
ORANJEMUND SHIPWRECK IVORY: A HISTORICAL ANALYSIS ON THE PROSPECTIVE GEOGRAPHIC ORIGIN

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ABSTRACT: *The origin of the ivory discovered in the 17th century Portuguese trading (Bom Jesus) shipwreck at Oranjemund remains inconclusive. This article seeks to discover from a written historical perspective the potential African habitat and origin of the elephant tusks discovered at Oranjemund shipwreck. A historical analysis of primary and secondary sources is used in this study. The finding from this report is that the ivory discovered in the Bom Jesus shipwreck was most likely from West Africa. It has been proven that Central and West African Regions were inhabited by Forest and Savanah elephants with tusks similar to those found in the shipwreck in the 17th century. The elephants were hunted in their numbers and there were ready markets in Central and West Africa which were opened to Portuguese traders. While we agree that a DNA analysis of the ivory will add more knowledge to the origin of the ivory, we can conclude through this historical analysis that the ivory from the Oranjemund Shipwreck was most likely from West Africa.*

KEYWORDS: Bom Jesus, Oranjemund Shipwreck, Mary Rose Warship, Ecological Habitat, Geographic Origin

INTRODUCTION

Along the southern edge of the Namib Desert lies the Orange River bordering South Africa and Namibia, the river originate deep within the mountains of modern day Lesotho (Smith, 2009). For centuries kimberlitic diamonds have washed into the river and carried downstream and discharged into the Atlantic Ocean. The Benguela Currents flows in the north easterly direction and deposit the diamonds on the Namib Coast north of the Orange River where they are blown by prevalent westerly winds into the desert.

In 1908 a German traveller discovered diamonds there and mining operations began from then until this present day. A multi-billion dollar company DeBeers holds a 50% stake in the mining company and the Namibian government also have a share of the other half in a joint company called Namdeb (Smith, 2009).



Figure 1: The shipwreck site: (Administrative map, 2010)

On 1 April 2008 during mining operations a company employee by the name of Kaapanda Shadika with his bull-dozer stumbled upon tons of copper ingots and elephant tusks, the company asked a contract archaeologist Dr Noli to investigate, he discovered that this is an ancient shipwreck. Since this is not his field of specialisation a maritime archaeologist was hired from South Africa; Dr Bruno Werz also representing his organization (SAIMA) Southern African Institute of Maritime Archaeology. A rescue excavation of the wreck was initiated as a result; the Namibian government stepped in the project financially after realising the cultural significance of the heritage. Needless to say here is that almost all project logistics were paid for by the Namibian government including the hiring of project managers and foreign archaeologist and conservators.

Among the cargo discovered on the shipwreck are 105 elephant tusks with a combined weight of 2 tons (Chirikure & Sinamai, 2015). These cargos are intriguing and interesting to African researchers and personally to the authors since they are of African origin. Various other cargoes on the ship were sourced from different countries such as Spanish gold coins, Venetian coins, copper ingots from Germany and lead and tin ingots from Eastern Europe.

Problem statement

The Portuguese imported African ivory throughout the 16th century (Disney, 1978). It was during this period that they were very active on the West African coast and it is believed they purchased ivory of varying quantity and quality. The tusks could have been sourced from one of the two elephant species common in Africa namely; forest and savannah elephants.

Forest elephants inhabit a great part of the ecology of West Africa these in particular yields small thin tusks and are suspected to have been the most hunted elephant specie given the fact

that their habitat range is in close proximity to 16th century Portuguese trading ports in Cape Verde and the Gold Coast (Modern Ghana) by the time. Savannah elephants are physically larger and yields large tusks similar to the ones discovered on the shipwreck. Ecologically savannah elephants are known to dwell in East Africa, could it be possible that the Oranjemund shipwreck ivory was sourced from East Africa? And possibly carried to the West African Coast by traders? How were the ivory hunting dynamics within the African continent like at the time?

Hypothesis

The majority of the elephant tusks discovered on Oranjemund shipwreck are large, it is probable therefore that these were sourced from East Africa. Existing evidence (considering the size of the tusks) points to the fact that these ivories were sourced from savannah elephants. An existing organized African trade networks in the interior by the time might have been responsible for the transportation of African ivories from East African hunting grounds to West African ports (Chirikure & Sinamai, 2015).

Objective

This paper therefore wants to find out from a written historical perspective the potential African habitat and origin of the elephant tusks discovered on Oranjemund shipwreck. This information is vital and will perhaps add to existing knowledge on African ivory hunting patterns of the time, and tell us about the geographical source of the ivory and also the extent Africa was involved in 16th century intercontinental trade.

Literature Review

Portuguese maritime archaeologist Prof Francisco J. S. Alves has a detailed and intriguing study of the ship's hull design. This was conducted in 2008 and 2009 respectively (Alves, 2010). This study tremendously shed some light on reconstructing the Bom Jesus especially details concerning the shape and design of the ship. However this study did not touch on the ivory of the Bom Jesus.

Another enlightening study that appeared in the international journal of maritime archaeology was done by Chirikure, Sinamai, Goagoses, Mubusisi and Ndoro (2010). This insightful article inexplicitly details the cargo of the ship although without much historical background of the African ivory and their origin. The National Geographic Society in October 2009 published a mind captivating report about the Bom Jesus (Smith, 2010). This publication reached millions of readers and scholars worldwide and it elaborated on the discovered ivory.

Another unpublished study on ivories of the Oranjemund shipwreck was that conducted by the University of Cape Town team. They obtained isotopic samples were obtained in 2014 to determine the diet, age, sex and other useful information about the elephants. We still await its publication and we believe that it will potentially give an undoubted explanation to the hypothesis under discussion in this paper. Chirikure and Sinamai (2015) briefly touched on the possible reason why different sizes of tusks were found on the shipwreck, but their paper pays little attention on the potential source of the ivory, and rather suggests that a scientific analysis of the tusks be done to solve the question of the geographical origin of the ivory.

Research method

Historical research method was used in this study, this includes the study of historical literature both primary and secondary sources available on the subject. These were used simultaneously used with the aim of answering the questions posed in the problem statement to prove or refute the hypothesis.

RESULTS

In this study, out of 105 elephant tusks discovered on the shipwreck, 10 were randomly selected for comprehensive measurements to determine their sizes and weigh. The elephant tusks length measured between 1.5 metres to 1.8 metres and weigh ranging between 18kg to 20kg, and they are curved. What does this mean? This means that the majority of the ivory discovered on Oranjemund shipwreck corresponds with ivory weighs and measurements of savannah elephant species. Based on these results we have a basis to suspect that the Oranjemund shipwreck ivories were obtained from Savana elephant species. The contemporary ecological habitat range of forest elephants, points mainly central Africa and West Africa (Wasser, 2004).

The savannah elephants however are found mainly in East and Southern Africa, this lead to a hypothesis that during the 16th century savannah elephants that yields larger tusks were hunted in East Africa or other regions other than West Africa and traded on the West African coast. Meaning the geographical origin of the ivory discovered on Oranjemund shipwreck is in East Africa rather than West Africa.

Ivory trade in West Africa

When the Dutch became prominent role players in the India trade, the most important commodity they traded was ivory (Feinberg & Johnson, 1982), which like the Portuguese and the Dutch they used ivory to pay for Asian commodities such as porcelain, pepper and silk. According to Feinberg and Johnson (1982), Dutch ships carrying imported African goods such as ivory, gold, slaves and wood sailed from Africa directly to the Netherlands. In Europe African cargoes such as ivories were boarded alongside other European goods bound for Asia, the reason why Europeans imported African ivories just to sell them to another continent in Asia is best explained by the need to monopolise the trade and increase their overall profit (Disney, 1978).

According to Disney (1978) Portuguese merchant ships from Europe to Asia were not permitted to make stops at any ports on the African coast except on East African ports such as Mombasa, Sofala and Malindi for refreshment purposes or rest while waiting the monsoon winds. The Portuguese were the first to use this management method. This routine was adopted to avoid sailors from engaging in illegal trade that would prove costly to the Portuguese crown (Disney, 1978). It is this 16th century approach that leads us to believe that the Oranjemund shipwreck ivory was boarded in Europe rather than picked on the African coast when the ships were on outbound voyages to Asia. Also by the 1530s a route used by Portuguese ships sailing from Europe to Asia was already established and strictly followed known as Carrera da India or Indian route (Castro, 2001) See figure 2 below.



Figure 3: Elephants in the West and Central African Regions (Hondius, 1691)

Figure 3 above shows elephants in the West and Central African Regions. Source: (National archives London log no: C34/22)

Common ivories in West Africa were sourced from elephants and hippopotamus, hippopotamus in particular being the major source of ivory. Most of the hippopotamus were predominantly found on the rivers of Upper Guinea, the hippopotamus ivory are said to have weigh between four and fifteen pounds each, and an average length of sixteen inches, and were very white and brittle (Rodney, 1970).



Figure 4: Oranjemund shipwreck tusks. Source (Alves, 2010)

As mentioned earlier the Portuguese like the Dutch bought their ivory along the West African ports, and their merchant ships voyaged to and from West Africa and the Netherlands carrying ivory, gold, redwood, hides, slaves and other goods.



Figure 5: Ivory from the Bom Jesus. Source: Alves, 2010.

According to Russell-Wood (1998) in India, African ivory was worked and used to make wedding beads and bangles for Indian brides. Table 1 below shows the amount of ivory exported from West Africa to the Netherlands from 1699 to 1703 - the ivory came-in different sizes.

Full tusks were referred to as tanderns and small Tusks were called Scrivillos or crevel by the Dutch and called escravelas by the Portuguese (Feinberg and Johnson, 1982). A full tusk weigh an average of about 41.4 pounds with a range from 29.6 pound and 41.4 pounds, this average

weigh is similar to the Bom Jesus ivory that have a total weight of about 2 tons (Chirikure & Sinamai, 2015).

So 41.4 divided among 105 tusks discovered on the shipwreck is equal to an average of 19 kg per tusk which is roughly equivalent to 41.4 pound, these figures are much smaller because the tusks had dried and lost excess water that add to the bulk weigh of fresh tusks. The scrivillos weigh about 5.8 pound each and range between 4.6 to 7.9 pounds (Feinberg & Johnson, 1982).

The scrivillos accounted for a large number of the ivory traded during the 18th century Dutch and English period in West Africa. Indiscriminate killing of young elephants was common in Gambia during the 17th century (Rodney, 1970). It is this probable cause that is likely to have been responsible for the high number of scrivillos on West African ports. Quite remarkable to note here is the wide range uses of ivory in Europe. Alper (1975) notes that the majority of Portuguese ivories sold in Europe were to Italian, German and possibly English carvers.

Giles (2010) a curator for ethnography at Bristol Museum in UK states that; Bristol having established itself as a slave station in the 18th century, African ivory alongside slaves were brought to the city. The ivory was used to carve statuettes, crucifixes and more importantly musical instruments such as piano keys which had gained popularity during the era. Various English renaissance statutes and crucifixes made use of ivories as early as the 15th century. The Mary Rose Warship sank in 1545 about 12 years after the Bom Jesus wrecked in 1533 (estimated). Needless-to-say; the Mary rose warship has remarkable artefacts that resemble those of the Oranjemund shipwreck. This warship yielded dice cubes which are thought to have been made from elephant ivory, also a personal chest was found to contain carved ivory plaque (Marsden, 2003).

Table 1: A 10 year period from 1705 to 1716 English Royal African Company ivory export, Volume 124.

year	Number of full tusks	Number of Scrivillos
1709	269	818
1710	1170	2886
1711	-	-
1712	158	38
1713	85	188
1714	347	705
1715	374	655
1716	72	215
1717	-	-
1718	-	-

Sourced: Feinberg and Johnson (1982, p446).

Table 1 shows the Royal African company ivory imports from West Africa within a ten year period from 1709 to 1718, showing both full tusks and scrivillos imported. Overall the number of scrivillos are more than the number of full tusks except in 1712 when the number of full tusks exceeded the smaller (scrivillos) tusks. According to Feinberg and Johnson (1982, 446) the war of Spanish succession is said to have affected the operation of the

Royal African Company to a great extent, and explains the drop in ivory imports from 1711, 1718 and 1719 respectively).

Table 2 Dutch ivory imports in a ten year period from 1709 to 1718

year	Full tusks Number of tusks	Number of pieces Scrivillos
1709	2.231	3.056
1710	1.391	1.941
1711	1.368	1.808
1712	2.218	4.594
1713	917	1.721
1714	1.754	2.531
1715	1.949	2.809
1716	2.275	3.148
1717	359	899
1718	2.304	2.304

Feinberg and Johnson (1982, p. 446)

It is clear from the Dutch export (table 2) that the number of full tusks and scrivillos resembles that of the English export. Never the less scrivillos accounts for the majority of the exported ivory in that period, a trend that remains constant throughout the 18th century. Interestingly the number of imported ivory more than doubled in preceding years in 1712 and 1718 respectively, it is from these years that the Royal African Company started to lose its monopoly over the trade and the Dutch East India Company capitalised. As indicated the high number of scrivillos is due to the fact that most tusks came from either forest elephants, hippopotamus or young elephants that have shorter or thinner tusks.

Table 3: A sample of a 10 year period 1705 to 1716 Dutch East India company Ivory Export on selected ports

Year	Commany		Butri		Sekondi	
	full tusks	Scrivillos	full tusks	Scrivillos	full tusks	Scrivillos
1705	205	-	144	32	52	-
1706	653	-	184	-	212	-
1707	132	-	-	-	72	-
1708	850	-	1184	463	72	-
1709	1419	312	2608	1542	1978	940
1710	1518	441	3112	1410	1978	531
1711	1263	480	7244	2109	2761	1142
1712	-	-	1033	222	945	49
1713	144	30	375	192	246	18
1714	186	-	2584	654	2508	222
1715	60	30	6242	1012	2954	836
1716	520	319	3404	513	2459	1067

Sourced: Feinberg and Johnson (1982, p. 445)

According to the table above we can clearly note that in a 10 year period the Dutch imported more full tusks than scrivillos on selected ports such as Butri, Sekondi and Commany. Table 3 above shows that the majority of imported ivory on these ports were full tusks or large ivories. This suggests that full tusks were a popular trade commodity from certain trade ports such as the three indicated in the table above. It is likely that the ivory hunters sold their best ivory on certain ports. It is possible that traders on these ports obtained these large tusks from the interior, most likely to be the north central Africa habitat region of savannah elephants (figure 10).

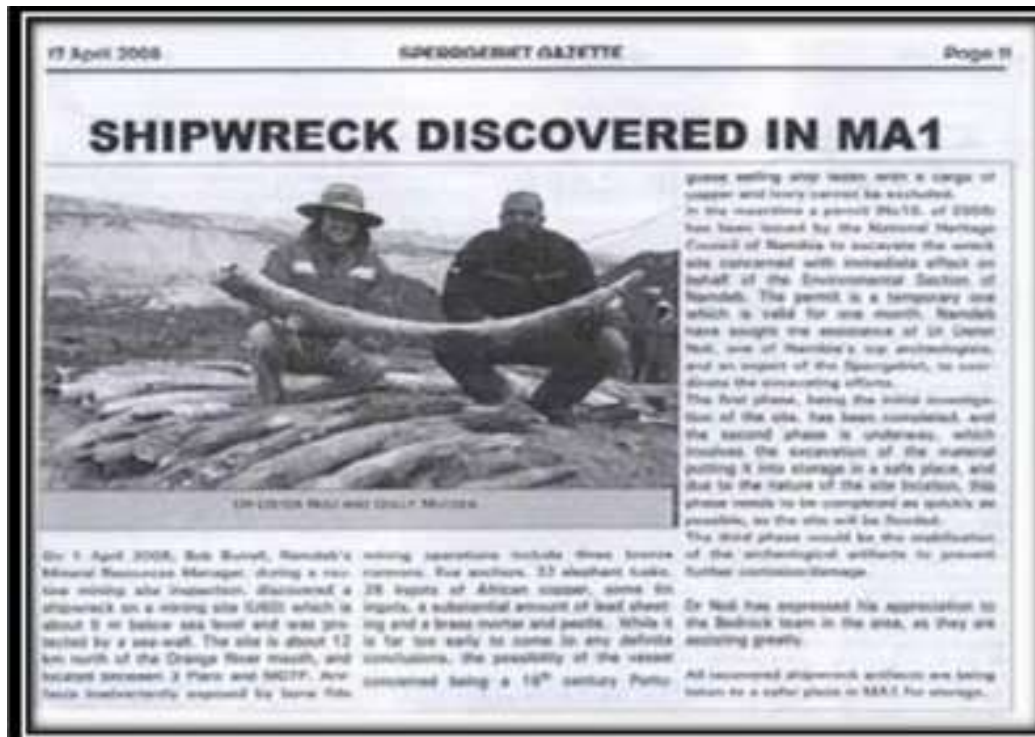


Figure 6: Ivory from the Bom Jesus. Source, Alves, 2010

In total (Table 2) more than 13 700 ivories were imported by the Dutch East India Company from West Africa between 1703 and 1718. This means that nearly seven thousand elephants were slaughtered within a ten year period, and as already stated the small ivories were sourced from either young elephants (Chirikure, et al, 2010), forest elephants (Daryl & Sharna, 1998) and hippopotamus (Rodney, 1970). These accounted for the majority of the ivory Imported.

The bulk of the ivory from the Bom Jesus shipwreck are large full tusks and it is reasonable to stipulate that by this period (16th century) there was little demand for ivory in Europe hence the supply was greater in West Africa. It remained so until the beginning of the 18th century when the Dutch and the English companies began competing among themselves, this was the point in time that the supply for ivory dropped (Alper, 1973) due to high demand.

The Portuguese traders in 16th century must have been overwhelmed with the large supply of ivory; it is likely that the African traders supplied the West African ports with the largest tusks they could get which could fetch them a good deal with the Portuguese traders. Likewise it is probable that when conducting trade the Portuguese were selective and that only the biggest ivories were imported.

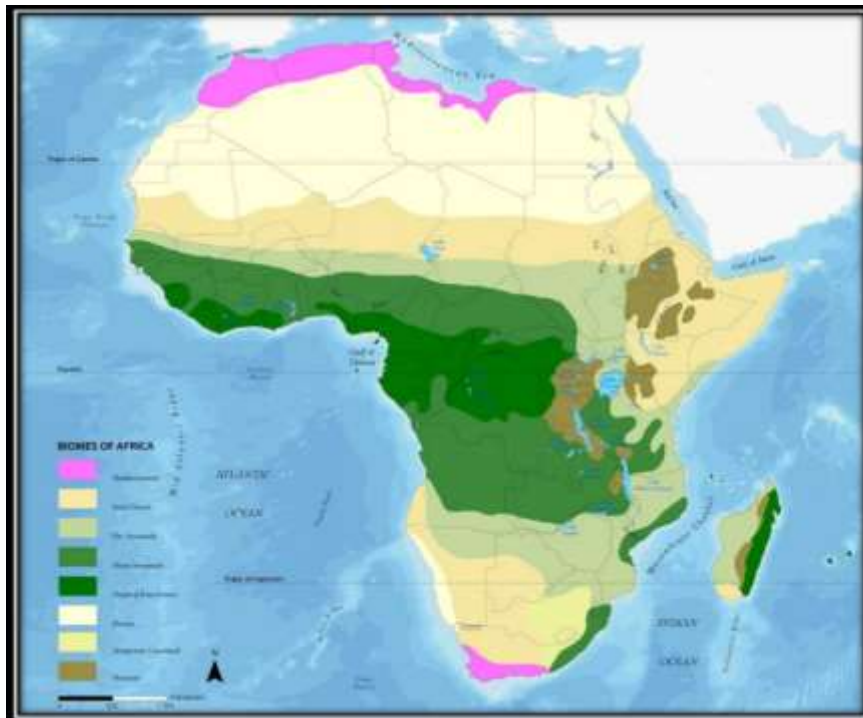


Figure 7: Biomes of Africa (Poole, 1997)

Ivory Hunting in West Africa

Like in India ivory was used for many purposes in Africa. Rodney (1970) states that the Cocolis and Landunaz of Upper Nunez used tusks for delimiting the boundaries of their fields. Kusimba and Kusimba (2003) point out that ivory must have served a non-utilitarian or ritual purpose while Horton (1996) indicates that ivory was used for personal ornaments in East Africa.



Figure 8: Two African ivory Bracelet dating from the 18th century, similar in purpose to Indian bracelets, Source photo taken from the Bristol Museum (2010), (register no: E483. Bristol Museum Archives)

Interior Kingdoms where ivory originated from in Africa had their own established ivory hunters; the king of Asante had his own personal hunters who used traditional weapons to hunt elephants (Feinberg & Johnson, 1982). According to Rodney (1970) it was only in the course of the 18th century that guns were used by Africans to hunt elephants. Before that most African hunters used indigenous weapons and traditional methods to hunt and meet European ivory demands.

Rodney (1970) gives a vivid picture of the methods they employed to hunt the animals; the *Sape* hunters are said to have used poisoned harpoons near elephants' feeding grounds. The *Nalus* attacked the elephants at close angle, and the Mandinga in Gambia used Poisoned spears thrusting it towards the target either standing or on horsebacks. The horses here needless to say were acquired through trade with the Portuguese which means that new hunting methods were being introduced. In addition Betherncourt and Curto (2007, 123) states that the Portuguese periodically shipped horses and individual soldiers from Brazil to protect their trade in West and Central Africa. In East Africa the Waata used bows and poisoned arrows to hunt elephants and it was these who kept the East African ports supplied with ivory from the Tsavo area (Kusimba & Kusimba, 2003, 7-8). Kusimba and Kusimba (2003, 8) point out that the Waata hunters supplied the East African caravans with ivory and these were the professional ivory hunters in East Africa in the 15th century a status they held up to the dawn of the Portuguese era in 16th century, as the trade propagated the Waata changed their life styles from being hunter gatherers to being elephant hunters only. Thus lifestyles of certain African groups were changed completely as a result of the demand for ivory by Europe and Asia.

The Waata hunters had established a relationship with the *Oromo* pastoralist in that "if they killed an elephant one tusk was given to an Oromo chief", (Kusimba and Kusimba 2003, p. 7-8). Other groups such as the Wataita agriculturalist forged brotherhood with the Waata in a bit to gain access to their hunting secrets and to have a share in their wealth. A forged relationship among these groups would mean that any intruders or outsiders coming to hunt in their territory would be reasonably punished or be expelled given the lucrative gain all benefited from ivory hunt. However no evidence exist to show that they traded their ivory in West Africa or West African traders ventured in East Africa for trade.



Figure 9: Elephant ivory Entitled "War Horn" from Congo, presumably used as a trumpet, or a musical instrument. Source: Author's photo taken from the Museum of Bristol (2010): (Log number Ea9097 Museum of Bristol)

The majority of the ivories were yellowish and straight suggesting that they might have been forest elephants. It is well known fact that East Africa had enjoyed trade with the Indian Ocean before the Portuguese intervention, the monsoon winds made it easy for ships from both side to sail with ease. Commodities that were traded varied. Goods from as far as China made their way to the African Coast. Betherncourt and Curto (2007) mention of Chinese porcelain being archaeologically excavated on the Swahili Coast, Indian silk, pepper, and other commodities were exchanged for African rice, elephant, hippo and rhinoceros ivories, these included both worked and unworked ivory.

However ivory trade is said to have been in little demand. Alper (1975) argues that it was only after the Portuguese arrived in the 16th century that ivory trade seemed to have been supplied in much larger quantities to East African ports - a claim that has not been satisfactorily sustained.

Alpers (1975) states that in East African South East part of Africa that the Yao and the Makua traders transported goods from ports to the interior and vice versa. They obtained ivory from the interior in the western Maravi and Chewa areas. They bought their ivories from the Lenje and Bisa Hunters who inhabited the area of Zumbo located at the confluence of the Zambezi River and the Luangwa River in South Eastern part of Africa.

According to Feinberg and Johnson (1982) scrivillos were sometimes sold on a cheaper prize than full ivory of the same weight. This could have encouraged hunters to acquire as much small ivories as possible to compensate for the weight prize imbalance. As we have mentioned earlier, smaller ivories were obtained primarily from hippopotamus and young elephants with developing tusks and very old elephants whose tusks are brittle and have worn out.



Figure 10: Map showing Ivory Trade routes in Central East Africa. (Alper, 1975)

As we have mentioned ivory trade in East Africa had existed for millennia and the principal buyers of the ivory were Persian and Indian merchants such as the *Banyans*. Alper (1975) states that the Persian and Indian merchants capitalised the ivory trade in East Africa. Before 1780 the Portuguese had little share in the East African ivory trade apart from monopolising the trade by imposing tax duties on goods travelling through the Indian Ocean on both East African and Asian coasts. This explains why the Portuguese despite having secured important ports in East Africa still relied on West African ivories.

The mode of transport was by Caravans from the interior where ivory were obtained to the coast where they were traded, Alper states that “the long distance overland caravan trade that developed after 1505 in East Africa was based on ivory trade” (Alper, 1975, pp.63).

Archaeological evidence shows that some of the ivories exported to India were worked ivory. In an excavation at Shanga in East Africa polished ivory beads, bars, tubes, pendant and a disc were among items excavated and according to Horton (1996) they were used as personal ornaments dating back to the fourteenth century. Historically the largest elephants are known to inhabit East Africa in Mozambique area (Alper, 1975). The Portuguese in a bid to capture the East African trade King Manuel of Portugal after sending spies to investigate ivory trade along East Africa in 1511 was informed that only at Sofala was ivory to be found. There is absolutely no evidence to suggest that East African ivory was transported to West Africa and the absence of an established route from East Africa to West Africa (figure 10) supports this fact. In addition it could have been impossible and naturally difficult to transport ivory across the Congo rainforest to West Africa since this is a natural barrier that divides East and West Africa.

River transport was among the most common form of transportation for commodities bought from the African interior to the coast, in West Africa and large quantities of ivories were transported through the rivers, Harms (1981) observes that

In a single voyage during the 18th century huge quantities of ivories and other exotic African goods would be carried in large canoes along the Zaire river to the coast, the canoes were as long as 20 meters and were sufficiently wide that they accommodated rowers on both side (p. 65).

This demonstrates the importance of river transport as one of the means used to transport bulk commodities including ivory. River transport in both the Zaire River in Central Africa and the Zambezi River to the Central East has been a principal means of transporting goods to the coast. This also partly mean that the absence of rivers connecting East Africa and West Africa makes transportation of commodities among the two regions impossible and refutes the theory of East African origin.

Savannah and Forest Ivory

It has been established that forest elephant`s tusks are physically smaller than savannah elephants. It is therefore possible to locate the region where the Bom Jesus ivory was sourced from with reference to the contemporary habitat and geographical ranges of the two elephant species in Africa.

Daryl and Sharna (1998) state that there are two elephant species in Africa namely savannah elephants, scientifically known as *Loxodonta Africana Africana*, and forest elephants also known as *Loxodonta cyclis*. The savannah elephants have certain distinct physical traits that set them apart from their forest cousins, as their name suggests they inhabit mainly the open savannah grasslands regions of Africa (figure 10) most abundantly in East Africa (Wasser, Shelock, Comstock, Ostrander, Mutayoba & Stephens, 2004).



Figure 11: Savanna Elephant. Source: Pitts (2017)

Forest elephants inhabit the tropical forest areas of Africa; they mainly dwell in the Congo basin area (Sukumar, 2003). They have shorter stature compared to savannah elephants but taller than pygmy elephant, and their tusks are straight unlike curved savannah elephants. Sukumar (2003) explains that the straight thin tusks of forest elephants evolved to help them avoid branches of trees from the thick forest from hooking onto the tusks.

Comparatively savannah elephants have large curved tusks. Male savannah elephants grow up to four meters, while female grow to an average of 3.5 meters compared to forest elephants with females growing up to merely 2.5 meters and males up to 3 meters. According to Sukumar (2003) the varying tusk length and sizes in elephants of the same species is mainly due to the use of the tusk which result in either fast or slow rate of ivory chipping or wear. It is also region specific - Sukumar implies that in areas where trees are common elephants even those with large tusks tend to have chipped and short ivories (figure 13).

Similarly tusks can grow to enormous size even among forest elephants in what is referred to as “handicap Principle” suggested by Zahavi (Sukumar, 2003) in that the tusks continues to grow throughout the life of the animal and it may reach a point where it becomes handicap meaning feeding might become a problem with crossed tusks among savannah elephants while mobility might be difficult with heavy long tusks among forest elephants (figure 14) thus the animal might die from starvation. It is therefore not definite that only forest elephants have small ivories (figure 14), and similarly not all savannah elephants have large ivories (figure 13) although this occurrence is rare among the two species. Large tusks hold a tradition in African societies and have been used extensively as trumpets and as beads. According to Sukumar (2003) poaching and ivory hunting might have contributed to the

diminution of the variation of male elephant sizes, swelled by European demand for ivory that reached its climax in the 17th and 18th centuries and contributed to this outcome.



Figure12. Forest elephant crossing a swamp - note their small thin and yellowy ivories.
Source (Poole, 1997)

Geographically Savannah elephants dwell in open environments (savannah grasslands) and according to Daryl and Sharna (1998) the open environment allows them to grow to tremendous heights, however open grassland also makes it easier for hunters to see them from a very far distance thus it puts them at more risk. Socially it has been discovered that savannah elephants live in large groups of about 50 to 100 individual per group this can make them more vulnerable to being slaughtered in large numbers by hunters or poachers (Disney, 1978).



Figure 13 A large savannah elephant with small worn out ivories due to digging roots.
(Poole, 1997)



Figure 14: A forest bull with abnormally excessive large tusks it could be a hybrid between forest and savannah elephant. Source (Poole, 1997)

In a study conducted in 2000 (Sukumar, 2003), African elephants were classified into two species namely savannah elephant *Loxodonta Africana Africana* and forest elephant *Loxodonta cyclotis*. They were classified as genetically distinct and the team sequenced four nuclear genes from 195 elephants in 21 populations across Africa to examine patterns of genetic divergence. 36 forest elephants from three locations were identified at Dzanga, Sangha, Lope, and Odzala. 121 savannah elephants from 15 locations were identified, according to the DNA results the savannah elephants population was indistinguishable while the forest elephants from Dzanga were genetically different from savannah elephants, limited indication of frequency in hybridization was observed in the forest savannah transition region of the Congo. However this study did not include samples from West Africa which has both forest type and savannah type elephants a likely hybridization area (Poole, 1997).

A second study analysed the continent wide elephant DNA by clustering the population into clades, five clades were identified namely: (A). East-North Central and South African savannah elephants, (B). West African forest and savannah elephant. (C). West, North Central, and Southern African savannah elephants, (D). Central African forest and savannah elephants and (E). West African forest and savannah elephants. Sukumar (2003) does not give any further details unfortunately on the results of this study other than that the Central African forest elephants are genetically similar to Asian elephants. Nevertheless this study yielded information about hybridization between forest elephants and savannah elephants in West Central Africa and this information is useful in determining the range of these species especially in West Africa.

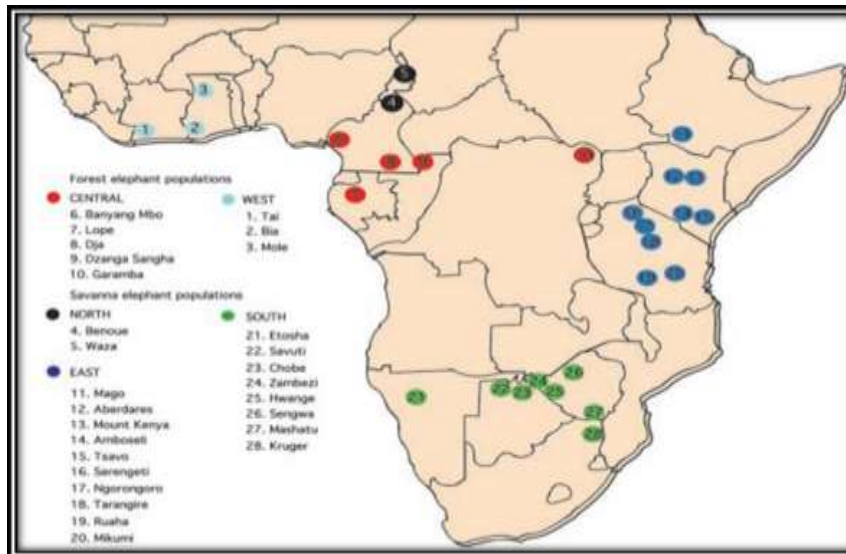


Figure.15. Range of Elephants in Africa in a study conducted in 2004. Source (Wasser, et al, 2004, P. 1)

Another study concerned with the African elephant was published in 2004 (Wasser et al, 2004), the study was concerned with the development of genetic and statistical methods that could be used to identify the origins of poached elephants in order to allow authorities to develop strict and tough measures for those areas or countries affected and to enable them combat and stop poaching in the identified hot spots (Wasser, et al, 2004).

With similarity to the earlier study conducted (Sukumar, 2003); this study included the rest of Sub-Saharan Africa (the region known to have most elephants). The study had a range of 16 microsatellite loci using 3.5 tissues and 84 samples from both forest *loxodonta Africana cyclotis* and savannah *loxodonta Africana Africana* in 28 locations, “geographic specific” was used to infer the geographic origin of DNA samples that could be obtained from tusks of unknown location (Wasser, et al, 2004, p. 1).

In conclusion the study results were similar to the one conducted in 2000 except in purpose, hybridization was observed between forest and savannah elephants especially at the edges of their range. Two samples showed evidence of hybridization and the report concluded that hybridization is rare in north central regions but prevalent in the north-western regions. Southern savannah elephants (Southern Africa) were identified to be somewhat different from eastern savannah elephants at least genetically; the Central African forest elephant were identified to be genetically and physically different from the Central African savannah elephant. Hybridization was also identified at their border ranges and these could neither be classified as Savannah nor Forest elephants (Wasser, et al, 2004).

There has not been any physical variation between East African savannah elephants and Southern African savannah elephants except genetically and the study have identified these genetic differences which are attributed to climate change, vegetation and biomes variation between south and eastern regions (Wasser, et al, 2004, 1).

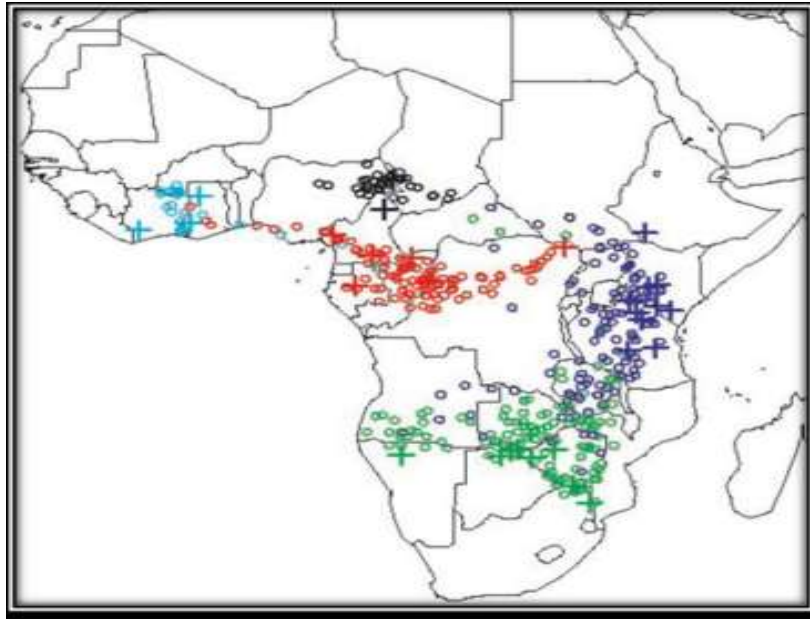


Figure 16: Range of Forest and Savannah Elephants also showing the distribution in more detail (Waser, et al, 2004)

Figure 16 shows the areas where elephant species and samples were taken from in the study, according to Waser et al (2004) the more close together the cycle are the more accurate the results are, it can be observed on the map the range of forest elephants is clustered in the area of the Congo basin (red) and some scattered through towards West Africa (cyan).

As can be seen on the map the distribution of forest elephants encompasses the West African regions (cyan) and the central African regions (red) on (figure 16). The savannah elephant range includes the South-Central African region (green), East African regions (blue) and North Central African regions (black)

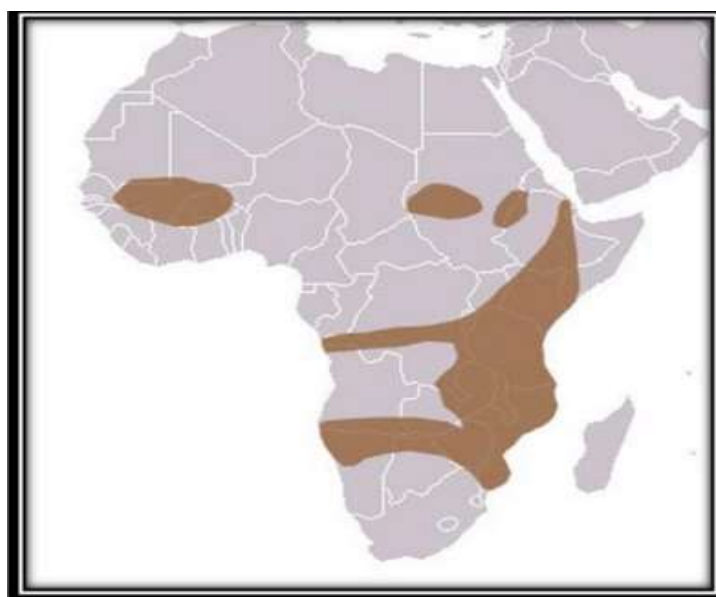


Figure 17: Range of savannah elephants (African Elephant, 2010)

Contemporary known ranges of savannah elephants (figure 17) includes a large region in West Africa. Figure 17 concur with the studies conducted by Wasser, et al, (2004) in particular with regard to elephant ranges, the same distribution pattern can be observed, this includes the rest of Southern Africa and East Africa except for West African savannah elephant range was not picked by Wasser, et al, (2004) study.

It is with some degree of confidence that we believe that the north central African (figure 15) savannah elephants thrived perhaps even at the West African Coast before settlements and population growth displaced wildlife and drove them into the interior (figure 3). It is realistic that savannah elephants or hybrids (off springs of savannah and forest elephants) but not pure forest elephants were frequently hunted specie by ivory hunters in as early as 16th century as a response to the growing demand by Europe. These studies enable us to visualise the distribution of elephant species on the African continent in a way never done before.

DISCUSSION

Central to the theme of this research paper is to discover by text where the elephants whose tusks were on board the Bom Jesus shipwreck ivory came from. Historical accounts have attested to the vibrant ivory trade in West Africa.

Studies have revealed that West African habitat range includes both savannah and forest elephants, the contemporary ranges of savannah elephant point to this fact which is shown in figure 17, and remarkably can be seen that West Africa has a significant population of savannah elephant despite a large number of forest elephants (figure15).

Historical accounts has proved that the hunting grounds for West African ivory hunters was in the eastern interior of the continent possibly the area indicated in black on figure 15. It is without doubt given the large number of Scrivillos on Dutch and English ivory trading ships in the 18th century. This suggest that forest elephants were a popular source of ivory in 18th century West Africa trade owing to indiscriminate killing of young and old elephants at the height of English and Dutch ivory demands and the introduction of advanced weaponry.

It is true that the largest tusked elephants are found among savannah elephant species and also that savannah elephants abound in large number in East Africa but a closer analysis on the range of these animals has established that West Africa has a significant number of savannah elephants as well which is likely to yield large tusks and it is prospective that the trend changed little from the time when the Portuguese purchased ivory in West Africa in 16th century to the time when the Dutch and English purchased theirs in 17th and 18th century.

It is in the black habitat range that we suspect was the source of the large savannah elephant ivory bought by the Portuguese on ports in West Africa and also this is a region that was identified to have hybridization between the two species, could potentially yield large tusks and hypothetically this could be part of the ivory discovered on Oranjemund shipwreck.

CONCLUSIONS

In conclusion it is with some degrees of certainty that we believe the Ivory discovered on the Bom Jesus/ Oranjemund shipwreck is from West African savannah elephants or a hybrid

elephants rather than East African savannah elephants at least from a historical perspective with the help of published scientific studies on savannah and forest elephant habitat range. It has been observed that the Dutch and the English royal companies competed among themselves for a greater share in the West African ivory trade (Feinberg & Johnson, 1982). This demand for more ivory by Europeans only fuelled the hunting and introduced advanced weaponry that led to more indiscriminate killings of elephants; this potentially led to varying ivory sizes that arrived on the West African coast.

By late 17th and early 18th century both large and small ivories arrived on the West African coast from hunting grounds in the eastern interior, this means an indiscriminate killing of young and old elephants characterised the hunting patterns of elephants. We can only postulate that during the 16th century when the Portuguese held a monopoly in the West African trade; only the largest ivory was purchased. This ivory was almost certainly sourced from savannah elephant species considering the sheer size, the ecological region where they came from is likely to have been in the upper West African regions, and this is supported by contemporary habitat range research studies (Wasser, et al, 2004; Sukumar, 2003).

This conclusion has been reached after careful analysis of information available on the subjects under discussion. Further research including DNA analysis of elephant tusks will enable other researchers to significantly add to this knowledge.

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