

The Deep-Sea Tortugas Shipwreck, Florida (1622): the Silver Coins

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Between 1990 and 1991 an assemblage of 1,184 silver cob coins was excavated from the 400m-deep Tortugas shipwreck off the Florida Keys, a merchant vessel from the 1622 Spanish Tierra Firme fleet most plausibly identified as the 117-ton *Buen Jesús y Nuestra Señora del Rosario*. A sample of 648 coins retained in the collection of Odyssey Marine Exploration in Tampa, Florida, was re-examined in 2011 to obtain optimum quantitative data about the coins' denominations, mint origins, dates and assayer administrators. Silver *reales* coins were identified from predominantly, and unexpectedly, the mint of Mexico, followed by Potosi and a 'Bogotá/Cartagena or Old World' class.

Although vast quantities of comparable silver coins have been recovered from the shallow-water wrecks of the *Atocha* and *Margarita* from the same homeward-bound 1622 Spanish fleet, this material has not been subjected to formal quantification. The value of the Tortugas collection lies in its association with a small Tierra Firme fleet merchant vessel, and as an important archaeological counterpoint to the more renowned large treasure-laden *flota* warships. The Tortugas wreck thus reflects the smaller scale maritime trade conducted between Colonial Spain and the Americas that is less conspicuous within the archaeological record.

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1. Introduction: Wealth, War & Inheritance

The marriage in 1469 of Isabella, heir to the throne of Castile, and Ferdinand, King of Sicily and heir to the throne of Aragon, set the stage for the unification of multiple Iberian Peninsula kingdoms and the birth of the Kingdom of Spain (Elliott, 1963: 23). Their sponsorship of the 1492 voyage of Christopher Columbus, intended to establish a western route to the Orient, but resulting in the 'discovery' of the Americas, was the precursor to the rise of a global empire (Fuson, 1987).

Previous to 1732, when the Mexico City mint began producing circular milled coins using screw press technology (Walton, 1994: 167), all coins in the Americas were made by hand, one at a time. Each tells a unique story. Those produced before the infamous mid-17th century Potosi mint scandal, and its resulting die insignia transition (Menzel, 1995: 15), reflect the birth of coin minting in the Americas, a fascinating, intricate and often mysterious evolution that archival researchers and coin scholars continue to explore, study and debate.

By the time King Philip IV ascended to the throne in 1621, Spain was the most powerful country in the world, controlling much of Europe, as well as the Caribbean, Mexico and the Americas – the New World. However, maintaining this position of supremacy was expensive, and financial problems plagued the nation. Spain was engaged in costly warfare much of the time, and Philip's throne had inherited past generations of debt.

The New World was abundant in desirable riches, in particular the precious metal silver, and in the relatively short timespan between the first voyages of Columbus and the rise of Philip IV to the throne, at age 16, Spain had become profoundly dependent on the Americas. In order to control the vast wealth emerging from the Spanish colonies, mints were established and operated in key areas throughout the New World. Wooden ships were built to transport massive amounts of plundered riches, which sailed in organized fleets, or *flotas*, each with a particular purpose and route.

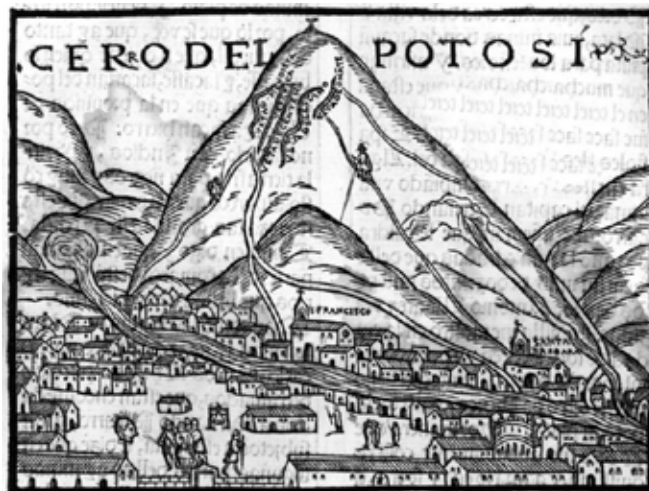


Fig. 1. View of the city of Potosi located in the geographic area of the viceroyalty of Peru, modern Bolivia, at the foot of the mountain for which it was named, renowned for its mineral deposits, especially silver and tin.
Engraving: from *La Cronica del Peru*, 1553.

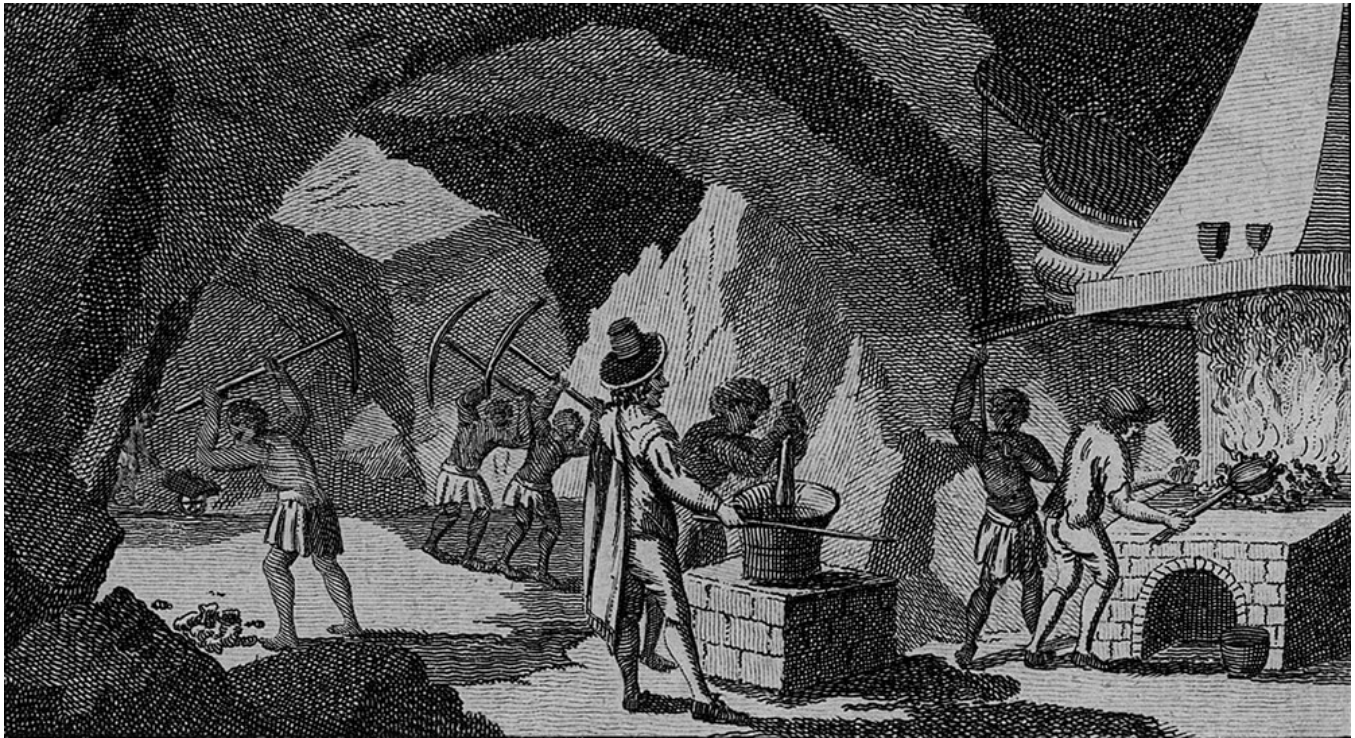


Fig. 2. 'Slaves at Work in the Silver Mines of Peru' from R. Johnson, *The History of South America* (London, 1789: 166). Slaves wield pick-axes to extract ore and crush the ore in a vessel, while a third works the bellows for a European smelter. Source: www.slaveryimages.org, compiled by Jerome Handler and Michael Tuite, and sponsored by the Virginia Foundation for the Humanities and the University of Virginia Library.

Each year these ships voyaged from Spain to the Americas along a route known as the *Carrera de Indias*.

When eight ships of the *Tierra Firme* fleet met their fate in 1622, New World silver in the form of the Spanish dollar, also called *pesos* or 'pieces of eight' (Walton, 1994: xiii), was the most coveted and widely traded money on Earth. In September of that year the *Tierra Firme* fleet – whose purpose was to transport Peruvian and South American treasures (Mathewson, 1986: 19; Walton, 1994: 47-9) – departed from Havana, Cuba, en route for Spain. The 28 vessels that formed the fleet (Lyon, 1989: Appendix B, *Communication from Marquis of Cadereita to the Crown, Havana, January 10, 1623, AGI Santo Domingo 132*) strained under cargos of vast imperial, private and commercial wealth: tons of Peruvian silver, fortunes in New World gold, Cuban copper, indigo and mercury. With officers, crew and passengers came personal belongings, such as medical tools, navigational utensils, tableware, precious gems and jewelry, and artistic and cultural souvenirs.

Spain and her creditors awaited the return of the fleet anxiously since its arrival was anticipated to refresh the royal coffers, repay loans and ease financial pressures (Lyon, 1989: 41-3). But two days subsequent to departing from the island of Cuba, eight of the ships were destroyed, as a contemporary account reported, victims of a "storme

and fearfull tempest" (*A True Relation of that Which Lately Hapned to the Great Spanish Fleet, and Galleons of Terra Firma in America*, London, 1623: 4). More than 500 lives were lost in the fleet disaster of 1622 (Lyon, 1989: Appendix B). Also lost was a king's ransom in 'treasure', a serious setback for Spain, whose supremacy in the world was upheld by the wealth of the Indies.

In 1980 and 1985 respectively, the Mel Fisher company, Treasure Salvors, Inc., discovered in the Florida Straits sections of two of the *Tierra Firme* fleet's richest vessels, the *Santa Margarita* and the *Nuestra Señora de Atocha*. Between 1990 and 1991, Seahawk Deep Ocean Technology excavated a shipwreck discovered off the nearby Dry Tortugas Islands from the same 1622 fleet, most plausibly identified as the Portuguese-built and Spanish-operated 117-ton *Buen Jesús y Nuestra Señora del Rosario* homeward-bound from Nueva Cordoba, Cumana on the north coast of Venezuela (Kingsley, 2013).

2. Making Money

Because no ship's manifest seems to survive for the *Buen Jesús y Nuestra Señora del Rosario*, it is impossible to propose how many silver coins it may have originally carried. The *Atocha* transported approximately 250,000 registered silver coins (Lyon, 1989: 58) and the *Margarita*'s manifest listed



Fig. 3. A 16th-century woodcut depicting the workings of a New World mint, with blanks being cut from sheets of silver, struck into coins, weighed and registered.

more than 140,000 registered silver issues (pers. comm. Eugene Lyon to Mel Fisher, 27 May 1980). No gold coins were listed on the manifests of either the *Atocha* or the *Margarita* (Mathewson, 1986: 131). To date, however, the *Margarita* shipwreck has produced 77 gold coins and the *Atocha* 128 examples. With the exception of a small sample of gold coins struck with an 'SF' mintmark representing the recently opened (c. 1622) Santa Fe de Bogotá mint – the first mint authorized to produce gold coins in the Americas (Menzel, 2004: 383) – gold coins on 1622 fleet shipwrecks were the European struck private funds of individuals and therefore exceedingly rare.

Although mechanically produced coins had been introduced to some areas of Europe by the mid-16th century,¹ until the year 1732 coins in the Americas were all struck individually by hand. First, blanks were hand-cut from strips of silver. Next, the blank, or planchet, was heated, sandwiched between double dies and struck with a hammer (Fig. 3). Any silver in excess of the requisite weight was trimmed from the outer coin's edges until the weight was correct. This resulted in irregularly shaped coins whose insignia were frequently off center (Menzel, 2004: 7-8). The dies themselves were made of steel, with insignia impressed into them by direct engraving or by the sinking (stamping) of multiple die punches, each punch being a

component of the coin's design. Sometimes die punches were used to repair or update a directly engraved die; alternatively, both die punches and additional direct engraving would be employed (Armstrong, 1997: 9-13). Appropriately sized dies were made for each denomination of coin.

3. The Spanish Dollar

The value of money was determined by the purity and weight of the metal. Silver coin denominations were counted in *reales*. With the exception of a seemingly single Mexico City mint $\frac{1}{2}$ *real* coin documented on the Tortugas site (Flow, 1999: 88), four denominations of silver coins prevail on the wrecks from the 1622 Tierra Firme fleet: 8 *reales*, 4 *reales*, 2 *reales* and 1 *real*, with 8 *reales* being by far the most abundant.

Purity was mandated to be .93 fine (Craig, 1989: 2). The 8 *reales* of silver equaled the one-ounce Spanish silver dollar of 27.47 grams (Craig, 1989: 2), which is less than the troy ounce standard today. The 4 *reales* coins weighed



Figs. 4-5. Loose silver coins in situ just beyond the sternpost on the Tortugas shipwreck (and close-up detail).

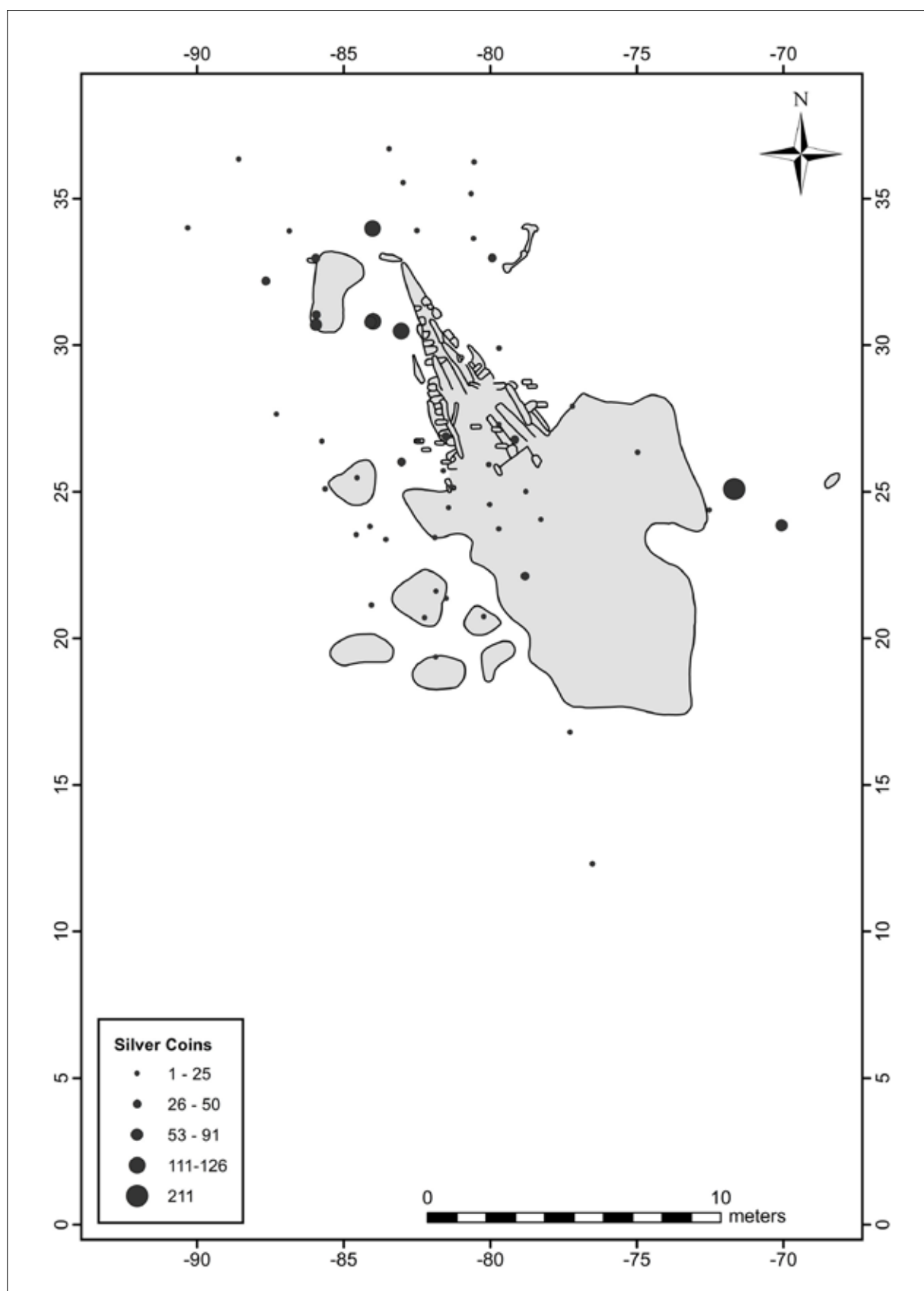


Fig. 6. Distribution of silver coins on the Tortugas shipwreck.

$\frac{1}{2}$ ounce each, 2 *reales* coins one-quarter of an ounce and the 1 *real* one-eighth of an ounce.

As stated, an initial study of the Tortugas shipwreck's silver coins lists a single $\frac{1}{2}$ *real* coin from the Mexico mint (Flow, 1999: 88), but the report contains no corroborating photograph. Although $\frac{1}{2}$ and $\frac{1}{4}$ *real* denominations were produced intermittently throughout the Spanish Colonial period, there is no record of either having been recovered from the *Nuestra Señora de Atocha* or the *Santa Margarita*. If the attribution is not erroneous (bearing in mind the potential for substantial metallic erosion within the marine environment), and a single $\frac{1}{2}$ *real* coin was indeed recovered from the Tortugas shipwreck, like most of the gold coins on these shipwrecks it would have functioned as the pocket money of an individual and would be one of the most rare coins in the 1622 collections.

4. Tortugas Coin Die Insignia

The silver coins from the Tortugas shipwreck bear unified iconography (Figs. 7-8). Thus, at random, on a Potosi mint coin dated to 1620, the crowned shield occurs on the obverse and the lions of León and the castles of Castile, quartered by a Greek cross and surrounded by a curving Moorish design called a tressure, or quatrefoil, characterizes the reverse. On either side the symbols are encircled within dots and a legend.

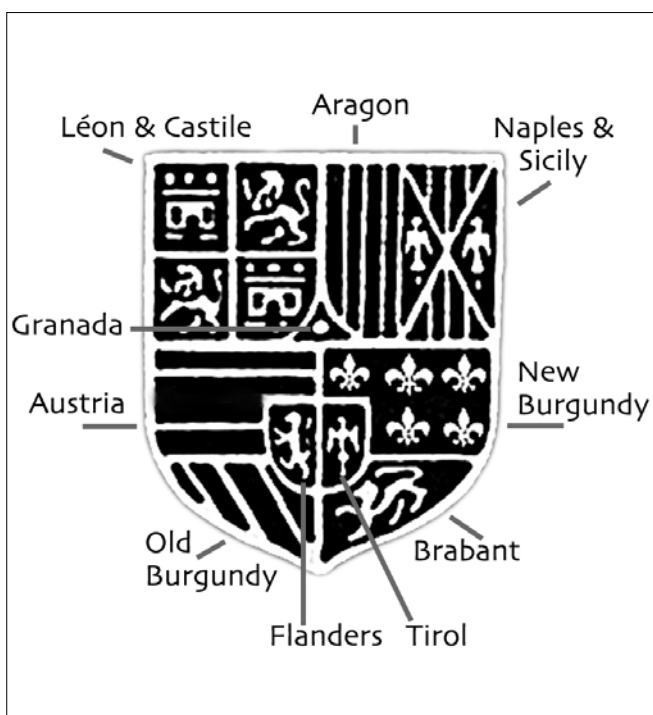


Fig. 7. The Habsburg shield, the arms of King Philip III of Spain, and with some variations, of the other Habsburg Kings: Philip II, Philip IV and Charles II. The symbols that compose the shield represent the various individual arms of lands under Spanish rule.

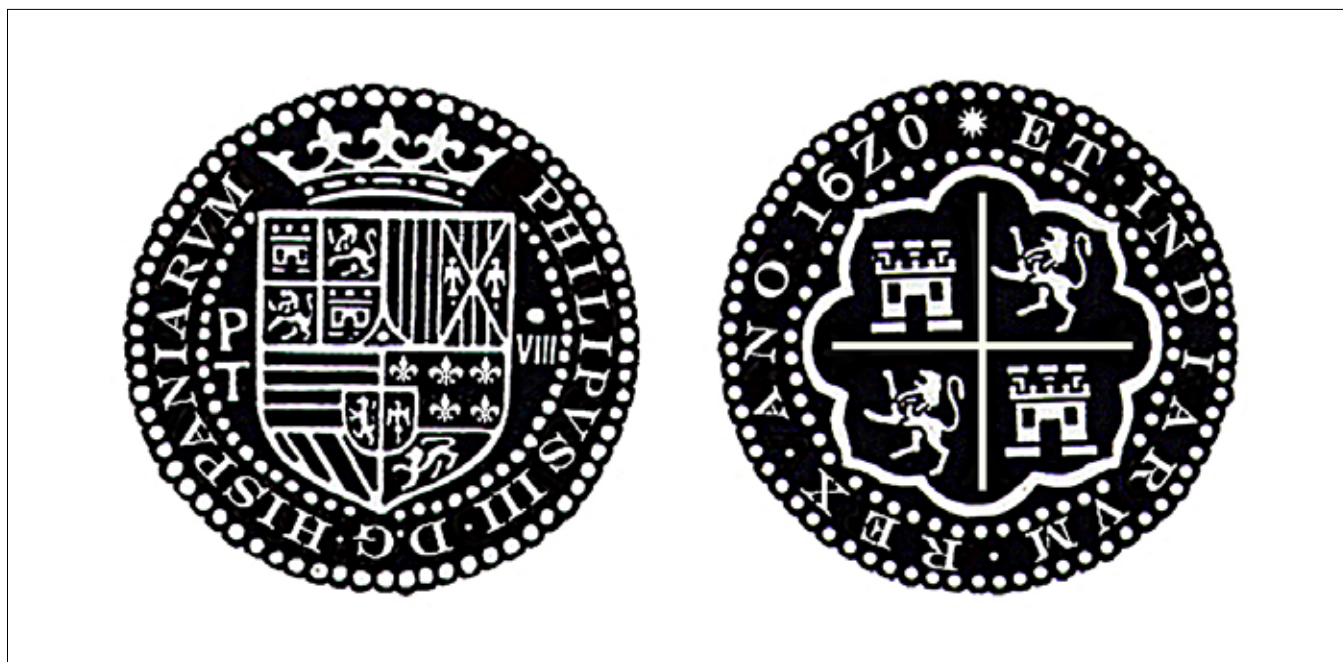


Fig. 8. Potosi mint silver coin die design. Obverse, to left, the crowned Habsburg shield with 'P' mintmark and assayer initial 'T' (Juan Ximénez de Tapia, 1618 intermittently through 1648). Reverse, to right, the lions of León and castles of Castile, quartered by a Greek cross and surrounded by a curving Moorish quatrefoil. On either side the symbols are encircled within dots and a legend.

The shield depicted is the Habsburg Shield, the arms of King Philip III of Spain, and, with some variations, of the other Habsburg kings: Philip II, Philip IV and Charles II (r. 1556-1700). The symbols comprising the shield represent the various individual arms of lands under Spanish rule at the time (Sedwick and Sedwick, 2007: 23-4). Therefore, the obverse symbolizes and advertises the power of the Kingdom of Spain. When the power base changed, the shield changed as well.

To the left of the shield, typically, are two initials, one set above the other, although placement of elements can vary. The upper initial on a Potosi mint coin is a 'P' representing Potosi or Peru. Below the letter 'P' the chief assayer of the mint (responsible for guaranteeing coins of legal weight and purity) was required to place his own initial. Therefore, this letter changes (Craig, 1989: 5).

To the right of the shield on the obverse is a numeral expressing the coin's value. This value can appear in the form of a traditional Roman numeral, or in Arabic form, or in a manner reflecting the handwritten style of the times, which often includes an 'o' above the value. The custom of the 'o' derives from handwritten traditions, which often included placing the final letter of a word above the first letter – the 'o' above 'M' mintmark representing the Mexico mint, for instance. In the case of coin values, however, the 'o' would represent the final letter in *cuatro reales*, or *ocho reales* (Sedwick and Sedwick, 2007: 28).

Potosi coins minted during the reign of Philip II did not carry a date and do not display an ordinal number, so the legend (using 'V' for 'U' in the Latin style) reads "PHILIPVS D.G. HISPANIARVM ET INDIARVM REX", meaning "Philip By the Grace of God D.G. [Dei Gratia] Spain and the Indies King." When Philip III took the throne the ordinal 'III' was added to the legend, thus "PHILIPVS III D.G. HISPANIARVM ET INDIARVM REX". The Potosi mint did not introduce dates into its coin legends until 1617. Therefore, beginning in 1617 the legend reads "PHILIPVS III D.G. HISPANIARVM ET INDIARVM REX ANO (abbreviation for *Anno Domini*) 16--".

Coin die insignia varied from mint to mint. Sometimes the differences are obvious, and sometimes quite subtle, as in the case of issues produced around the reign of Philip II from the Potosi and Lima mints. Early Philip II period coins (c. 1574-81) from the Potosi mint are so similar in appearance to Philip II shield style coins of the Lima, Peru, mint that for some years the coins of early assayers bearing the initials 'R', 'M', 'B' and 'L' were mistakenly attributed to Lima.

Prior to the discovery of 37 intact chests of silver coins on the *Atocha* site in 1985, a prominent numismatist, E.A. Sellschopp, attributed the coins of early assayers 'R' (Alonso

de Rincón), 'M', 'B' and 'L' to the Lima mint (and assayer 'C' to a mint at La Plata) (Sellschopp, 1971). Sellschopp's attributions were based on the artistic similarities between the coins carrying these assayers' initials with those of the confirmed Lima mint assayer Diego de la Torre. Comparing the workmanship, stylistic features and artistic rendering of these early Potosi coins with Diego de la Torre's Lima mint coins, it is easy to understand how their appearance led Sellschopp to arrive at this presumption. Other numismatic authors perpetuated his attributions.

However, research conducted by Cunietti-Ferrando (1989) and Dym (1989) provided documentary evidence that placed the assayers 'R' (beginning in 1574) and 'B' (beginning c. 1577) at the Potosi mint. Direct observation of assayer initial erasures and overstrikes definitively connect assayers 'L' and 'C' to assayer 'B', and hence to the Potosi mint. Assayer initials 'M' struck over 'R', and 'L' struck over 'M' specimens, are documented, as well as coins bearing 'M' to right of shield and 'L' to left of shield (Sedwick and Sedwick, 2007: 93), indicating a period of joint assayer-ship. Therefore, 'M' must also be attributed to Potosi.

Currently, documentary evidence has yet to be uncovered that places assayers 'M', 'B' or 'L' at the Lima mint (although Sellschopp's earlier theories were reiterated in the 1992 revision of his book). However, Sellschopp did correctly place assayer/engraver Alonso de Rincón in Lima. Rincón opened both the Lima and the Potosi mints, and a third that operated briefly in La Plata. However, his Lima mint issues all date to c. 1568-70, struck in the Lima mint's original 'pillars' format, a style that was discontinued and replaced with the crowned shield before the opening of the Potosi (1574) and La Plata (1573) mints (Cunietti-Ferrando, 1989: 62-4).

As a result of a Royal edict issued in 1570 (Dargent Chamot, 1989: 48), by 1572 both the Mexico City and the Lima, Peru, mints had transitioned from a previous 'pillars' design to the Habsburg shield. At the directive of the Viceroy of Peru, in 1573 Alonso de Rincón left the city of Lima to establish a new mint in La Plata (now Sucre, Bolivia), taking Lima mint tools and, by then, shield type dies with him to begin the work (Cunietti-Ferrando, 1989: 53-4). La Plata's very brief and sparse production of coins occurred in late 1573. The endeavor quickly proved to be ill advised and Rincón was subsequently dispatched to Potosi with the directive of re-establishing operations there. Again Rincón began his work with tools and dies originally from Lima.

The timely transition from 'pillar' style dies to the crowned shield style serves as a key chronological marker that allows Rincón's Lima issues and his La Plata/Potosi issues to be differentiated.

5. The Condition, Grading & Identity of the Tortugas Coins

Coins are graded by quality and, in the case of shipwreck coins, quality is largely determined by degree of exposure to the elements and erosion. The coins from the Tortugas shipwreck were found scattered individually under light sediment cover, usually less than 5-10cm deep, but exhibit a degree of wear and erosion typical of unprotected coins on high energy sites (Figs. 4-6). This suggests that the coins were exposed to the water column and seabed surface before being gradually buried. Such a state of preservation is also true of many silver coins discovered on the shallow-water *Margarita* shipwreck.

By contrast, the *Atocha* site has to date produced 52 'chests' of coins. Each *Atocha* rosewood chest contained between 1,192 and 4,533 coins, for an average of 1,982 coins per chest. The lids and bases measured on average 57.2cm long and 22.3cm wide and were built with 2-3cm thick planks (Malcom, 2001). These plain, rectangular wooden boxes largely decayed and disintegrated over time. Because of a chemical reaction between the metal and the saltwater, silver sulfide both blackened the coins and fused them together, thus retaining the shape of their chests. Coins from the interior of such conglomerations, having been protected from the elements, tend to be in mint or near mint condition, those on the outer perimeter less so. No evidence for comparable chests was encountered on the Tortugas shipwreck, where the coins were not being transported as cargo but seemingly as part payment, alongside the gold bars, for the outward-bound consignments (cf. Kingsley 2013: 10-12).

The Tortugas collection was graded for this study following a widely accepted set of guidelines whereby, based on surface condition, each coin is assigned a grade category of one to five, with special features noted separately. For instance, a coin may be noteworthy because it exhibits a full or partial date or because of a rare assayer initial, but while increasing its interest these features do not influence its grade. Because the coins under consideration are not uniform or machine made, no two are identical. The grading process involves both measurable criteria and individual subjectivity.

- Grade One coins display little or no visible ocean wear, show little or no roughness or pitting, and, therefore, look much as they did when new. Both sides are in Very Good to Excellent condition and the obverse and reverse features resulting from the original strike are defined and easily identifiable.
- Grade Two coins were partly exposed to the elements. The coin may not be completely intact or it may look



Fig. 9. A rare 1543-72 pillars and waves style Mexico City mint coin recovered from the Tortugas shipwreck. The single dot between the pillars represents the 1 real denomination value. Unless otherwise stated, Figs. 9-42 © Odyssey Marine Exploration.

more 'sand-blasted' than a Grade One, but the quality is still Good and most of the features resulting from the original strike are easily identifiable.

- Grade Three coins are in Fair overall condition, but ocean wear is very apparent. Many Grade Three coins were typically located on the outer layer of a shipping chest and, therefore, the side of the coin that faced into the chest will be of Grade One or Grade Two quality. The opposite side, exposed to the elements following the wooden chest's deterioration, is completely worn away. Other Grade Three coins might incorporate ocean wear distributed across both sides of the coin. On Grade Three coins, obverse and/or reverse sides will still offer easily identifiable characteristics that have definition.
- Grade Four coins are still identifiable as Spanish Colonial coins, but they have been subject to much wear and tear and the markings are faint and have little or no definition.
- Grade Five coins are just above a fragment in quality, but can still be identified as a coin taking into consideration factors such as shape and provenience.
- A Fragment is a piece of silver recovered among concentrations of coins, but with no markings to identify it as a coin.

Grading assessments need to take into consideration additional external criteria affecting form and preservation. For instance, almost all handmade coins display areas of smooth 'soft strike' on which the markings appear to have been erased. Often this feature is actually due to the blanks of silver used to make the coins not being uniformly flat, as well as coin dies that wore down unevenly with use over time. The feature can also be the result of tongs used to hold the coins during production. Soft strike still represents the 'mint' condition of a coin and should not be confused with ocean wear, which can make a coin look rough, pitted or sand-blasted.

Denomination	Mexico	Potosi	Bogotá/ Cartagena or Old World	Unknown
8 reales	199	34	3	107
4 reales	28	9	2	20
2 reales	5	3	1	12
1 reale	23	2	0	4
Unknown	60	4	1	130
Total	315 (48.6%)	52 (8.0%)	7 (1.1%)	274 (42.3%)

Table 1. *Tortugas shipwreck silver coins by quantity, denomination and mint (2011 analysis of 648 coins).*

In August 2011, the author re-analyzed 648 silver coins from the *Tortugas* shipwreck in the collection of Odyssey Marine Exploration in Tampa, Florida (Figs. 12-42). Crucial criteria for distinguishing between mints are the fact that Mexico City coins are easily identified because each of the cross's four flared extensions end in an orb. (A mint at Santo Domingo, Dominican Republic, also produced shield-type coins with orbéd crosses in 1578: Sedwick and Sedwick, 2007: 75. However, few are known to exist, and these may be identified by the location of the assayer initial on the coin reverse, a trait not seen on other American minted coins.) Potosi mint coins, by contrast, bear an unadorned Greek cross, as do coins from the Lima, Panama, Santa Fe de Bogotá/Cartagena and Spanish Peninsular mints.

The Lima mint closed in 1588 and, except for an additional brief production in 1592 (Sedwick and Sedwick, 2007: 52), did not reopen until after the 1622 fleet disaster near the Florida Keys, making coins from this mint fairly old and significantly rare on shipwrecks of this period. The Nuevo Reino de Granada (New Kingdom of Granada) mints of Santa Fe de Bogotá and Cartagena, authorized in 1620, did not begin production until at least mid-1621 (AGI Santa Fe 192) and are also exceedingly rare in 1622

fleet coin assemblages. Lastly, Spanish Peninsular minted coins discovered on shipwrecks departing from the Americas were twice-traveled wealth, having originated in Europe, crossed the ocean to the New World, entered into circulation and in September 1622 were en route back to Europe. Spanish Peninsular coins, therefore, are also exceedingly rare on 1622 shipwrecks in the Americas.

Due to its location and date of sinking, one might assume that most coins from the *Tortugas* shipwreck bearing the Greek cross would be Potosi issues. Because this proved not to be the case (Table 1), for the purpose of this study a coin was attributed to a specific mint only if indicators were visibly identifiable. Where no visible indicators existed, the coin was designated an 'Unknown' classification. If a coin was labeled 'Unknown', but displayed a Greek cross, had the overall appearance of a Potosi mint coin and no other markings to suggest otherwise, it was given an additional label of 'Unknown + Assume Potosi' (Table 2).

In the case of the 1622 shipwrecks the *Atocha* and *Margarita*, 8 reales denomination coins are most numerous, followed by 4 reales, with 2 reales denominations relatively rare and 1 reale denominations scarce. For example, of the silver coins recovered in 1985 from the *Atocha* site, 0.001% (110) were 1 reale denominations, 15.0% (17,088) were 2 reales denominations, 21.8% (24,853) were 4 reales denominations, and 63.1% (71,808) were 8 reales denominations (Malcom, 2001).

This makes sense since small denominations may have been most desirable for local trade, but shipping cargos long-distance in large denomination form was most efficient. Because the *Tortugas* shipwreck coin collection included a fairly high percentage of 'unknown' denomination coins, a decision was made with Odyssey artifact data specialist Eric Tate to distinguish between higher denomination coins of 8 or 4 reales and lower denomination

Denomination	Unknown + Assume Potosi
8 reales	66
4 reales	17
2 reales	11
1 reale	4
Unknown	32
Total	130

Table 2. *Tortugas shipwreck silver coins for the 'Unknown + Assume Potosi' class by quantity and denomination.*

issues. This study demonstrated that nearly twice as many 'unknown' coins were higher denominations varieties:

- Total 'Unknown': 130
- Unknown (either 4 or 8 *reales*): 28
- Unknown (either 1 or 2 *reales*): 15
- Unknown (unidentifiable): 87

As stated previously, the Tortugas shipwreck coins were discovered loose and scattered under light sediment cover in deep waters (not in coin chests or conglomerations; Fig. 6), and exhibit a degree of erosion typical of exposed coins associated elsewhere with high-energy marine environments. The predominance of 207 Grade Four (31.9%) and 334 Grade Five (51.5%) coins amongst the Tortugas collection must be attributable to their unprotected state

over a long period. Only a single coin (0.1% of the assemblage) was attributed to Grade One and Two:

- Grade One: 0
- Grade Two: 1
- Grade Three: 57
- Grade Four: 207
- Grade Five: 334
- Fragment: 49

The Tortugas coin collection is surprising for a vessel of the 1622 Tierra Firme fleet for two reasons (Table 1). Firstly, this study has demonstrated that the majority of coins were manufactured at the Mexico City mint (48.6% of the total sample; Figs. 12-21). The primary purpose of the Tierra Firme fleet was to transport Peruvian and South



Fig. 10. Five better-preserved (Grades 2 and 3) Tortugas shipwreck silver coins. Top left: Habsburg shield with letters 'o' above 'M' to left of shield signifying the Mexico City mint, above assayer initial 'D'; denomination unconfirmed. 'D' assayer coins appear c. 1598/1599, 1618-34, and possibly at intervals before 1618. Identification of the 'D' assayers is at present unconfirmed. Top right: coin reverse displaying lions of León and castles of Castile in inverted positions, quartered by a Greek cross and surrounded by a curving quatrefoil; mint and denomination unconfirmed. Center: Habsburg shield with 'oM' signifying the Mexico City mint, with assayer initial 'D' (as above); denomination unconfirmed. Bottom left: coin reverse displaying the lions of León and castles of Castile, quartered by a Greek cross and surrounded by a curving quatrefoil; letters 'DIA' preserved on the right outer edge, part of 'INDIARVM' meaning 'Indies'; mint and denomination unconfirmed. Bottom right: a 8 reales coin obverse, the initial 'P' to left of shield signifying the Potosi mint, and 'o' over 'viii' to right signifying the 8 reales denomination.

Denomination	Mexico	Potosi	Bogotá/ Cartagena or Old World	Unknown
8 reales	335	212	6	9
4 reales	157	67	4	4
2 reales	66	45	2	6
1 reale	104	31	1	1
½ reale	1	--	--	--
Unknown	--	--	--	133
Total	663 (56.0%)	355 (29.9%)	13 (1.1%)	153 (13.0%)

Table 3. *Tortugas shipwreck silver coins by quantity, denomination and mint (1999 analysis of 1,184 coins).*

American ‘treasure’ (Mathewson, 1986: 19; Walton, 1994: 47-49). Thus, the majority of coin cargo would be expected to have originated in Potosi (Figs. 1-2), then a territory of the Viceroyalty of Peru (and today of Bolivia). Coins minted in Mexico City, by contrast, would have been transported overland to Veracruz on the east coast of Mexico for consignment to New Spain fleet ships (Mathewson, 1986: C2-C3).

Even when the 52 Potosi (8.0%) and the 130 ‘Assume Potosi’ (20.1%) issues in the 2011 *Tortugas* wreck collection are combined (Table 2; Figs. 22-34), Mexico mint issues still outnumber those from Potosi (315 Mexico coins compared to 182 Potosi/Assume Potosi: 48.6% compared to 28.1%). Even adding the 52 Potosi coins to all of the 274 ‘Unknown’ origin coins (thereby assuming for the sake of this exercise that all ‘Unknowns’ were minted in Potosi), the number of Potosi to Mexico coins is still only slightly higher (48.6% Mexico compared to 50.3%). Thus, the *Tortugas* ship was transporting an unusually high percentage of Mexico City mint coins. Notably the *Atocha* and the *Margarita* wrecks also produced a large representation of Mexico City mint coins for Tierra Firme fleet shipwrecks, but unlike the *Tortugas* assemblage Potosi mint coins proved to be by far the majority, with 85-90% of *Atocha* coins originating there (pers. comm. Corey Malcom, 12 September 2012).

The second curiosity amongst the *Tortugas* assemblage examined in 2011 is the comparatively high percentage of 1 *reale* denomination coins, also from the Mexico mint (Table 1; Figs. 12-14), although these may simply represent a personal or merchant shipment belonging to an individual/s with business interests in New Spain. In total the collection contains 343 8 *reales* issues, 59 4 *reales*, 21 2 *reales* and 29 1 *reale*. Of these, the 1 *reale* issues account for 7.3% of the Mexico coins, compared to 3.8% for the wreck’s Potosi coins (see Table 3 for the figure of 1 *reale*

coins accounting for a far higher 15.7% of Mexico issues from the 1999 data set).

One explanation for the interpretation of these Mexico City mint coins, other than as ‘pocket money’, may be proposed. The Tierra Firme and New Spain fleets shared one port-of-call in common, Havana, Cuba. Havana was the final meeting point for all ships before undertaking the return voyage to Spain (Mathewson, 1986: C2-C3; Walton, 1994: 53). According to Dr. Eugene Lyon, the foremost authority on the history of the 1622 shipwrecks, having converged that year in Portobello with a guard fleet under the command of the Marquis de Cadereita, the Tierra Firme fleet was traveling far behind schedule. The New Spain fleet reached Havana in advance of the combined Tierra Firme and Guard fleets. With hurricane season and its dangers upon them, the commander of the New Spain fleet chose not to wait any longer before disembarking.

The New Spain fleet thus departed for Spain, unfortunately leaving its valuables behind in Havana for the well armed, but ill timed combined Tierra Firme and Guard ships to transport. According to Dr. Lyon, coins, ingots and agricultural products from New Spain fleet ships were loaded onto the *Atocha* and *Margarita* in Havana, a scenario which is to account for most of the Mexico mint coins in the assemblage (pers. comm. Eugene Lyon, April 2010).

Comparing the original sample of 1,184 silver coins recovered from the *Tortugas* wreck (Table 3), from which 1,051 issues were examined prior to 1999 (Flow, 1999: 88), with the 2011 reanalysis presents a remarkably similar overall quantitative picture (Fig. 11). From the larger 1999 data set the Mexico mint is again dominant amongst the assemblage (56.0% of the total compared to 48.6% for 2011), while Potosi is represented by 29.9% of the coins compared to 28.1% (filtering the ‘Unknown + Assume Potosi’ coins into the equation), while the Bogotá/Cartagena or Old World source issues are identical at 1.1%, and

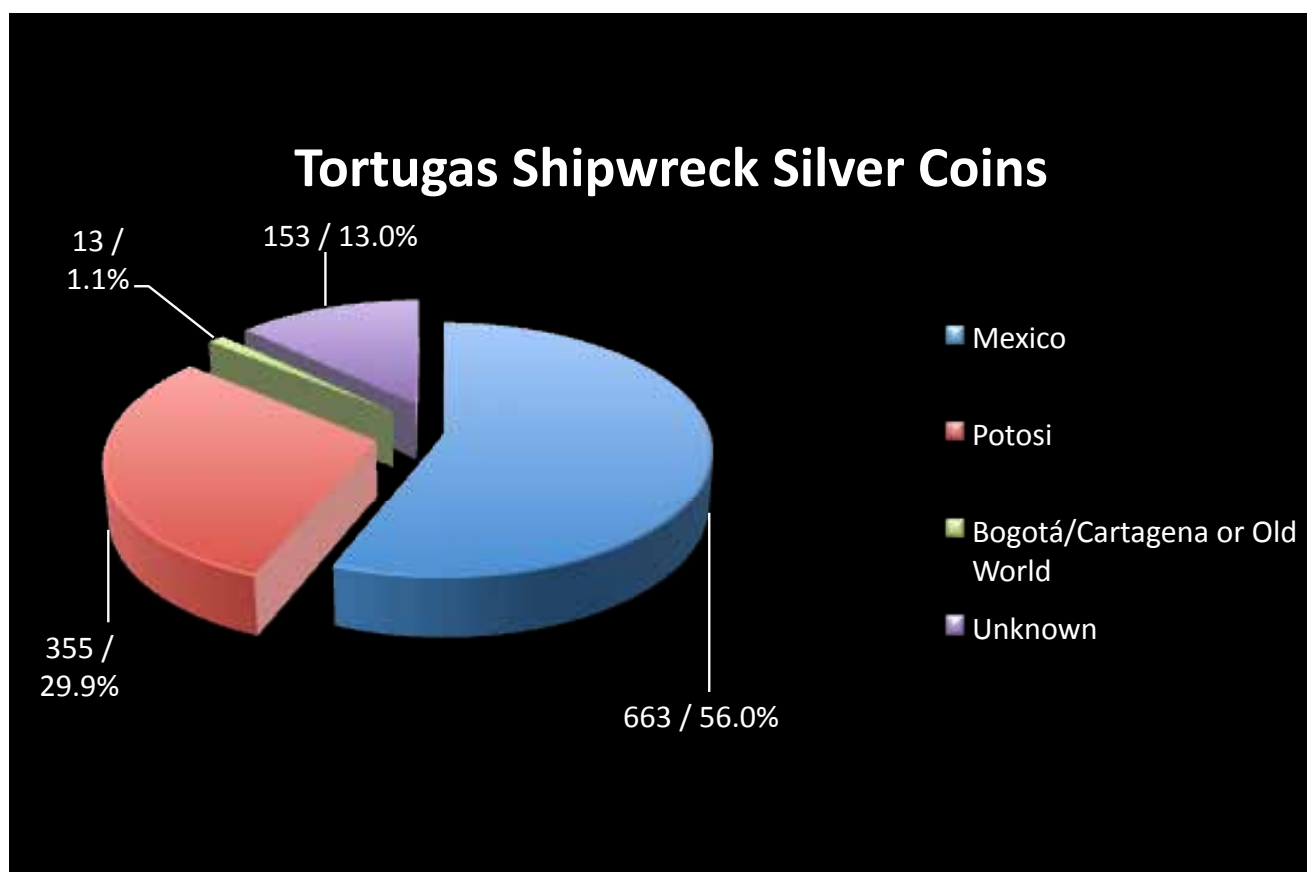


Fig. 11. Tortugas shipwreck silver coins by quantity and mint (based on the 1999 analysis of 1,184 coins).

a lower 13.0% are unknown (compared to 22.2% from the 2011 analysis).

In total, the 1999 collection contains 562 8 *reales*, 232 4 *reales*, 119 2 *reales* and 137 1 *reales*, plus one apparent ½ *real*. Of these, the 1 *real* issues account for 15.7% of the Mexico coins, compared to 8.7% for the wreck's Potosi coins. It is suggested that the numerically superior 1999 sample is utilized for official site statistics. Thus, from the Tortugas coin assemblage 53.5% of coins are 8 *reales* issues, 22.1% 4 *reales*, 11.3% 2 *reales*, 13.0% 1 *real* and 0.1% ½ *real*.

6. Tortugas Mints, Assayers & Dates

Only three of the 648 coins from the current study of the Tortugas shipwreck exhibit a date and all are incomplete: TOR-90-00517-CN and TOR-90-00784-CN both read '162-' (Figs. 38, 41), while TOR-90-00894-CN has a partial date of '16--' (Fig. 19). A fourth coin examined in 1999 is dated '--21' for the year 1621 (Fig. 35). Dated

coins on early 17th-century shipwrecks in the Americas are rare in general. Prior to 1607 in Mexico City, and to 1617 in Potosi, coins did not carry a date. When the year of issue was eventually added to the coin dies, it was located at about the 11 o'clock position on the outer perimeter of the coin's obverse (Mexico) and reverse (Potosi and Santa Fe de Bogot /Cartagena). Because the coins were hand struck and hand cut, most of the wording in the legends and most of the dates were sacrificed in the process of obtaining the desired weight by edge clipping.

Of the 648 Tortugas coins examined in 2011, all that are identifiable fall into three categories: Mexico City, Potosi and Santa Fe de Bogot /Cartagena or possibly Old World. All are of the crowned shield variety.

The Mexico City mint was the first to issue coins in the Americas, beginning in 1536 (Utberg, 1963: 8) during the monarchy of Johanna and Charles I (r. 1516-56). Mexico coins produced prior to c. 1572 displayed a 'pillars' design, rather than a crowned shield (Dargent Chamot, 1989: 48). Two coins illustrated in the earlier analysis (Flow, 1999: 87) are of the c. pre-1572 pillar design (Fig. 9). Both

appear to be from the Mexico City mint, although the Lima, Peru, mint also produced pillar style coins prior to *c.* 1572. One appears to be an extremely rare early Mexico coin assayed by 'L,' Luis Rodríguez (*c.* 1547?-53? and *c.* 1554?-1569; Sedwick and Sedwick, 2007:63-64) (*c.* 1548-67; Menzel, 2004: 69). Since no 'pillar' issues were represented amongst the 2011 study of 315 Mexico City examples in the Tortugas assemblage, it is clear that other than these rare anomalies the vast majority of the ship's coins were minted after *c.* 1572, beginning in the second half of the reign of Philip II (1556-98).

Assayer tenures often span more than one monarch's reign. For example, the previously mentioned Mexico City assayer Luis Rodríguez took his post late in the reign of Charles and Johanna (r. 1515-56) and held it for more than ten years into the reign of Philip II. Potosi's assayer 'B', Juan de Ballesteros Narváez, performed this office intermittently during the years *c.* 1577-1615 under both Philip II and Philip III (Dym, 1989: 84; Menzel, 2004: 243). An undated coin that bears a king's ordinal number in the legend may narrow down its possible date range. While the Mexico City mint included the ordinal 'II' in coin legends, Potosi, which began operations in 1574 (Dym, 1989: 80), did not. Both the Mexico and the Potosi mints included the ordinal's 'III' and 'IIII'. It is to be expected that the majority of the Tortugas coins would have been minted during the reign of Philip III, and two were identified as bearing a visible ordinal 'III' in their legend; none possessed a visible ordinal 'II' or a visible ordinal 'IIII'. Nine Tortugas coins were identifiable as Philip II period issues: five Potosi, two Mexico, one seemingly early Potosi or Lima, and one an 'Unknown/Assume Potosi' with Philipus spelled with double 'PP' (TOR-90-00949-CN; Fig. 25), a typical Philip II era coin characteristic.

Coins may display certain features that help place undated examples within broad dates of production. A chief assayer's initial is the most valuable such feature. While some assayers' years of operations are confirmed, others such as those struck before dates were included in the coin legend, and particularly those minted during the reign of Philip II, are in many cases chronological estimates based on historical information derived from archives and incomplete records. Evolving artistic styles of coin die emblems, and assayer initial overstrikes and combinations, also help pinpoint date ranges.

Of the 315 Mexico City mint coins examined (Figs. 12-21), 30 incorporate a visible assayer's initial:

- One coin 'A': Antonio de Morales, *c.* 1608-10 (TOR-90-00999-CN; Fig. 17).

- 27 coins 'D': an assayer using the initial 'D' is confirmed to have worked at the Mexico City mint from 1618 into the 1630s (TOR-90-00382-CN; Fig. 16), and also possibly intermittently prior to 1618. An assayer 'D' is confirmed *c.* 1598/1599 working jointly with assayer 'F' on coins known bearing both assayers initials, one to the left of the shield and the other to the right, with some examples bearing the ordinal 'II' and some the ordinal 'III' (Sedwick and Sedwick, 2007: 66-7). The 'D' assayer initial does not necessarily represent the same individual for the above date ranges.
- Two coins 'O': Bernardo de Oñate *c.* 1571?-1578? and Luis de Oñate *c.* 1578-1589 (Sedwick and Sedwick, 2007: 65-6) (TOR-90-00780-CN, TOR-90-00920-CN).

Of the 52 Potosi mint coins examined (Figs. 22-34), 30 have a visible assayer's initial:

- Two coins 'B': for Juan de Ballesteros Narváez, intermittently *c.* 1577-1615; also Hernando Ballesteros substituting for Juan de Ballesteros (Dym, 1989: 84), similarly also using the letter 'B'. One of the two 'B' coins (TOR-90-00402-CN; Fig. 30) is of the Philip II period style; the other is undetermined (TOR-90-00462-CN).
- One coin 'M': Juan Muñoz, 1616-17 (TOR-90-00422-CN; Fig. 33).
- 13 coins 'Q': Agustín de la Quadra, 1613-16 (see TOR-90-00762-CN, TOR-90-01041-CN; Figs. 23, 32).
- Seven coins 'R': TOR-90-01003-CN is a Philip II period type 'R' (Fig. 22), either representing Alonso de Rincón (*c.* 1574-76) or Baltasar Ramos Leceta, who served as assayer intermittently between *c.* 1590-98 (and also during the reign of Philip III). I suspect that the coin in question was issued under Ramos Leceta, *c.* 1590-98. With the exception of coins TOR-90-00737-CN and TOR-90-00377-CN, which are of unconfirmed reign, the remaining 'R' coins were all issued under Baltasar Ramos Leceta and are Philip III types (TOR-90-00481-CN, TOR-90-00379-CN, TOR-90-00777-CN, TOR-90-01009-CN; Figs. 27, 31).
- Seven coins 'T': Juan Ximénez de Tapia, 1618 into the late 1640s (TOR-90-00398-CN, TOR-90-00435-CN, TOR-90-00478-CN, TOR-90-00640-CN, TOR-90-00798-CN, TOR-90-01054-CN, TOR-90-00506-CN; Figs. 24, 29, 34).

Seven of the coins examined in 2011 originated from the Nuevo Reino de Granada (New Kingdom of Granada) mints of Santa Fe de Bogotá or Cartagena, located in northern South America, or alternatively derived from a Spanish Peninsular mint (Fig. 35). In any case, they are exceedingly

rare. In 1620, King Philip III authorized military engineer Don Alonso Turrillo de Yebra to establish two mints in Nuevo Reino de Granada (Lasser, 1989: 132). The first to be approved was Santa Fe de Bogotá. Cartagena was then approved as an ancillary mint (AGI *Santa Fe* 536, book 11, folio 228 vº). It is known that the first dies, intended for Bogotá, were crafted in Madrid, and in a document dated 25 May 1620 (AGI *Santa Fe* 536, book 11, folio 226 vº) King Philip III ordered their delivery to Turrillo.

Turrillo first set up establishment in Cartagena in 1621, but its city officials created impediments that caused him to transfer his employees and coin-making tools to Bogotá, from where he wrote that with the approval of Audiencia officials he had struck coins of both gold and silver, “with much more perfection than that which is styled in some of the other mints...” and that these coins had entered the stream of commerce. From Bogotá, Turrillo continued to petition the king for intervention regarding the minting house in Cartagena, to enable him to commence operations there. It is certain that Turrillo produced authorized coins of silver at Cartagena in 1621 and coins of both silver and gold at Bogotá in 1622, and that some of these were “lost on one of the (1622) galleons which were flooded” (AGI *Santa Fe* 192).

Turrillo’s earliest Nuevo Reino de Granada coins bore mintmarks of ‘S’ above the letter ‘F’ (for Sante Fé); ‘S’ without a visible letter ‘F’ below the ‘S’; and ‘R’ above ‘N’ for Nuevo Reino. All bear the assayer initial ‘A’. While a comprehensive study of his coins is beyond the scope of this report, there are two features that in the absence of an assayer’s initial can make a ‘Turrillo coin’ difficult to distinguish from an Old World minted one. The first is the ‘S’ mintmark, which appears on some of Turrillo’s coins, but problematically also on all coins issued by the Seville mint in Spain. The second feature is the presence of the arms of Portugal within the crowned upper third center shield. This feature is found on seven Tortugas shipwreck coins examined in 2011, six of which do not have visible mintmarks, one of which has a visible ‘S’ mintmark and none of which exhibit a visible assayer’s initial (TOR-90-00410-CN visible ‘S’ mintmark, TOR-90-00517-CN, TOR-90-00567-CN, TOR-90-00784-CN, TOR-90-00813-CN, TOR-90-00911-CN, TOR-90-01014-CN).

An eighth Nuevo Reino de Granada coin from the Tortugas shipwreck bears the partial date of ‘--21’ and assayer initial ‘A’ (TOR 000628.0058; Fig. 35), definitively linking it to Alonso Turrillo de Yebra and his Nuevo Reino de Granada mints. This example is one of only four known Nuevo Reino de Granada coins struck with the date 1621, the first year of issue for Turrillo’s mints. The three others were recovered from the *Atocha* shipwreck.

In 1580 Philip II expanded his empire territorially with the annexation of the Portuguese throne, after which the Portuguese arms were incorporated into the shield of coins produced in Spanish Peninsular mints. The Nuevo Reino de Granada mints of Bogotá and Cartagena were the only New World mints to include this feature on their coin dies. Examples of Turrillo’s Nuevo Reino de Granada silver coins have been discovered on the *Atocha*, the *Margarita* and now the Tortugas wreck sites (Flow, 1999: 84; Fig. 35).

7. Gold Coins

Two gold coins were seemingly recovered from the Tortugas shipwreck, both of Spanish peninsular origin (Flow, 1999: 82; Stemm *et al.*, 2013: 21, fig. 33). This scarcity of gold coins is not surprising. As stated above, Don Alonso Turrillo de Yebra possessed the first imperial authorization to mint gold coins in the Americas, a grant issued in the year 1620. With the exception of Turrillo’s documented sample of gold coins “lost on one of the [1622] galleons which were flooded” – the first known to depart from the Americas on a vessel bound for the Old World – gold coins on 1622 ships in the Americas were the European struck private funds of individuals and, therefore, were exceedingly rare. Their value also ensured their rarity: counted in *escudos* (and with 8 *escudos* coins required to be of .92 fineness and equaling the silver 8 *reales* coin in weight: Craig, 1989: 2), the gold to silver value ratio in 1622 was 16:1 (Walton, 1994: 20). Of the two documented gold coins, only L01051.0078 is illustrated in an earlier unpublished report (Flow, 1999: 82). The lack of the arms of Portugal confirms that it is of pre-1580 Spanish peninsular origin.

8. What Would a Spanish Dollar Buy?

While it has been widely quoted that a common worker would need to labor a month to earn one or two Spanish dollars (also called *pesos* and ‘pieces of eight’), each consisting of 8 *reales* of silver, just like today the value of money fluctuated as a result of inflation, recession and geography. As a general indication of income, Walton (1994: xiii) has suggested that in the era of Columbus the richest aristocrat in Spain earned over 80,000 *pesos* a year from his estates, while a typical laborer made about 25 *pesos* annually. In 1622, the year of the Tortugas shipwreck sinking, and in 1623, a master carpenter could make 238 *maravedís* a day (34 *maravedís* = 1 *reale*), a master mason 272 *maravedís*, a laborer 136 *maravedís*, a gardener 25 *maravedís* and a female cook 11 *maravedís* a day.

In the period covering 1600-49, building craftsmen in Madrid earned 20.1 grams of silver per day, by far the



Fig. 12. Mexico City mint; 1 reale denomination (TOR-90-00763-CN). Obverse: the small framed pomegranate symbolizing New Granada, upper-center, clearly depicted. Reverse: a cross whose four extensions each end in an orb, indicative of the Mexico City mint, quarters the lions of León and castles of Castile. Diam. 2.0cm, Grade 3.



Fig. 13. Mexico City mint; 1 reale denomination (TOR-90-00770-CN). Obverse: Habsburg shield; the letters 'o' above 'M' to left of shield signifying the Mexico City mint. Reverse: the lions of León and castles of Castile quartered by an orb-tipped cross, surrounded by a curving quatrefoil. Diam. 2.0cm, Grade 3.



Fig. 14. Mexico City mint; 1 reale denomination (TOR-90-01005-CN). Obverse: crowned Habsburg shield. Reverse: an orb-tipped cross quarters the lions of León and castles of Castile, surrounded by a curving quatrefoil. The legend displays preserved letters 'IARUM ET IN,' representing a section of 'HISPANIARUM ET INDIARUM', with colon punctuation indicating striking during the reign of Philip II. Diam. 2.3cm, Grade 3.

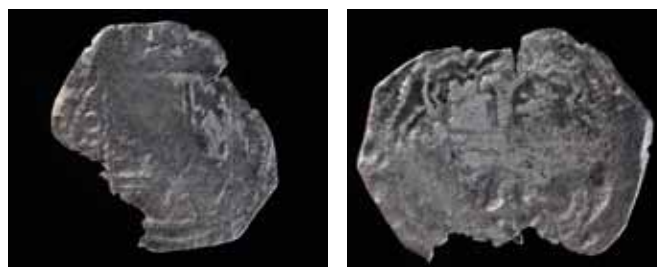


Fig. 15. Mexico City mint; 2 reales denomination (TOR-90-00901-CN). Obverse: mintmark 'oM' to left of crowned Habsburg shield; Roman numeral 'II' denomination value to right of shield. Reverse: eroded lions of León and castles of Castile quartered by an orb-tipped cross, surrounded by a curving quatrefoil. Diam. 2.6cm, Grade 3.



Fig. 16. Mexico City mint; 4 reales denomination (TOR-90-00382-CN). Obverse: mintmark 'oM' to left of shield, above assayer initial 'D.' Kings' ordinal 'III' clearly visible at the 6:00 position. Reverse: lions of León and castles of Castile, quartered by an orb-tipped cross and surrounded by a curving quatrefoil. Diam. 3.1cm, Grade 3.



Fig. 17. Mexico City mint; 4 reales denomination (TOR-90-00999-CN). Obverse: 'oM' to left of Habsburg shield above assayer initial 'A,' representing Antonio de Morales (c. 1608-10). Reverse: lions of León and castles of Castile, quartered by an orb-tipped cross and surrounded by a curving quatrefoil. Diam. 2.5cm. Grade 3.



Fig. 18. Mexico City mint; 4 reales denomination (TOR-90-01025-CN). Obverse: Arabic numeral '4' to right of shield represents denomination value. Reverse: lions of León and castles of Castile, quartered by an orbéd cross and surrounded by a curving quatrefoil. Diam. 3.0cm, Grade 3.



Fig. 19. Mexico City mint; denomination unknown (TOR-90-00894-CN). Obverse: mintmark 'oM' to left of shield; partial date '16--' on outer perimeter, 10:00-11:00 position, confirms that this coin was struck during the reign of Philip III or Philip IV. Reverse: features entirely eroded. Note that the Mexico City mint is the only New World mint whose year of strike appears on the die obverse. The coin diameter indicates this is most probably an upper denomination 4 or 8 reales. Diam. 3.6cm, Grade 5.



Fig. 20. Mexico City mint; 8 reales denomination (TOR-90-00365-CN). Obverse: Arabic numeral '8' to right of shield representing denomination value. Reverse: lions of León and castles of Castile, quartered by an orbéd cross and surrounded by a curving quatrefoil. Diam. 3.3cm, Grade 3.



Fig. 21. Mexico City mint; 8 reales denomination (TOR-90-01000-CN). Obverse: Habsburg shield; assayer unknown. Reverse: eroded lions of León and castles of Castile, quartered by an orbéd cross and surrounded by a curving quatrefoil. Diam. 3.8cm, Grade 3.



Fig. 22. Potosi mint; 1 reale denomination (TOR-90-01003-CN). Obverse: mintmark 'P' to left of shield above assayer initial 'R' representing either Alonso de Rincón (c. 1574-76) or Baltasar Ramos Leceta (Philip II period, c. 1590 to 1598). Reverse: lions of León and castles of Castile quartered by a Greek cross and surrounded by a curving quatrefoil. Diam. 2.2cm, Grade 3.



Fig. 23. Potosi mint; 2 reales denomination (TOR-90-00762-CN). Obverse: crowned Habsburg shield; mintmark 'P' above 'Q' for assayer Agustín de la Quadra (1613-16). Reverse: lions of León and castles of Castile, quartered by a Greek cross and surrounded by a curving quatrefoil. Diam. 2.4cm, Grade 3.

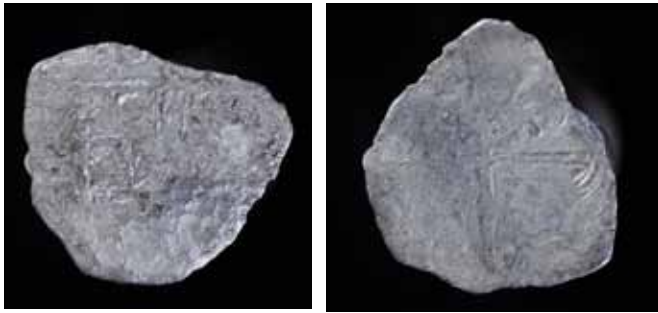


Fig. 24. Potosi mint; 2 reales denomination (TOR-90-00798-CN). Obverse: mintmark 'P' above assayer initial 'T' signifying Juan Ximénez de Tapia (1618 intermittently through 1648). Reverse: lions of León and castles of Castile, quartered by a Greek cross and surrounded by a curving quatrefoil. Diam. 2.1cm, Grade 4.



Fig. 25. Potosi mint; 2 reales denomination (TOR-90-00949-CN). Obverse: 'Philippus' spelled double 'P', a typical feature during the reign of Philip II; 'dot' punctuation in the legend represents a die type that began during an era commonly described as the 'third period' of assayer 'B,' approximated to have commenced c. 1581; lasting until 1586. Assayer 'A,' Juan Alvarez Reinaltes continued the style during his tenure, 1586-89. Reverse: partial lions of León and castles of Castile quartered by a Greek cross, surrounded by a curving quatrefoil. The notably tiny castles also point to this period of assayers 'B' and 'A.' Diam. 2.4cm, Grade 3.

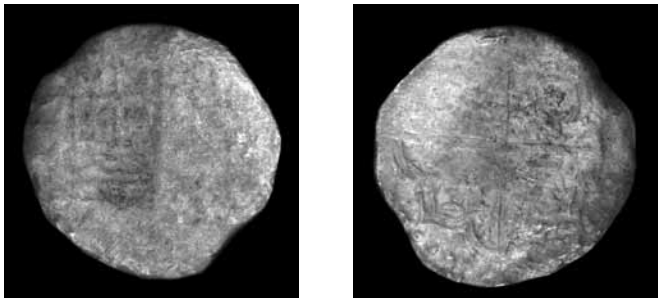


Fig. 26. Potosi mint; 8 reales denomination (TOR-90-00506-CN). Obverse: faint Habsburg shield with the initial 'T' to left for assayer Juan Ximénez de Tapia (1618 intermittently through 1648). Reverse: the lions of León and castles of Castile in inverted positions, quartered by a Greek cross and surrounded by a curving quatrefoil. Diam. 3.4cm, Grade 3.



Fig. 27. Potosi mint; 4 reales denomination (TOR-90-00777-CN). Obverse: mintmark 'P' to left of shield above assayer initial 'R' Baltasar Ramos Leceta (Philip III period, 1598-1612; possibly 'R' over 'B' overstrike/monogram, which would have concluded c. 1610). Reverse: lions of León and castles of Castile, quartered by a Greek cross and surrounded by a curving quatrefoil. Diam. 3.0cm, Grade 3.



Fig. 28. Potosi mint; 4 reales denomination (TOR-90-00800-CN). Obverse: eroded Habsburg shield. Reverse: lions of León and castles of Castile, quartered by a Greek cross and surrounded by a curving quatrefoil. Castles feature a multi-window design reflecting that the die was carved c. 1589-1616 under one of three assayers, 'B,' 'R' or 'Q,' as by the time 'Q' left office in 1616 the multi-window design had been replaced with 'Sevilla' style castles. Diam. 2.6cm, Grade 4.



Fig. 29. Potosi mint; 4 reales denomination (TOR-90-01054-CN). Obverse: Habsburg shield with mintmark 'P' above the initial 'T' for assayer Juan Ximénez de Tapia (1618 intermittently through 1648). Reverse: the lions of León and castles of Castile, quartered by a Greek cross and surrounded by a curving quatrefoil. Diam. 2.3cm, Grade 4.



Fig. 30. Potosi mint; 8 reales denomination (TOR-90-00402-CN). Obverse: crowned Habsburg shield with mintmark 'P' to left, above the initial 'B' signifying assayer Juan de Ballesteros Narváez. Reverse: the lions of León and castles of Castile, quartered by a Greek cross and surrounded by a curving quatrefoil. A Philip II era issue that would have been struck c. 1577-98. Diam. 3.8cm, Grade 3.



Fig. 31. Potosi mint; 8 reales denomination (TOR-90-01009-CN). Obverse: Habsburg shield with mintmark 'P' above the initial 'R' signifying assayer Baltasar Ramos Leceta during the reign of Philip III (1598-1612). Reverse: the lions of León and castles of Castile, quartered by a Greek cross and surrounded by a curving quatrefoil. Diam. 3.5cm, Grade 4.



Fig. 32. Potosi mint; 8 reales denomination (TOR-90-01041-CN). Obverse: mintmark 'P' to left of shield above assayer initial 'Q' for Agustín de la Quadra (1613-16) during the reign of Philip III. Reverse: an eroded Greek cross. Diam. 3.3cm, Grade 3.



Fig. 33. Potosi mint; 8 reales denomination (TOR-90-00422-CN). Obverse: mintmark to left of shield above assayer initial 'M' representing assayer Juan Muñoz (1616-17). The king's ordinal 'III' is visible in the legend, 5:00 position. Reverse: the lions of León and castles of Castile, quartered by a Greek cross and surrounded by a curving quatrefoil. Diam. 3.8cm, Grade 4.



Fig. 34. Potosi mint; 8 reales denomination (TOR-90-00398-CN). Obverse: partially crowned Habsburg shield; mintmark 'P' above assayer initial 'T' signifying Juan Ximénez de Tapia (1618 intermittently through 1648) during the reigns of Philip III and IV. Reverse: the lions of León and castles of Castile, quartered by a Greek cross and surrounded by a curving quatrefoil. Diam. 3.3cm, Grade 3.



Fig. 35. Nuevo Reino de Granada/Cartagena; 8 reales denomination (Tortugas 000628.0058). Obverse: crowned Habsburg shield displaying arms of Portugal; assayer initial 'A' to right of shield. Reverse: the lions of León and castles of Castile, quartered by a Greek cross surrounded by a curving quatrefoil; partial date of '--21' at 11:00 to 12:00 position. This coin is highly important: it is the sole example from the Tortugas wreck bearing both the Portuguese arms and the assayer initial 'A', thus definitively linking it to Alonso Turrillo de Yebra and his Nuevo Reino de Granada mints; it is also one of only four known existing Nuevo Reino de Granada coins struck with the date 1621, the first year of issue for Turrillo's mints. The other three known Turrillo coins struck 1621 were recovered from the Atocha shipwreck. Diam. 4.2cm, Grade 2. Photo: courtesy of Dr. Susan Pearson and Bill Pearson.



Fig. 36. Unidentified mint; 2 reales denomination (TOR-90-00567-CN). Obverse: upper section of Portuguese arms within the Habsburg shield, indicative of either a Spanish peninsular mint origin or one of Turrillo's Nuevo Reino de Granada mints; 'PH' for 'PHILIPVS' visible in the legend. Reverse: an eroded Greek cross which originally quartered the lions of León and castles of Castile. Diam. 2.0cm, Grade 3.



Fig. 37. Unidentified mint; 4 reales denomination (TOR-90-00911-CN). Obverse: faint Habsburg shield with visible Portuguese arms, indicative of either a Spanish peninsular mint origin or one of Turrillo's Nuevo Reino de Granada mints. Denomination value 'IIII' located vertically to right of shield. Reverse: an eroded Greek cross originally quartered the lions of León and the castles of Castile. Diam. 2.5cm, Grade 4.



Fig. 38. Unidentified mint; 4 reales denomination (TOR-90-00784-CN). Obverse: details eroded. Reverse: the lions of León and the castles of Castile, quartered by a Greek cross surrounded by a curving quatrefoil; partial date of '162-' on the outer left edge, 11:00 position. The style of the lions and castles is indicative of either a Spanish peninsular mint or one of Turrillo's Nuevo Reino de Granada mints. Diam. 2.7cm, Grade 3.



Fig. 39. Unidentified mint; 4 or 8 reales denomination (TOR-90-00813-CN). Obverse: details entirely eroded. Reverse: the lions of León and castles of Castile, quartered by a Greek cross. Elaborate open-mouthed lions suggest either a Spanish peninsular mint origin or one of Turrillo's Nuevo Reino de Granada mints. Diam. 2.4cm, Grade 4.



Fig. 40. Unidentified mint; 8 reales denomination (TOR-90-01014-CN). Obverse: partially crowned Habsburg shield bearing Portuguese arms. The Portuguese arms suggest either a Spanish peninsular mint origin or one of Turrillo's Nuevo Reino de Granada mints. Reverse: a partial Greek cross surrounded by a curving quatrefoil. Diam. 3.0cm, Grade 4.



Fig. 41. Unidentified mint; 8 reales denomination (TOR-90-00517-CN). Obverse: eroded. Reverse: lions of León and castles of Castile quartered by a Greek cross surrounded by a curving quatrefoil; partial date of '162-' at 11:00 position. The elaborate open-mouthed lions and rendering of the castles suggest either a Spanish peninsular origin or production in one of Turrillo's Nuevo Reino de Granada mints. Diam. 3.5cm, Grade 3.



Fig. 42. Unidentified mint; 8 reales denomination (TOR-90-00410-CN). Obverse: crowned Habsburg shield bearing Portuguese arms; the initial 'S' indicative of either the Seville or Bogota mints. Reverse: lions of León and Othe castles of Castile quartered by a Greek cross. Diam. 3.0cm, Grade 4.

highest wage across Europe (compared to 12.6 ounces of silver in Antwerp in the same date range, the second largest wage bracket). Building laborers, meanwhile, made 8.0 grams of silver per day in Madrid (Allen, 2001: 416). In these years the annual 'subsistence basket' has been estimated at costing 439 grams of silver in Madrid, 391 grams of silver in Mexico, 201 grams in London and 152 grams in Amsterdam (Allen *et al.*, 2011: 44).

The Archivo General de Indias Lima reveals that in 1591 20,200 *pesos* purchased the valuable and prestigious office of Potosi mint assayer for one Juan de Ballesteros Narváez (Dym, 1989: 83), while at the same mint in 1598 the annual salaries for key mint officials in *pesos* were 3,500 for a treasurer, 1,800 for an assayer, 1,400 for a weight master and 150 for a master smelter (Menzel, 2004: 7). Finally, an example depictive of the Americas in the later part of the 17th century, embedded in some pirate's Articles of agreement listed in John Esquemeling's *The Buccaneers of America* (1967: 59), states that "Lastly, they stipulate in writing what recompense or reward each one ought to have, that is either wounded or maimed in his body, suffering the loss of any limb, by that voyage. Thus they order for the loss of a right arm six hundred pieces of eight, or six slaves; for the loss of a left arm five hundred pieces of eight, or five slaves; for a right leg five hundred pieces of eight, or five slaves..."

9. Conclusion

There are no mints, timeframes or assayers represented in the Tortugas shipwreck coin assemblage that have not been documented amongst the *Nuestra Señora de Atocha* and *Santa Margarita* shipwreck collections. The coins examined in 2011 are consistent with those found on the *Atocha* and *Margarita*. Thus, assayer 'D' is the final assayer to represent the Mexico City mint, assayer 'T' is the final assayer from the Potosi mint and assayer 'A' is the only operative to represent the mints of Nuevo Reino de Granada. Each of

these officers held their posts immediately previous to and beyond the years when the 1622 fleet vessels sank. Because Philip IV had only been king for the short period of 17 months before the fleet disaster of 6 September, it is to be expected that the majority of the coins lost on these ships would date from the reign of King Philip III.

The latest date to appear on a Tortugas shipwreck coin is (16)21, appearing on the single example to display both the arms of Portugal and the assayer initial 'A' (Fig. 35). The *Atocha* and *Margarita* collections have both produced coins featuring the ordinal 'IIII' and coins dated '1622', mostly from Spanish American mints, but even a few coins minted in Seville. While exceedingly scarce relative to the *Atocha/Margarita* collections as a whole, amongst Old World coins in general those from Seville have the greatest representation, which is not surprising as the port of Seville was the hub of all maritime commerce to and from the 'Indies'.²

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Notes

1. See: <http://www.segoviamint.org/english/history.htm>.
2. For further research related to coins from the 1622 Tierra Firme and other coins of the period, see: Tedesco, C., *Treasure Coins of the Nuestra Señora de Atocha and Santa Margarita* (SeaStory Press, 2010); Tedesco, C., *Pieces of Eight - Treasure Coins of the 1622 Shipwrecks Nuestra Señora de Atocha, Santa Margarita, and the Portuguese Carrack São José* (SeaStory Press, forthcoming); and Tedesco, C., 'The Treasures Within the Treasure', *X-Ray International Dive Lifestyle Magazine* (April 2010).

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