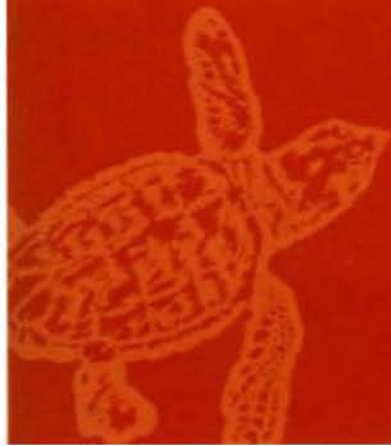


Historical review of the archipelagos
of macaronesia and the marine turtles

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INTRODUCTION

The Atlantic Ocean is an immense mass of water that separates several continents and with several archipelagos dotting its surface. The archipelagos of the Azores, Madeira, Selvagens, Canaries and Cape Verde form an arch across the eastern central portion of the Ocean. These islands form a bio-geographic area known as MACARONESIA, characterised by its biological affinities and by the fact that these are all volcanic islands of different geological ages, the oldest being the Cape Verde islands and the Azores the most recent.

Sea turtles, on the other hand, are a group of animals that is made up of eight different species, six of which can be seen with varying frequency in the waters of Macaronesia. The specific characteristics of the presence of each species in each archipelago vary however (Table 1). We now have significant zoo-geological data for each species and archipelago, but, from a scientific point of view, very little is known about their history.

	AZORES	MADEIRA	CANARIES	CAPE VERDE
<i>Caretta caretta</i>	*	*	*	*
<i>Dermochelys coriacea</i>	*	*	*	*
<i>Chelonia mydas</i>	?	?	*	*
<i>Isanachelys kempi</i>	*	*	-	-
<i>Lepidochelys olivacea</i>	-	-	-	*
<i>Isanachelys imbricata</i>	?	?	*	*

Table 1: Presence (*) of the different species of sea turtles in the Macaronesian islands. (? = unknown).

The six species of turtles to be found in the Macaronesian islands are protected both by international legislation and by the domestic legislation of each of the three countries involved: Portugal (Azores, Madeira), Spain (Canaries) and Cape Verde.

Basically, turtle population management requires information concerning their distribution, biology and ecology; the threats they face, etc. But, in our opinion, correct management is not feasible while we remain ignorant about the state of these same populations in the past. Thus, the current state of conservation of a specific population can be seen as the result of a series of interactions that, starting in the past, have led the species to where it is now.

The objective of this article is to highlight a series of historic and pre-historic data about sea turtles and the Macaronesian archipelagos of the Canary Islands and Cape Verde that we have managed to collect. Most of these are either previously unpublished or have been incorrectly interpreted in the past by previous authors. Moreover, these historic data not only provide a direct insight into the species/archipelago relationship, they also provide us with a wealth of bio-ecological data that enables us to assess present situations and face future challenges.

Some of the biological bibliographic references from the 19th and 20th centuries have been excluded. The excluded 19th century references for Cape Verde include a very imprecise report by ROCHEBRUNNE, 1884, and one by BOCAGE, 1896, mentioning the presence of a young *Caretta caretta* turtle on the island of Sao Vicente, and the fact that he suspects that the species breeds on this island. Most of the 20th century biological reports concerning Cape Verde have been collected from LOPEZ-JURADO et al., 2000aK.

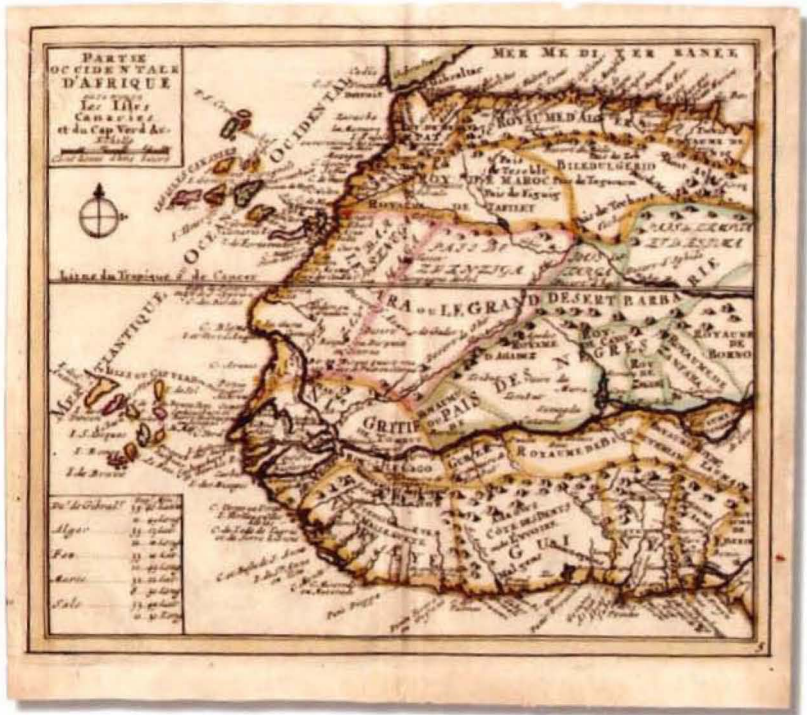


Figure 1. Western Africa.

RESULTS

1. The historic discovery of the archipelagos of the Canary Islands and Cape Verde and their relationships with sea turtles.

The discovery of each of these two archipelagos was very different. They were both settled by Europeans in the 15th century, although the Canary Islands had already been settled since the 1st century A.D. (ONRUBIA, 1979) by societies from the neighbouring African continent that lived there without any major upset until the arrival of the conquistadors.

The Cape Verde archipelago, on the other hand, was uninhabited at the time of its discovery and its settlement started in the late 15th century.



Figure 2. Canary and Cape Verde Islands.

A - THE CANARY ISLANDS

As we have said, the Canary Islands were inhabited in 1402, when Norman explorer Jean de Bethencourt arrived (BONTIER & LE VERRIER, 1453). Each island had a highly differentiated population, but one thing they all had in common was that they had no knowledge of sea travel (CHIL and NARANJO, 1850; JORGE, 1996).

This fact has often been used, correctly in our opinion, to show that the Canary Island aborigines came from inland areas of the African continent. They may have been people that had been driven into exile by Roman conquerors as part of their plans to pacify the territories they had conquered. However, it is surprising that, despite the fact that most of the islands had large areas of forests, and the fact that the islands are in sight of one another, no signs of boat building have ever been found on any of the islands, not even remains.

It appears that the fishing activities of the aborigines of the Canary Islands were restricted to collecting molluscs along the coast, coastal fishing with hooks made from bone, using toxic substances dissolved in inter-tidal pools (latex from *Euphorbia* spp.) and, finally, the occasional catch of larger specimens that probably washed up on the coasts.

However, although the abovementioned medieval book contains reports of several land animals on several of the islands, there is no mention of any sea turtles.

Even though there is a lot of zoological archaeology work remaining to be done on the Canary Island aboriginal sites, there is a reference to the presence of sea turtles in one of these, situated in an aboriginal cave dwelling (Villaverde, Island of Fuerteventura) (Meco, 1999), which was allegedly used as food at a site that is about 10 kilometres from the Fuerteventura coast. This archaeological level has been dated to 1730 B.C. (± 50 years), i.e. one thousand two hundred years before the Europeans arrived in the Canary Islands.

The Canary Island Museum of Las Palmas de Gran Canaria also has two small statues (anthropomorphous idols) in the shape of sea turtles, dating back to approximately the same period. They were discovered in the coastal town of La Aldea (island of

Gran Canaria) (Figure 3), and they are assumed to have had some religious significance (see LOPEZ-JURADO and MARTINEZ, 1983).

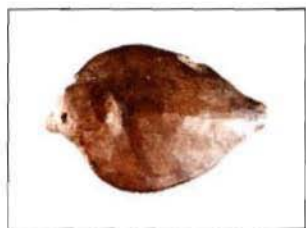


Figure 3. Anthropomorphous idols of Canary Islands.

B - THE CAPE VERDE ISLANDS

Man discovered the Cape Verde islands by chance. There are two different versions of what happened.

The first attributes the first sighting of the islands to Portuguese explorer Diego Gomes, along with Genoese merchant Antonio da Noli. Briefly, the author claims that, on his return journey back to Portugal, after sailing for two days and one night, they discovered a group of islands. Gomes went ashore on one of them, and he named it Santiago. This occurred between 1458 and 1460 (some sources are more precise, stating that it all took place on the 1st of May 1460). This version (the data of which were recorded by Martín Behain in 1487) adds that the discovery took place two years before the city of Ribeira Grande was founded on the island of Santiago by the first Portuguese settlers (see CRONE, 1937).

The quotation is as follows:

"Antonio da Noli and myself left the port of Zaya and we sailed for two days and one night towards Portugal, and we saw some islands on the sea, as my caravel bore more sail than the other one, I arrived first to one of these islands, and I saw white sand and it seemed a good port to me and there I dropped anchor, as did Antonio, I told him that I wished to be the first to land, and that is what I did, we saw no sign of man and we named the island Santiago as we had discovered it on that saint's feast day, there we caught fish in great abundance, on the coast we found many strange birds and fresh water creeks, the birds were so tame that we killed many of them with sticks and there were many pigeons, there were also figs in abundance, but they do not grow on trees as they do at home because our figs grow close to the leaf, these ones grow out of the bark from the base of the tree up to the crown, these trees grow in great numbers and there is much grass here".

The few (and doubtful) descriptions of places apart, the important thing is that he makes no mention of any presence of sea turtles.

The second version, of which we have a far more extensive and accurate version (CRONE, 1937), is set in 1456. The first publication of this dates back to 1507, and relates the travels of a Venetian named Alouise da Ca' da Mosto. We have reproduced the first paragraphs below:

"On the third day we sighted land, with everybody crying "land ahoy, land ahoy", tremendously surprised as we were not expecting any land in these parts. Two men sent to the

crow's nest sighted two large islands. As we heard this, we gave thanks to God for allowing us to see new things, because we knew well that islands such as these had not been described in Spain. To find out more and to check our fortune, we sailed towards one of them and we soon arrived.

As, on our arrival, it appeared large to us, we sailed along the coast a short distance until we reached a place that seemed a good anchorage. There we dropped the anchor and, as the weather was calm, we lowered a boat into the water which, with a good crew, was sent ashore to see if there were any people on the island. The boat reached the shore and explored a good amount of territory, but we found no tracks or signs, from which it was concluded that there were no inhabitants.

When they told me of this, in order to gain complete satisfaction, I sent ten men ashore with arms and crossbows the next morning with orders to climb a high and mountainous part of the island to see if they could spot something or see some other island. This was done without observing anything new except that the island was uninhabited and that there were a very large number of pigeons that allowed themselves to be taken by hand, something that was unknown to the men. They brought many of them back to the caravels that they had captured with stakes and sticks.

From the other shore they saw three large islands that we had not seen: one of them lay to the north and the other two to the south of our route, within sight of each other. They could have seen to the West another island far away in the sea, but they could not clearly confirm this due to the distance. I did not want to approach them, as I did not wish to waste any more time before continuing my journey and, moreover I judged that they must be as uninhabited and as wild as the others: but shortly afterwards when others heard the news about the four islands that I had found, they were anxious to explore them: they saw that there were ten islands, both small and large. They were all uninhabited and nothing was found except pigeons, strange species of birds and large schools of fish.

But returning to my tale: leaving this island and continuing on our route we saw the other two islands. Then, sailing along the coast of one of these that seemed to be well forested, we discovered the mouth of a river. Judging that the water must be good there, we anchored to replenish our reserves. Some of my men, having gone ashore, went as far as the mouth of that river where they discovered small amounts of very white and pure salt, some of which they brought back to the ship. Of this we took as much as we needed; also judging the water to be very good we filled up our stocks.

I should also explain that we found here large numbers of turtles some of which we captured. Their shells were larger than a good sized buckle. The sailors killed some of these and added them to our victuals because they said that on other occasions in the Gulf of

Arguin where they had also found them although not of this size, they had eaten them'... We also fished along the banks of this river and further up stream, where we found fish in such quantities that it is incredible to record. Many species that we had not seen before were large and tasted good... We remained there for two days entertained in the aforementioned gathering of supplies, including many pigeons, of which we killed immense quantities.

It is worthy of note that the first island that we stoppd ashore on we named Bonavista as it was the first land we had seen in these parts: the other island that appeared to be the largest of the four we named San Jacomo because it was the day of Saint Phillippo Jacomo when we anchored there."

In our opinion, the islands discovered in this account were Boa Vista and Santiago; with the islands of Sal, Maio and possibly Fogo being visible in the distance from the heights of Boa Vista. From our own experience we know that after a violent storm, the usual haze that covers the islands disappears and the clarity of the horizon makes it possible to see other islands from the highest peaks.

In our opinion, the reference to small sized turtles is the final proof that Alouise de Ca' da Mosto reached Cape Verde. Up until 1998, nobody had reliably reported young turtles in Cape Verde (specimens larger than a 15th century belt clasp or buckle) of two species: green turtles (*Chelonia mydas*) and the hawksbill (*Trachemelys imbricata*) (see the literature review in LOPEZ-JURADO et al., 2000 a and b). The latter especially are found with great frequency in the more sheltered and warmer bays along the shores of all the Cape Verde islands. So, if nobody except Ca' da Mosto had realised that these turtles were in the bays of Cape Verde until 1998, this would accredit the Venetian as the discoverer of the Cape Verde islands.

2. Historical data

From the time of the discovery of the two archipelagos, in the Canary Islands to a lesser extent, and especially for the islands of Cape Verde, highly expressive reports start appearing that illustrate their close relations with sea turtles.

The underlining is ours

A - EUSTACHE DE LA FOSSE. 1480. Cape Verde Islands

He published his account in 1548, although the journey itself took place between the end of 1479 and the first five months of 1480, i.e. some 24 years after they had been discovered (FOULCHÉ-DELBOSC, 1897).

This French merchant from Tournay (south of France) travelled throughout the Iberian peninsular in late 1479, until he reached Seville, attracted by the licenses offered a year beforehand by the Catholic Monarchs of Castile, Ferdinand and Isabel, for the mariners of Palos (Huelva, in the south of Spain) that wished to do business with the African lands of what was known as the "Gold Coast" (to the south of what is now Liberia). In Seville, he bought a variety of goods for trading and then headed for Cadiz from whence he set off on a merchant voyage at the end of 1479.

Unfortunately for him, shortly after reaching the "Gold Coast", and when he had just started trading with the natives, four Portuguese vessels, always suspicious of Spanish activities in Africa, took him prisoner and confiscated all his cargo. Paradoxically, he helped the Portuguese to sell all this cargo. On the return journey, he reached the islands of Cape Verde around February or March of 1480, and this was the account of what he saw there:

"...and after a time, we reached the islands that are off Cape Verde of which we will tell later on, and these islands are 10 in number, and there is not more than one inhabited, on which islands man or leprous creatures are cured in two years: and in fact we went to one of those same uninhabited islands and there were two lepers there for cure. I did not speak to them and they were on said island, I only went to the entrance and we caught a lot of fish in 2 or 3 days so that we lived (off them) for more than six weeks and there we took a large turtle that we ate and found to be very good; from these turtles the leper is cured by eating them and spreading blood and fat on all his meals (turtle fat) and thus, after two years, they are completely purged and cured of their leprosy. And in fact I was in Gand when I returned from said voyage, where Monsieur Jean de Luxembourg, having been advised that I had been to this place, was happy to hear of my manner for curing leprosy, he later went there and was on the island of Santiago for the space of two years, and he was completely cured. And while making preparations to return, the deadly sickness took him by surprise and there he died as I was later told by some of his servants who had made the journey with him. Therefore, to get back, to our purpose, these turtles are quite large; as a good large shield can be made from their shell to cover oneself when it is necessary for battle..."

He continues to describe the island and the large numbers of fish and birds. Later on he once again talks of turtles:

"...And it is the custom there that when the sea retreats, grass grows on the sandy gravel, and these large turtles go there to graze; and later the peoples of the island turn up side down all the ones they can find, and then they kill them and with their blood they bathe those infected and sick with said leprosy in said blood; and when they are dry they find two or three days that they cannot bathe and and afterwards they are fine and this makes them strong again and they purge their insides by eating of this fish and of the fat of these turtles, so they continue thus for two years and they are completely cured as has been said..."

In 1483, that is, three years after the journey of Eustache de la Fosse, King Louis XI of France, who thought he was suffering from leprosy, sent Georges Paleologue de Bissipat, to "the Green island and Barbarous country" to find the sanatorium of the island of Santiago described by de la Fosse and to acquire "some very appropriate things for the health of his person". Unfortunately, King Louis XI died, but not of leprosy, before his envoy returned (VILLIERS, 1958). It is striking that the account is situated on an "uninhabited" island. Considering the fact that only Santiago was inhabited in those early years of settlement, this island must have been Maio, Boavista or Sal.

This reference highlights the fact that the sea turtles that nested in Cape Verde were a highly significant element, right from the time they first entered Western history.

B - VALENTIM FERNANDES. 1506-1508. Cape Verde Islands

This type setter and printer of Austrian origins, when called by Queen Leonor of Portugal, widow of King John II, established his residence in Lisbon, where he started printing maps and naval charts of that time.

His works include the first charts and maps of the Cape Verde islands published between 1506 and 1508. These are described by FONTOURA DA COSTA, 1939, whose work we will follow in this article.

In his general remarks on the Cape Verde archipelago, Fernandes writes:

"In the months of May, June, July and August, there is in these islands a great abundance of turtles, which the lepers cure in salt. These islands were initially so healthy that any lepers

arriving there were cured. But they are now so unhealthy that the people sicken. I believe that after the negroes that brought them corrupted the air as they had done in their own land, they became unhealthy”.

He then goes on to quote the account of Ca’ da Mosto. At that time, only the Cape Verde islands of Santiago and Fogo were settled, according to Valentim Fernandes.

It is striking that the first reports about the seasonal breeding habits of the turtles coincides with the summer months that later authors take on board literally.

C - NICHOLAS SANSON. 1656. Cape Verde Islands

He was an explorer and geographer who, in the mid 17th century, wrote a series of geographic atlases of the continents that included many remarks on the human and natural history of the places he visited. In the atlas devoted to Africa, he writes, in reference to the islands of Sal, Boavista, Maio and Santiago:

“...Their turtles are two or three feet long; they come out of the sea and lay their eggs at night, they hide them in the sand and the heat of the sun causes them to hatch.



Figure 4. West Coast of Africa and Canary islands.

D - WILLIAM DAMPIER. 1683. Cape Verde Islands

William Dampier was an English citizen, first a merchant and then an adventurer, who made numerous journeys all over the world between the end of the 17th century and beginning of the 18th century. He really was a remarkable observer of the flora and fauna of the regions he visited, leaving us tremendously detailed descriptions of many species, including sea turtles.

In the first of his books (*A new voyage round the world*, chapter four), he mentions a visit, starting in early September 1683, to the islands of Sal, Sao Nicolau, Maio and Santiago (Cape Verde).

The original work was printed in 1697, six years after Dampier returned from his travels; two editions came out in that same year, and a third one was published in 1698. In the following years, new accounts of his travels were added to the collection, which was culminated in 1729 with an edition of the collection in four volumes; the first of these volumes is the one that was published in 1968 and the one that we use here.

On the 23rd of August 1683, they set sail from the port of Achamack in Virginia (USA) and after a week of storms, a few days later, they arrived at the island of Sal, which they found to be inhabited basically by Portuguese bandits. It was here, and in this moment, that Dampier made his famous account about the flamingos (*Phoenicopterus ruber*) and their peculiar form of nesting, and their culinary qualities. From the island of Sal, they went to the island of Sao Nicolau, and later to Maio, and then to Santiago; before leaving Cape Verde for the African coast south of Sierra Leone.

On the island of Maio, they attempted to buy provisions of meat but just one week before their arrival, another English ship under the command of Captain Bond, of Bristol, had arrived on the island and, with a malicious trick, had taken the Governor of the island prisoner and kept him aboard, offering to release him in exchange for beef and goat meat. But when his demands were met, he sailed away with the Governor still aboard and no more was ever heard of him again. Apart from that, he described the island as follows:

"...Here are plenty of Bulls, Cows and Goats; and a certain season of the year, as May, June, July and August, a sort of small Sea-Turtle come hither to lay their Eggs; but these Turtle are not so sweet as those in the West-Indies..."

This is the only mention made of turtles in Cape Verde that is made in this book. It is surprising that, despite the fact that he arrives during the nesting season of the turtles (according to late 20th century data), he does not report them either in Sal (somewhat surprising although he spent little time on this island) or in Sao Nicolau, or Santiago, the fourth island he visited before leaving for the African coast. It is only on Maio that he appears to collect reliable information on the turtles despite the local suspicions of English ships. In fact, he must have eaten their meat as he states that they are not as sweet as the turtles from the West Indies; almost certainly referring to the green turtle (*Chelonia mydas*) that he would have known well from his previous journeys as he started his odyssey in 1679 with a voyage from London to Jamaica, although he wandered extensively around the Caribbean before reaching Cape Verde.

The phenological observations made by Valentim Fernández are extraordinarily accurate and they suggest that, 300 years ago, the breeding season of the nesting population of turtles in Cape Verde was one month earlier than nowadays (see for example DAMPIER, 1729) starting in May and finishing in August; compared with the present season that starts in mid June and finishes in mid October. As we will see later however, the dates mentioned by Dampier must refer, at least in part, to the months of greatest density of nesting females.

Another interesting point is the mention of their small size; assuming that he was comparing them with the size of the green turtle, a species that he had already come across in the Caribbean and female green turtles grow to a larger size than female loggerheads.

E - FRANÇOIS LEGUAT. 1690. Cape Verde Islands

Leguat was a Huguenot of French origin who had emigrated to settle South Africa and the islands of the Indian Ocean. During this odyssey, they reached the island of Sal on the 30th of October 1690, where they went ashore in search of water, without success. They did, however, make some interesting remarks about the island and the made a couple of mentions of sea turtles:

"...We found most of our Companions ashore catching Turtles, we went along with them up into another part of the Country...Here also Sailors come to turn the Turtle, a Term us'd by

them for killing it, because they turn the Turtle on its Back when they catch it; all the Shore is covered with these Animals, specially in the Season, when they lay their Eggs. We turn'd some of these stupid and slow Creatures, and amongst the rest, two which, according to the guess of the Skiffes, weigh'd 500 Pounds each. We Carry'd all that was good of them aboard with us..."

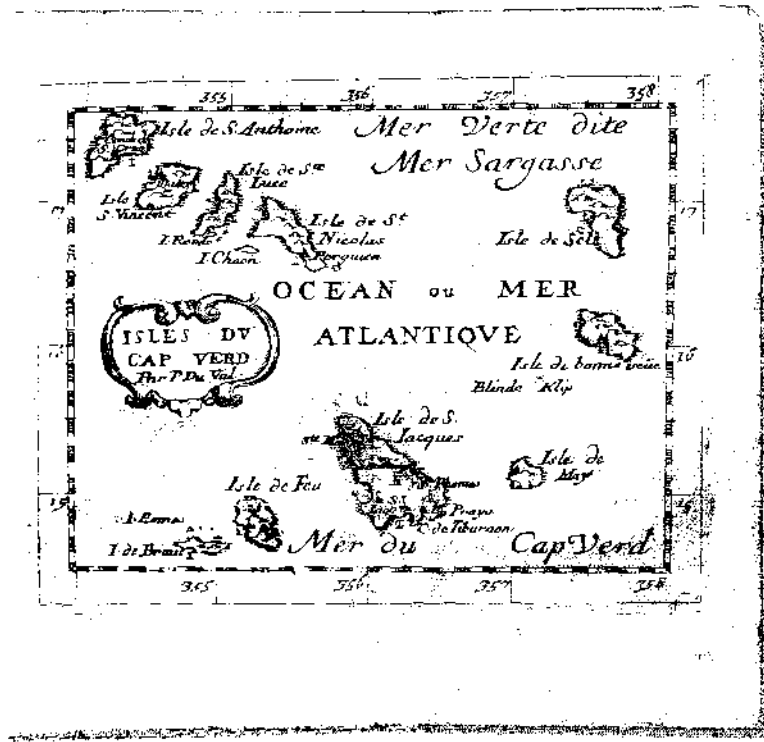


Figure 5. Cape Verde Islands. By P. Du Val.

This suggests that there was a high density of nesting females on the beaches. It is also worth noting that, in late October, there were still females to be found on the beaches: a fact that coincides with the data that we have gathered between 1998 and 2003. We even have records of hatchlings emerging from the nest on the 5th of January 2000 on the beach of Canto (island of Boavista); which, in general terms, would indicate that the eggs were laid in late October, or even in November of the previous year.

F - FRANÇOIS FROGER, 1695. Cape Verde Islands

He was a 19 year old boy who sailed in a French ship named “The English Falcon” on its voyage to “officially” establish a colony in the Magellan Strait. In reality, it was a pirate ship financed by Louis XIV of France. Along with 5 other ships, it spent three years raiding the coasts of Africa, South America and the West Indies, returning to its base in La Rochelle in 1697.

After its visit to Cape Verde in June/July 1695, Froger claims:

“In Sao Vicente, there are turtles that weigh from 300 to 400 pounds. The eggs do not need more than 17 days to reach full maturity in the sand, but the little turtles that emerge, need further nine days before they are capable of reaching the sea, because of which 2/3 of them ordinarily fall prey to the birds.”

During his short stay in this port, Froger saw the arrival of a ship from Nantes that had come to fill its holds with turtles for Martinique.

His remarks highlight the fact that there was a certain export trade of sea turtles which can only be explained by the fact that the existence of turtles here was common international knowledge at the time.

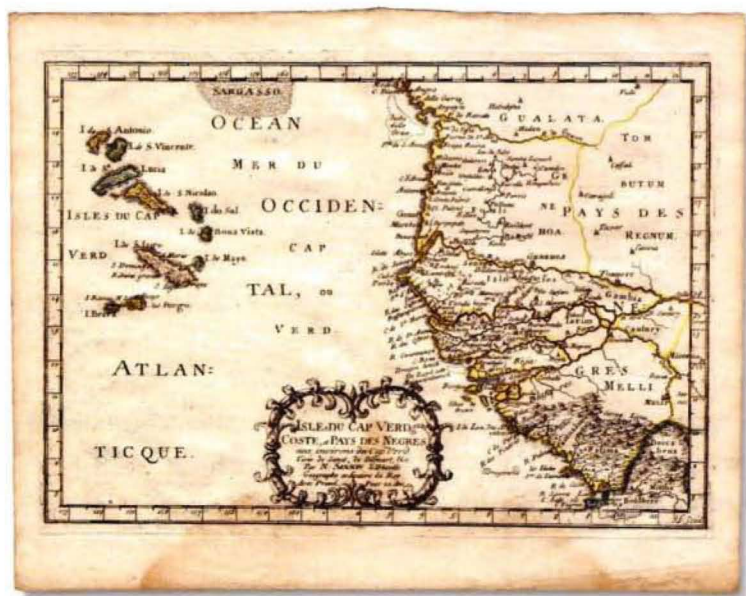


Figure 6. Cape Verde Islands. By N. Sanson d'Abbeville, mid 17th century.

G - WILLIAM DAMPIER. 1729. Cape Verde Islands

Dampier's second book was published in two parts by James and John Knapton (London). The first part, which includes the part dealing with Cape Verde, was published in 1703; and the second part in 1709. The 1729 edition (which is the one that was edited again in 1981) brought them together and published them as one, and this is the edition used by us.

This voyage commenced on the 14th of January 1699 and, after a few days in Tenerife, they reached the island of Maio on the 11th of February. Here, apart from describing the process of producing and transporting salt, Dampier makes some highly interesting comments about the vegetation and the fauna.

About sea turtles, he says:

"...I have already said (Vol. I^o) that the months of May, June, July and August, (that is, the wet Season) are the Time when the green Turtle come hither, and go ashore to laid their Eggs. I look upon it as a thing worth taking Notice of, that the Turtle should always, both in North and South Latitudes, lay their Eggs in the wet Months. It might be thought, considering what great Rains there are then in some Places where these Creatures lay, that their Eggs should be spoiled by them. But the Rain, tho' violent, is soon soaked up by the Sand, wherein the Eggs are buried; and perhaps sinks not so deep into it as the Eggs are laid; And keeping down the Heat may make the Sand hotter below than it was before, like a Hot-bed. Whatever the Reason may be why Providence determines these Creatures to this Season of laying their Eggs, rather than the dry, in Fact it is so, as I have constantly observ'd; and that not only with the Sea-Turtle, but with all other Sorts of amphibious Animals that lay Eggs; as Crocodils, Alligators, Guano's, Etc..."

The above is probable one of the oldest records of the relationship between the incubation of sea turtle eggs and the impact of the rains; a fact that, in part at least, explains the relationship between sexes and the incubation temperature. It is striking that he now describes the species as *green turtle*.

Further on, and once again in reference to the island of Maio, he adds:

Referring to Dampier (1697).

“...When the Turtle-Season comes in they watch the Sandy-bays in the Night to turn them; and having small Huts at particular Places on the Bays to Keep them from the Rain and to sleep in: And this is another Harvest they have for Food; for by Report there come a great many Turtle to this and the rest of the Cope Verde Islands. When the Turtle season is over they have little to do, but to hunt for Guinea-Hens, and manage their small Plantations...”

In this extract, Dampier clearly shows the importance of turtles as a source of food for the population of this island; and he states that these animals are also to be found on the other islands of Cape Verde. It is interesting to note the system used to capture the turtles. Even now, this is called “velar tartarugas”. Finally, he mentions the Guinea hen, or Guinea fowl (*Numida meleagris*) as a source of food when the turtle breeding season comes to an end.

From Maio, Dampier went to Santiago to take on supplies of water and, after a few days there, the expedition set sail for Pernambuco (Brazil).



Figure 7. West Coast of Africa, 1738.

H - ANTOINE-FRANÇOIS PREVOST. 1749. Cape Verde Islands

He wrote a "Histoire generale des voyages" based on pre-published accounts. Chapter five of this work (the first chapter of volume VII) is based mainly on the account that Georges Roberts wrote in 1726, in which he describes his voyage to the Cape Verde islands in 1721.

In September 1721, English Captain George Roberts was commissioned in London to carry merchandise from Virginia (America) to the coast of Guinea (Africa). During the voyage, a storm drove them off course and they ended up in Plymouth. From there, and after a month's wait because of the conditions of the sea, they finally set sail for Africa.

Roberts' first visit to Cape Verde (he had previously bought wine in Madeira and in Tenerife, where he apparently sold his cargo) must have taken place between December and January 1721-22. He visited Sal (where he found no-one), Boavista (where he bought salt, horses and donkeys), Maio and Santiago. On this voyage, he makes no mention of turtles and they returned to Barbados in March 1722.

On his arrival he had to sell everything that he had brought from Cape Verde at a loss (most of the animals had died and the wine had gone off) and he bought a ship to go into business for himself. He set off for the coast of Guinea and Cape Verde again in mid July 1722. A fever confined him to his bed for three days and, during this time, the pilot lost his way so, after wandering the ocean, they finally reached the island of Sal in mid October 1722.

This is the moment that his account starts to include observations concerning sea turtles³.

"The anchor was dropped in the Bay of Palmeira, which is in the north of the island. This was the season of the green turtles. On this occasion, Roberts remarked that the French often came to the islands of Cape Verde with the sole intention of catching turtles, which they salt on the shore, just like Newfoundland cod, and they sell them in the West Indies at a great profit. They keep the shells for France, where the profit is greater than in England, especially the shells of the turtles of these islands that have a finer, more transparent shell than those of anywhere else. On the other hand, they sometimes find grey amber, particularly on the island

³ The account continues in the words of Prevost.

of Sal and it is believed that if the wild cats and even the green turtles did not eat this precious gum, much profit could be made. Roberts, who needed provisions, having sent a ship's boat ashore in search of some freshly caught turtles, he saw it return in under two hours. She returned with one that weighed between 200 and 300 pounds, with a negra from the island of Sao Nicolau who gave it to him on behalf of his companions. They had come to Sal from Sao Nicolau, 60 in number to fish turtles there on the orders of an English captain from Bermuda who had left them there and then left to take on salt in Boavista. But such a long absence made them loose hope of seeing him again and they offered Roberts half of their turtles, their oil, their shells and their grey amber in exchange for carrying them and the other half of the merchandise to Sao Nicolau".

And further on, still referring to the island of Sal, he says:

"So many turtles are caught that several sail ships come to load them all every year and they salt them for transporting to the American colonies. These animals use the time of the rains to lay their eggs in the sand and they leave them to warm in the sun. This is when the inhabitants hunt them with no difficulty other than turning them on their backs with stakes as they are so big that they would not have the strength to do this with their hands. The meat of the turtles is as common in the colonies as cod in the countries of Europe".

About the island of Boavista, he says:

"Most of its inhabitants live off goats, whose milk is their main food stuff, together with fish and turtles".

About the island of Maio, he states:

"Turtles there are not so abundant" (compared with Boavista)

The island of Brava:

"...it is abundant in fish. Quantities of turtles come too, which lay their eggs in the rainy season. But the inhabitants do not eat them like those of Santiago and San Felipe (Fogo); despite the fact that on all the other islands, these eggs are considered a delicious feast, as Captain Roberts himself can vouch".

The island of Sao Nicolau:

"It appears that, nowadays, most of their trade is confined to turtles, which they catch in large numbers"

And finally, several references to São Vicente:

"The fishermen of San Nicolau go there to hunt turtles"

"With the exception of São, there is no other island in all of Cape Verde where they catch so many turtles."

"It is essential to mention the amount of shells and small turtle skeletons, the shore is full of them, that come here in very large numbers."

São Vicente is a desert island on which there are 20 Portuguese from San Nicolau that have been there for 3 years devoted to curing the skins of the goats that they catch with trained dogs. Their dwellings were huts in which the furniture they used consists of leather stools and turtle shells that act as : nails and bowls for the water"

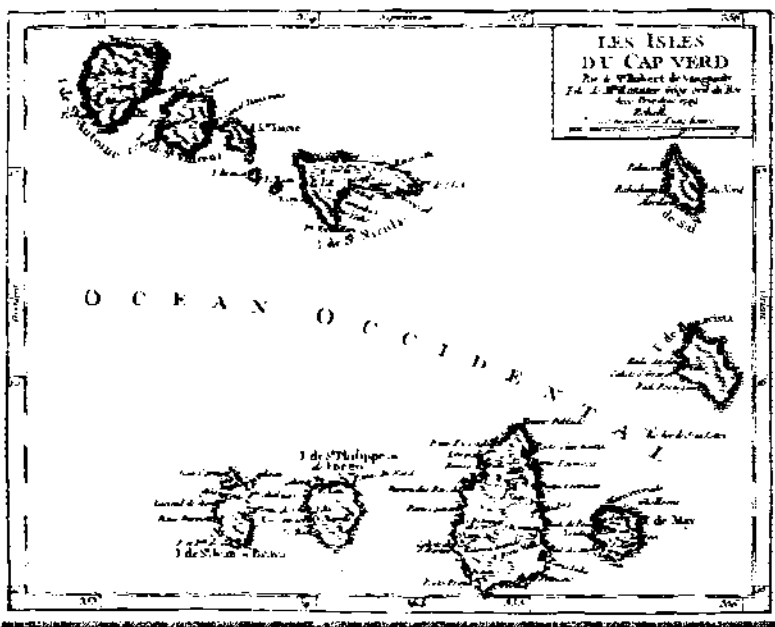


Figure B. Cape Verde Islands. By St. Robert de Vasquoduy, 1745

The following points from the abundant information above can be highlighted:

- Those 50 years after Froger's reference (see above), the French continued to export turtle meat from Cape Verde to the French West Indies.
- That turtles were highly abundant on the island of Sal.
- That they were large animals, as they had to be turned over with the help of stakes.
- That turtles were also highly abundant on Sao Vicente.
- Those expeditions were sent from Sao Nicolau to both Sal and Sao Vicente to catch turtles.
- That the turtle carapaces were used as household utensils.

1 -GEORGE GLASS. 1764. Canary Islands

He was a doctor of the English navy that attempted to set up a commercial factory on the coasts of the Sahara. His adventure ended in tragedy, but, before the end, he left his writings, in which he describes the Canary Islands. They include a reference to sea turtles in association with the east coast of the island of Fuerteventura (Las Playas bay) in late May of approximately 1763:

"At that moment, some fishermen caught a large loggerhead turtle in the bay, weighing some five hundred pounds, which they took ashore and they put it on its back on top of a large stone, after cutting its throat, from whence came a flow of steaming blood. As they had no bowl to catch it, the mayor and the rest of his people caught all they could in their hands and they drank it. When they realised our disgust at seeing such a barbaric and bestial manner of eating, they shook their heads and they told us that it was an excellent remedy against the frost itch and they invited us to join in; to our even greater disgust, we noticed their hands full of scabs and sores"

Apart from the fact that the date of the observation almost coincides with the start of the breeding season of the turtle species *Caretta caretta* in Cape Verde, it is also striking that the animal was an adult, judging from the weight (see above the estimations of the weight of nesting turtles in Cape Verde provided by Leguat, Froger and Roberts); and the fact that they believed that turtle blood had medicinal properties.

J - JOSE DE VIERA Y CLAVIJO. 1799. Canary Islands

A priest and historian, in 1799 he wrote his "Dictionary of the natural history of the Canary Islands" (which was published in 1868-1869); in which he defines the names of places, animals and plants of the Canary Island archipelago.

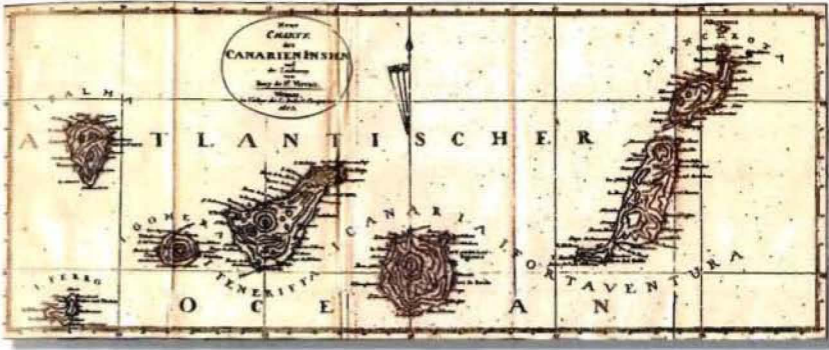


Figure 9. Canary Islands. By Bory de St. Vicent, 1803.

In Tome II, he defines the term "Islets" as follows:

"Islets (INSULAE DESERTAE). These are the six smaller islands situated close to Lanzarote, called Alegranza, Montaña Clara, Graciosa, Roque del Este, Roque del Oeste and Isla de Lobos: all of which are arid, mountainous desert lands. On Alegranza, archil is collected; on La Graciosa, the livestock grazes during the winter; on Montaña Clara, the best Canary Island birds are sought; on Isla de Lobos, they used to fish for the sea beasts of this name (monk seals), and on all of them, turtle eggs, shell fish, shells, etc. are to be found"

This reference is self-explanatory.

K - PETER SIMMONDS. 1885. Cape Verde Islands

On page 225 of this interesting book on wild animals used for food, the author writes:

"In Portugal, syphilitic patients are often sent to the Cape Verde islands to be cured by feeding on turtle flesh. The flesh of the green turtle is eaten in...the Cape Verde islands"

What is striking is the fact that although the curative properties of the flesh and blood of Cape Verde sea turtles were considered an efficient remedy for leprosy in the early years after the discovery of the islands, they were still being used 400 years later for curing syphilis. Nowadays, it is the popular belief that they have aphrodisiacal properties.

L - JAMES PARSON. 1962

This is the last of the great unknowns that we quote in our review of the historic literature. In 1962, he wrote a book on the green turtle in the world.

In this highly interesting book, most of the account covering the Cape Verde islands goes to establish that:

- It is the green turtle that nests in these islands
- He establishes a similarity between Ascension Island and Cape Verde to the south and north of the equator.
- He mentions Sal, Boavista and Maio as the most important islands for this species
- He suggests that the coast of Africa is probable the feeding grounds for these populations, from Mauritania south.
- He provides new data, from a certain M. Alexandrino, director of the airport of Sal, who tells him in a letter in 1959, that small numbers of turtles still come to nest on this island in the months of August and September. He adds that at least some of these are *Caretta caretta* and not *Chelonia mydas*.
- In the same year, J. Cadenat assures him in a letter, that in several journeys to Cape Verde, he has never seen green turtles, only occasional loggerhead turtles.

He finishes by saying:

"The Cape Verde turtles, like those of Ascension, are crying out for a historical and ecological study". James J. Parsons. The green turtle and man. Univ. Florida Press Book. 1962. (page. 45).

CONCLUSIONS

In the above article, we have attempted to directly transcribe pre-historic and historic knowledge (although, in some cases, we have reached the mid 20th century) available on sea turtles in the Macaronesian islands of the Canary Islands and Cape Verde.

We believe that there are two clearly demonstrated facts:

- The Cape Verde islands, especially Sal and Sao Vicente, were known as sites with a high density of nesting turtles between the 15th and the 18th centuries.
- Sea turtle eggs were collected on the uninhabited islets of the Canary Islands in the late 18th century.

Obviously this latter fact, together with the archaeological data mentioned above, could suggest that a species of sea turtle (the loggerhead turtle) that used to inhabit the eastern Canary Islands has become extinct. This possibility would be connected to the aboriginal population of the islands that used turtles as food and they considered them as a kind of God, probably in allusion to their value as a natural resource.

The extinction of turtles in the Canary Islands would have taken place in parallel to the extinction process of the monk seal (*Monachus monachus*) in the islands, a mammal that used to be eaten by the pre-historic inhabitants of the larger islands before the arrival of the Europeans, who, in turn, wiped them out from the same uninhabited islets on which Viera y Clavijo mentions that sea turtle eggs were collected (see LOPEZ-JURADO et al., 1995), and which were inaccessible to the aboriginal Canary Islanders because, as has already been mentioned, they did not know how to sail.

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