

BYSSUS

In the midst of the mollusks in a Museum display case are these incongruous objects: a muff, a child's cap and one glove, all in a glorious golden bronze of high sheen, finely woven of byssus *lana pinna* (fish wool), as Sicilian fishermen called it.

This silky fiber, byssus, has a curious and ancient history. Secreted by gland cells in the foot of clams belonging to a species of the family *Pinnidae*, the fiber is fine but extremely strong. The hair-like threads anchor the shell to the rocks. So firmly are they anchored that a man must use considerable force to break the fibery threads. The clams live 15 to 20 or even 30 feet below the surface of the sea.

Many other clams secrete such fibers. The tenacity of mollusk byssus is well-known in folktales. One tells about the famous bridge at Bideford, on the coast of Devon in England, that was held together by a network of byssus spun by mussels. The town council believed the masses of mussels protected the foundations from being undermined by the tide. John Watkins in his 1792 *History of Bideford* tells of the many difficulties with keeping the bridge in repair owing to the rapidity of the tide, and hints of the importance of the byssus. The "muscles" [sic] he says, which "adhere to the bottom part of the bridge are not suffered to be gathered."

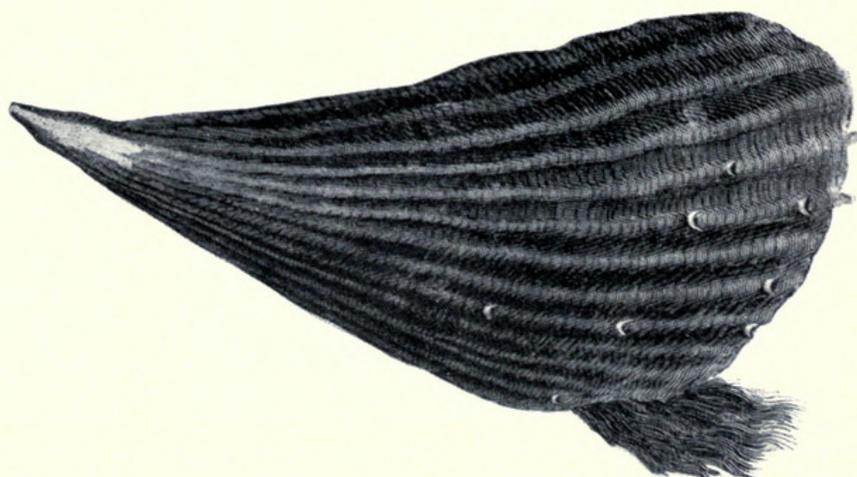
As a fiber byssus was probably first used in southern India where the business of diving for this wool of another species of *Pinna* was popular near the city of Colchi, according to the book *Periplus of the Erythrean Sea*, a document at least as late as the time of Tertullian (150-222 A.D.), who also wrote about the byssus.

From India, the use of byssus spread to Greece and other countries. The first documentation of its use in Italy at the ancient city Tarentum (Tarento) is in Tertullian. Speaking of the materials for weaving, he says:

Nor was it enough to comb and to sow the materials for a tunic. It was necessary also to fish for one's dress. For fleeces are obtained from the sea, where shells of extraordinary size are furnished with tufts of mossy hair.

Procopius, who wrote during the Persian Wars (about 550 A.D.) tells us that the five hereditary satraps (governors) of Armenia who received their insignia from the

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Roman Emperor were given chlamys (or cloaks) made of the fibers of the *Pinna*. In classical antiquity, the name "byssus" was applied to linen, cotton and silk and was known to be used for garments for kings, priests and other persons of high rank or honour.

Derived from an old Egyptian word meaning "string" and "linen," Herodotus applied the word "byssus" to mummy bandages made of a kind of flax, and hence it was translated in the English Bible of 1611 as "fine linen." "There was a certain rich man, which was clothed in purple and fine linen, and fared sumptuously every day." (Luke XVI, 19).

Robert James Forbes in *Studies in Ancient Technology* (Vol IV, 1964) writes that "The best type of byssus was woven in the temple-shops as it was the ritual cloth for the gods and mummies."

There is no doubt that byssus was for the quality trade. In 1398, John de Trevisa wrote, "Thereby many manere flexe, but the fayrest of all growth in Egypte: for thereof is Bissus made ryght favre and whyte as snowe."

But what did this fine linen have to do with *lana pinna* as we know it? Today, the word "byssus" is used universally to refer to the holdfasts of bivalve mollusks, but it is interesting to reflect upon the way the meaning of the term came about. Because Teodoro Gaza, a 15th Century Greek scholar who translated Aristotle, made an error in 1470 while translating Aristotle's *Historia Animalium*, the word "byssus" was applied to the holdfast fibers of the *Pinnidae*, *Mytilidae*, *Pteriidae* and other mollusks. According to some scholars, Gaza confused the Greek word for depth, as used by Aristotle in describing the ecology of *Pinna*, with the term for the vegetable fibers. Gaza probably genuinely believed that Aristotle intended the word to be applied to the mollusk holdfast. In 1555 Rondelet in his writings perpetuated this mistake and thus the term was established.

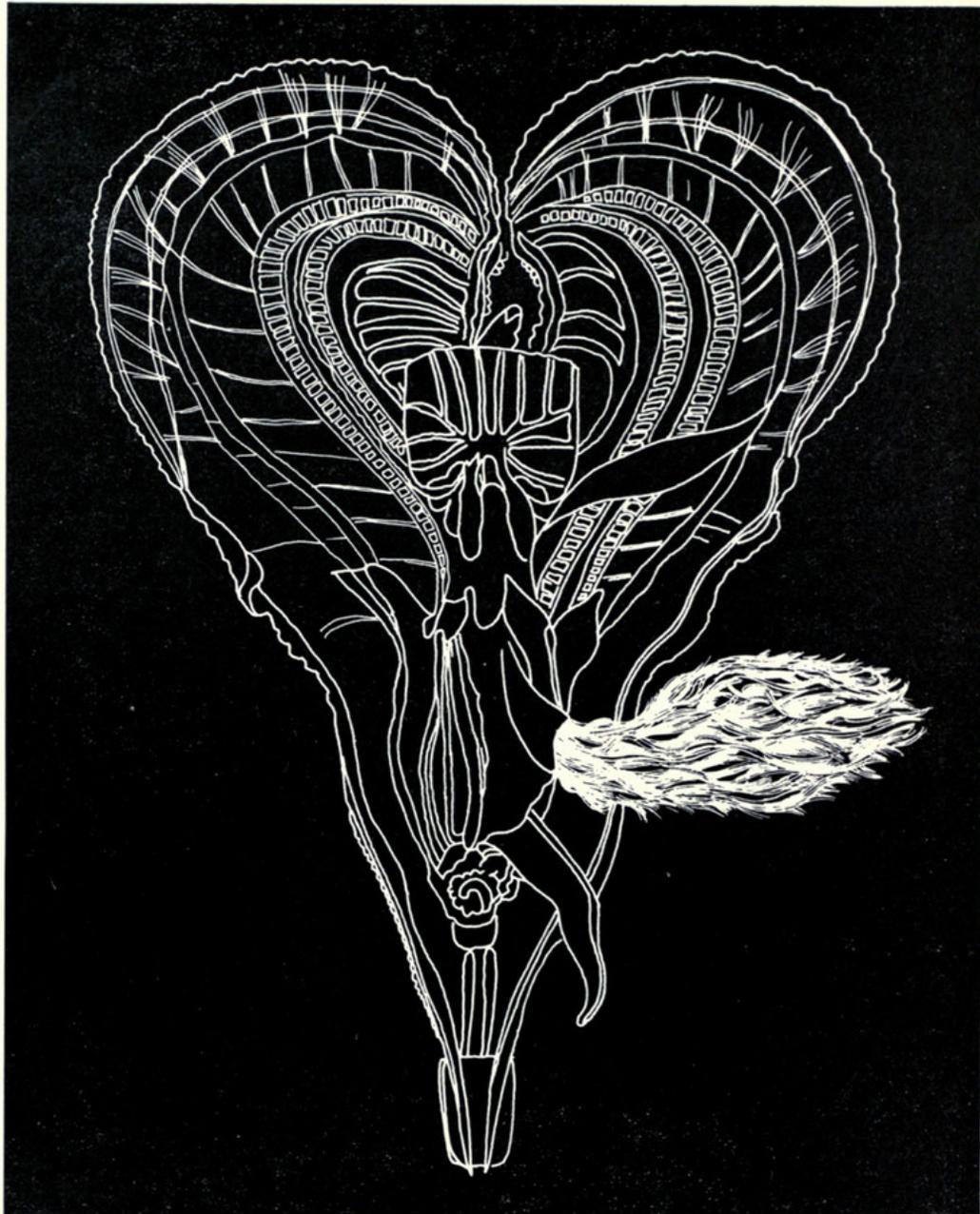
One might appreciate that Aristotle did intend the word to be applied to the holdfast since it was similar in texture to the "fine linen" when woven, but not to the mummy bandages. Upon microscopic examination mummy bandages have proved to be made of flax.

Zoologically, byssus is defined as the tuft of fine silky filament by which mollusks of the genus *Pinna* and various mussels attach themselves to the surface of rocks. The fragile, fin-shell of *Pinna nobilis* found in the Mediterranean is long and tapering, sometimes attaining a length of two feet, narrow at one end and gradually widening to considerable breadth at the other. The byssus originates from the base of the foot, which is the narrow end.

This fabulous foot can exude glue at its owner's pleasure; it then adheres the filaments to the proper place. The filaments can be reproduced after they have been cut away or damaged. P.L. Simmonds, in *The Commercial Products of the Sea* (1883), compared the mechanism in *Pinna* to that of a wire-drawer's mill:

The *Pinna* possess a machine as incontestably mechanical as a wire-drawer's mill . . . The animal first attaches the extremity of the thread, by means of its adhesive quality, to some crag or pebble . . . when this is effected, the *Pinna*, receding . . . draws out the thread through the perforation of the extensile member by a process which Paley, in describing the similar operations of the terrestrial silkworm, justly compares to the drawing of wire. One difference alone exists: the wire is the metal unaltered, except in figure; whereas, in the forming of the thread, the nature of the substance is somewhat changed, as well as the form; for, as it exists within the water, it is merely a soft and clammy glue, the thread acquiring, most probably, its firmness and tenacity from the action of the air upon its surface at the moment of exposure.

BYSSUS



There were several methods of obtaining *Pinna*, none of them easy. Diving was one of these and was described in a 1795 work by Guiseppe Saverio Poli:

. . . *Pinna* is especially abundant on the shores of Sicily . . . grown spontaneously in large groups, and in calm water, when the shadows fall from the summit of the island, is clearly seen by persons in boats growing nearly upright and fixed in the sandy bottom at the depth of about 30 feet. There are divers, whose business it is to bring it up. But, since it cannot be loosened even by repeated blows, (for the sand firmly resists the attempts of the diver, being supported by its own weight and by the superincumbent water), in these circumstances he sits down at the bottom of the sea, brushes away with his fingers the earth which encompasses the shell, and then endeavors to pull it up by seizing it with both hands. If he is thus likely to be detained at the bottom for a longer time than he can hold his breath, he ascends to the surface, supports himself upon corks, which are in readiness for him, and, when he has sufficiently recovered himself by breathing, he again dives to the bottom to complete his task.

Another method of gathering *Pinna* was an instrument called the *pernonico*, composed of "two semi-circular bars of iron fastened at the ends, at one of which is a wooden pole, at the other a ring and cord." Fishermen would guide their boats near

where *Pinna* occurred, let down the *pernonico*, and then would loosen *Pinna* by embracing it with the iron bars and twisting it around.

The "cramp" was still another way of making *Pinna* leave home. It was described in *The Commercial Products of the Sea* as a kind of iron fork, "with perpendicular prongs 8' in length each of them about 6" apart, the length of the handle being in proportion to the depth of the water . . ."

After all this, it took one pound of raw wool (from 40 to 50 shells) to make but three ounces after processing. Baron Riedesel described the process at Tarentum in 1772:

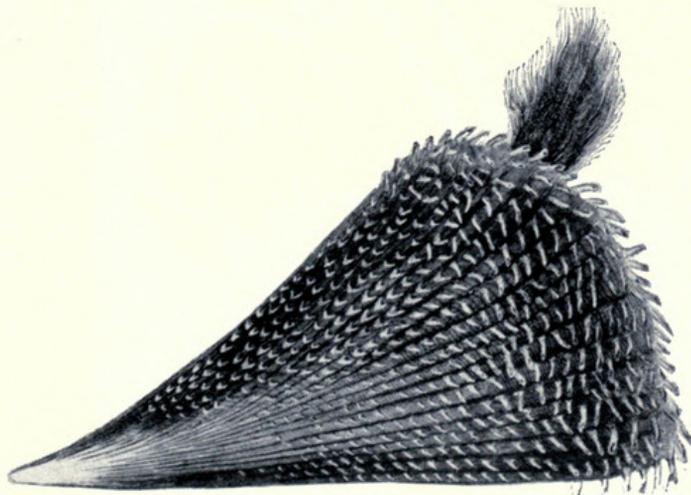
The preparation is both laborious and ingenious, only the tips of the wool can be used and the other half is thrown away; they wash it a number of times in cold water, and dry it in the air till it is cleared of all impurities; then they comb it on a fine wire card, and last of all spin it on small spindles and knit it. Many mix it with silk by which the work gets more firmness but loses that softness and warmth which it hath naturally.

This delicate, but extremely resilient fiber, best compared to fine hair or spun glass, was greatly sought after for robes called "tarentines." It is said that the scarf of the turban of Archytas was made of byssus. In 1754, a pair of stockings of byssus was presented to Pope Benedict XV, and according to legend, due to their extreme fineness, they fit in a small snuff box. A pair of gloves could be held in a walnut shell.

Its brilliant colour, ranging from a beautiful golden yellow to a rich olive brown, prompted one writer to the supposition that ". . . byssus of the *Pinna* is said to be the Golden Fleece for which Jason sought." Whether this romantic fancy can be taken seriously is something else again, but St. Basil (370 A.D.) did admire its "golden fleece . . . which no artificial dye could imitate." Others have likened the web's beautiful yellow brown to the "burnished gold hue which adorns the backs of some splendid flies and beetles."

Despite its delicacy, the fabric woven is strong and durable, but is so attractive to moths that few ancient garments have survived.

An early English Museum-goer, John Evelyn, in 1645, found byssus worthy of note in



his listing of fascinating rarities at the Museum of Ferdinando Imperato:

We were invited to the collection of exotic rarities in the Museum of Ferdinando Imperati, a Neopolitan nobleman, and one of the most observable palaces in the city, the repository of incomparable rarities. Amongst the natural herbals most remarkable was the *Byssus marina* and *Pinna marina* . . .

Unfortunately, the use of byssus has dwindled to but a few articles made by Italian country women for the tourist trade—mainly as curiosities—in present day Sicily and Calabria.



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