the sea. Subsequent to his visit to Sant'Antioco, Max Paradiso went to interview Prof. Gabriel Hagai, professor of Hebrew Codicology at the *Ecole pratique des Hautes Etudes* in Paris. He stated that even though he was initially sceptical of what Chiara Vigo was doing, he realised that “she is the last remnant of Jewish and Phoenician religious practices, that was once far more widespread in the Mediterranean”. Her combination of folklore and religion has allowed him to reconstruct a forgotten and missing part of Jewish history (Paradiso, 2015).

Another person interviewed by Max Paradiso about the manufacturing of byssus is Evangelina Campi, a professor of Italian History and the author of the book *La Seta del Mare* (The silk of the sea). She knew of a few more elderly women in Apulia, which is the area along the coast on the heel of Italy (Wolters 1971, 75), who could make byssus, but they did not know how to treat it with lemon juice and spices to make it shine. Moreover, Chiara is the only person known who still harvests the material by diving (Paradiso, 2015).

Byssus as Material used for the Sails of Ships

When we take the above into account, it seems very unlikely that byssus was used to weave sails for Phoenician ships, due to its scarcity and high cost. There would not have been enough of the material for the quantity of sails needed. Moreover, it may not have

been strong enough to be used as material for sails, considering the sheer weight of these heavy wooden ships (Aubert 1993, 148). Phoenician ships were equipped with a sturdy wooden mast, which according to Ezekiel was made of cedar wood (Ezek 27:5). A square sail would be hoisted on this mast, suspended from a straight yard and there was no boom at the bottom of the sail. Instead there would be ropes called “sheets” at both bottom corners of the sail, by means of which the sail could be set (Casson 1995, 47). The corners, called “cringles” (Casson 1995, 70), to which the sheets were attached, had to be very strong to withstand the enormous forces which came into play when a ship was propelled by wind blowing into the sail. And not just the corners had to be strong, the entire sail as well.

Therefore, it is much more likely that threads of byssus were used to embroider part of the emblem on the sails of Phoenician ships, together with threads of blue and red-purple manufactured from Murex shells, as these colours do not fade. This would have given a golden hue in the light of the sun, making the emblem instantly recognisable from a distance, especially if the Phoenicians had the monopoly of the manufacturing of byssus. As I have explained elsewhere (Smith 2012, 123), the sails of Phoenician ships may have had a logo or emblem embroidered in their sails. This would have made them recognisable from afar by friend or foe. Even today, sails of ships can carry symbols, such as for country of origin, type of ship or class of vessel, and sponsors of ocean racing yachts.

Conclusion

Based on the analysis of various types of linen in antiquity, byssus is not another word to indicate linen. It is a completely different material. The translation by Diakonoff of the text of Ezekiel 27:7 referring to “byssus with embroidery” where the original Hebrew text states *šēš*, is his interpretation (Diakonoff 1992, 172), which is probably incorrect, but may have been caused by incorrect information in various dictionaries. Sails for Phoenician ships were most likely made of *šēš*, which is strong, good quality, Egyptian linen. These sails were possibly embroidered with a logo, which may have contained byssus as one of the colours, but the Bible, in its description of the ship Tyre in Ezekiel 27:3–9, does not specifically state this. It is certain that the Phoenicians produced byssus, which was used as threads for embroidery and to weave garments as an ultimate sign of luxury, worn by a select few.

It is impossible to tell how widespread *Pinna Nobilis* clams occurred in the Mediterranean Sea and whether extensive exploitation by the Phoenicians might have led to their present scarcity. The clams may have been removed in their entirety to harvest their filaments, instead of the removal of the filaments under water and leaving the clam in its place. This would have led to widespread extermination of the species.

In recent years a few scientists have rediscovered byssus and have done research into its characteristics and uses. Among these are Daniel McKinley, an American biologist and historian, who published a comprehensive study in 1998 (McKinley, 1998).

The Natural History Museum in Basel, Switzerland, held an exhibition in 2004 dedicated to sea-silk, called “*Muschelseide – Goldene Fäden vom Meeresgrund/Bisso marino – Fili d’oro dal fondo del mare*” (Sea-silk – Golden treads from the bottom of the sea). A catalogue with the same title was published by F. Maeder, A. Hänggi, and D. Wunderlin. At this exhibition, 20 items made of sea-silk were on display, and by now an inventory of a total of 60 items has been made by Felicitas Maeder, who runs the Project Sea-silk at the museum in Basel (Maeder 2004, 1).

Prof. Jan S. Jaworski from the Faculty of Chemistry at the University of Warsaw presented a paper at a workshop held in Frascati, Italy on his analysis of the properties of the byssal threads of the Veil of Manoppello and the chemical nature of their colours. This Veil of Manoppello is a relic with the image of a face, and is made of woven byssus. The material looks like linen, but has been identified by Chiara Vigo as byssus (Maszloch 2010, 1).

A newspaper article in the travel section of the Sunday Times of 10 April 2016 by Alex Polizzi about the Italian islands made mention of Chiara Vigo and her skills of weaving the “beard of the clam” (Polizzi 2016, 18).

In the light of the above information about byssus, it does not seem to be the case that byssus is the same as *šēš* or *bûš*. The latter two, with *bād*, are types of linen, and are made from plant based fibres, namely flax. Byssus is a special type of silk, not made of filaments spun by the silk worm, but made of filaments that originate in the sea. Other clam and mussel species also produce byssus, in order to anchor themselves to the sea bed, but this does not seem to be in large enough quantities that it can be harvested (Maszloch 2010).

Woven byssus looks very much like woven linen, as can be seen on the picture of the veil of Manoppello ((Maszloch 2010). As the sound of the word byssus is very close to that of *bûš* and *šēš*, confusion may have arisen over which material is what. Ignorance over the origin of the real byssus material probably also played a role, and merchants may have tried to sell a very fine quality linen as byssus to increase their profits. In short, byssus is not the same as linen.

Translators of ancient texts in modern times are also probably at a loss trying to translate the word byssus when they encounter this in writings, not knowing where the material originated. The same applies to lexicographers, as most of them do not seem to know what byssus is, with the exception of Webster’s. Moreover, if the word *bûš* is of Akkadian or Aramaic origin, it would much more likely refer to linen originating in the

Fertile Crescent, which is too far removed from the areas in the Mediterranean Sea where byssus was produced to be equated with byssus.

Slowly but surely, the almost forgotten knowledge of how to make byssus is rediscovered so that we can marvel at what beautiful items long-forgotten people in antiquity were able to produce from tufts of filament made by molluscs on the bottom of the Mediterranean Sea. The sails of the Phoenician ships were probably not made of byssus with embroidery, but of linen with an embroidered logo, which may have incorporated byssus as threads. Byssus was too scarce a material and too lightweight to have served as sails for the heavy wooden ships. In the final analysis, it is most likely embroidery with byssus, not byssus with embroidery.

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