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RECONSTRUCTION AND ANALYSIS OF THE 1513 DISCOVERY VOYAGE OF JUAN PONCE DE LEON

by DOUGLAS T. PECK

THE long and eventful discovery voyage of Juan Ponce de León, the Spanish conquistador and explorer, has not received the amount of in-depth study and analysis that this historically significant voyage so richly deserves. Perhaps a reason for this can be found in the fact that sixteenth-century (and later) historians, in dwelling on the fact that the largely apocryphal purpose of the voyage was to find a fountain of youth, perverted the factual reporting of the real purpose of the voyage and its several significant discoveries. This distorted version continues in many contemporary history books because of the proclivity of writers simply to paraphrase previous authors. To avoid this I have examined original source documents wherever possible for information and data untainted by unsubstantiated conjecture and fiction.

This study documents and answers four primary questions: (1) Which island did Ponce de León visit and identify as Guanahani, the landfall of Columbus? (2) Where on the coast of Florida did Ponce de León first land? (3) Where is the Florida west coast harbor—discovered, explored, and charted by Ponce de León—that was used as a landing and departure point by later Spanish explorers? (4) Sailing southwesterly from the Tortugas, what land did Ponce de León sight and briefly explore?

The answers to these questions can be found by a reconstruction of the track of Ponce de León's voyage to determine where he made landfall on his several discoveries. This study documents such a reconstruction. A sailing vessel was used as a research test vehicle to determine the track of those segments of the voyage where the problem was one of open ocean navigation from a known departure point. The remainder of the track along the shore was determined primarily by viewing and con-

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firming the log's description of the geographical landforms encountered.

The only extant source giving details of Ponce de León's voyage is Antonio de Herrera's *Historia General de los hechos de los Castellanos en las Islas tierra firme del Mar Oceano*, published around 1601. Philip II appointed Herrera as Spain's official historiographer of the Indies in 1592. His position gave Herrera access to both official and secret archives, and soon after Ponce de León's voyage, he must have summarized and paraphrased from the explorer's original holograph log or a copy that has since disappeared.

Used were three English translations of Herrera's chapter on Ponce de León's voyage by Florence P. Spofford, L. D. Scisco, and James E. Kelley, Jr.¹ The Kelley work includes the English translation adjacent to the Spanish text. The latter is from the original 1601 publication and contains copious footnotes explaining possible differences in interpretation of sixteenth-century word definitions.

Some scholars question the validity of using the navigation data in Herrera's account obtained directly from the original log. Herrera summarized and abridged Ponce de León's log in the same manner that Las Casas summarized and abridged Columbus's log. Both were done from the original holograph document or a scribe's copy. Unfortunately, Herrera added numerous comments that were based on knowledge obtained after 1513, and were missing from the original log. Thus some scholars believe that Herrera authored the entire account and that the navigational data are his and not extracted from the log. These additions by Herrera are easily identified, however, and when they are removed the original log entries of compass headings, times, distances, descriptions of landfalls, latitudes, identification of known islands with Indian names, sea conditions, and weather—all of which are elements of a navigator's log—come through with clarity. Why should they lose their value just because they come to us by a second person?

1. The Spofford translation is contained in T. Frederick Davis, "History of Juan Ponce de León's Voyages to Florida: Source Records," *Florida Historical Quarterly* 14 (July 1935), passim. L. D. Scisco's translation, "The Track of Ponce de León in 1513," can be found in *Bulletin of the American Geographical Society* 45 (no. 10, 1913), 721-35. Kelley's translation is from a working draft, April 15, June 7, 1990, and a final edition from July 26, 1990.

But what of the accuracy of the data contained in Ponce de León's log? Here there are several stumbling blocks. The latitudes for the islands and shore features do not agree with known facts. His compass courses would have put him ashore in some places, and, in others, he would have been far at sea when he reported land. There will be answers to these questions as the voyage is reconstructed, but first one must examine the purpose and goal of the voyage and determine where Juan Ponce intended to sail.

Juan Ponce de León was relieved as governor of Puerto Rico in 1511, when Don Diego Colon asserted his right to appoint governors of the Indies islands according to the crown's contract with Columbus. Already a very wealthy aristocrat and on good terms with the court, Juan Ponce had the insatiable urge of the Spanish conquistador to obtain more wealth and more prestige. Thus, when "he had news that they found lands to the north," he resolved to go there.² He applied to the king for permission to seek new lands to discover, to be named adelantado of those he conquered, and to receive the honor and wealth from his successful ventures.

The Spanish crown closely controlled permission to explore. Open-ended charters or patents were not issued, and documents spelled out specific terms, including naming the destination or goal of the planned exploration. The capitulation or patent that Ponce de León received in February 1512 detailed his authority and mission.³ He was authorized to seek and claim the Islands of Beniny.⁴ There was no mention of a fountain of youth, but the patent included detailed accounting procedures for the immense wealth that, according to Indian rumor, was present in Beniny and the surrounding islands.

The "lands to the north" and the Islands of Beniny are indicated in Peter Martyr's map of the New World published in 1511.⁵ Peter Martyr, a learned historian and cosmographer in the Spanish court, undoubtedly had access to all the knowledge

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2. David O. True, in "Some Early Maps Relating to Florida," *Imago Mundi* 11 (1954), 73-84, gives a comprehensive review of the lands known or suspected to exist north of Cuba prior to 1512.
 3. Vicente Murga Sanz, *Juan Ponce de León* (San Juan, 1971), 100-03.
 4. There are various spellings for the island: Beniny, Beimendi, Bimenei, Beimeni, and the modern term Bimini.
 5. Peter Martyr's map was issued in his *Legatio Babylonica, Oceani Decas, Poemata, Epigramata* (Seville, 1511).

and reports from the Spanish discoveries, from spies, and from Portuguese, French, and English expeditions. Ponce de León probably did not have a copy of this map, but, as an aristocratic conquistador, he had access to the same sources of information used by Martyr to draw his map. The Martyr map was among the latest knowledge available at the time of Ponce de León's planned voyage, and it became a graphic picture of the "news" of which he spoke. The large land mass north of Cuba, labeled on the Martyr map as the "Isla de Beimeni parte," was the Islands of Beniny and was Ponce de León's goal according to his patent. While most of the map is greatly distorted (particularly the shore of Honduras and Nicaragua), the eastern end of Cuba, Espanola, Puerto Rico, and the Lucayos (Bahamas) are fairly accurately portrayed since this was the area of most intensive occupation, exploration, and charting at the time. The charts and rutters of the Lucayos Islands and adjacent waters were available to Anton de Alaminos, the professional pilot of Ponce de León's voyage. Ponce de León likely understood what he had to do to reach his goal. He would sail seaward up the chain of the Lucayos to the northernmost charted island of Guanahani and then travel across the uncharted sea in a northwesterly direction to his Islands of Beniny.

In the reconstruction of the voyage, one finds the latitudes reported by Ponce de León troublesome—particularly the latitudes of Guanahani and the landfall on the Florida coast—and they have provoked controversy concerning their accuracy. Some scholars insist that the latitudes reported in the log must be reasonably accurate because they were taken with a quadrant or astrolabe. This, however, does not square with the knowledge that we have of early sixteenth-century Spanish navigation.

Ponce de León was neither a seaman nor a navigator. He was an aristocratic conquistador, trained from early childhood as a warrior, and he spent most of his adult life fighting the Moors in Africa, the rebellious Tainos on Espanola, and the Caribs on Puerto Rico and adjacent islands. The king's patent required him to keep a log to establish his claim to the islands he discovered. He no doubt wrote the narrative portion of that log, but he likely turned to Alaminos for the navigational data of latitudes and compass courses. Anton de Alaminos was an "up from the ranks" Spanish pilot who had served as a young apprentice seaman with Columbus on one of his early voyages

and had stayed in the Caribbean to become the most experienced and sought-after pilot in the Indies. And like all Spanish pilots of his time, his simple, unlettered trade consisted of navigation by dead reckoning (compass course and distance) from a known departure point. Yet some scholars picture him as proficient in celestial navigation and taking sights on the meridian of the sun. Edward Lawson argues that Alaminos must have used an obsolete edition of the tables of declination, but there is no indication in the log that either Alaminos or Juan Ponce used celestial navigation. This required expertise in the use of an astrolabe and the complicated tables of declination in a current Regiomontanus Ephemerides or Kalendarium, both of which were written in Latin.⁶

After intensive research into the subject, Samuel Eliot Morison notes: "Celestial navigation formed no part of the professional pilot's or master's training in Columbus' day or for long after his death. It was practiced only by men of learning such as mathematicians, astrologers, physicians, or by gentlemen of education."⁷ Alaminos was none of these, so it can be concluded that he used only dead reckoning to determine his azimuth position and latitude. Alaminos's use of dead reckoning to establish his latitudes will be further developed in the reconstruction to follow.

The compass courses given in the log are also troublesome, and for this one needs to examine the magnetic variation of the area in question and the variation correction, if any, set into the compass being used.⁸ In developing both plotted and sailed courses, I used the magnetic variation for the early sixteenth century, projected by James E. Kelley, Jr., from a computer analysis of early charts, maps, rutters, and other documents.⁹ Compasses of the time were made in various European cities, and it was common practice for the compass to be set to true north when manufactured, thus building into the compass the variation correction for that particular city. Kelley also deduces

6. Edward W. Lawson, *The First Landing Place of Juan Ponce de León on the North American Continent in the Year 1513* (St. Augustine, 1956).

7. Samuel Eliot Morison, *Admiral of the Ocean Sea: A Life of Christopher Columbus* (Boston, 1942), 183-96.

8. Magnetic variation is the difference in degrees between magnetic north and true (geographical) north.

9. James E. Kelley, Jr., letter to author, April 22, 1990.

from a study of early maritime navigation that the Spanish explorers of the period used a compass made in Seville with a one-half point (5.63 degrees) easterly correction built in. This correction (I should say error), built in by the manufacturer, shifted the north arrow on the card point to the left, or counterclockwise, 5.6 degrees from magnetic north. On a voyage, then, when magnetic north is moved farther to the left (as in a westerly variation zone), the north arrow on the card will be rotated to the left from true north to the degree of the westerly variation. Accordingly, I applied this 5.6 degree correction of the Seville compass to my navigational computations.

After outfitting three vessels at his own expense, as spelled out in the patent, Ponce de León departed from Anasco Bay the afternoon of March 3, 1513, in search of the Islands of Beniny. His pilot, Alaminos, without a doubt had with him a chart of the Lucayos Islands, at least as far north as Guanahani. Beyond that point lay unexplored islands. Passing Point Borinquen (then called Point Aguada), Ponce de León took his departure for navigational purposes sometime after midnight, March 5. He reported sailing a heading of northwest by north to his first landfall in the Turks and Caicos islands. It is this northwest-by-north heading that must now be corrected so the track can be accurately sailed to identify the reported island landfalls.

The compass heading of northwest by north on the thirty-two-point compass then in use comes out to 326.25 degrees. When computed for the built-in Seville variation correction, it is $326.25 - 5.63 = 320.62$ degrees. By rounding off the decimals to 321 degrees, one has the compass (or magnetic) heading that Juan Ponce sailed.¹⁰

But the compass heading that Ponce de León traveled was not the actual, true heading that I needed to compute for the compass heading I should sail for my reconstruction. This basic 321 degree compass heading had to be further corrected for the westerly variation on each leg, and since the first leg had a westerly variation of five degrees, the computation is $321 - 5 = 316$ degrees. This 316 degrees is the true heading (from true north)

10. Unlike our present compass rose, or card, which is divided into 360 degrees, the early sixteenth-century compass rose was divided into 32 points, or segments, equalling 11.25 degrees.

of the first leg to be sailed to arrive at the true course or track over the bottom as influenced by the currents. This computation was repeated for each leg as the basic compass headings and/or variation changes.

I sailed the first leg for three and one-half days, or eighty-four hours, to an island on the Banks of the Babueca, named El Viejo, which can be positively identified as Grand Turk Island. It is the only island on a large bank near the end of both the sailed and reconstructed track. The distance to Grand Turk is 288 nautical miles. The time of eighty-four hours computes to a speed of 3.4 knots over the bottom. With the help of the Antilles current (around 0.8 knots), this computes to a speed of 2.6 knots through the water— a reasonable speed for Ponce de León's heavy-laden vessels.

The chart in figure 1 shows the plotted track from Puerto Rico with each individual plot between the islands that Ponce de León either sighted or at which he anchored. The track shown is that sailed on the corrected true heading as influenced by the Antilles current.

My sailed track was bent considerably to the west of the 316 degree heading by the branch of the Antilles current that flows westerly past Hispaniola and Cuba, and I ended three nautical miles northeast of Grand Turk Island. I believe that Ponce de León reached the bank five to seven miles east of my position, since he reported anchoring on the bank (Banks of Babueca) that stretches almost twenty miles in a southwesterly direction from Grand Turk. On such a long leg, and considering all the variables, my track verifies not only Ponce de León's reported compass heading and distance but also verifies the correction factors that I used to correct the heading for sixteenth-century conditions.

Juan Ponce's log gives the latitude of El Viejo as 22 degrees, 30 minutes N., while the actual latitude of Grand Turk is 21 degrees, 25 minutes N. (from the anchorage on the bank, south). Placement of the latitude a little over one degree too far north will be reflected slightly differently in all later latitude reports in the log. This is because Alaminos started his dead reckoning from Point Aguada with a northerly error on his chart, and early sixteenth-century charts and rutters consistently

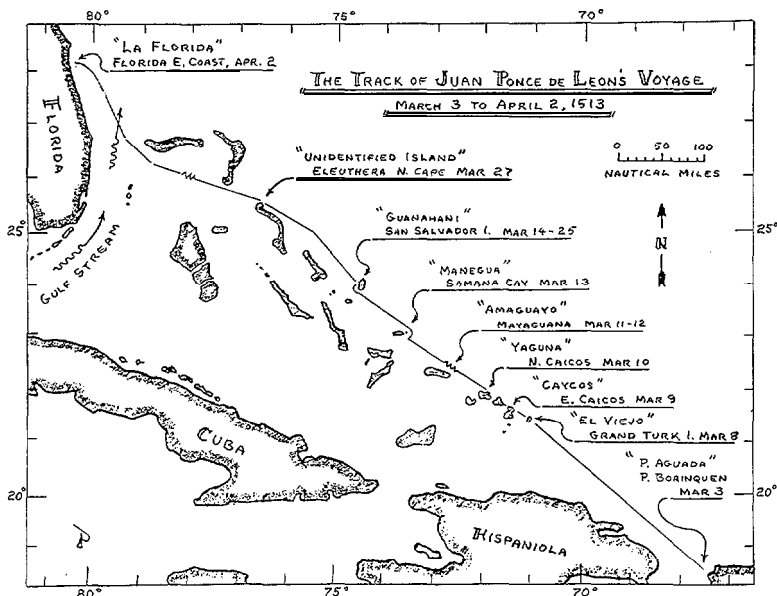


Figure 1

show known landmarks in the New World as several degrees too far north. The Rotz chart, as late as 1542, shows the Puerto Rico latitude nearly three degrees too far north.¹¹

After the sail to El Viejo, Juan Ponce passed the next several islands to reach his immediate destination of Guanahani, from which he then moved into unknown waters in search of the Islands of Beniny. Precise navigation is not required here, and the islands are identified primarily by their being a day's sailing distance in a northwesterly direction.

Juan Ponce's log then reads: "The next day they anchored at an islet of the Lucayos, called Caycos." This is East Caicos, one of the few islands that retained its Indian name. The following day's entry notes: "Soon they anchored at another called Yaguna in 24 degrees." This is identified as North Caicos— an easy day's sail of about thirty-five miles, as indicated by the expression "soon they anchored." The north shore of North

11. Jean Rotz, *The Boke of Idrography* (London, 1542; reprint edited by Helen Wallis, New York, 1981).

Caicos is at latitude 21 degrees, 58 minutes N., indicating that Alaminos carried forward the northerly error from his departure point, with the error gradually increasing. This increase in error can be explained in part by the fact that Alaminos was unaware of the increasing westerly variation bending his compass heading to the south. He likely thought he was traveling on a more northerly course.

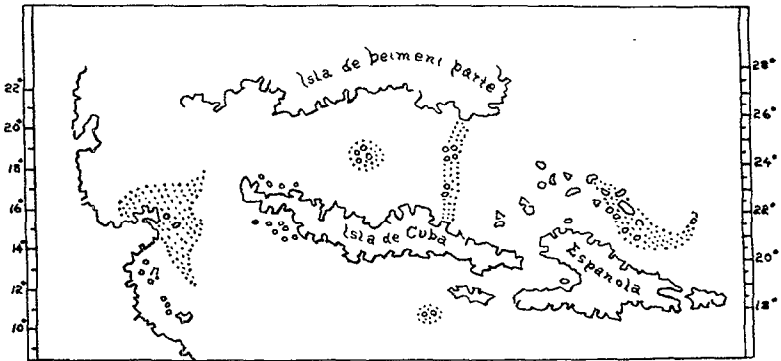
The log continues: "At the 11th of the same [month] they came to another island called Amaguayo, and there they stayed al reparo." As the chart shows, sailing the corrected compass heading for about forty-eight nautical miles— an overnight sail at 2.6 knots— brought Juan Ponce to Mayaguana. Most scholars in previous translations conclude that they anchored here for "repairs," but Kelley correctly shows that "al reparo" means hove-to, or as in Columbus's diario, "jogging on and off."

From here Ponce de León sailed to an island called "Manegua," which he apparently passed without stopping, locating it at 24 degrees, 30 minutes N. latitude. As the chart shows, this is Samana Cay, whose latitude is 23 degrees, 03 minutes N. Once again the location shows that Alaminos, by the dead reckoning, retained the northerly error. Samana is the small cay that the National Geographic Society named Guanahani— the landfall of Columbus— but the Ponce de León log has him arriving at Guanahani the next day and about sixty-five nautical miles farther on the northwesterly course. The Jean Rotz chart also shows Manegua (Samana Cay) as being southeast of Guanahani.

The next leg carried Ponce de León to the island of San Salvador, and the log entry contains several significant facts: "At the 14th they came to Guanahani, which lies in 25 degrees, 40 minutes, where they trimmed up one ship in order to cross the windward sea of those islands of the Lucayos." Ponce de León identified the island as the one that "Admiral Don Christoval Colon discovered."

At a later date the log calls out the latitude of Key West as 1 degree, 40 minutes too far north, which is about the average of the northerly errors from dead reckoning. If this 1 degree, 40 minute northerly error is subtracted from the 25 degrees, 40 minutes reported for Guanahani, the result is 24 degrees latitude, which locates it through the middle of San Salvador. This revelation enters Ponce de León into the current contro-

PETER MARTYR'S MAP OF THE NEW WORLD



This is a scaled reproduction of the northeast portion of Peter Martyr's map issued in his *Legatio Babylonica, Oceani Decas, Poemata, Epigrammata*, at Seville in 1511.

Projected latitudes not present on original map are added, and the label "Isla de Beimeni" printed right side up for clarity

Figure 2

versy over the landfall of Columbus by identifying it as the island of San Salvador.

Another fact at this point is that Ponce de León changed his course to the northwest, prepared the ships for an ocean crossing (the "windward sea") from the Lucayos, and was ready to move into unknown seas in search of his Islands of Beniny. This scenario can be seen in the Peter Martyr map (figure 2), where the landmass titled "Isla de Beimeni" lies in a northwest direction over open water from the northernmost charted island (Guanahani) of the Lucayos.

At this point my reconstruction returns to using my sailing vessel to duplicate the track over open water from Guanahani to Ponce de León's landfall on the shore of Florida. The party departed Guanahani probably on March 25 and ran northwest until March 27. At this point Juan Ponce and his pilot saw an island that they could not identify—no doubt because it was not on their chart. The northwest heading of 315 degrees when corrected for the 5.6 degree Seville compass factor and the 9 degree westerly variation becomes 300 degrees true.

My track, pushed north by the strong Antilles current in this area, ran about fifteen nautical miles east of Cat Island and into the northwest trending coast of northern Eleuthera. This track

shows that Eleuthera was the island “they could not identify,” and they probably rounded it to the north at Bridge Point and resumed their northwest heading.

Nearly all previous research has Ponce de León sailing around Great Abaco, indicating it as the island the Spaniards saw but could not identify. This is a natural conclusion because of the long chain of Bahamas Islands lying in a generally north-westerly direction, and Great Abaco is the last island before open waters across to the east coast of Florida. I had assumed my track would follow this same route, so when my sailed track from San Salvador ran into Eleuthera, far from the cape I had assumed I would round before sailing to Florida, I thought my project was in trouble because of bad course correction factors.

But my calculations had worked for over 700 miles and had pinpointed six of the islands scattered through the Bahamas. Why would they fail now? I soon realized that Great Abaco was not the turning point toward Florida; it had to be Bridge Point on Eleuthera.

On Monday, March 28, Ponce de León left Bridge Point on Eleuthera astern and continued sailing on a northwest heading. His log reads: “They ran 15 leagues by the same course, and Wednesday they proceeded in the same way.”¹² This means that for two twenty-four-hour sailing days they ran northwest fifteen leagues (about forty-five miles) each day. The speed computes to less than two knots (1.87) per day.

I believe this reduced speed was deliberate. Alaminos and Ponce de León were sailing into unknown, uncharted waters. They had already been surprised to see an unknown and uncharted island. This was not the time to rush headlong and perhaps end up on a reef. I believe they intentionally slowed their progress, constantly sounded with the lead, and probably hove-to at night or in times of restricted visibility, especially in view of the fact that they were sailing into a period of dark nights with a waning moon.¹³ This track from Eleuthera to the coast of Florida is shown in figure 3.

12. Interpretations of the length of one Spanish league vary from 2.82 to 3.40 nautical miles. For my computations, I used an arbitrary factor of 3.0 nautical miles for each league.

13. Herman H. Goldstine, *New and Full Moons 1001 B.C. to A.D. 1651* (Philadelphia, 1973).

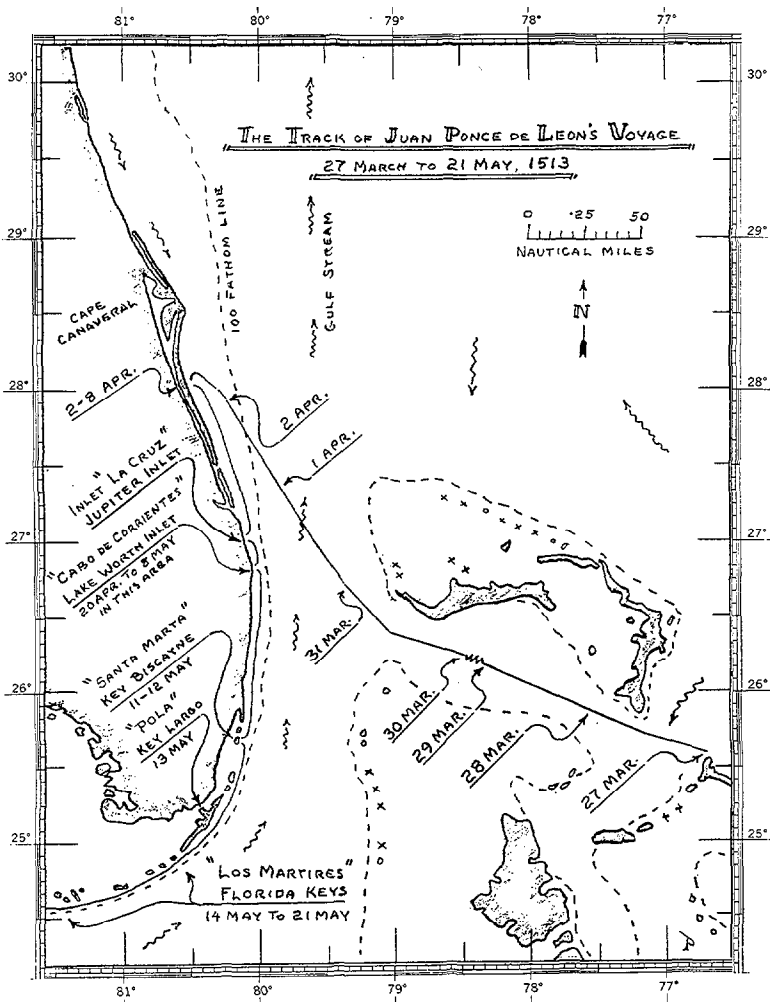


Figure 3

To maintain the reduced speed, I sailed the corrected heading of 297 degrees true with drastically reduced sails for ninety miles, and I found that on this heading the strong Antilles current, which turns and flows through New Providence channel, carried me right through this wide channel about ten miles south of the southern cape of Great Abaco. Since Juan Ponce

had seen Eleuthera in daylight, he would have passed Great Abaco after dark, although he could not have seen it at ten miles distance even in daylight.

My reconstructed track passed within the theoretical sighting range of both Cat Island and Great Abaco, but I did not see either landmass, and neither did Ponce de León. The theoretical sighting range is based upon a viewer's line of sight passing just inches over the curvature of the earth's horizon and picking up the top few inches of the highest elevation on an island in unlimited visibility. Far more than the top few inches of an island must be above the horizon for the naked eye to see it, and unlimited visibility never exists in the Bahamas, especially in the summer months when a heavy sea haze is present. For this reason, even though my chart appeared to have Ponce de León sailing through a maze of several islands, he was unable to see them and thought he was in the open sea headed for Beniny.

At this point (March 29) the log reads: "And afterwards, with bad weather, up to 2 April, running west-northwest, the water [depth] decreased to 9 brazas, at one league from shore." Here Juan Ponce and his party obviously ran into a cold front, with the accompanying storms and wind shift to the northerly quadrant, forcing them to change course to west-northwest. During the initial passage of the front on March 29-March 30, when the wind came out strong from the northwest and north, he likely did what any prudent sailor would do. He hove-to, or jogged along, barely moving under reduced sail. After about twenty-four hours, when the winds shifted to the northeast and the storms abated, Ponce de León was able to pick up that west-northwest heading. With this heading he probably was hard on the wind rather than running with the wind as before, and since a square-rigged vessel of that era simply did not respond well to windward work, his forward progress was likely reduced to a crawl. This, combined with cautious jogging at night, likely reduced Ponce de León's forward progress to about thirty miles a day or less.

The Spanish probably crossed the Gulf Stream at its strongest point where it is squeezed between the lower bulge of Florida and the protruding Great Bahamas Bank, and, in this venturi, the current can and does pick up speeds of over three knots. During my sailing of this track I experienced a 3.8 knot current for over twelve hours between Grand Bahamas and

Florida, with the current averaging 1.5-2.5 knots on either side of that point. With the slow progress of the vessels, they probably were swept north faster than their progress west, and this is reflected in the track.

On April 1 Ponce de León and his crew were in the strongest part of the Gulf Stream, being swept north. Then early on April 2, as they reached the 100 fathom line and moved out of the strongest current, the course began to veer more westerly, and they reached their landfall and subsequent anchorage later that day.

From my reconstructed track I found that Ponce de León's anchorage and landing after discovering Florida and the North American continent were about 28 degrees N. latitude and 80 degrees, 29 minutes W. longitude, which is below Cape Canaveral and a short distance south of Melbourne Beach. I do not say that this is the exact spot, but I place the accuracy within five to eight nautical miles either side of this fix.

After landfall Ponce de León ran along the coast looking for an inlet or harbor, and, not finding one, he anchored in eight brazas of water.¹⁴ The log is ambiguous as to whether he ran along the coast in a northerly or southerly direction, but the question is moot since he could not have gone far before nightfall forced him to anchor. At my projected site, based on the log, the description of the coastline fits, and the depth of water for the anchorage is within a few feet of that reported.

Alaminos placed this point at 30 degrees, 08 minutes latitude or 2 degrees, 05 minutes north of my position. This northerly error is consistent with Alaminos's gradually increasing northerly errors in reporting the latitudes of the islands to this point in the northwesterly track.

If one accepts the logical, reasonable, rational, and indeed proven point that Alaminos's dead reckoning, as influenced by the unknown currents and magnetic variation, was not an exact science, then it can be shown that Alaminos's latitudes, with their ever-increasing northerly errors, explain why once again he reported his latitude a considerable distance north of his actual landfall. Advocates of a St. Augustine landing site, with

14. Spofford and Scisco both translate braza as fathom (six feet). Kelley identifies a Spanish braza as equivalent to 5.5 English feet. This means that Juan Ponce anchored in about forty-four feet of water. Researchers who use the standard six-foot fathom calculate the depth at fifty-four feet.

strained and incongruous reasoning, insist that of the ten latitudes given by Alaminos, containing northerly errors, it was the only one with an accurate celestial navigation position without the northerly error.

After finding nothing of interest ashore, or perhaps waiting for a favorable wind, Ponce de León left the anchorage on April 8 and sailed slowly south along the coast, no doubt anchoring each night. For twelve days he reported no inlets, capes, or Indian villages, which is consistent with the smooth and relatively barren coast south of the landfall at twenty-eight degrees latitude. On April 21 he ran into the strong Gulf Stream current near shore. At this location, which I have identified as a point just north of Lake Worth Inlet, the stream pushed him back faster than he could sail forward, although he reported that he had good winds. Ponce de León managed to anchor his ship and one other, but the third ship was caught offshore in water too deep to anchor and was carried back north out of sight.

This action could only have taken place at the bulge (or cape) of the coast just north of Lake Worth Inlet. I experienced a 2.3 knot current when sailing past this point, and it could be greater if influenced by tidal flow, surface air temperature, and pressure gradients. At this point, the twenty-fathom line (too deep for anchoring) comes within one and one-half miles of shore, and the shallow shelf for anchoring falls off rapidly rather than gradually, as it does farther north. The third ship could have been within a few hundred feet of the two that anchored, but, unable to anchor, it was carried north by the current.

This scenario cannot be repeated north of Cape Canaveral as the bottom there gets deeper only gradually, providing ample anchoring depths as far as twenty miles offshore. This rules out a landfall above that point since Ponce de León likely stayed inshore in sight of land. In following the coast south, the first cape he would have reached was Cape Canaveral, and these conditions do not exist there.

At this point Juan Ponce landed ashore and, after a fight with the Indians, "departed from there to a river, where he took on water and firewood." The river was Jupiter Inlet, which he no doubt had seen when he passed it earlier. He named this river "La Cruz" and left a stone cross with an inscription. He must have stayed here for some time waiting for the return of

the third ship and for enough wind to fight the strong current, as the next entry is May 8. It reads: "Sunday, 8 May they doubled the cape of La Florida, which they called Cabo de Corrientes." This is the cape below Jupiter Inlet where the Spaniards had previously experienced the strong currents carrying away the third ship, so naturally they called it "Cabo de Corrientes." Herrera muddied the water here by inserting his own interpretation that they were doubling the "cape of La Florida," which was on maps of his time (usually at Biscayne Bay), but in fact they were still north of this point.

The log entry continues: "All this coast, from Punta de Arracifes, to Cabo de Corrientes, runs north by northwest and south by southeast and is clean, and of depth of 6 brazas and the cape lies in 28 degrees, 15 minutes." The coast to "Cabo de Corrientes" does run north by northwest and south by southeast and is clean, but where is "Punta de Arracifes?" Ponce de León had not mentioned this landmark before. This is another insertion by Herrera from a later map and should be disregarded; he may have it incorrectly located, as he did cape La Florida.

Alaminos reports this cape at latitude 28 degrees, 15 minutes while it is actually at 26 degrees, 48 minutes. Alaminos was now shortening his northerly error to 1 degree, 27 minutes, and that is understandable since his calculations were based upon his estimate of speed and distance from fifteen different, short, slow-moving legs in unknown currents.

From this point, "they navigated until they found two islands to the south in 27 degrees, to one which had a league of unimpaired shoreline, they assigned the name Santa Marta, they took on water at her." Santa Marta is Key Biscayne, which has a little over a league (three and one-half miles) of unimpaired shoreline, and the other island is Virginia Key. These are the first two islands south of Lake Worth Inlet (Cabo de Corrientes).

Alaminos reports the latitude of Santa Marta at 27 degrees when it actually lies at 25 degrees, 42 minutes, which indicates that he was now calculating his latitude 1 degree, 18 minutes too far north. The errors in his last two calculated latitudes were probably due to his inability to estimate these strong and changing currents since the variation would not have been as great a factor on this southerly course as it was on the northwesterly course.

The next entry reads: "Friday 13 May, they made sail, running along the edge of a sandbank, and reef of islands, as far as an island they call Pola, which lies in 26 degrees, 30 minutes and between the shoal and the reef of islands, and the mainland it extends toward the great sea like a bay." Pola is probably Key Largo. Ponce de León was running down Hawk Channel between the outer reef and the Keys, and through the several inlets he could see the eastern extremity of Florida Bay, which Herrera knew extended into the "Great Sea," or Gulf of Mexico. The latitude here is meaningless since Key Largo is such a long island, extending north-northeast and south-southwest, and the latitude could vary by over one-half a degree depending upon where it was measured.

Starting here, the log is vague as to specific islands, but it is apparent that Ponce de León continued down Hawk Channel to the Tortugas, naming the string of keys "Los Martires." Alaminos reported the keys at latitude 26 degrees, 15 minutes, and Key West and the adjacent keys at 24 degrees, 35 minutes. His northerly error now became 1 degree, 40 minutes—about the midpoint of the range of his northerly errors.

The log at this point is unclear and is obviously missing some lines, but it implies that on May 21 the party turned "sometimes to the north and at others to the northeast," and, although the departure point is not mentioned, this turn was made at the Tortugas. This is when Ponce de León turned north and east to explore the backside of his island, and since one cannot pinpoint his place of landing by a reconstruction of the track from such vague compass headings, one must rely on the geographical description of that landfall.

On May 23 the log reads: "They ran along the coast, to the south (not caring to see what was Mainland) as far as some islets, which were running out to sea, and because it seemed there was an entrance, between them, and the coast, for the ships, in order to take on water and firewood, they stayed there until 3 June, and careened one ship." The obvious landfall here is on the mainland just north of Gasparilla Island where Ponce de León sailed south past the islands of La Costa, Captiva, and Sanibel to the wide and deep entrance to San Carlos Bay at the mouth of the Caloosahatchee River. This landfall fits the north and northeasterly sailing directions and the geographical description of the islands.

The Spaniards found the harbor (San Carlos Bay), which they later reconnoitered. There was ample anchorage with nearby protected shelving beaches upon which the boats could be careened. Charlotte Harbor has been proposed as the harbor they explored, but that location is a large, shallow, almost land-locked inland bay with only a tortuous, winding, dredged entrance through nearly three miles of offshore shoals. It hardly justifies the name harbor.

Ponce de León remained in the harbor for nine days. There were skirmishes with well-organized Indians who put up fierce resistance. He captured four of the natives, released two, and kept the others as guides. The Spanish departed on June 14, stopping by a nearby island (probably Sanibel) for firewood and water.

Ponce de León seemingly had gained little, but Alaminos, in one of his responsibilities as pilot, charted the harbor. It became a key issue in later exploration of the mainland. During the reconnoiter of the harbor on June 5, Alaminos likely noted that the wide, deep mouth of the Caloosahatchee River, where it empties into San Carlos Bay, could accommodate many deep-draft vessels. He also found on the south side of the river, at what is now Punta Rassa, a deep spot right at the shore where the vessels could tie up as at a wharf and unload heavy equipment and horses.

While Spanish pilots were ordered to keep their charts secret from the French and the English, after 1513 the Alaminos chart was common knowledge to other Spanish pilots operating in the area. This deep-water port was utilized by Alonzo Alvarez de Pineda in 1518, by the re-supply ship of Panfilo Narváez in 1527, and is the most logical known deep-water port for the large expeditionary force of Hernando de Soto in 1539.

Leaving San Carlos Bay, Ponce de León reached the Tortugas on June 21, where he provisioned his ships with fresh meat and took aboard 160 loggerhead turtles that were nesting there. Three days later, on June 24, he decided to sail on a course southwest by west.

At this point one must question why he had abandoned his search to the north and selected the southwest-by-west route. All his other courses across unknown waters in search of Beniny had been to the north, so why now sail such a finite course and

in a direction contrary to his belief that Beniny lay somewhere north of the Lucayos?

One can only conclude that the Indians convinced him that the rich lands that he sought were not to the north. They pointed southwest by west, straight to the Yucatan. The two Indian guides he captured in San Carlos Bay may have been a factor in this change of course.

This leg of the voyage is critical in determining exactly where Ponce de León landed after sailing this new course for two and one-half days. Also this is one of the legs where use of a sailing vessel to arrive at the true track over the bottom is superior to attempting to plot the track using non-empirical estimates for the influence of the currents.

The following is the computation of my compass heading: on the thirty-two-point compass, southwest by west is 236.25 degrees. After subtracting the Seville compass error, it becomes $236.25 - 5.63 = 230.62$ degrees. Adding the two degree easterly variation, it becomes $230.62 + 2 = 232.62$, or 233 degrees for the true heading sailed. I sailed on this heading at a speed of 2.6 knots. By computing the time and distance of previous legs, I determined that this was Ponce de León's average speed with favorable wind conditions. He may have sailed slower and more cautiously at night and faster during the day, but use of this average speed, while affecting the enroute track slightly, would have put him in the same location.

My recorded track over the bottom is illustrated in figure 4. I recorded a Sat Nav and a Loran C fix every four hours.¹⁵ The fixes are numbered for convenience of analysis. One will notice that the loop current from the northwest began almost immediately, pushing my vessel south of the sailed heading. In fixes seven through eleven I reached the axis of the Gulf Stream, the track actually was pushed back east, and the four-hour distance over the bottom was cut nearly in half. Beginning at fix eleven and through fix thirteen, the current diminished, the course picked up a more westerly vector, and the distance

15. Sat Nav (Satellite Navigation System) supplies an accurate latitude/longitude fix upon passage of any one of twelve orbiting satellites. Loran C (Long Range Navigation System) is based on shore-transmitted signals. It gives a continuous, accurate latitude/longitude fix and computerized log and speed over the bottom.

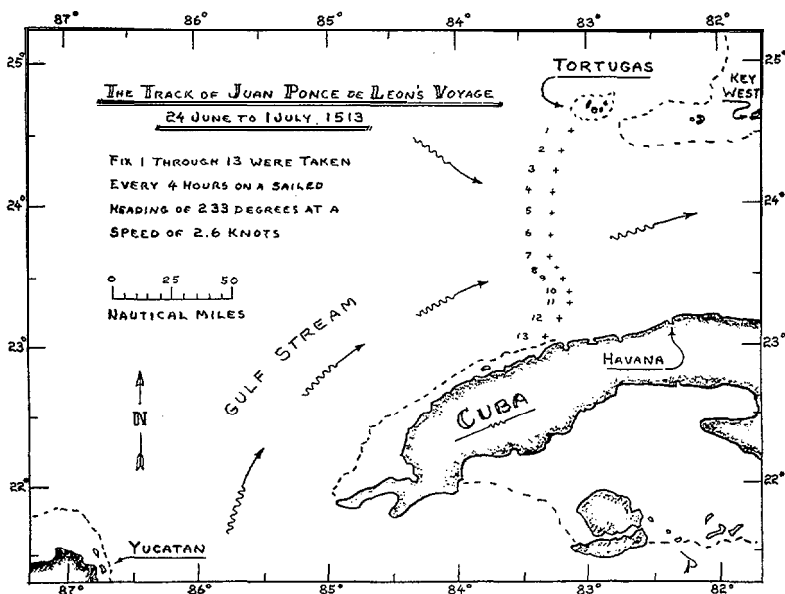


Figure 4

over the bottom increased. I terminated my sailed track twelve miles from the coast of Cuba as required by State Department regulation.

I determined that Ponce de León's track probably ended fifty-eight nautical miles west of Havana, just west of a harbor at Bahía Honda and on the ten-fathom shelf where there would have been ample anchorage sites for his brief exploration of the coast. At this spot Ponce de León could not decide whether this was Cuba or some new, unknown land. While the Spanish occupied the extreme eastern end of Cuba, the central and western area was an unknown and unexplored wilderness, and Ponce de León likely could not identify it. The Spanish do mention Cuba, but only with a confusing and ambiguous statement: "They found themselves 18 full leagues abaft the beam for it to be Cuba."¹⁶ Does this mean it was not Cuba because it was located eighteen leagues (about fifty-four nautical miles) in the wrong direction? This seems a small error in view of their extensive voyage from any known landmark. We will probably never

16. This is Kelley's translation. Spofford translates the phrase as "off course," which is equally ambiguous.

know what was meant by this remark, and esoteric conjecture about it serves no useful purpose.

Some historians contend that Ponce de León did reach the Yucatan on this leg and so became the discoverer of Mexico.¹⁷ They overlook the fact, however, that Ponce de León would have had to sail at a speed of 6.76 knots to make the 300 miles against an average current of 1.5 knots. This speed was not only quite unattainable for their vessels, but rather than the south-west-by-west heading reported, he would have been forced to sail a heading of 260 degrees for the first half of the leg— to avoid being swept down to Cuba— then, about midway, change to a heading of 205 degrees to make the Yucatan. This is a highly unlikely scenario.

Ponce de León, after briefly exploring the coast of Cuba, no doubt deciding it was not Beniny, and probably running short of both provisions and patience, left Cuba on July 1 for the return to Puerto Rico. He elected to retrace his route through the northern Lucayos because of his obsession that Beniny was located there. As a last desperate effort before returning to Puerto Rico, he sent one ship with Juan Perez de Ortubio as captain and Anton de Alaminos as pilot to search again the northern Lucayos for Beniny.

Ponce de León reached Puerto Rico around the middle of October without finding his island. Ortubio and Alaminos returned a short time later and, after discovering a large wooded island (probably Andros), announced that it was Beniny. Everyone concerned must have realized that it was just another of the primitive, windswept Lucayos islands inhabited by a few poor and frightened Taino Indians. Nevertheless, this pronouncement resulted in cartographers introducing the island's name into the northeastern section of the Bahamas where it was changed often. Eventually, they designated it as the present island of Bimini east of Miami.

17. The most prominent of these works is Samuel Eliot Morison's *European Discovery of America: The Southern Voyages, A.D. 1492-1616* (New York, 1974), 499-536. See also Aurelio Tio, "Historia del descubrimiento de la Florida y Beimeni o Yucatan," *Historia Boletín* 2 (no. 8, 1972). Both authors base their opinions on depositions in court records many years after the fact in which petitioners (probably Ponce de León's surviving relatives) tried to establish land grants in the Yucatan. This is hardly a valid source for establishing a historical event involving landfall of a sailing vessel for which the navigation log exists.

Juan Ponce de León failed to find his Islands of Beniny. He died in 1521 at the age of forty-seven without realizing that he had contributed much to future Spanish exploration and conquest of the mainland. He had discovered the Gulf Stream—vital in carrying the treasure-laden Spanish galleons back to Spain— and he had also discovered the first good, deep-water harbor on the mainland, which would be used to advantage by later explorers. Finally, he gave the name La Florida to the Florida peninsula, and this became the basis for the claim of Spanish sovereignty over most of North America.