

## Byssus

by

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In zoology the word „byssus” is generally in use to indicate the fibres attaching *Mytilus*, *Modiolus*, *Pinna* (Fig. 1), *Dreissena*, and other Lamelli-branchia to their substrate. What is the origin of this word? Who has introduced this technical term into zoology?

It is evident that it is the Latinized form of the Greek word βύσσοσ (bussos). If we look up this word in a dictionary, we find it, with a difference in gender and accent, in two significations:

1. ὁ βύσσοσ (masculine), the depth of the sea or of a river. E.g. Ilias XXIV 80: Iris . . . . .plunged into the depth of the sea like a ball of lead. Herodotus used the word to indicate the depth of the Nile (II 28, II 90) or of a well (III 23). It is a Ionic form of the Attic word βυθός (buthos; even for one who is not a linguist, it will be quite acceptable that th in one Greek dialect corresponds with ss in another).

2. ἡ βύσσοσ (feminine), a very fine vegetable fibre, cultivated in eastern Mediterranean countries, which was spun and woven into extremely thin, white and costly tissues. The word is not of Indo-Germanic origin, but probably adapted from a Semitic language (Lutz).

Pliny mentioned it in the Latin form „byssus” (feminine, plural „byssi”) in the same sense. It is generally translated as „fine linen”. According to some the byssus-fibres did not originate from flax but from the cottonshrub (see Olck). This question need not be considered here. We find clear instances of this βύσσοσ in the traditional Greek text of the New Testament. St. Luke XVI 19: „There was a certain rich man, which was clothed in purple and fine linen, and fared sumptuously every day”. In the Apocalypse XVIII 12 and 16 it is mentioned among other articles of luxury. Apocalypse XIX 8: „And to her (the Bride of the Lamb) was granted that she should be arrayed in fine linen, clean and white”. Ibidem XIX 14: „And the armies which were in heaven followed him upon white horses, clothed in fine linen, white and clean”.

At first sight none of those two significations helps us in any way to understand the use of „byssus” in zoology. Nowhere in classic literature the Latin word „byssus” or one of the two Greek words βύσσοσ (masculine) or βύσσοσ (feminine) is used in connection with any Mollusc. With one exception: in Aristotle (*Historia animalium* V 15) we read: αἱ δὲ πῖναι<sup>1)</sup> ὀρθαὶ φύονται ἐκ τοῦ βύσσοσ ἐν τοῖς ἀμμώδεσι καὶ βορβορώδεσιν.

<sup>1)</sup> Variant: πῖναι. The right orthography is probably πῖνα, Latin „pina” (Keller). It is a pre-Hellenic word, adapted in Greek and Latin (Brands). Linnaeus wrote „Pinna”, which is the acknowledged orthography in zoology.

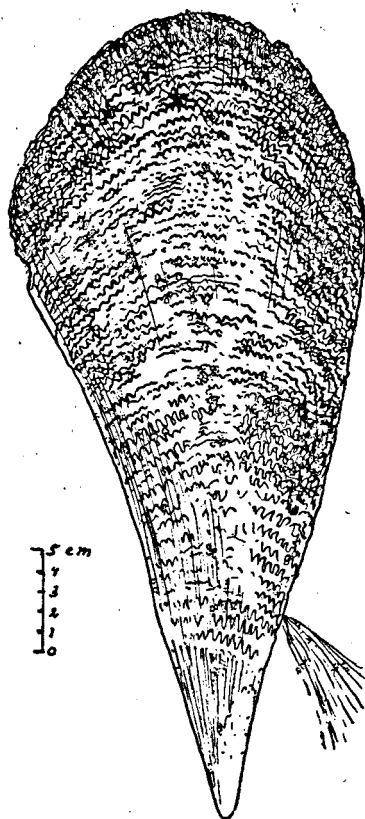


Fig. 1. Shell of *Pinna nobilis* L. with byssus.  
J. Ypey after Bucquoy, Dautzenberg & Dollfus.

If you lay before a classical scholar this text and a picture of any *Pinna* in its natural attitude, apex of the shell vertically downwards, he will not hesitate to translate: „The *Pinna*-mussels grow upright out of the depth, in sandy and muddy places”. As a zoologist you cannot have any objection against this translation. Perhaps you may ask: did such a keen observer like Aristotle not mention the obvious fibres attaching *Pinna* to her substrate. He did mention them V 71: „the *Pinnac* are rooted” (ἐπιζωνται).

The above translation of Aristotle V 15 is supported by a classic text. Athenaeus (about 230 A.D.) in his technological work entitled

Δειπνοσοφιστά III p. 89 c cited the very statement of Aristotle, but with the variant βυθός (buthós) instead of βύσσος (bussós).

Willem van Moerbeke (Guillelmus de Morbecca or Morbacha) was born at Moerbeke (East-Flanders, now Belgium) about 1215. He entered in the order of the Dominicans, studied in Louvain and Cologne and came into close relations with Thomas Aquinas and with the Popes Clement IV and Gregory X. He died shortly after 1282 as Archbishop of Corinth (Greece). He knew the Greek and Arabic languages and he wrote or translated papers on medicine and sciences. Among his works is a Latin translation of Aristotle's *Historia Animalium*. In this translation the passage quoted above has: „Pinnæ rectæ nascuntur ex fundo in arenosis” (Aubert & Wimmer), „the Pinna-mussels grow upright from the depth in sandy places”. Unfortunately Moerbeke's mediaeval Latin translation was not printed before 1908 and then only partly.

Theodorus Gaza, born 1398 in Thessaloniki (Greece) came in 1430 or somewhat later to Italy as a refugee and made a successful career as a professor of the Greek language and philosophy. He died about 1478. Like Moerbeke did two centuries earlier, Gaza also made a Latin translation of Aristotle's zoological papers and his translation was printed at Venice in 1476. Several editions followed. Gaza translated the passage on Pinna: „Pinnæ erectæ locis arenosis coenosisque ex bysso, id est villo sive lana illa pinnali, proveniunt”. „On sandy and muddy sites the Pinna-mussels grow (come forth) upright from the byssus, that is this hair-tuft or Pinna-wool”.

The words corresponding to „id est villo sive lana illa pinnali” are wanting in all known manuscripts of the Greek text. Evidently they are an explanatory note of the translator Gaza.

In some harbours of southern Italy the wives and daughters of the fishermen still spin and weave or knit the fibres of *Pinna nobilis* L. into purses and gloves and adornment for clothes. The Italian word for this stuff is „lana pinna”. Samples of this local industry are in the Museum of Natural History at Leiden and in the Musée Maritime at Monaco. They are characterized by a peculiar golden brown lustre. Such a use of the fibres of Pinna is mentioned from the late antiquity through the Middle Ages till modern times, but not earlier than the third century A.D. (Aristotle wrote in the fourth century B.C.). In Greek or Latin texts it is never called βύσσος or „byssus”, but occurs as „silk from the sea” or „silk of Pina”.

Evidently Gaza did not understand the word βύσσος as a synonym of βυθός, depth. We must bear in mind that in the time of Aristotle the words βύσσος, depth, and βύσσος tissue, probably were pronounced quite differently, but they were written in the same way,

without an accent. The latter was added only in the manuscripts in Alexandrian times. So in the manuscripts available in the Middle Ages mistakes in the accents readily could occur. Gaza probably had some vague notion of „byssos” being a tissue and knew something of the use of Pinna-fibres, and not paying attention to gender and accent or having before him a corrupt copy, he combined the two notions and baptized the filaments of Pinna „byssus”.

The zoologist R ondelet, 1555, was so fascinated by the authority of Gaza, that describing Pinna he cited and adopted Gaza’s translation of the passage of Aristotle without criticism. But, wondering at this byssus of marine origin, he added to the description of Pinna a chapter on byssus, beginning: „Byssus terrenus est et marinus”, „there is a byssus of the land and one of the sea” (so far as I could find, the byssus marinus has its only origin in the error of Gaza).

Gesner, 1558, quoted the passage from R ondelet and then criticized the translation of Gaza in such a keen and modern way, that I have nothing to add to it. I translate from Gesner: „In Greek we read: ὄφθαλ φόνονται ἐκ τοῦ βύσσοῦ. Athenaeus, citing this place, has βυθοῦ with this sense: they grow right out of the mud, or of the depth. Pliny, interpreting this place omits these words. R ondeletius reads with Gaza βύσσοῦ and translates: out of the byssus; he thinks the word βυθοῦ in Athenaeus corrupt.... .I [Gesner] see some rudiment of wool growing on the pinnae; I doubt however, whether it is rightly called by the name byssus. So far as I [Gesner] know only Aristotle mentions it and that only once, in this very place, if we interpret it rightly. But if βύσσοϛ is understood as wool, it has the feminine gender. So in this case we had to read: ἐκ τῆς βύσσοῦ. The commentators of Aristophanes wrote: Ionian people say βύσσος instead of βυθός. In favour of the version of Athenaeus there is the masculine article, and it makes little difference, whether we read βύσσοῦ or βυθοῦ for the Greek easily interchange ss and th. From byssus in the sense of depth is derived the word abyssus..... The matter itself seems to me [Gesner] easier to understand, if the Pinnae are said to grow out of the mud, than out of the tuft of hair, for they go upright out of the mud, but their tuft of hair lies lateral. Moreover I would rather say that the hair-tuft grows from Pinna than Pinna from the hair-tuft”. So far Gesner.

Aldrovandus, 1606, cited first R ondelet, and then the critical remarks of Gesner, adding that he (Aldrovandus) quite agreed with Gesner. However, it was too late already and it has turned out to be impossible to abolish the term byssus from zoology. In nearly every century after Gesner some philologist or zoologist has protested against the cited translation of Gaza (so Scaliger, 1619; Müller, 1836; Aubert & Wimmer, 1868; Steier, 1933). So far as I know, d’

Arcy Thompson, 1910, is the only one who has ever defended the translation of Gaza.

It is not my intention to make any objection against the use of the word byssus in its usual zoological meaning, but we must bear in mind, that not one author before Gaza, 1476, has ever used the word byssus in this sense and that all later use goes back to the quoted passage of Gaza.

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(In the description of a species of *Pinna* he uses the word *byssus* in our modern zoological sense without any interpretation: „a little curve, where the *byssus* lies”).

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#### Samenvatting

Het woord *byssus* als term voor de draden, waarmee *Mytilus* en andere *Lamellibranchia* vastgehecht zijn, is in de zoologie ingeslopen, doordat *Gaza*, 1476, een zin van *Aristoteles* verkeerd uit het Grieks in het Latijn vertaald heeft. In het Grieks en Latijn heeft dit woord geheel andere betekenissen.