

On the origin of *khutū*

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ABSTRACT: *Khutū* was a material derived from an animal used by Medieval Asian peoples in the manufacture of knife handles and as an alexipharmic. Al-Bīrūnī (973–1048) made extensive enquiries into the origin of *khutū* but reached no definite conclusion. Literary scholars in the first half of the twentieth century identified the walrus and narwhal as probable sources, but in ignoring aspects of the literature on *khutū*'s appearance and provenance left a number of questions unanswered. We clarify and extend this research and identify further clues to the identity of *khutū*. We concur that walrus ivory was one source of *khutū*, suggest that the remains of “Ice Age” mammals may have influenced development of the medieval literature on *khutū* more than previous investigators realized, and offer a new hypothesis of *khutū*'s origin.

KEY WORDS: Al-Bīrūnī – musk ox – *Ovibos moschatus* – *Odobenus rosmarus* – *Monodon monoceros* – *Mammuthus primigenius*.

INTRODUCTION

Khutū was a horn-like or tooth-like material derived from an animal used in medieval Asia in the manufacture of knife handles. It was also believed to have the ability to detect and neutralize poisons (Ettinghausen 1950). The source or sources of *khutū* is a long-standing mystery (Wiedemann 1911; Reinhart 1912; Ruska 1913; Laufer 1913, 1916; Ettinghausen 1950; Dankoff 1973). A horn-like substance that reacts to poison brings to mind rhinoceros horn (Ettinghausen 1950; Chapman 1999), but in Islamic literature rhinoceros horn was not credited with alexipharmic properties until the late thirteenth century (the first mention is in a work by al-Qazwīnī of 1283; Ettinghausen 1950: 110), whereas such characteristics were ascribed to *khutū* in the first half of the eleventh century (see below). In the Islamic literary tradition, rhinoceros horn probably gained its alexipharmic reputation from *khutū* (Ettinghausen 1950: 131), although it is possible that the acquisition was directly from Chinese ideas about rhinoceros horn without *khutū* as an intermediary (Ettinghausen 1950: 113). The full transfer of mythology from *khutū* to rhinoceros horn did not occur until the mid fifteenth century, when rhinoceros horn was credited with *khutū*'s characteristic reaction of agitation or sweating in the presence of poison (extensive discussion of these matters can be found in Ettinghausen 1950: 110–132 and of rhinoceros horn in the Islamic world throughout this book).¹

Laufer (1913, 1916), Ettinghausen (1950) and Dankoff (1973) identified *khutū* with marine ivory from the walrus, *Odobenus rosmarus* (Linnaeus, 1758), and narwhal, *Monodon monoceros* (Linnaeus, 1758). Following these previous authors we investigate the question of *khutū*'s origin and not the later literary confusion that saw *khutū*'s characteristics transferred to other materials (see Ettinghausen 1950). We clarify the line of research that identified marine mammals as the source of *khutū* and offer additional support for the theory. We reconsider an earlier hypothesis of Wiedemann (1911) that *khutū* was mammoth

ivory and find support for this idea too. We then offer a theory that might make sense of aspects of the *khutū* literature that previous researchers overlooked. We conclude that *khutū* may have been several materials that were linked in people's minds because they originated in the same place, travelled along the same trade routes, and were used for the same purpose.

The origin of *khutū* is a literary conundrum.² We use translations of Arabic and Chinese texts used in previous studies, which were produced by Arabist and Sinologist linguists of the first half of the twentieth century.³ The exception is Said's (1989) translation of Abū al-Rayhān Muhammad ibn Ahmad al-Bīrūnī's "Kītab al-jamāhir fī ma'rifat al-jawāhir", a text which was unavailable to Laufer (1913, 1916) when he conducted his seminal studies on *khutū* and only fragmentarily translated by Ettinghausen (1950: 138–141). The current authors are not linguists. We acknowledge that alternative translations are possible and hope that literary scholars will revisit the literature on *khutū* in light of our conclusions.

THE LITERARY TRADITION

Six descriptions of *khutū* are presented below. A seventh will be introduced later in context. Several variants of the word *khutū* are used. The synonymy of the words *khutū*, *chatuq*, *khatū*, *khatuq*, *ḥabaq* and *khataq* was demonstrated by Dankoff (1973), who also supported Laufer's (1913, 1916) thesis that *khutū* was walrus or narwhal ivory. Other spellings are phonetic variants of the word *khutū* and accepted as such by Laufer (1913, 1916) and Ettinghausen (1950).

Much of the source material can be traced to al-Bīrūnī, a native of Khwārizm (Khiva) on the southern shore of the Aral Sea. Known as "The Master" (Boilot 1960), he is widely regarded as the most profound and reliable medieval Muslim writer on the natural world (Ettinghausen 1950; Said 1989; Hitti 2002) and the authority with whose writings any theory about the origin of *khutū* has to be consistent.

Al-Bīrūnī's description of *khutū* preserved in al-Khāzinī's "Kītab mīzan al-hikma" written in 1121 (Laufer 1913: 316) reads:

It is asserted that it is the frontal bone of a bull living in the country of the Kirgiz who, it is known, belong to the northern Turks . . . The Bulgar bring from the northern sea teeth of a fish over a cubit long. White knife hafts are sawed out of them for the cutlers. The middle portion is distributed among the single hafts, so that every piece of the tooth has a share in them; it can be seen that they are made from the tooth itself, and not from ivory, or from the chips of its edges. The various designs displayed by it give the appearance of wriggling. Some of our countrymen bring it to Mekka where the people regard it as white chutww. The Egyptians crave it and purchase it for a price equal to two hundred times its value. Likewise I conclude from the appearance of the chutww that it is the main portion of a tooth or horn.

In another passage preserved in the same work al-Bīrūnī adds information on *khutū*'s shape and colour (Laufer 1913: 315):

It originates from an animal; it is much in demand, and preserved in the treasuries among the Chinese who assert that it is a desirable article because the approach of poison causes it to exude. It is said to be the bone from the forehead of a bull. Its best quality is the one passing from yellow into green; next comes one like camphor, then the white one, then one colored like the sun, then one passing into dark-gray. If it is curved, its value is a hundred dīnār at a weight of one hundred drams; then it sinks as low as one dīnār, regardless of weight.

Ibn al-Ḥusayn Kāshgharī's eleventh-century definition of *chatuq* (Ettinghausen 1950: 122) runs:

Horn of a sea fish imported from China. It is said that it is the root of a tree. It is used for knife handles. The presence of poison in food is put to the test by it because when broth or other dishes in the bowl are stirred with it the food cooks without fire, or if the horn is placed on a bowl it sweats without steam.

A text on precious stones by Ibn al-Akfānī (d. 1348) includes a passage derived from al-Bīrūnī's work (Laufer 1913: 316–317):

Chartūt is also called *chutw* . . . al-Bīrūnī says: it originates from an animal. It is said to be obtained from the forehead of a bull in the region of the Turks in the country of the Kirgiz, and it is said also that it originates from the forehead of a large bird which falls on some of these islands; it is a favorite of the Turks and with the Chinese . . . The Ichwān al-Razījāns state that the best is curved, and that it changes from yellow into red, then comes the apricot-colored one, then that passing into a dust color and down to black . . . It has been established by experience that together with the vapors of perfume it has an excellent effect in the case of hemorrhoids.

A work called “*Cho keng lu*” compiled in 1366 by the Chinese author T'ao Tsung-i reads (Laufer 1913: 322): “*Ku-tu-si* is the horn of a large snake, and as it is poisonous by nature, it can counteract all poisons, for poison is treated with poison. For this reason it is called *ku-tu-si*.”

Ku-tu-si or *ku-tu-hsi* (Ettinghausen 1950) is the root of the Arabic word *khutū* and its variants (Laufer 1913; Dankoff 1973). A passage in al-Ghaffārī's work on mineralogy written around 1511 reads (Laufer 1913: 317):

The *ḥutū* is an animal like an ox which occurs among the berber and is found also in Turkistan. A gem is obtained from it; some say it is its tooth, others, it is its horn. The color is yellow, and the yellow inclines toward red, and designs are displayed in it as in damaskeening. When the *ḥutū* is young, its tooth is good, fresh and firm; when it has grown older, its tooth is also dark-colored and soft.

There are other examples of this kind of description (Laufer 1913, 1916; Ettinghausen 1950; Dankoff 1973; Said and Hamarneh 1973; Said 1989), but the problem of the origin of *khutū* should be apparent. *Khutū* was described as a horn, a tooth, a bone and the root of a tree. It was reportedly derived from a bull or a bird, while something similar to *khutū*, though seemingly not it, was carried by a fish. Chinese writers attributed *khutū* to a snake. By al-Bīrūnī's time the material was used for detecting poisons, though the “*Ḥudūd al-'Ālam*”, written in the late tenth century (Minorsky 1937, 1955), mentioned only that it was used for knife handles. The curved variety of *khutū* was expensive, which suggests a straight, cheap variety. *Khutū* was also highly variable in colour. The question we address is that asked by al-Bīrūnī in the eleventh century: what is *khutū*?

THE WALRUS AND THE NARWHAL

Laufer (1913, 1916), who worked mainly on the Chinese branch of the *khutū* problem, and Ettinghausen (1950), who worked on the Arabic branch, went to great lengths to track *khutū* to its source. Both concluded that *khutū* was ivory from the walrus and perhaps the narwhal.

The tusks of walruses and narwhals look different, so the idea that *khutū* came from the narwhal as well as the walrus requires explanation. *Khutū* was occasionally called a “thousand years' old snake” in Chinese literature (Laufer 1913: 318), a description that connotes the long, twisted tusks of narwhals. The tusks of narwhals and walruses were probably cut up before being traded, and ivory from both species may have been processed

before being exported: sectioning, sanding and polishing might have obscured differences between the two types of ivory. Medieval peoples were also less concerned about taxonomy than we are: craftsmen and their clients might have recognized two types of *khutū* and attributed both to the same kind of animal, or, conceivably, might not have drawn a distinction at all, regarding both substances simply as material suitable for the making of knife handles. The word *khutū* might thus have covered what we recognize as two materials that were linked in people's minds because they travelled along the same trade routes (see Christian (2000), and below) and were used for the same purpose (Laufer 1913, 1916; Ettinghausen 1950).

Ibn al-Ḥusayn Kāshgharī, however, ascribed *khutū* to a fish, an identification that does not sit comfortably with the walrus or the narwhal. But this reference is not really problematic. A number of mammals were once called fish because they live in water, and a few still are: the Persian for dolphin translates as Jonas's fish, while in Turkish a seal is a bear-fish and a hippopotamus a horse-fish (Abrahamowicz 1970). Accepting that the remains of narwhals and walruses might have been confused by medieval peoples we can move on to assess how these animals' tusks relate to descriptions of *khutū*.

Walrus tusks are unique in their structure. The osteodentine core of a walrus tusk has a granular texture (Figure 1), which in polished sections appears as sub-rounded translucent grains set in an opaque matrix. Al-Bīrūnī's reference to the middle portion of the fish tooth from the northern seas implies that the core of the tooth differed from the material surrounding it; he also wrote that the core cannot be confused with ivory (presumably from an elephant), implying that the material on the outside of the tooth might be so confused. Thus al-Bīrūnī described a tooth that is ordinary on the outside and special on the inside borne by a creature from the northern sea. Only the walrus fits this description.

Geographical considerations confirmed to Laufer (1913, 1916) and Ettinghausen (1950) that marine mammals were the primary source of *khutū*. Al-Bīrūnī wrote that the Bulgar brought fish teeth from the northern seas. The Bulgar were merchants settled on the Volga River between the Muslim Empire to the south and pastoralist and hunter-gatherer peoples to the north (O'Brien 2007: 62), who specialized in trading furs. If al-Bīrūnī's "fish teeth" were an adjunct to the medieval fur-trade (Christian 2000) it would not be surprising if the animals from which they were obtained lived in the Arctic Ocean.

Al-Bīrūnī also commented that the expensive variety of *khutū* was curved, and since he mentioned a cheaper kind immediately afterwards it may be inferred that this type was not

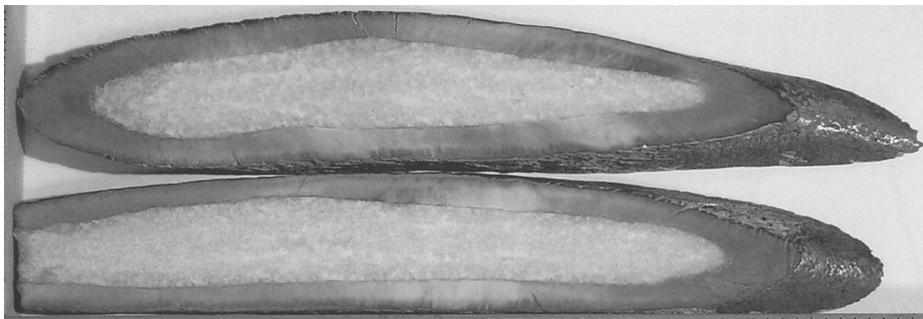


Figure 1. Oblique section through an ancient walrus tusk showing the osteodentine core (light coloured material). The darker, outer part of the tooth is reddish-brown in colour from having been in contact with the soil. The lower example is 17.5 cm long. (© Mark Knapp.)

curved. Walrus tusks are usually curved whereas narwhal tusks are straight, so perhaps the curved and straight varieties of *khutū* belong to the walrus and narwhal respectively. If so, the interpretation that expensive *khutū* (curved, attractive core) came from the walrus and cheap *khutū* (straight, hollow) from the narwhal would make sense.

Two allusions to *khutū*'s wavy pattern appear in translations of the Arabic source material: wiggling and damascening (see Ettinghausen 1950: 117; the term damascening as applied to the technique of hammering gold and silver threads into a sheet of metal to produce a geometric design is a late usage: see Maryon 1960). Medieval armourers may have complemented damascened blades with damascening handles, just as modern-day knife-makers sometimes strive for the same balance in their own designs (see below). But modern-day knife-makers do not use walrus ivory to achieve a damascene effect, because osteodentine has a granular appearance. Allusions to waviness may illustrate a confusion between materials used to make knife handles, of which more presently.

There is another line of evidence that *khutū* was walrus ivory in a text that was unknown to Laufer in the 1910s and was discovered by Ettinghausen only as he was finishing his 1950 treatise (having belatedly read this text Ettinghausen wrote a few pages of reinterpretation and appended them as a supplementary note to his unaltered chapter on *khutū*). It appears to be the original on which the fragments preserved in al-Khāzinī are based. Elements of this text also suggest that there might have been other sources of *khutū*. In al-Bīrūnī's work on precious stones, "Kitāb al-jamāhir fī ma'rifat al-jawāhir", is the following passage (Said 1989: 180–181):

... When I enquired about the *khutū* from the members of the diplomatic mission which had come from the Qāta'ī Khān⁴, they said: "The only merit about it is that it lets out perspiration when any poison comes into contact with it. This is why it is held in such esteem. It is the bone of [the] forehead of [a] bull."

This is what has been said in books, although the only additional information we could get is that this bull is found in Khirkhiz. Its forehead is thicker than two fingers which would show that it cannot be the forehead of the Turkish bull, as it is smaller bodied. But it could well be the horn. As for the belief that it is the forehead of a bull, it would be the forehead of the mountain goats of Khirkhiz. Only they can have such foreheads . . .

It has patterns described over it and bears resemblance to the pith of the teeth of the fish which the Bulgarians bring to Khwārazm [Khiva] from the North Sea which is adjacent to the ocean. It is bigger than the hand in size and the pith is longer in the middle . . .

A Khwārazmian happened to find a tooth which was very white on the sides. He had hasps of daggers and knives made from it. The natural patterns described upon it were very thin, white and pale. It resembled the down of a cucumber if peeled in such a manner that that the seed grains are also cut off . . .

A tradition which runs about it – and it is extremely difficult to check the veracity of the factual truth behind this tradition – has it that it is the forehead of a big bird . . . [Natives in the wilderness of China] believe it to be a very large fowl residing in uninhabited regions beyond the sea of Zanj and China, eating large ferocious elephants . . .

Amīr Abū Ja'far ibn Bānū had a large box-like case made of long and broad *khutū* planks . . .

The reference in this passage to a peeled cucumber indicates *khutū*'s main source: shave a cucumber lengthways and towards the middle a pattern of translucent seeds set in an opaque matrix becomes evident that very closely resembles walrus osteodentine. There is no doubt in the authors' minds that this aspect of al-Bīrūnī's text refers to walrus ivory. Other aspects of the passage, however, suggest a different source for *khutū*.

THE WOOLLY RHINOCEROS AND WOOLLY MAMMOTH

The avian reference (see also the passage by Ibn al-Akfānī) may be rooted in stories about giant birds originating in Siberia that were based on skulls of the woolly rhinoceros,

Coelodonta antiquitatis (Blumenbach, 1799) (Laufer 1916: 388).⁵ The motif may also be connected with the Arabic legend of the rukh (Ettinghausen 1950) and the use by ivory carvers of the horny excrescence above the bill of the helmeted hornbill, *Rhinoplax vigil* (Forster, 1781) (see Laufer 1916: 382–389).⁶

Ivory from the mammoth, *Mammuthus primigenius* (Blumenbach, 1799), was coveted by medieval Chinese craftsmen, who must have acquired it from northern Eurasia (Laufer 1913). The theory that khutū was mammoth ivory was first proposed by Wiedemann (1911). Though Laufer (1913) did his best to dismiss this idea, and in so doing convinced Wiedemann and other scholars that khutū was walrus ivory (Laufer 1916: 380), he could not convince himself that the mammoth and khutū were unconnected. At the end of his first monograph, Laufer (1913: 356) admitted that mammoth ivory and khutū might have been confused in the minds of medieval peoples: if tusks of the walrus and narwhal had been mixed up because both originated in the far north, it is possible that the tusks of mammoths might have been caught up in the same confusion.

References to the Kirghiz (or Kirghiz lands) in Muslim texts underlined Laufer's suspicion that the mammoth might be a source of khutū. In the “Ḥudūd al-ʿĀlam” of 982 (Minorsky 1937, 1955), it was stated that Kirghiz lands supplied large quantities of khutū (Ettinghausen 1950: 116). The name Kirghiz (Khirkhiz, Kirgiz, Kyrgyz) is confusing, because in al-Bīrūnī's time the Kirghiz lived across a large area of Siberia, their homeland occupying a position between Arab and Chinese civilizations to the south and reindeer-herders, hunter-gathers, and marine-mammal hunters to the north (Mackenzie 2005; Overy 2007: 139). Concerning khutū's origin, Laufer (1916: 372) conceded that “when we recall the commercial relations of the Arabs with the Kirgiz, the whole question seems to assume a new turn. It is possible . . . that al-Bīrūnī's bull furnishing ivory may be an allusion to the mammoth . . .”. Ettinghausen (1950: 119–120) agreed, writing “. . . the sources of supply seem to point to a land animal. Thus the possibility of an identification with mammoth bones . . . poses itself again.” As explained below, the land-living bull furnishing ivory may be a different animal, but there are reasons for thinking that mammoth ivory may have a stronger connection with the literature on khutū than previously suspected.

The work of Laufer (1913, 1916) and Ettinghausen (1950) leads to the far north. From the eleventh century at the latest walrus ivory was traded from Greenland and reached southern and eastern Asia (Cammann 1954; Roesdahl 2001). But the Norse did not settle Greenland until the 980s, by which period khutū was known to the Chinese and Arabs (it is mentioned in the “Ḥudūd al-ʿĀlam” of 982), which suggests that the trade in khutū originated elsewhere. Laufer (1913) surmised that the marine-mammal hunters of north-eastern Siberia and the Bering Strait region must have gathered the khutū that reached China. Focusing on the far north and north-east of Eurasia and the region's prehistoric remains, other themes of the literature on khutū make more sense. Previous research did not address the colours attributed to khutū, perhaps because bones and teeth in their fresh state are always white or yellow. Teeth and bones that have been buried for any length of time may be variously coloured, however. Digby (1926: 176–177) described Siberian mammoth ivory as follows:

I doubt if there is any other natural growth, animal or vegetable, extinct or existent, that varies in colour so much as the mammoth tusk as found in Arctic Siberia.

Two or three that I examined were as white as modern elephant tusks. They must have come straight out of clean ice.

Then there are tusks that look like stained mahogany, highly polished near the point, though coarsening toward the butt.

There are blends of mahogany and white and mahogany and cream.

There are bright blue tusks, with a powdery bloom on them that you can rub off with your finger; tusks of steely blue; tusks of walnut and russet and brick red.

Not only are these tints present, but there are rich and delicate combinations – superimposed one on another – of several tints on the same tusk, polished surfaces of softly blending tints ranging the entire spectrum.

Mammoth ivory may also be patterned. An eighteenth-century Swedish military officer P. J. von Strahlenberg (see Howorth 1887: 49–50) reported that when mammoth tusks were

... sawn into thin leaves and polished, one may observe upon them all sorts of figures of landscapes, trees, men and beasts, which likewise proceeds from the decay of these teeth caused by the air. Because it is observed that the more they are decayed, the greater variety of figures is found upon them, and those thin leaves which are made of that thin part which is not quite mouldered away, serve to inlay and cover small boxes and little cabinets with, as is done with amber.

On the same theme Howorth (1887: 50) added that

... the famous Scotch traveller, Bell of Antermony ... observed ... many mammons' horns, so-called by the natives. Some of them were very entire and fresh, like the best ivory in every circumstance excepting only the colour, which was of a yellowish hue; others of them mouldering away at the ends, and, when sawn asunder, were prettily clouded. The people made snuff-boxes, combs and divers sorts of turnery-ware of them.

If *khutū* was mammoth ivory another puzzling attribution would make sense, namely Amīr Abū Jaʿfar ibn Bānū's "large box-like case made of long and broad *khutū* planks". It is not possible to pare down the tusks of walruses or narwhals into broad planks suitable for the construction of a large case; only ivory from an elephant or a mammoth would be suitable. Since the Arabs knew about elephant ivory, Bānū's box of *khutū* planks was probably made of mammoth ivory.

A connection with mammoth ivory might also explain why *khutū* was thought to be a kind of wood. Mammoth ivory is grained and variously coloured, was sawn into planks and veneers for construction and decorative work and mounted onto lathes to make turnery-ware. As such it should come as no surprise that some southern recipients of mammoth-ivory trade-goods thought that the material was a kind of timber.

THE BULL-GOAT

In a supplementary note Ettinghausen (1950: 140–141) commented on the belatedly found passage in al-Bīrūnī's text on precious stones:

Al-Bīrūnī seems to imply that he has actually seen *khutū* pieces. It is therefore significant that he distinguishes between the *khutū* and the fish tooth, i.e., the walrus tusk ... Unfortunately I cannot offer any satisfactory solution of the problem. It seems unlikely that al-Bīrūnī is speaking of the tooth of the sperm whale ... The narwhal has no core with a design ... it is not likely that Egyptians would have paid a high price for hippopotamus teeth, which must have been fairly common in their country ... In case there is no other tooth like that of the walrus – nor a horn resembling it – the only remaining possibility would be that al-Bīrūnī makes a distinction between two types of walrus teeth, perhaps teeth of different sizes or in different states of preservation; or we would have to assume that the cause of the whole confusion is of a semantic nature ...

Why our author called the tusk a forehead bone remains another puzzle, especially since he himself preferred to call the *khutū* a horn.

This is where the matter was left in 1950. Dankoff (1973) supported the thesis that *khutū* was marine ivory, making no mention of the distinction al-Bīrūnī draws between *khutū* and

fish teeth (his article was restricted to the etymology of the word *khutū*). A similar distinction is made in Chinese literature (Laufer 1913: 342–343). Northern and central Eurasian countries, regions and peoples were mentioned as suppliers of *khutū* (Ettinghausen 1950: 116–117), sources imply that *khutū* came from a living land animal and thus not a marine mammal or mammoth (Laufer 1916: 372–373), and several authors stated that *khutū* was derived from a bull or ox (passages quoted above). Moreover, al-Bīrūnī reported that “bone from the forehead of a bull” was used to describe *khutū* both by the authors of books he had read and by the Far Eastern emissaries of whom he enquired. He took issue with this idea, seemingly on the basis of first-hand observations, writing

its forehead is thicker than two fingers, which would show that it cannot be the forehead of the Turkish bull, as it is smaller bodied. But it could well be the horn. As for the belief that it is the forehead of a bull, it would be the forehead of the mountain goats of Khirkhiz. Only they can have such foreheads.

The walrus, narwhal and mammoth can again be discounted, because it is not likely that al-Bīrūnī’s examined artefacts from one of these creatures and then pondered the question of whether he had seen the remains of a bull or a goat, that is, the remains one or another type of animal with which he was completely familiar.⁷

A material is required that fulfils the following criteria. It connotes the description “bone from the forehead of a bull” but may be derived from a goat-like animal. It is described as a horn, though one sufficiently odd in appearance that al-Bīrūnī’s was not sure what it was. It should be bigger than a man’s hand and have “patterns described over it”, perhaps wavy patterns. It is suitable for the manufacture of knife handles. It may be linked with the walrus, narwhal and mammoth owing to its appearance, use, provenance or association with Medieval Asian north–south trade routes.

Based partly on our knowledge of the materials used by northern carvers and knife makers (the second author is a craftsman who specializes in working these materials), we offer a tentative hypothesis. One species that we know of fits the above template quite well. The musk ox, *Ovibos moschatus* (Zimmerman, 1780), resembles a bull but is more closely related to goats (see Lent 1988; Darwent and Darwent 2004). It has unusual horns that could have given rise to the description “bone from the forehead of a bull” (see Figure 2). Al-Bīrūnī appears to have examined *khutū* and he emphasized the thickness of the forehead bone: the horns of a male musk ox form a pad across its forehead called a boss, which is typically two or three inches thick, while the skull-cap underneath may be four inches thick. Al-Bīrūnī thought *khutū* was a horn but was unsure: the musk ox lacks the kind of horns that he probably would have recognized as belonging to a more typical bovid. Further, musk-ox horn is one of a handful of substances that are particularly prized by modern-day carvers and knife makers who specialize in using Arctic materials. Walrus ivory is valued for its durability and granular texture, mammoth and ancient walrus ivory for variable colouration, and walrus oosik (baculum or penis bone) for its density. Musk-ox boss, though delicate compared with ivory or bone, is valued for its translucency and intricate pattern of contorted growth lines, which form as the horns coalesce to form a boss. No other Eurasian mammal has horns which form a boss, the nearest equivalent being the African buffalo, *Syneris caffer* (Hodgson, 1847) (see Nowak 1999), whose horn material is dark in colour. The irregular structure of musk-ox boss is clearly visible on polished surfaces, recalling descriptions of *khutū*’s patterning (see Figure 3). Finally the musk ox inhabits Arctic latitudes alongside other sources of *khutū* identified in previous studies: the walrus, narwhal and mammoth.



Figure 2. Musk ox. (© Arthur Moss, reproduced by permission.)



Figure 3. Knife with handle made from musk-ox horn. Note the matching pattern on blade and handle. (© Mark Knapp.)

The musk ox thus seems to be a good candidate, but the hypothesis is not straightforward. Most authorities, though not all, think that the musk ox died out in Eurasia before al-Bīrūnī's time. There are a number of ways in which musk-ox horns, or tales about musk oxen, might have reached the Near East and China and influenced contemporary literature. As today, musk oxen inhabited Greenland in medieval times, and Norse sailor-merchants were trading in northern luxury goods in the ninth century at the latest: the Norwegian chieftain Othere told the court of King Alfred of England about a voyage he had made around Scandinavia to the White Sea in search of walrus (Cammann 1954; Roesdahl 2001). The Norse in Greenland supplied much of the walrus ivory that was traded around the world from the late tenth century (Roesdahl 2001). A west-to-east supply route for whatever khutū might have been before the tenth century seems unlikely, however, because the material appears to have been known in the Far East before it was known in the Near East (Laufer 1913), suggesting that the trade-route's origin lay in a different direction.

Bering Strait has never presented much of a barrier to the movement of people (Fitzhugh 1997), and a musk-ox refugium existed on the Arctic slope of North America until the middle of the nineteenth century (Allen 1912; Lent 1988). Laufer (1913) stated "Chinese trade in marine ivory leads us back to the culture of those arctic peoples settled along the northern shores of Asia and America who hunt the walrus and the narwhal for the sake of their flesh, blubber, and tusks . . .". The same peoples hunted the musk ox and traded with one another. If walrus and narwhal tusks and musk-ox horns were mixed together in consignments of Arctic goods, even if musk ox horns were present only occasionally, southern recipients might well have had cause to be confused about the distinction between a fish tooth and a bull forehead.

The third possibility leads to an established controversy. Until recently it was thought that the musk ox died out in Eurasia with mammoths and woolly rhinoceroses at the end of the last ice age. At the other end of the scale the Russian mammologist Vereshchagin thought that the species might have survived in Siberia long enough to encounter seventeenth-century Russian explorers (Spassov 1991). Recent radiocarbon analyses (MacPhee *et al.* 2002) of the remains of Eurasian musk oxen have produced dates of 3000–2700 BP for bones from the Taimyr Peninsula and the Lena River Delta (see also

Orlova *et al.* 2004; Boeskorov 2006). Where the last Eurasian musk ox populations lived is not known, so the radiocarbon dates available at present may reflect the date of the species' extinction or be considerably earlier. Further, in a burial complex in the Noin Ula Mountains of Mongolia, probably dating from the first century BC, two plaques were found impressed with an animal figure that looks like a musk ox (Spassov 1991). These plaques have been controversial because it has been assumed that musk oxen died out in Eurasia before the first century BC. As such, Soergel (1942) suggested that the Noin Ula animal is a chimera, having the body of a takin, *Budorcas taxicolor* (Hodgson, 1850), and the head of a musk ox, the latter being known to the artist by way of "fossil" skulls from northern Siberia. If Mongolians of the first century BC were familiar with musk-ox horns, Chinese and Arab craftsmen of later centuries might have been. If ancient horns formed part of the medieval trade in knife-handle materials, the colours attributed to khutū would make more sense (ancient musk-ox horns are variously coloured for the same reasons that ancient ivory often is). It is also possible that the musk ox survived in Siberia into medieval times in places that have not yielded musk ox remains or that have not been sampled for radiocarbon dating (Spassov 1991).

Of the previous three hypotheses the second is arguably the most likely. A different kind of explanation involves not the movement of artefacts but tales about the animals that bore them. Walrus ivory was traded to China and the Near East (Roesdahl 2001). Stories about Arctic environments and animals probably moved along the same trade routes. Walrus ivory and descriptions of other Arctic animals might have travelled together and influenced writers who attempted to find out what khutū was. This explanation leaves open the question of why al-Bīrūnī drew a firm distinction between walrus ivory and the material he observed and called khutū.

SUMMARY AND CONCLUSION

Al-Bīrūnī concluded that khutū was the horn of a goat from the land of the Kirghiz (Siberia). Laufer (1913, 1916) argued that khutū was marine ivory, mainly from the walrus, though perhaps also from the narwhal, and also thought that mammoth ivory might have influenced the khutū literary tradition. Ettinghausen (1950) concurred with most of Laufer's conclusions, though not always for the same reasons, but finished his work still puzzled by elements of the Muslim literature on khutū.

Mammoth ivory may have influenced the khutū literary tradition, but not in the way that previous researchers thought. From mammoth ivory might have been derived ideas about khutū's coloration, patterning and wood-like appearance, and its reputation as a material used in cabinet-making. It seems likely that Amīr Abū Jaʿfar ibn Bānū's box was made from mammoth ivory. But in light of al-Bīrūnī's text on precious stones, "bone from the forehead of a bull" does not appear to be an allusion to the walrus, narwhal or mammoth. We have explored al-Bīrūnī's view that khutū was a horn, and hope we have at least made it challenging to think of a better candidate for the source of this horn than the musk ox. Regardless of whether musk-ox horn was a kind of khutū we offer a geographical hypothesis of the medieval literature on this material: it comprises descriptions of, and stories about, materials derived from living and extinct animals that became linked and confused in people's minds because they travelled along the same trade routes from the Arctic.

NOTES

¹ Abū al-Rayhān Muhammad ibn Ahmad al-Bīrūnī (973–1048) offered a detailed description of the Indian rhinoceros, *Rhinoceros unicornis* (Linnaeus, 1758), in his book on India (Ettinghausen 1950: 12) and none of his subsequent writings on khutū alludes to the rhinoceros as a source (see Laufer 1916: 379–381; Ettinghausen 1950: 118). Al-Bīrūnī also discusses separately from khutū the use of rhinoceros horn for knife handles, as do other Muslim authors (Ettinghausen 1950: 56). The anonymous “Ḥudūd al-‘Ālam” of 982 distinguishes between countries that supplied rhinoceros horn and those that supplied khutū (Ettinghausen 1950: 118).

² The key Arabic source material by original authors in which khutū is named and described dates mainly from the eleventh century. Writers active between the twelfth and sixteenth centuries generally base their accounts on earlier works. The significance of artefacts made of different materials is difficult to interpret in such a context. Consider the theory that khutū was sheep horn. A knife handle made of sheep-horn from the period in question would demonstrate that sheep horn was once used to make knife handles, not that sheep horn was once called khutū. Conversely, failure to find sheep-horn knife handles would not prove that sheep horn was not used to make knife handles in the period in question or that sheep horn was not called khutū, because absence of evidence is not evidence of absence. This is especially so in the context of utilitarian objects, some of which may have been made of delicate materials (see text), from a thousand years ago. A knife handle made of goat horn from the relevant period would neither challenge the theory that sheep horn was khutū nor demonstrate that goat horn was. In the absence of labelled artefacts the issue of khutū’s identity remains a textual matter.

³ These translations were used by Laufer (1913, 1916) in his seminal study of khutū and endorsed by Pelliot, arguably the leading linguist and sinological bibliographer of the early twentieth century, who wrote a complimentary addenda to Laufer’s (1913) article (Pelliot 1913: 365–370). Ettinghausen, a leading Islamicist of the mid-twentieth century, used the translations in his study of khutū, making one correction to Laufer’s linguistics: the replacement of “ku-tu-si” with the transliteration “ku-tu-hsi” (Ettinghausen 1950: 118). Dankoff (1973) made a short but important contribution in demonstrating the synonymy of a number of spellings of khutū and supporting Laufer’s conclusion that all such terms indicated marine ivory.

⁴ Ruler of the Qāta’ī. It is from the word Qāta’ī and its variants (for example, the more familiar khitai/ khitan/ qidan) that Cathay (China) was derived. In al-Bīrūnī’s time the Qidan ruled a large area centred on northern China as the Liao Dynasty (947–1125) (Roberts 2006).

⁵ The arched skeletal snout of a woolly rhinoceros resembles a bird’s beak, while the animal’s horn looks like an enormous claw (Howorth 1887; Digby 1926). Erman (quoted in Howorth 1887: 6–7), a German physicist who travelled around the world in 1828–1830, noted that

By comparing numbers of the bones of antediluvian pachyderms, which are thrown up in such quantities on the shores of the Polar Sea, [Siberian peoples] have got so distinct a notion of a colossal bird, that the compressed and sword-shaped horns, for example, of the rhinoceros tichorinus are never called, even among the Russian promuishleniks and merchants, by any other name than that of ‘birds’ claws’. The indigenous tribes, however, and the Yukagirs in particular, go much further, for they conceive that they find the head of this mysterious bird in the peculiarly vaulted cranium of the same rhinoceros; its quills in the leg-bones of other pachyderms [mammoths], of which they usually make their quivers; but as to the bird itself, they plainly state that their forefathers saw it, and fought wondrous battles with it.

⁶ If “ivory” from both the walrus and the hornbill were raw materials for the medieval knife-maker, stories belonging to one could have become attached to the other. By some such confusion, Laufer thought, might people have come to believe that khutū was derived from a bird.

⁷ The horns of cattle usually grow from the sides of the skull, whereas the horns of goats usually grow from the top, most often from just above the eye sockets. Cattle horns are usually simple in external structure and ornament, dark in colour, and relatively homogenous in internal texture. The horns of goats and sheep are variable in all of these characters. Goats, and especially sheep, typically have air-filled chambers in their skull-bones below the horns; in many species this feature is highly developed and obvious, particularly in males. The chambers cushion impacts. See Schaffer and Reed (1972); Janis (1982); Caro *et al.* (2003).

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