A LOOP IN THE SEA

A Kit Kat Essay - February 2014

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When Jim Ginter first approached me with an invitation to the Kit Kat club, I was intrigued by the name. It is not a name that gives you a good hint about its membership and purpose. I am glad I attended the meeting. What great company this turned out to be. I am thrilled to be in your fellowship every month and I thank you for it.

I also love the essays. It is exciting to see how the passion for the subject comes through. Some are about really interesting things that the speaker knows about or did. Among these are Jim Ginter's conservation concerns, Roger Sugarman's essay on proper running and David Staley's interest in fractals. Also, Ty Marsh's concern about health care overinvestment in our community and Greg Browning's tour of American illustration. I learned about Chile's early history from Pat Osmer, which is actually tangentially related to today's essay. Other essays strike for their personal emotional appeal: Jim Carpenter's love of poetry, Brent DeVore's personal experience at Kent State, the other Brent's recent plea for mentors and Denny Griffith's description of his version of paradise. Wow! What a library of experiences. And I am only in my second year as a member. Thank you.

It is May 20, 1498. Three Portuguese sail ships enter the vibrant port of Calicut, an independent kingdom in Southwest India. The arrival marked a triumph of seamanship. The Portuguese fleet was the first from a Western country to discover a sea route to India. This new route would enable trade between Europe and the Orient to soar, 45 years after it had been severely curtailed by the Turkish conquest of Constantinople, today's Istanbul, in 1453. Italian cities, which were most engaged in this trade until the conquest, saw their fortunes dive into a decline from which they never recovered.

The point of discovering this route was to gain access to the fortunes that could be made trading spices and other products. The spices traded were many and included cinnamon, pepper, cloves, nutmeg and ginger. To get an idea of the value of this commerce circa the year 1500, 220 pounds of ginger - then measured as one “quintal” - were worth 4 Portuguese cruzados in Calicut and could be sold in Lisbon for 120 cruzados; a multiple of 30, a markup of 3000%. A successful trading voyage could bring back as much as 1700 tons of spices. Huge profits; the kind of income that can sustain the building of empires. As it did.

The Portuguese arrived ahead of Spain, their principal competitor. This essay covers the story of how the Portuguese got to India first and why I am so fascinated by it. This fascination has to do with much more than the spice trade. There are major achievements in seafaring technology; both in shipbuilding and navigation technologies. There is the incredible courage of sailors to admire, exploring the unknown in little ships, at sea for months without much information about what laid ahead. And there is a most interesting cast of characters, especially Portuguese leaders with vastly different personalities, but all committed to advance the will of a small country pursuing an ambitious national objective.

In its pursuit of glory and national interest, the race between Portugal and Spain parallels the US-Soviet race to the Moon. Who gets to the Moon first vs. who reaches India first. In both cases, winning the race meant preeminence as a world power. The race was of major consequence to the world. The capability to navigate the high seas brought the connections between Europe, Asia and Africa to new and unprecedented levels, and lead to the discovery of new lands in America. World commerce was consequently revolutionized. It scaled up, was recentered away from Italy and became more globalized.

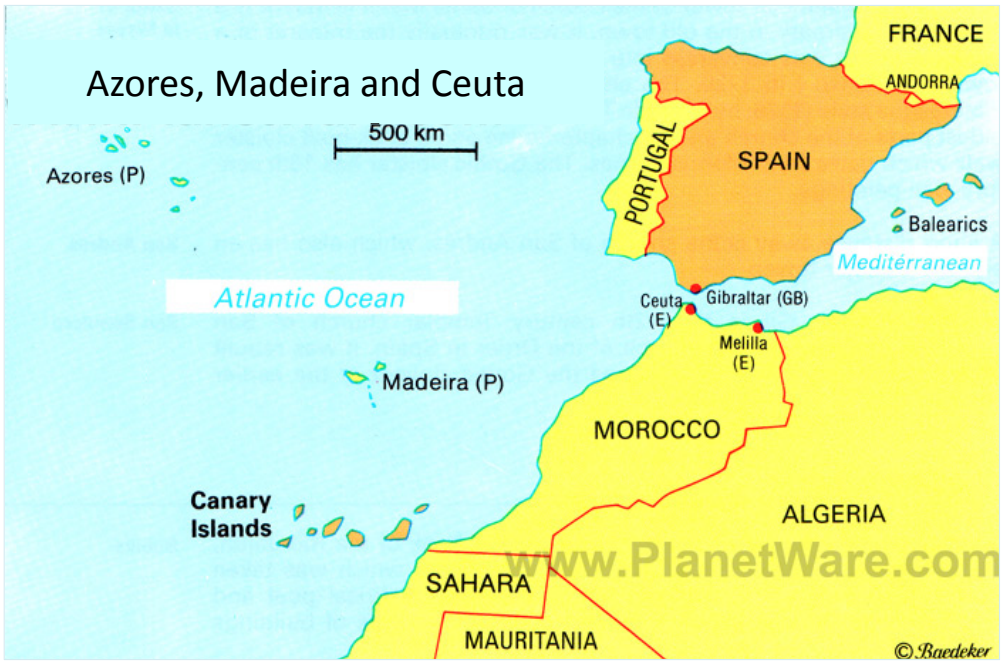
The race also triggered the creation of new countries and new empires. It marked the start of European expansion in a world then dominated by the much larger Asian and Islamic civilizations and triggered more than 500 years of preeminence by the West. For its daring and technical accomplishment in exploration, I believe that Portugal's achievement is equal to landing a man on the Moon, and for its political and commercial consequence, I also believe that this was the greatest race of all time.

New technology was key. To reach India, the Portuguese developed specialized ships. The best example is the Caravel. It combined both square and triangular sails and was designed with a rather short draft that made it ideal for exploring unknown waters. Caravels were fast and small, typically 40 to 60 feet long. The Portuguese also developed new technology to navigate in the Southern Hemisphere. They learned to determine latitude by measuring the apex of the Sun instead of the North Star, which is not visible below the Equator.

I am also fascinated by the role of the odd man in the race; Christopher Columbus. When the story is told about the discovery of America, the motivation for Columbus' voyage and the historical context within which it took place is sometimes overlooked or kept in the background. Columbus' trip on behalf of the Spanish Crown was an offshoot of the race to India. As nearly everyone knows, it was an attempt to get to Asia faster by sailing west instead of east. This happened at a time when the Portuguese were getting close to reaching India by sailing around Africa. Spain was far behind. Fourteen years earlier they had been defeated by the Portuguese in a major naval battle for control of the West African coast. Columbus' voyage was an attempt to catch-up. The long throw when you know you are losing. And it didn't work. Columbus never reached Asia, as was his intent. It is somewhat ironic that Columbus' recognition as a great

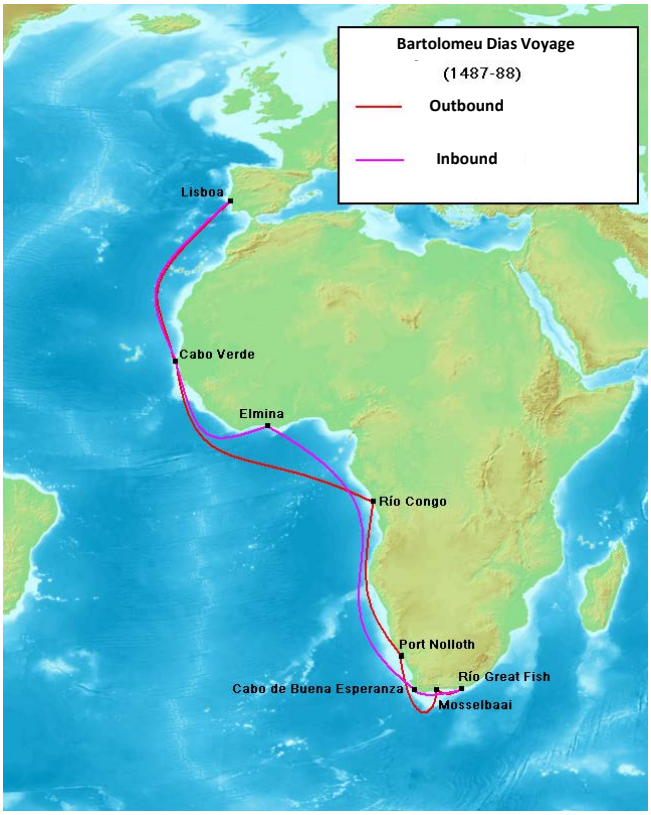
navigator in the Age of Discovery is based on the inadvertent, and in his own view unfortunate, outcome that he reached America instead of Asia.

In contrast, the Portuguese took a step-by-step approach to reach India, moving progressively farther down the African coast, as each mission built on the learnings from the previous one. This gradual approach was not at all dissimilar to the way the US reached the surface of the Moon in 1969. Portugal started by taking advantage of its geographic location to explore the open waters of the Atlantic, initially for deep sea fishing. In the process they learned about the winds, currents and weather in the North Atlantic, both west and south of Portugal.



Things shifted into a higher gear in the early 15th century. In 1415 Portugal conquered the port of Ceuta, on the south side of Gibraltar, from where Muslims were launching raids into Southern Portugal. Shortly thereafter the Portuguese discovered the Atlantic islands of Azores and Madeira. At about that time, a naval school was founded, named Sagres, to congregate

experts in cartography, astronomy, shipbuilding and related subjects. It was lead by one of the king's sons, Prince Henry, a visionary who became known as Henry the Navigator. While not all experts agree on the existence of this school, many credit it with the invention of the quadrant and the mariner astrolabe. The quadrant was used in the Northern Hemisphere to determine latitude based on the height of the North Star with respect to the horizon. The mariner astrolabe did the same job in the Southern Hemisphere by measuring the apex of the Sun. The Sagres school was not a physical place but a group of people that Prince Henry would get together periodically. For its technological contributions to high seas navigation, Sagres should be considered the NASA of the 15th century.



Up until the conquest of Constantinople, the Portuguese were mostly interested in their trade with West Africa and with their newly discovered Atlantic islands. After that, the race to India was on. By 1482 the Portuguese had gone deep into the Southern Hemisphere and reached the mouth of the Congo River. Four years later they had reached as far south as Namibia.

The next mission, in 1488, was captained by a star pilot and astronomer, Bartolomeu Dias. It was an historic trip, the first to actually round the Cape of Good Hope. Except that Dias didn't call the cape, Good Hope. He called it Cape of Storms. Its waters are prone to fierce storms, caused in part by a meeting of warm and cold ocean currents. During Dias' crossing, the storms were so strong that the fleet was blown off the coast. The crew got very scared. Try to picture a violently stormy night at sea with superstitious sailors in a small, thrashing ship when no one can see the waves coming. The sky is covered. There is no starlight. In those days ships had no lighting, except perhaps for a few candles in cabins. The terrified sailors threatened to mutiny and demanded to go back. After assembling a council to discuss, Dias yielded. He sailed forward for another three days and then turned back. When completed, the trip to the cape had covered nearly 16,000 miles over a 15 month period. The Portuguese King, John II, was furious with the failure to advance into the Indian Ocean. Despite his achievement, Dias was never again put in command of a fleet. King John renamed the cape Good Hope, because he believed an important corner had been turned to reach India.

A word about King John. He was Henry the Navigator's nephew. Endowed with a decisive character, King John was resented and feared by much of the Portuguese nobility. Many didn't share his vision of discovering a maritime route to India. In the early years of his rule, he faced resistance as he worked to centralize power in the crown at the expense of the nobility. Heads rolled and property was confiscated before John finally prevailed. A major test came

when a group of noblemen challenged John's right to the throne to favor one of his cousins. As the movement grew, John asserted his rule by inviting said cousin to dinner and stabbing him to death with his own hands. The practice of solving succession disputes by counting chads hadn't been invented yet.

John was the strong and visionary King to lead the Portuguese to India. Two of his initiatives are of particular interest. First, concerned with Muslim presence in the Indian Ocean and consequently his ability to trade there, John sent two Arabic speaking spies to the region. One was charged with finding a suitable port (i.e. non-Muslim) to land and trade. The other was charged with searching for the legendary Christian ruler Prester John, who was seen as a potential ally. None of the two spies ever managed to get back to Portugal. One died but the other did manage to send a letter back from Cairo suggesting the port of Calicut as the best landing spot. King John had hoped that this second spy, Pero da Corvilha, would meet up with Bartolomeu Dias in India. After sending the letter, the spy stayed in Africa to also look for the legendary Prester John. Because of the information gathered by the spy, the Portuguese already knew where to go when they finally entered the Indian Ocean years later.

A second initiative was the establishment of a small board of scientific advisors, which King John called "Junta Matematica," or Mathematics Council. Among their members was Mestre Vizinho, a rabbi and astronomer. Mestre Vizinho translated to Portuguese from Hebrew a set of tables computed by another rabbi, Abraham Zacuto, who lived in Spain. These tables were a breakthrough to enable navigation in the Southern Hemisphere. Mariners used them to convert measurements of the apex of the Sun in a given day into an estimation of their latitude. After the Jews were expelled from Spain, Zacuto moved to Lisbon and joined the Mathematics Council.

And then, 1492! Despite the Portuguese lead, this was a watershed year for Spain. In January, Ferdinand and Isabella, the catholic monarchs, expelled the Muslims from Iberia and united the territory that became modern Spain. Within a very brief few months, in August, Columbus sailed. Only nine weeks later, in October, he reached America. Until that moment, Spain's achievements in the race had been minor, with basically only the Canary Islands to show for. 1492 turned Spain into a major player. Columbus' trip was a shot across the Portuguese bow, just like the flight of the Sputnik for the US.

Columbus was no stranger to the Portuguese. He had previously lived in Lisbon for eight years and sailed under the Portuguese flag. He was well known in the local exploration community. At that time, Lisbon attracted local and expat sailors, craftsmen, scientists, cartographers, financiers and merchants interested in exploration. A kind of Silicon Valley, in that it was the center of the newest and most technologically advanced industry of its time.

During his time in Lisbon, Columbus tried to sell his westbound plan to King John. The King rejected him for several reasons. First, given the treaty of Alcaçovas, then governing the division of new discoveries between Spain and Portugal, any new lands or routes to Asia would almost certainly be Portuguese, so the King judged that he didn't need Columbus. Second, King John believed that he would soon get to Asia anyway by sailing around Africa.

Third, the King's Mathematics Council didn't believe in Columbus' plan. They judged, correctly, that Columbus was grossly miscalculating the size of the Earth and that the trip to Asia would be far longer and costlier than stated. The circumference of the Earth is more than 24,000 miles. Not eighteen as Columbus estimated. And finally, Columbus' demands for compensation were considered absolutely outrageous. He wanted the title of "Admiral of the Ocean Sea," and to be governor of all the lands he would find. Both the title and the governorships were to be

hereditary, thus conferring nobility to his descendants. On top of that, Columbus wanted 10 percent of the profits of the related trade.

The King wouldn't agree to these demands, so Columbus moved to Spain in 1485. He was initially rejected there too, so in 1488 he went back to Portugal for another round with King John. The year 1488 is important because it is said that Columbus was in Lisbon when Bartolomeu Dias returned from his historic trip to the Cape of Good Hope. With Dias' information, the King was now more sure than ever that he didn't need Columbus.

Still, King John's decision not to finance Columbus makes for an interesting speculation about strategy and about how it sometimes happens that the wrong choice is made even when correct information is available. The Mathematics Council provided correct information about the size of the Earth. The King believed correctly that the routes and lands Columbus would perhaps reach were Portuguese by law. Around Africa was indeed the best route. But, if there were two possible routes to India, was it not wise to try to own both of them? Was it an error to let Columbus search for an alternate patron who would possibly end up as a major competitor? Easy to say now, but I wonder if this was discussed at the time in Lisbon.

Remarkably, when returning from his first trip, a storm blew Columbus off course and he ended up in Lisbon before returning to Spain. He debriefed King John and the Mathematics Council. They concluded that Columbus had not been to India, as claimed, but instead in some newly discovered place that no one really knew quite what it was.

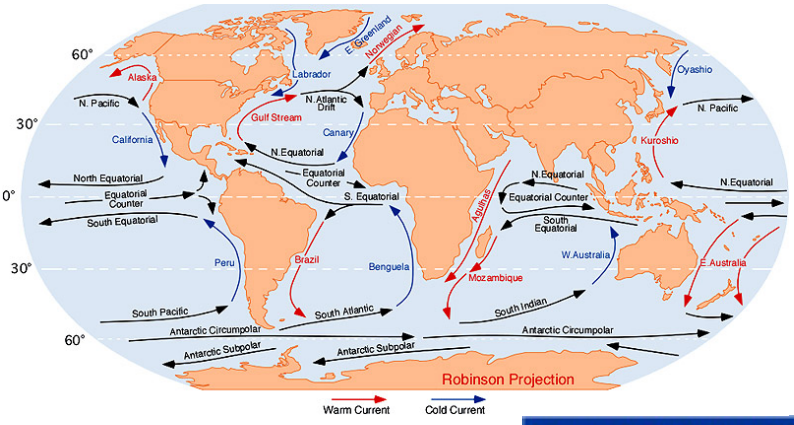
Three years later, in 1495, King John died under suspicious circumstances, at the young age of 40. He was succeeded by his cousin Manoel, the younger brother of the rival he had stabbed to death years earlier. Manuel ordered a new mission around Africa, the one hoped to finally reach India. Still smarting from what they perceived as Bartolomeu Dias' failure to

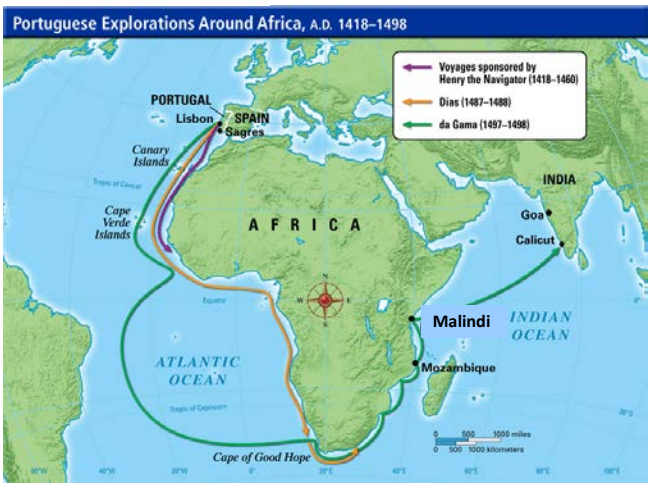
advance into the Indian Ocean, the Portuguese decided to give the command of the fleet not to a star mariner as they had done previously, but to pick this time a different type of commander. The man they picked, Vasco da Gama, was instead a soldier with an imposing and terrifying personality. His commanding presence would ensure that the fleet would not come back early again.

One author, Charles Nowell, described Da Gama as "…a man of iron physique and surly disposition. Unlettered, brutal, and violent, he was nevertheless loyal and fearless. For some assignments he would have been useless, but for this one he was made to order. The work lying ahead could not be accomplished by a gentle leader." In other words, the Dias' mission ended because sailors were more afraid of the sea than they were of their commander. Da Gama succeeded because, terrifying as the waters of the cape were, sailors were even more terrified of their commander. So they forged ahead.

With Vasco da Gama, Portugal tried a new and faster route. It was made possible by the discovery that currents in the South Atlantic move counterclockwise; west near the equator, south near the Americas, east near the pole and north by the African coastline. Accordingly, the new route sailed from Portugal to a region between the Cape Verde Islands and the Equator, and then turned southwest. Southwest! That is away from India, away from the safety of the African coast, and into uncharted high seas. At some point prior to reaching the South American coast, Da Gama merged with the current going south. Later, as he approached the Southern African latitudes he turned east until reaching the coast of South Africa. This maneuver, known as the "Loop in the Sea," was a closely guarded state secret. It took Vasco da Gama only 5 months to reach the Cape of Good Hope, 2 months less than it had taken Bartolomeu Dias to reach the same point. Before the loop, Portuguese navigators had been going against the current as they

sailed down the African coast. No one knows for sure who figured out the loop, if it was Da Gama himself, Dias, the Mathematics Council or someone else.





I am in awe of the bravery required to perform the loop for the first time. Da Gama lead his sailors into waters that they had never sailed before and stayed in the high sees, without the sight of land or access to provisions, for a full 3 months. The traditional route had been to stay close to the West African coast while looking for a passage to the Indian Ocean. Once Bartolomeu Dias reached the cape, that was no longer necessary. They knew where the passage was.

As an aside, it was during the westernmost end of the loop that Vasco da Gama observed birds and floating debris in the water, both signs of nearby land. That information was shared with the commander of the next mission, Pedro Alvares Cabral, who then extended his loop further west and discovered Brazil on his way to India, in 1500. Another notable fact about Cabral's voyage is that it included Bartolomeu Dias, the explorer who had first rounded the Cape of Good Hope. Tough no longer allowed to be a commander, he joined the fleet as captain of one of the ships. Sadly, while sailing through a storm near the Cape of Good Hope, his ship sank and he drowned. The cape waters that he had once retreated from out of fear, and that ruined his career, in the end also claimed his life. What an extraordinary sequence of events for a man who went down in history as the conqueror of the Cape of Good Hope, or as the Cape of Storms; a name he had good reasons to prefer.

Vasco Da Gama's voyage is described in considerable detail in a diary written by one of the sailors in his fleet. The diary had been lost for more than 300 years when it was discovered in 1838 in a Lisbon archive. It is a most interesting book, for it provides the closest thing to hearing this story from the horse's mouth.

The description of the voyage is scant until the rounding of the cape, which they did on the second attempt. It becomes richer as Da Gama enters the warm waters of the Indian Ocean. They stayed close to the East African coast as they move northbound. Soon they began to encounter other traders. The Indian Ocean was a very different place from the South Atlantic, where there was no ocean trade and the Portuguese sailed by themselves. In contrast, the Indian Ocean was a lively trading environment, with mostly Arab and Indian merchants trading with coastal cities in East Africa, India and the Arabian Peninsula.

The Portuguese arrived as new competitors for trade. They were better received in some places than others. They feared attacks, especially by Muslim rulers and traders. The Portuguese survived because of the unmatched power of their cannons. Cannons kept them safe and also proved an effective tool to procure water and other supplies. An interesting safety practice adopted by the Portuguese was the use of convicts. In every voyage, a few convicts would be offered forgiveness of their sentence if they agreed to sail. Their role was to do the worst jobs, especially the one of being first to disembark and test the attitude of natives.

Four months after rounding the cape, Da Gama reached the prosperous trading port of Malindi, in today's Kenya. Its ruler, who was not Muslim, went along well with Da Gama and lent him a pilot to guide him to Calicut. A month later Vasco da Gama arrived in India. Finally! Calicut was Tranquility Base. It had been nine and a half months and 14,000 miles since departing from Lisbon and 83 years since the conquest of Ceuta, when Henry the Navigator pressed the Portuguese in pursuit of his vision that the future of the country was at sea.

Da Gama soon found out that getting to Calicut was not enough to trade successfully. He had brought to trade goods like wool caps, hats, honey, cooking oil and sugar. In contrast, locals traded goods like spices, silk and gold. The Portuguese offer was considered inadequate and actually met with scorn. Pressured by established traders, the Zamurin, the Hindu ruler of Calicut, required that Da Gama pay customs duties and arrested some Portuguese sailors to guarantee payment. True to his character, Da Gama responded by kidnapping a few locals and forcing a trade. Despite the deteriorating relationship, Da Gama managed to barter enough goods with local traders to make the trip a limited financial success. But the relationships between the Portuguese and local rulers remained contentious after that.

In subsequent trips, the Portuguese relied on brute force to carve a space in the Indian Ocean trade. Cabral, who headed the voyage following Da Gama, retaliated an attack by Muslim and Indian traders that killed 50 of his men. He seized ships and killed its crews. He also bombed Calicut. Vasco da Gama, in a second voyage to India, bombed Calicut again and terrorized ships in the Indian Ocean. By then trading had been extended to other Asian cities and become very profitable. Portugal reached China in 1513 and Japan in 1542.

Upon returning from his first voyage, Vasco Da Gama received a hero's welcome in Lisbon. The trip had taken an appallingly heavy toll. Of the 170 men who left, only 54 came back. Most died of disease. Da Gama was rewarded with a fiefdom and an hereditary pension. After his second voyage, Da Gama had a falling out with the King but was later rehabilitated and died in India, as its vice-roy and a rich nobleman, in 1524. He also died as the victor of the race to India. In his lifetime, Portugal had become a rich country, the leading spice trading nation and a preeminent world power.

In contrast, Columbus died much earlier, in 1506. His status within the Spanish court was diminished, especially after the death of Queen Isabella two years prior. Accounts differ if he died rich or poor but agree on the fact that he died bitterly disappointed. He had not been given his due as the discoverer of a route to Asia and promises made to him to govern lands he discovered had been broken. To Columbus' certain disappointment, the Portuguese and the Spaniards had adopted different approaches to negotiate with him. Given Columbus' high demands, Portugal didn't make a deal. Spain made the deal but didn't pay.

As the true dimension of the discovery of America became apparent, the focus shifted, as exploring the new continent became as important as operating the route to Asia. Spain assumed a very aggressive stance to explore the Americas, lead by names we all heard: Pizarro, Ponce de

Leon, Vespucci, Cortez, Magellan and others. Commerce between America, Asia and Europe turned Spain into a very wealthy country. Their bigger economy and larger population - seven million to Portugal's one, made them a formidable competitor. Spain also benefitted from a new treaty, the Treaty of Tordesilhas, which replaced the Treaty of Alcaçovas and redivided the world in a manner far less favorable to Portugal.

Thus, as the timeline advances further into the 16th century, as the game transitioned from discovery to colonization, Portugal began to lose its edge. Despite being first to India, it was simply too small a country to remain a leading world power. It had neither the population nor the economy to marshal the resources needed to control a major empire. Portugal remained a player, but the leading colonizing powers became larger countries: Spain, the UK and France. But for more than one hundred years, pressed forward by visionary leaders, technological achievement and incredibly brave sailors, Portugal was a small yet daring country that punched well above its weight. Thank you.