Journal of Anomalistics Volume 23 (2023), pp. 188–201

Mirage Identification Suggested for Egede's Sea Serpent Sighting

Ulrich Magin[1]

Abstract – The description of a "sea monster" by the Apostle of Greenland, Hans Egede, is among the first three written observations of a "sea-serpent" that is known, and has become one of the classic reports of unidentified marine animals in the corpus of sea serpent lore. It is also one of the most discussed encounters on record (the opinions of the different interpreters will be given after the description). This paper uses an already suggested identification of a possible stimulus for the report (that of Paxton et al. that Egede's report is of a baleen whale), and expands on it using the finds of Lehn on Arctic mirages and sea-monsters.

Keywords: sea-serpent – sea-monster – whale, mistaken for sea-serpent – greenland – mirage

Zusammenfassung – Die Beschreibung eines „Seeungeheuers" durch den Apostel von Grönland, Hans Egede, gehört zu den ersten drei schriftlichen Beobachtungen einer „Seeschlange", die bekannt sind, und ist zu einem der klassischen Berichte über nicht identifizierte Meerestiere im Korpus der Seeschlangenüberlieferung geworden. Es handelt sich auch um eine der am meisten diskutierten Begegnungen in den Aufzeichnungen (die Meinungen der verschiedenen Interpreten werden nach der Beschreibung wiedergegeben). In diesem Beitrag wird eine bereits vorgeschlagene Identifizierung eines möglichen Stimulus für den Bericht verwendet (die von Paxton et al., dass es sich bei Egedes Bericht um einen Bartenwal handelt) und anhand der Funde von Lehn über arktische Luftspiegelungen und Seeungeheuer erweitert.

Schlüsselbegriffe: Seeschlange – Seeungeheuer – Wal, für Seeschlange gehalten – Grönland – Fata Morgana

The Witness

In several books, Hans Egede tells the story of an encounter with a strange and large sea-animal off the coast of Greenland, in 1734.

The cryptozoological books (which cover "animals unknown to science") generally assume the witness was Hans Egede, although he actually only describes what others have told him. He is a good reporter, though, and he is generally regarded as very earnest and truthful man. As at

1 **Ulrich Magin** is a freelance author and translator, as well as a German correspondent and columnist for the *Fortean Times*.

http://dx.doi.org/10.23793/zfa.2023.188

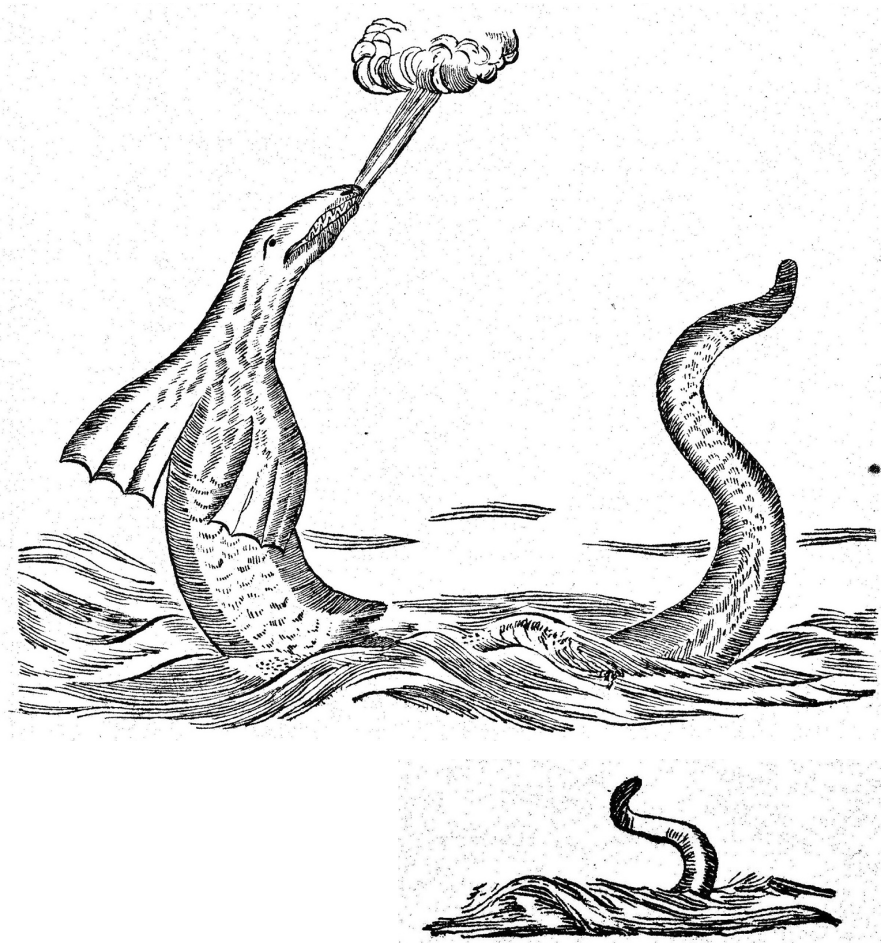

Figure 1. Egede's monster; drawing by Bing, after Oudemans.
Figure 2. The tail of Egede's monster; drawing by Bing, after Oudemans.

the time of his life Denmark and Norway were one state, he is referred to both as a Dane and a Norwegian.

Born on 31 January 1686 in Harstad, Norway, and raised as a stout Lutherian, he studied theology in Copenhagen. After some time as a parish priest on the Lofoten Islands, in 1721 he went as a missionary to Greenland to convert the Inuit to his form of Christianity. In this he

was very successful, as he learned and preached in Inuit, earning the name of Apostle of Greenland. In his several books on his mission, he proves to be an accurate and careful observer, not given to exaggerations.

He died on 5 November 1758 in Stubbekøbing on Falster, Denmark, and his book on his expeditions and efforts which does not only describe his works for Christianity, but the natural history of the island as well, was published in all Scandinavian languages, and in several English and German translations. (A detailed account of his life can be found in Anon., 1882.)

The Report

According to Hans Egede (1818, p. 86), in his *A Description of Greenland*:

> As for other sea monsters and wonderful animals, we find in Tormoder's History of Greenland, mention made of three sorts of monsters, where he quotes a book, called "Speculum Regale Iclandicum;" or, the Royal Island Looking-Glass, from whence he borrows what he relates*.[2] But none of them have been [p. 86] seen by us, or any of our time, that ever I could hear, save that most dreadful monster, that showed itself upon the surface of the water in the year 1734, off our new colony in 64°. This [p. 87] monster was of so huge a size, that coming out of the water, its head reached as high as the mast-head; its body was as bulky as the ship, and three or four times as long. It had a [p. 88] long pointed snout, and spouted like a whale fish; great broad paws, and the body seemed covered with shell work, its skin very rugged and uneven. The under part of its body was [p. 89] shaped like an enormous huge serpent, and when it dived again under water, it plunged backwards into the sea, and so raised its tail aloft, which seemed a whole ship's length distant from the bulkiest part of the body.[3]

2 Egede here inserts the following, longer note:

> *The above-mentioned author calls the first of these monsters Havestramb, or Merman, and describes it to have the likeness of a man, as to the head, face, nose, and mouth; save that its head was oblong and pointed like a sugar-loaf; it has broad shoulders, and two arms without hands; the [86] body downwards is slanting and thin; the rest below the middle, being hid in the water, could not be observed. The second monster he calls Margya, or Merwoman, or Mermaid, had from the middle upwards the shape and countenance of a woman; a terrible broad face, a pointed forehead, wrinkled cheeks, a wide mouth, large eyes, black untrimmed hair, and two great breasts, which showed her sex; she has two long arms, with hands and fingers joined together with a skin, like the feet of a goose; below the middle she is like a fish, with a tail and fins. The fishermen pretend, that when these sea monsters appear, it forebodes stormy weather.

3 For the German reader, this is the account as published in Egede (1763, pp. 111–114):

> Seewunder in dem Grönländischen Meere.
>
> Was die wundersamen Fische, oder Meerwunder betrifft, so thut Thormoder in seiner

Erich Pontoppidan refers to Egede's report in his *Natural History of Norway* (Pontoppidan, 1755, II, p. 199):

> Another drawing also, which appears more distinct with regard to the form of this creature, was taken from the reverend Mr. Egede's journal of the Greenland mission, where the account stands thus in p. 6. "On the 6th of July, 1734, there appeared a very large and frightful Sea-monster, which raised itself up so high out of the water, that its head reached above our main-top. It had a long sharp snout, and spouted water like a Whale, and very broad paws. The body seemed to be covered with scales, and the skin was uneven and wrinkled, and the lower part was formed like a Snake.
>
> After some time the creature plunged backwards into the water, and then turned its tail up above the surface a whole ship-length from the head*. The following evening we had very bad weather." So far Mr. Egede.
>
> The drawing annexed gives me the greatest reason to conclude, (what by other accounts I have thought probably) that there are Sea Snakes, like other Fish, of different Sorts. That which Mr. Egede saw, and probably all those who sailed with him, had under its body two flaps, or perhaps two broad fins; the head was longer, and the body thicker+, but much shorter than those Sea-snakes, of which I have had the most consistent accounts.[4]

> Geschichte von Grönland, dreyer Gattungen, welche in denen Grönländischen und Isländischen Meeren gesehen worden sind, Erwähnung; es hat sich aber kein einziges dererselben zu unserer Zeit sehen lassen; ausser ein gewisses abscheuliches Seethier, welches im Jahre 1734, der Colonie gegenüber, unter dem 64sten Grade wahrgenommen worden, und folgendermassen gestaltet gewesen: Es war ein Thier von so ausnehmender Grösse, daß sein Kopf, wann es sich auf dem Wasser zeigete, bis an den Mastkorb des Schiffes in die Höhe gieng [12 bis 15 m]. Sein Körper war eben so dick, als das Schiff, und drey bis viermahl so lang. Es hatte eine lange und spitzige Nase, und bließ wie ein Wallfisch. Es war mit langen und breiten Flossen versehen. Sein Körper sahe wie mit Schuppen bedeckt, und sehr runzlich aus, mit Ungleichheiten auf der Haut. Uebrigens war es an dem Ende wie ein Wurm gestaltet. Wann es sich untertauchte, legte es auf dem Wasser den Bauch nach oben; und hob seinen Schwanz dermassen in die Höhe, daß das Ende, so lang wie das Schiff, von seinem Leibe abgestanden.

This is typical breaching behavior.

4 Again, this is the account in the original German edition of Pontoppidan (1754, pp. 374–375):

> Eine andere Zeichnung, die in Ansehung der Gestalt dieses und dergleichen fürchterlichen Thieres sehr zuverläßig zu seyn scheinet, ist aus des Herrn Superintendenten Egede fortgesetzten Relationen, die Grönländische Mißion betreffend, genommen, und S. 6. daselbst heißt es also: ‚Den 6. Jul. 1734. ließ sich ein sehr erschreckliches Seethier sehen, welches sich übers Wasser so hoch aufrichtete, daß dessen Kopf über unsern grossen Mars hinausreichte. Es hatte eine lange spitzige Schnautze, und blies wie ein Wallfisch. Es hatte grosse breite Pfoten, und der Rumpf schien mit einer harten Rinde bewachsen zu seyn,

The asterisks mark notes:

> * I remember to have seen this Sea-snake represented in a large picture at Mr. Jacob Severin's, who then had the care of the expeditions to Greenland, under his majesty's commission, and had put a Latin verse under it; the purport of which was, as far as I can remember, that he looked with disdain upon that infernal Dragon, that seems to frighten all that come there with the design of enlightening and converting the Greenland heathens.
>
> + In the New Survey of Old Greenland, p. 48, the before mentioned Mr. Egede speaks of the same monster, with this addition, that the body was full as thick and as big in circumference as the ship that he sailed in. Mr. Bing, one of the missionaries, that took a drawing of it, informed his brother-in-law, Mr. Sylow, minister of Hougs in this diocese, that this creature's eyes seemed red, and like burning fire; all which makes it appear that it was not the common Sea-snake.

Further versions, and the translation of the Danish original, can be found in Thomas (1996) and Paxton (2005). Two images of the strange sea-animal, one showing it high out of the water and one showing the tail when it dived, were made by Mr Bing, a missionary accompanying Egede, and published on a map. They were reproduced by Oudemans (1892, pp. 117–118).

Previous Interpretation

In his book, Egede describes and depicts arctic animals like seals and whales in great detail, and correctly. It should be noted, however, that in the case of this sea-serpent he is only a reporter, outlining what others who saw the animal had told him.

Several descriptions by Egede and his son Paul have appeared in different translations which do not all agree in all points. The whole set of discrepancies is aptly listed by Oudemans, but is not relevant to the interpretation suggested here.

> und die Haut war sehr schrumpelicht und uneben. Das Thier war sonst unterwärts wie eine Schlange gestaltet, und es gieng daselbst wieder unter Wasser, und warf sich rücklings herum, und auf diese Art streckte es den Steert übers Wasser in die Höhe, der vom Rumpfe eines ganzen Schiffs Länge entfernet war. Des Abends darnach bekamen wir ein sehr starkes Wetter.' Soweit Herr Egede. Die beygefügte Zeichnung giebt mir Gelegenheit, mit Gewisheit zu schliessen, daß, so wie sonst aus andern Nachrichten erhellet, das Geschlecht der Seeschlangen, nach Art anderer Fische, in mehrere species abgetheilet werde. Das Thier, welches Herr Egede, und vermuthlich alle diejenigen, die mit ihm auf dem Schiffe waren, gesehen, hatte unter dem Leibe ein paar Pfoten, oder vielleicht ein paar breite Flosfedern, der Kopf war auch länger, und der Rumpf dicke, dabey aber auch viel kürzer, als bey denen Seeschlangen, von denen meine meisten Nachrichten handeln.

In all versions, Egede's sea-serpent is atypical in that it has a very large, pointed head with only a short neck while conventional sea-monsters have a serpentine body or at least a long and slender head-neck region.

As Egede's description is one of the earliest (the second time ever that the sea-serpent appears in any book), it has aroused considerable interest and interpretation.

Henry Lee (1826?–1888), the naturalist of the Brighton Aquarium and a prolific author of books on cephalopods and marine mystery animals in the 19th century, thought that Egede had only seen the then freshly discovered giant squid,

> ... his drawing is so far correct that we are able to recognise at a glance the distorted portrait of an old acquaintance, and to say unhesitatingly that Egede's sea-monster was one of the great calamaries [...] That which Mr. Egede believed to be the creature's head was the tail part of the cuttle, which goes in advance as the animal swims, and the two side appendages represent very efficiently the two lobes of the caudal fin. [...] The supposed tail, which was turned up at some distance from the other visible portion of the body [...] was one of the shorter arms of the cuttle, and the suckers on its under side are clearly and conspicuously marked. (Lee, 1883, pp. 67–68)

Lee's ideas were supported by Richard Ellis (Ellis, 2002, pp. 21–22) in his book *The Search for the Giant Squid*. However, as giant squids seldom have a body that is larger than that of a porpoise, and arms that go with that in size, to mistake one for a large marine monster three times as long as a ship is rather unlikely.

The three most prominent sea-serpent researchers A.C. Oudemans, Rupert T. Gould, and B. Heuvelmans all thought that Egede's crew had seen a large, serpentine and still unknown marine creature.

A.C. Oudemans (1858–1943), a well-known Dutch zoologist who had a special interest in the sea-serpent and in the Loch Ness monster, reads a number of things into the simple account (Oudemans, 1892, pp. 117–118):

> From what has been said of the animal, seen by Egede, we gather that it appeared on the 6th. of July, 1734, in fine weather before the Danish Colony the Good Hope, Davis Straits, Greenland; (Egede says: "the following evening we had very bad weather", so we may conclude that the weather was fine, when the animal was seen; it had a considerable length, say a hundred feet, and was much thicker than a snake of those dimensions would be, say some eight feet; it raised its head, its neck and the fore-part of its trunk high above the surface of the water, it had a long, sharp snout, it blew like a whale (the breath of an animal as large as a whale must of course have been distinctly visible in those cold regions; I also wish to fix the reader's attention on the figure where the animal is not spouting a stream of water, but where its breath is condensed by the cold, and forms little curling clouds of

> vapour). It had broad and large flappers. […] Its lower part was formed like that of a snake, by which Egede evidently means to say that it was perfectly round and tapered to the end of the tail, and that he did not see any appendages (which does not exclude their presence, for the middle part of the body remained invisible, hidden by the water). The creature plunged backwards into the water. It evidently has a considerable flexibility, as is also shown in the figure. Consequently it cannot have been a snake, which has no dorso-ventral flexibility, nor a gigantic calamary, as Mr. Lee thinks, which has no flexibility at all! It had a very flexible, long tail, almost one half of the length of its body, which was distinctly seen by Egede and figured by Mr. Bing. […] The figure shows an eye with a heavy eye-brow, a nostril, and teeth; the flappers have external visible fingers, as sea-lions have; those of porpoises and dolphins are without them. Afterwards we shall more than once have occasion to observe that the sea-serpents's [sic] head is drawn by Bing too large, and the neck too short.

He concludes:

> Pontoppidan is convinced, when seeing Bing's figure, that there are several species of sea-serpents, all belonging to the same genus. I do not wish to discuss this point.

Lieutenant-commander in the British Royal Navy Rupert Thomas Gould (1890–1948), an expert on navigation, but also on historical enigmas and oddities, as well as a researcher of sea-serpent material, suggested no identification of Egede's animal other than that it must have been a sea-serpent, as it was clearly identical to reports of sea-serpents in other parts of the world, and definitely not a giant squid. (Gould, 1935, pp. 26–29) He compares Egede's account with similar reports of columnar sea-serpents with flippers dangling, such as the observations reported from the East Cape, New Zealand, on 24 July 1891, and an encounter with the monster by the steamer *Rotomahana*, on 1 August 1891 in the same general region.

The Belgian cryptozoologist Bernard Heuvelmans (1916–2001) at first points out that what Egede describes does not resemble the later sea-serpent reports from Norway:

> Neither of the Egede's called the beast a 'sea-worm' or sea-serpent, and in any case it had 'great broad Paws' ('flippers' might be a better translation) which would make such a name absurd. All the same most modern writers have thought it was one of the creatures that then went by this rather unsatisfactory name. (Heuvelmans, 1968, pp. 101–102)

However, and without explanation, he then counts Egede's creature among one of his hypothetical sea-serpent categories, the Scandinavian super-otter, a large marine mammal generally resembling, but not necessarily related to, the known otters. (Heuvelmans, 1968, pp. 547, 575)

In contrast, Danish cryptozoologist Lars Thomas (1996), going back to the original Danish language descriptions, thinks the animal more closely resembled the extinct ancient whale *zeuglodon*.

Figure 3. A breaching humpback whale. (De Whit Welles Wwelles14, commons. https://commons.wikimedia.org/wiki/File:Humpback_stellwagen_edit.jpg)

C. Paxton, a zoologist at the University of St Andrews, is convinced the animal was a baleen whale, and the "shell work" barnacles, and discusses several possible identities. As regarding the tail, he assumes "an alternative explanation […]. Many of the large baleen whales have long, snake-like penises […]. If the animal did indeed fall on its back then its ventral surface would have been uppermost and, if the whale was aroused, the usually retracted penis would have been visible. […] even if the monster was an unknown species, the diagnostic features (the blow, the two obvious flippers and the possible breaching behaviour) suggest a cetacean." (Paxton, 2005, p. 8)

Paxton et al. admit problems with the description of teeth and the depiction of the tail. However, if the image was distorted – as in a mirage and as I will now suggest, these objections can be met. Certainly, the behaviour of Egede's monster (spouting, breaching) is that of a whale.

Was it a Merman?

The creature that Egede saw bears a very close resemblance to a very fabulous beast, the giant merman. According to chapter XVI of the 13th century *King's Mirror* (Konungsskuggsja, 1978, p. 71; quoted after Lehn, 2004, p. 121).

> It is reported that the monster called merman [hafstrambr] is found in the seas of Greenland. This monster is tall and of great size and rises straight out of the water. It appears to have shoulders, neck and head, eyes and mouth, and nose and chin like those of a human being; but above the eyes and the eyebrows it looks more like a man with

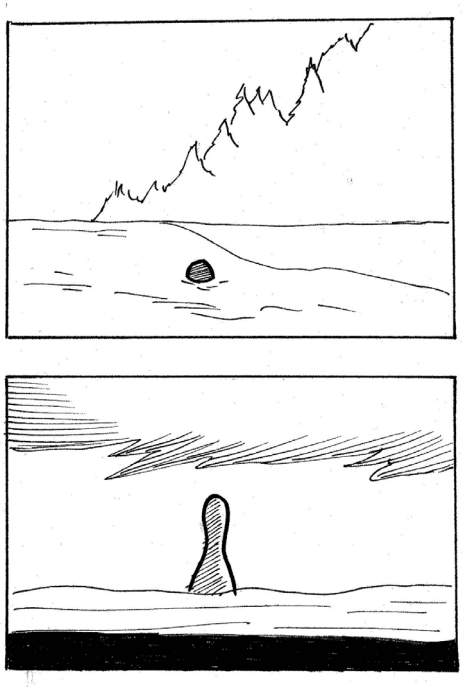

Figure 4. A rock in Lake Winnipeg. Above natural state, below elongated by a mirage, drawn by Ulrich Magin, after Lehn, 1981, p. 365.

> a peaked helmet on his head. It has shoulders like a man's but no hands. Its body apparently grows narrower from the shoulders down, so that the lower down it has been observed, the more slender it has seemed to be. But no one has ever seen how the lower end is shaped, whether it terminates in a fin like a fish or is pointed like a pole. The form of this prodigy has, therefore, looked much like an icicle [or "work of ice", as in the Konungsskuggsja 1978]. No one has ever observed it closely enough to determine whether its body has scales like a fish or skin like a man. Whenever the monster has shown itself, men have always been sure that a storm would follow.

Lehn (2004, p. 123) mentions another old reference to the merman. The Latin *Historia Norvegiae*, written around 1170, lists several wonders of the ocean of northern Norwayy off Halogaland, including whales, walruses, and icebergs, but also monsters:

> An English translation would read approximately thus: "there is the hafstramb, the largest wild beast, but without head or tail, so that it appears like a [tree]trunk as it springs up and down, and it shows itself not without promising peril for seafarers."

Obviously, what the informants of Egede saw bears a close resemblance to this giant merman, up to the location, the head like a "peaked helmet", and the bad weather that follows.

Lehn's Refracted Monsters

There is one marine phenomenon of the Arctic which is actually followed by a drastic change in weather, and it has been described and identified as possible sea monster stimulus by Waldemar H. Lehn of the University of Manitoba. This is the distorted image of a smaller animal or rock under certain atmospheric conditions. The atmospheric specifics are described in great detail by Lehn (1979 und 1981), and are of interest for optical scientists only. Generally, air of different temperature has a different density, and therefore bends normally straight rays of light. When rays of light are bent in arctic conditions with drastic temperature differences, a surfacing or "spy-hopping" orca can be distorted to become the image of a giant animal with

a large head, a short but thin neck, and a bulky body on sea level. It is important to note that conditions for the "merman mirage" are ideal before a change in weather.

As Lehn (1981, p. 365) explains:

> The thermoclines that generate merman images are best created when a warm air mass slowly moves over significantly cooler surface air. In conditions of relative calm, the boundary between the two air masses will possess the flatness and uniformity necessary for well-defined (but distorted) images.
>
> A typical situation is illustrated by the last stages of a warm front, when the warm-cool interface has almost descended to the surface. […] I have observed […] the sudden appearance of a medium-range mirage, followed within 40 min by a sudden temperature rise, rainstorms, and disappearance of the mirage.

According to meteorologists, the merman-type distortion is always followed by this change in weather:

> The correlation of mirages with storms was first described by Wegener. Temperature inversions often accompany the advance of a warm front in the standard cyclone model of the atmosphere. As the core of the cyclone passes, the cold front of a high-pressure zone follows, generally accompanied by a squall line that brings violent and destructive winds. (Lehn, 2004, p. 132)

I suggest that the surfacing, possibly breaching, of a whale, coupled with the distortion of its body due to atmospheric conditions, does better explain what Egede saw than an assumed large but yet undiscovered marine animal. (It has to be pointed out that Lehn [1981, p. 366], in briefly referring to Gould's book, must have had the same idea.)

The general shape (pointed head, shoulders, half up vertically in water, unlike any other sea serpent sighting), the arctic environment and the following bad weather are strong points in favour of this possibility. If Paxton is correct, it might have been the optically distorted image of a baleen whale, and the tail may have been its penis.

Godthåb, modern Nuuk, the site of the encounter, is well known for mirages. The distortion of islands off the colony into the shape "of a forest" or "sailing ships, flag masts, old mountain castles with ruined towers", that is, into generally elongated vertical shapes, were well attested by Cranz, in his *Historie von Grönland* in 1765 (quoted in Tributsch, 1983, pp. 66–67).

There is only one point that may argue against such identification: Lehn stresses that the mirage described as merman has to be seen from a distance. In his models he calculates with distances between 700 m and 1 km. If the drawing of Egede's creature is correct, it must have been far closer to the ship. However, drawings of this kind often involve simplifications, and the creature may have only been drawn near the ship to allow a comparison of size.

Finally – How reliable is Egede's report? It is only the third Scandinavian sighting (Nr. 5 in Oudeman's, Nr. 6 in Heuvelmans' listing), but the second to be published, and then from a barely discovered region, and by a missionary. In addition, it hardly uses any of the sea-serpent characteristics listed by Olaus Magnus in 1555 (giant length, mane, coils) that later became stereotypes. Chances are therefore high that we are dealing with an honest reportage, although with the well-known shortcomings of perception and recall errors one faces with each and every eyewitness account.

Additional Cases of Optically Distorted Sea Creatures Mistaken as Sea Monsters?

If the identification of Egede's monster as being the result of the combination of breaching whale and mirage condition is correct, there should be other instances of unidentified marine animals in the general shape of an elongated creature seen shortly before a change in atmospheric conditions, and more instances of optical distortions of known sea creatures may be hidden in the files on sea-monsters. In fact, more such reports exist.

For example, in September 1494, Christopher Columbus encountered a sea-monster near Saona Island, off Haiti. In the words of Washington Irving (1828, p. 50):

> After leaving this place, the weather, which had been so long variable and adverse, began to assume a threatening appearance. A huge fish, as large as a moderate sized whale, raised itself out of the water one day, having a shell on its neck, like that of a tortoise, two great fins like wings, a head the size of a pipe, and a tail like that of a tunny fish. At sight of this fish, and at the indications of the clouds and sky, Columbus anticipated an approaching storm, and sought for some secure harbour.[5]

Another possible instance happened when Jon Hortop was close to Bermuda on 8 July 1570. He saw a "sea-monster in the shape of a man:"

> When we came in the height of Bermuda, we discovered a monster in the sea, who shewed himselfe three times unto us from the middle upwards, in which parts hee was proportioned like a man, of the complection of a Mulato, or tawny Indian. The Generall did commaund one of his clearks to put it in writing, and hee certified the King and his Nobles thereof. Presently after this, for the space of sixteene days we had wonderful foule weather, and then God sent us a faire wind, untill such time as we discovered the lland called Faial. (David, ed., 1981, p. 442)

5 Irving gives his sources as "Herrera, Hist. Ind. Decad. 1, Lib. 11, C. Hist. del Almirante, Cap. 59," which I have not yet been able to trace.

Figure 5. Umi-bozu of Japan, print by Utagawa Kuniyoshi: "Kuwana – The sailor Tokuso and the sea monster." (https://commons.wikimedia.org/wiki/File:Kuwana_-_The_sailor_Tokuso_and_the_sea_monster.jpg)

As no size is mentioned, this may have been a smaller creature. Both anecdotes are included here not as definite identifications but rather as a hint of what might be accountable after carefully checking the records.

Temperature differences are just as high in tropical as in arctic storms. After the *King's Mirror* ("Whenever the monster has shown itself, men have always been sure that a storm would follow") and Egede ("the following evening we had very bad weather") these are two additional cases.

Lehn (1981, p. 363) mentions the sea bonze or Umi-bozu of Japan, and there can be little doubt that some illustrations of this mythical giant marine monk closely agree with the distorted images of sea animals as shown by Lehn (1981). These monsters are often depicted on Ukiyo-e woodblock printings created in the Edo period (1603–1868). Especially a printing by Utagawa Kuniyoshi (1798–1861) looks practically identical to the photo of the distorted boulder taken by Lehn.

Conclusion

In addition to undiscovered sea-animals and known sea-animals that were not recognized by the observer, natural phenomena also play a role in the creation of sea-serpent sighting experiences. Several such factors have already been identified: the role mirages play in certain Norse monster legends has been pointed out by Lehn (1979, 1981, 2004), Michael Shoemaker (1995, pp. 46, 47) has shown how the still mysterious phenomenon of the underwater light wheels has contributed to the body of sea-serpent sightings, and Ulrich Magin (2011, pp. 165–168) has suggested that even submarine volcanic eruptions have been misrepresented as sea-monsters.

A cryptozoological researcher must be a true Renaissance scholar with knowledge not only of zoology, and mythology, but also of the natural sciences.

References

Anon. (1882). *Hans Egede, der Apostel Grönlands: Ein Stück aus der Missions-Geschichte*. Pilger-Buchhandlung.

Egede, H. (1763). *Herrn Hans Egede, Mißionars und Bischofes in Grönland, Natur-Geschichte von Grönland*, übersetzet von D. Joh. Ge. Krünitz. Mylius.

Egede, H. (1818). *A description of Greenland*. T. and J. Allman.

Ellis, R. (2002). *Riesenkraken der Tiefsee*. Heel.

David, R. (Ed.) (1981). *Hakluyt's voyages*. Houghton Mittlin.

Gould, R. T., & Forstner, G.-G. von (1935). *Begegnungen mit Seeungeheuern*. Grethlein & Co. Nachf.

Heuvelmans, B. (1968). *In the wake of the sea-serpents*. Hill and Wang.

Irving, W. (1828). *A history of the life and voyages of Christopher Columbus*. Vol. 2. G. & C. Carvill.

Lee, H. (1883). *Sea monsters unmasked*. William Clowes and Sons.

Lehn, W. H. (1979). Atmospheric refraction and lake monsters. *Science, 205*, 183–185.

Lehn, W. H., & Schroeder, I. (1981). The Norse merman as an optical phenomenon. *Nature, 289,* 362–366.

Lehn, W. H., & Schroeder, I. (2004). The hafstramb and margygr of the King's Mirror: An analysis. *Polar Record, 40*(213), 121–134.

Magin, U. (2011). *Investigating the impossible: Sea-Serpents in the air, volcanoes that aren't, and other out-of-place mysteries*. Anomalist Books.

Meissner, R. (Ed.) (1978). *Konungsskuggsja*. Gustav Kiepenheuer.

Oudemans, A. C. (1892). *The great Sea-Serpent*. E. J. Brill.

Paxton, C. G. M., Knatterud, E., & Hedley, S. L. (2005). Cetaceans, sex and sea serpents: An analysis of the Egede accounts of a "most dreadful monster" seen off the coast of Greenland in 1734. *Archives of Natural History, 32* (1), 1–9.

Pontoppidian, E. (1754). *Versuch einer natürlichen Historie von Norwegen: Zweiter Teil.* Franz Christian Mumme.

Pontoppidan, E. (1755). *The natural history of Norway*. A. Linde.

Shoemaker, M. (1995). The lightwheel wonder. *Fortean Studies, 2*, 8–63.

Thomas, L. (1996). No super-otter after all? *Fortean Studies, 3,* 234–236.

Tributsch, H. (1983). *Das Rätsel der Götter: Fata Morgana*. Ullstein.

Acknowledgment:

I am indebted to K. W. Lehn who sent me his academic papers in 1984, and C. Paxton for his paper on Egede's report.