DEPARTURE

The accounts and circumstances relating to Drake's departure from Nova Albion pose various questions concerning date and time, Indian legend, visit to the Farallones, disposition of Tello's bark, and men left behind.

Only three accounts give the date; two of these, Monson's and Stow's, give July 25th. Oddly, Famous Voyage gives none, although it is a fairly detailed account. World Encompassed, however, not only gives the 25th, but two other dates connected with the departure: the 23rd and 24th. From the context in which they are given there is no reason to question their validity. From this account the actual date of departure from the mainland of Nova Albion appears to be July 23rd, but since the next paragraph states that the Farallones, called by the English the "Ilands of Saint James," were fell with on July 24th, one is left to wonder why it took two days to sail a distance of only about 20 nautical miles.

Reconstructing the departure, the tide table shows a high tide for July 23rd (August 2nd, New Style) as occurring at 11:25 a.m., with a height of 4.3 feet. Drake had to leave on the ebb as soon as the tide turned. Converting this time to the apparent time that Drake would have been keeping from noon to noon transits of the sun, his time for the change of tide would have been 11:07. Thus, an hour before noon, the Golden Hind would have begun hauling and kedging out of Drake's Cove to drive with the tide out of the estero and into the bay outside. Shortly after noon she should have been standing out to sea to begin her passage across the Pacific.

World Encompassed records that the Indians took a sorrowful farewell, but being loath to leave the Englishmen, they presently ran to the top of the hills to keep them in sight as long as they could, building ceremonial fires before and behind them and on each side. (1) One would suppose that some tradition of Drake's visit survived with the Coast Miwok tribes, and perhaps in an offhand way it had. Heizer points out that a belief among them and some Pomo tribes concerning the dead should be taken into account; they believed that the home of the dead was associated with Point Reyes. He comments:

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1. See p. 170, supra.

> .... The belief is that this seaward projection is associated with the dead, who follow a string leading out through the surf to the land of the dead. It is barely possible that this belief, which is quite clearly of Coast Miwok origin, is a legendary reminiscense of Drake's visit which seems to have been, in part at least, interpreted by the Indians as the return of the dead. It may be superfluous to mention that no Indian has ever stated his idea of the origin of this legend, or of its association with the visit of Drake's party; yet there remains the possibility that the occurrence made an impression so deep that Point Reyes became in this way associated with the home of the dead in the west, from which the English were supposed to have come and gone. If this tradition were associated with Drake, it would, of course, signify that his anchorage was behind Point Reyes in Drake's Bay. On the other hand, this remarkable point which juts far out into the ocean is a prominent feature of Coast Miwok territory, and by reason of its unique topography might have been associated with local ceremonial beliefs. (1)

In a footnote to the above regarding the unique quality of Point Reyes, Heizer points out that it was not uncommon for the Indians of California to attach legendary significance to such features and cites Mount Diablo as an example. Assuming that Point Reyes had acquired a legendary association with the dead long before Drake, then of course they were preconditioned to believe that the English were their own deceased returning when they saw the two ships ghosting in under sail from around the point.

Whatever may have been the case, however, there is one point about the story that could not have been as meaningful to Heizer in 1947 as it is to us today. This is the belief that the dead followed a string out through the surf to Point Reyes. From Drake's Cove inside the Estero, this would have been precisely what Drake did in the eyes of the Indians, who apparently up to the very end never accepted the English as mortal. To begin with, the Golden Hind had to be hauled out of the cove to an anchor, probably her kedge, and once in the stream she kedged out with the tide across the bar with its breakers on either side.

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1. Heizer, Francis Drake and the California Indians, p. 277.

To an Indian, the mechanics of the operation were not likely to have been understood. As he first witnessed it at the cove, he was probably unaware of the anchor that would have been laid outside by boat sometime beforehand, and he could see only that the ship appeared to follow the cable or "string" out of the cove as the Englishmen hove it on board. Once in the stream outside the cove, the ship's boat would have picked up the anchor as soon as the tide turned, and with it slung beneath her, ready to be dropped at a moment's notice, she would have preceded the Golden Hind. The anchor is never seen, and the labors of the boat crew can easily be taken to be unrelated to the ship. During this whole time, however, the anchor cable can be seen leading from the water back to the ship where to all appearances it is still following the "string" as it moves out of the estero and through the breakers to the bay outside.

Although it must be allowed that we are dealing with a legend which is difficult or impossible to substantiate, it is singularly curious that the Coast Miwok should have believed that the dead followed a string into the sea to reach Point Reyes when it is perfectly accessible overland. The story is much less credible for the neighboring Pomo tribes unless some of them had also witnessed this at Drakes Bay.

Drake's course leaving the coast must necessarily be to the southwest. Therefore, on leaving Drakes Estero he would have passed close by the eastern end of Point Reyes, and it may not be too unlikely that to the Indians at the estero he disappeared from sight, a matter misconstrued by them to mean that he had returned to the land of the dead from whence he had come. (1)

From World Encompassed we are told that:

> Not farre without this harborough, did lye certain Ilands (we called them the Ilands of Saint James) hauing on them plentifull and great supply of Seals and birds, with one of

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1. John Stow gives Drake's course from Nova Albion as "from thence setting his course southwest." See p. 99, supra. Logically, the initial course would have been set in general direction of destination. However, even if he had intended to first examine the Farallones before leaving the coast, his first objective would be the North Farallones, and thus he would still pass close by the east end of Point Reyes.

> which wee fell, July 24. whereon we found such prouision as might competently serue our turne for awhile: we departed againe the day next following, viz. July 25...."

As mentioned previously, the distance to the islands from the mouth of Drakes Estero is only some 20 nautical miles. It is possible, of course, that Drake did not reach these on the same day he left Drakes Bay, but the departure from mainland Nova Albion on the 23rd, and the falling in with the islands on the 24th is probably best explained by concluding that Drake had changed over to the nautical practice of dating the log from noon to noon instead of from midnight to midnight as for civil days. At sea, the ship's daily progress was reckoned from noon to noon, as it still is, but now the ship's day carries only one date. In the sixteenth century and for some time afterwards, the date for the following day was brought forward and begun at noon rather than at midnight. The name of the day of the week remained unchanged throughout the day, however.(1) Some hint that this was the case in this situation is contained in the statement that "we departed againe the day next following, viz. July 25."(2) Logically, the day of departure from the mainland was the time to set the normal sea routine; by noon of the 23rd, Drake was undoubtedly securing for sea and standing out of Drakes Bay with no intention of spending much time with the Farallones.

Sometime in the late afternoon, Drake should have reached the islands. The description of the quantities of birds and seals suggests that the entire group was reconnoitered, either at this time, or perhaps previously using the small bark. It was done more likely on this occasion, and the value of doing so is shown by the fact that the islands provide excellent navigational aid for approaching this part of the coast. It is probable that Drake took the trouble to plot their position as well as to make drawings or views of them and their relationship to Point Reyes.

The island with which he "fell" was most likely the Southeast Farallon, the largest of the group. The North Farallones are a distinct group of small, precipitous, rocky islets, while the Middle Farallon is too insignificant to consider, being a single black rock 50 yards in

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1. Waters, The Art of Navigation, p. 76 and 579.
2. See p. 170, supra.

diameter and 20 feet high,[1] though it may have been slightly larger at that time. Opportunity was apparently taken to land and obtain some of the birds, eggs, and seals, which even today abound on the island. It must be assumed that proper victualling had been completed on the mainland before departure, and that these merely supplemented the regular salt provision with enough fresh meat to last for a few days.

The water surrounding the Southeast Farallon is shoal enough to have allowed Drake to anchor overnight in six to ten fathoms within a half mile of the island; whether he anchored or hove-to is not made clear. Fog may have closed in with the coming of dark, or he may have been reluctant to leave at night not knowing what other islands or rocks might lie ahead. On the basis of nautical dating, the statement, "we departed againe the day next following, viz. July 25," supported particularly by Stow's use of the same date, tells us that Drake did not leave the island until after noon. The matter of getting a latitude of this island supports this view. Either he waited to get an observation from ashore on the island or from the Golden Hind.[2]

World Encompassed fittingly closes this reconstruction of Drake's sojourn on the Northwest Coast of America:

> ... our Generall now considering that the extremity of the cold not only continued, but increased, the Sunne being gone farther from vs, and that the wind blowing still (as it did at first) from the Northwest, cut off all hope of finding a passage through these Northerne parts, thought it necessarie to loose no time; and therefore with generall consent of all, bent his course directly to runne with the Ilands of the Moluccas.

The trans-Pacific voyage was culminated the 3rd of November when "wee came in sight of the Ilands of the Moluccas, as we desired." Here, at the island of Ternate, a trade agreement was made with the reigning king of the island initiating English trade in the Far East. The Golden Hind

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1. U. S. Coast Pilot, Pacific Coast, 1917, p. 84.
2. For a ship sailing on a parallel of latitude to close with Point Reyes, the first land sighted could well be the Farallones, and a knowledge of their latitude therefore becomes a matter of prime importance.

returned home in the fall of the following year, Monday, September 26, 1580; the second ship to circumnavigate the globe and with Drake the first commander to complete a circumnavigation.

The fate of the small bark that Drake brought from Central America and the question of whether or not any of his men remained behind at Nova Albion is not clarified by the accounts. Another question is whether some of the treasure was left behind.

None of the English accounts mention anything at all of Drake's second vessel, and in an account as detailed as World Encompassed, one would think that some mention or even an allusion to it would appear. It was apparently not forgotten by the Spaniards, however, and the question of its fate was apparently put to John Drake when he made his second deposition at Lima, Peru. His statement records only that it was left at Nova Albion and nothing more. (1) From an archaeological standpoint, the remains of the vessel would provide almost certain evidence of Drake's visit, and yet there is no good reason to expect that they will ever be found. Ordinarily, Drake would have broken up an unwanted vessel for firewood and its ironwork as he did on other occasions during this voyage, and the same fate would almost certainly have befallen this one. (2) In John Drake's deposition, he did not hesitate to say that this was done to two vessels abandoned on the Argentine coast, one of which was in Drake's fleet and the other a captured Portuguese ship. Was the little bark from Central America then left intact, and if so, for what purpose?

In regard to the question of people being left at Nova Albion, there is an extremely curious discrepancy in the number of persons comprising Drake's company when he was last seen on the coast of Mexico and when the company was again recorded in the East Indies. No deaths are known to have occurred in the interval, and although there may have been

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1. See pp. 91, 92, supra.
2. At Seal Bay, the 50 ton fly boat, Swanne, was broken up for her ironwork and for firewood. Shortly after departing this place, the canter, Christopher, was abandoned and left to drift on the sea. At Port Saint Julian, the 100 ton Portuguese prize, Mary, was broken up for firewood, according to John Drake's second deposition.

some, it is unreasonable that they would account entirely for the discrepancy. From the best of the Spanish sources, Drake had about 87 persons with him when he left the Mexican coast, (1) and yet, on the occasion of the wreck in the Celebes, World Encompassed gives the number of persons then on board as "58 in all." Prior to this, the negro woman and two negro men were left at one of the islands in the Celebes where the Golden Hind was overhauled, thus making 61 persons accounted for. John Drake confirms the reduction in numbers in his first deposition when he stated that Drake departed from Ternate with 60 men. (2)

Though it may appear that a number of people were left at Ternate to set up an English factory for trading purposes, for example, it is notable that when the first English expedition since Drake's visit returned to Ternate and the Moluccas under Sir Henry Middleton in 1605, no mention of these men was made by Middleton or the reigning king, whose father, Babu, reigned when Drake was there. The son mentioned Drake in a letter sent to King James with Middleton, lamenting that the English had not returned as he had expected them to. (3) There is one more important incongruity to the matter of people being left here. Thomas Cavendish's expedition of 1586-88 nearly duplicated Drake's voyage and was the first English expedition to return to the East Indies. Cavendish passed close by the Moluccas but did not call there, and his account makes no mention of any of Drake's men being there.

What happened to these 20 or so people? Was John Drake covering up something when he claimed they were left at Ternate? With so many enemies of the English in the area, these men would have been in an extremely precarious position, and even though the king of the island appeared to be friendly, he was not too much trusted by Drake's companions.

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1. Nuttall, New Light on Drake, pp. 147, 177, 181, 186, 198, 302, 303, and 351.
2. See "John Drake's Second Deposition" in H. R. Wagner, Sir Francis Drake's Voyage, note 36, p. 501.
3. Foster, The Voyage of Sir Henry Middleton, pp. 61-63.

Munro-Frazer in his History of Marin County, [1] cites an Indian legend told by the Nicasios in which there may be some slight clue to the discrepancy in the accounting of Drake's personnel. It is not likely that Drake, per se, could have been remembered through the years by the Indians except by his mere presence as an unusual visitor.

> .... One of these Indians named Theognis, who is reputed to have been 135 years old when he made the statement, says that Drake presented the Indians with a dog, some young pigs, and seeds of several species of grain. Some biscuit were also given to them, which they planted, believing in their simple ignorance that they would spring to life and bear similar bread. The Indians also state that some of Drake's men deserted him here, making their way into the country, became amalgamated with the aboriginals to such an extent that all traces of them were lost, except possibly a few names which are to be found among the Indians, "Winnemucca," for instance, is a purely Celtic word, and the names, "Nicasio," "Novato," and others are counterparts, with slight variations, of names of places in the island of Cyprus.

Heizer rejected the story on very good grounds; specifically, because the gifts mentioned by Theognis could almost certainly be traced to a Spanish expedition in 1793 which attempted unsuccessfully to form a settlement at Bodega Bay. He cites a statement by Felipe Goycoechea, one of those concerned in the attempt to found the colony, who later in the year said that he had seen some pigs and chickens which the Spanish had left there with the Indians.[2]

It is very likely true that Theognis was mistaken in his story of Drake, but there may be a shred of truth to a story of deserters told by other Indians. There is good reason to believe that at least one person did remain behind. The possibility that others did also should not be entirely rejected even though the Nicasio Indian tradition may be

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1. J. P. Munro-Frazer, ed., History of Marin County, pp. 96-97.
2. See Henry R. Wagner, "The Last Spanish Exploration of the Northwest Coast and the Attempt to Colonize Bodega Bay," California Historical Society Quarterly, X, (1931), p. 331.

entirely mistaken or merely a distorted recollection of Drake's journey inland, or even of Cermeño's visit.

Aside from the Indian legend, there is good reason to conjecture that the missing members of Drake's crew remained at Nova Albion, although it is not likely that they were deserters, whose chances of surviving and getting home were extremely slim. The story of deserters is undoubtedly an assumption made by the interpreter. But if a few Englishmen remained behind for other reasons, consider the circumstances under which Drake came to California. The Golden Hind was heavily laden, and some of Drake's company was accommodated in a small bark. Previously, they had been accommodated in a pinnace during the passage along the west coast of South and Central America. For the Pacific crossing, could Drake have accommodated these additional people in the Golden Hind with the additional burden of extra water and provisions for them? Could he have done this without leaving a part of the treasure behind, and looking farther ahead, would he still have capacity to load a significant tonnage of spices in the Moluccas without parting with equal weight of goods in trade or leaving people there? These are questions that surely must have passed through Drake's mind in Nova Albion. As for what actually occurred by way of trade in the Moluccas, we do know that it is recorded in Anonymous Narrative that he obtained six tons of cloves and according to John Drake, he traded no gold or silver. (1)

The Golden Hind must be likened to a balance scale, on one side of which is her maximum safe loaded displacement or capacity -- on the other, the total burden of people, victuals, water, stores, armament, cargo of trade goods and treasure. We may be fairly certain that no provision was made on the ship for the extra burden of men and goods carried in the bark when Drake sailed for the Northwest, and it was apparently intended that the two vessels would stay together the whole time, either through the Northwest Passage or across the Pacific. (2) In addition,

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1. John Drake said that the quantity was "ten tons of spices, cloves, ginger and pepper that they had obtained by exchange in the Moluccas." See Nuttall, New Light on Drake, p. 34; also pp. 32 and 52.
2. One of Drake's prisoners taken at the Isle of Caño, Cornieles Lambert, stated that "... he was obliged to take Rodrigo Tello's bark with him, for they would have to take to the open sea for more than

the total number of persons was undoubtedly more than originally planned to be accommodated on the Golden Hind alone, since Drake's fleet was reduced from its original five ships to three before passing through the Strait of Magellan into the Pacific. (1)

Assuming that some of Drake's company did part at Nova Albion, one has then to weigh the question of whether they stayed there or departed independently in the bark to make their best way home. Considering the first possibility, it would not be too farfetched for Drake to have induced some to stay a season and wait for the return of another expedition; their presence, it might be argued, would have a beneficial effect in supporting the English claim to Nova Albion. Also, if men were left, it makes a certain amount of sense to leave some of the treasure to provide capacity for spices or other goods to be obtained in the Moluccas. This would have been the heavy, and least valuable, silver. Also, there can be little doubt that the entire company had an interest in the treasure; to leave some would have ensured them of their share as well as provide additional incentive to return.

Wagner points out that as soon as Drake returned home he broached the subject of another expedition, and on his first visit to London he arranged to go back to the Moluccas with six ships and bring a vastly profitable return to his subscribers within a year. (2) Early in 1581 a defi-

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(Cont'd.) seventy or eighty days. They were going to strengthen the bark with a solid wale so as to enable her to carry more sail and be fit for the long voyage she would have to make in order to reach the Moluccas." See Nuttall, New Light on Drake, p. 184.

1. Drake's fleet originally set out with 150 men and 14 boys. Apportioning this number among the five ships gives an approximate division as follows: Golden Hind, 120 tons, 18 guns and 60 men; Elizabeth, 80 tons, 16 guns and 54 men; Marigold, 30 tons, 6 guns and 22 men; Swan, stores ship, 50 tons, 5 guns and 20 men; Benedict, pinnace, 12 tons, 1 gun and 8 men. Of these, the Swan and Benedict were disposed of, their goods and men being taken aboard the remaining three ships.
2. See Wagner, Sir Francis Drake's Voyage, p. 213. See also E.G.R. Taylor, The Troublesome Voyage of Captain Edward Fenton, footnote 1, p. 5.

nite project was organized by the Earl of Leicester, consisting of ten ships to be commanded by Drake which were to go out to the Moluccas by way of the Cape of Good Hope. Again, a return to the subscribers was promised within a year. However, after numerous delays and changes in organization, during which Drake was forbidden to leave England by the Queen, the command passed to Edward Fenton, and the expedition did not sail until June 2, 1582. John Drake in command of a 40 ton bark, the Francis, contributed by Francis Drake, and a number of the crew from the Golden Hind were included in the expedition.

Fenton ultimately abandoned the plan of going to the Moluccas, and the project was terminated off the coast of Brazil with the intention of returning to England. Now, however, there occurred a curious circumstance for which there is no positive explanation. John Drake, on learning of Fenton's intention to discontinue the voyage, deserted him to continue alone down the South American coast with the Francis and seventeen men and a boy. Undoubtedly, he contemplated passing around South America to make a raid on the coast of Peru. Whether he planned to continue on to Nova Albion can only be conjectured, but if that was his intention, it was then in his power to do so. All that can be said is that John Drake was very guarded in his statements about Nova Albion in the depositions he made to his Spanish captors.

Although there is nothing to indicate that there were any plans to return to Nova Albion, either in Drake's proposals or in the plans for the Earl of Leicester's voyage, the possibility that a detachment or a single ship may have been secretly designated to go there from the Moluccas by way of the Manila galleon route cannot be ruled out. Fenton's instructions, in addition to requiring him to call at the Moluccas, evidently permitted him to make a discovery of China and Cathay for trade as far as the fortieth parallel. (1) Thus, from the knowledge of

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1. The opening paragraph of Fenton's instructions, issued 9 April, 1582, states "... for the order to be observed in the voyage recommended to him for the East Indies and Cathay." Item 10 of the instructions states that "you shall not passe to the Northeastward the fortie degree of latitude at the most." The opening paragraph of his Chaplain's official narrative confirms the intent to make a general discovery of China and Cathay as well as the islands of the East

the North Pacific navigation gained from the Spaniards as well as Drake's own experience, it would not have appeared to be any great matter for a ship, once in the height of the prevailing westerlies, to cross over to Nova Albion and return to the Moluccas by the Northeast Trades in the lower latitudes. It must be realized that to have given the slightest hint would have jeopardized either personnel or treasure left at Nova Albion, since the Spanish were regularly plying the route. It would have been a relatively simple matter to dispatch one of their galleons to search the West Coast in the course of their regular navigation.

On the Cavendish expedition, which sailed from England in 1586, in emulation of Drake's voyage of circumnavigation, (1) there occurred another curious circumstance which has no explanation. After taking the rich Manila galleon, Santa Anna on November 4, 1587, off Cape San Lucas at the tip of Baja California, one of Cavendish's two ships, the Content, 60 tons, apparently commanded by John Brewer, who was one of Drake's men from the Golden Hind, mysteriously disappeared in the night when she failed to join Cavendish from the road where they had left the Santa Anna. One of the Spanish pilots taken by Cavendish speculated that the Content had gone on to the Northwest Passage; nothing further was heard of her. Stress of weather could not have been the cause of separation, though it is possible that there was a secret plan agreed upon beforehand. Was it possible here also that the Content had gone on to Nova Albion to rescue persons or recover treasure left there by Drake?

A company of men left at Nova Albion would by no means have been entirely abandoned. There was still the bark by which all or a part of them could have returned to civilization. Although the Spanish were thoroughly alarmed by Drake's raid they were thinly spread along the coast, and it would not have been too difficult to elude them. The men could have departed from Nova Albion at the same time as Drake or waited for a pre-arranged meeting with an expedition promised to follow, failing which, they might then make their way home.

(Cont'd.) Indies. See Taylor, The Troublesome Voyage of Captain Edward Fenton, pp. 50, 54, and 59-63.

1. Francis Pretty,"The Voyage of Thomas Candish About the Circumference of the Whole Earth," 1586-8, Hakluyt, Principal Voy.,1600 ed.

Another factor to consider in this matter is that Drake was in a peculiar and uncomfortable position. He was alone at the back of the world, so to speak, heading up a tremendously costly expedition with a great wealth in the hold of his ship and with no communication at all with his homeland. His last contact with the civilized world saw him disappear into the Pacific Ocean. If the Golden Hind disappeared on the trackless Pacific, the world, his backers, and family would never know of his final course of action unless there was someone to carry word of him from this point back to civilization.

It was previously mentioned that at least one person seems to have remained behind at Nova Albion. This was a man named N. de Morena, said to have been a pilot with Drake, whose story was passed along to Father Jeronimo de Zárate Salmeron from Father Antonio de la Ascension, who accompanied Vizcaino to California in 1602-03. The story was published by Fr. Salmeron in his "Relation of Events in California and New Mexico up to 1626." There is a curious ring to Morena's story which in some respects seems to be covering up Drake's activity at Nova Albion, since he merely stated, in effect, that he was so ill that he was put ashore to see if the land might give him new life. Following his recovery in a few days, he walked back to Mexico in four years time. It is fairly certain that Drake made no landings other than at Drakes Bay, and he remained here 36 days. If Morena had been put ashore anywhere, it was certainly here, a fact that is borne out in the context of his account, though he gives no hint that Drake remained there for any time or purpose. At the conclusion of the brief discourse of his travels, he stated that "he must go to get acquainted with the court of England." To get home at all would be enough for most men, but was there something more beyond his own remarkable tale to be related to the English court?

The following account of Morena's is based on the translation published in The Land of Sunshine, February, 1900. (1) Editorial comment and interpretation as published is omitted; the footnotes are added.

The Father Fray Antonio de la Ascension, a friar of

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1. Land of Sunshine, Charles F. Lummis, ed., XII:3 (February, 1900), p. 184-5.

the Barefoot Carmelites, one of the three who went with Sebastian Vizcaino to the discovery of CapeMendocino, gave me this narrative as a thing secure, wherefore I put his name here; and he says:

A foreign pilot, named N. de Morena, (1) who steered the Englishman from the sea of the North to that of the South through the strait of Anian, (2) gave this narrative to Captain Rodrigo del Rio, Governor that then was of New Galicia. When the Captain Francisco Draque returned to his country, this pilot -- who had come emerging from the Strait in his company -- was very sick, and more dead than alive; and to see if the airs of the land would give him life, as a dead thing they put him ashore. The which in a few days recovered health and walked through that land for the space of four years. He came forth to N. M., and from there to Santa Barbara in Chihuahua, and then passed to the mines of Sombrerete in search of said Rodrigo del Rio. And the said pilot recounted to him the following:

Having given a long narrative of his much wandering, he told him how the said Englishman, Francis Drake, in the stopping place of the Strait of Anian, (3) had put him ashore,

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1. Some confirmation that this man had actually been with Drake is contained in a statement by Gaspar de Vargas, Alcalde, or Mayor, of the port of Guatulco, Mexico, written April 13, 1579, on the day Drake entered the port; "...At dusk I returned to the town for the third time to ascertain whether I could obtain some information as to who the men are. All that I have been able to find out is that the men on the ship belonging to Juan de Madrid think that the name of the pilot of the ship is Morera." See Nuttall, New Light on Drake, p. 214. Foreign pilots were commonly employed on English ships at that time, particularly if they had some acquaintance with the waters to be sailed in. Since Morena, or Morera, as the case may be, assisted in piloting through the Strait of Magellan, he may have been hired on in England.
2. This is a mistake for the Strait of Magellan.
3. The word in the Spanish text of the account is paraje (stopping place) but was taken by the translator to be a misprint for pasaje (passage).

for the reason aforesaid, and that after he had recovered health he had travelled through divers lands, through many provinces, more than 500 leagues [1] of mainland, until he came far enough to catch sight of an arm of the sea which divides the lands of New Mexico from another very great land which is on the side of the West. [2] And on the coast of that sea were many and great settlements, among the which is a nation of white people, the which are accustomed to go horseback, and fight with lance and dagger. It is not known what nation this may be. The said Father Fray Antonio says he believes that they are Muscovites. I say that when we see them we shall know who they are. This pilot told how this arm of the sea runs from north to south; and that it seemed to him it went on to the northward to connect with the harbor where the Englishman had put him ashore. And that on that sea coast he had seen many and good harbors and great inlets; and that from the point where they put him ashore he would venture to get to Spain in 40 days in a good ship's-tender; and that he must go to get acquainted with the Court of England.

He offered himself to take the said Rodrigo del Rio to the stopping place of the arm of the sea which he discovered;

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1. It is an interesting point that by dividing the short land league used by Cermeño for his inland measures of distance (approximately 2,400 yards per league) into the actual distance from Drakes Bay down the coast and then inland to the head of the Gulf of Mexico gives a quotient very near the 500 leagues stated by Morena (498 leagues, more or less). This league appears to have its basis in the measure of distance used by the Celts of Gaul, the leuga or leuca, which was equal to a Roman mile and a half; thus 7,200 feet or 2,400 yards. See. M. Oppenheim, ed., Naval Tracts of Sir William Monson, Vol IV, p. 159. This short league can also be identified in the records of Pedro de Unamuno and Vizcaino. See Aker, The Cermeño Expedition at Drakes Bay, App. VII.
2. The Gulf of California, referred to by the Spanish as Mar Rojo (Red Sea). The land "on the side of the west" was Baja California.

and said that he could easily cross him over to the other side. (1)

> This arm of the sea is held to be an assured thing. It is that of the Californias, called Mar Rojo; and the land which is on the other side is that of the Californias. As they told me it, so I set it down, without quitting nor adding anything of my own part.

Morena may have been a deserter from Drake's camp, but if so, it seems hardly likely that he would want to go on to the Court of England, nor would there be any good reason for concealing desertion from the Spanish. As an aside, it is evident that Morena would have discovered the Golden Gate and San Francisco Bay, and from his description it is clear that the point where Drake had left him was very close by the "stopping place," or terminus, of what Morena assumed to be the Strait of Anian, from which he judged that he could reach Spain in 40 days. It may have been a mistake for him to mention this to the Spanish, as in the final analysis this was exactly what they did not want. Hopefully, Morena's full story may come to light one day.

There is one final mystery which may have some foundation with Nova Albion. This is the story of Peter Carder, (2) who related that he and seven other men became separated from Drake by foul weather off the tip of South America after passing through the Strait of Magellan.

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1. This passage leaves a question whether Morena was referring to the "stopping place" as the head of what we know today as the Gulf of California or to what he supposed its head might be at San Francisco Bay. Logic points to San Francisco Bay since Morena was of the opinion that the gulf, or "arm of the sea," might go on to where Drake left him, and he therefore could not have regarded the existing terminus as the "stopping place." Before continuing on his way to Mexico, he was bound to have seen that the southern part of San Francisco Bay continued an indeterminate distance to the south between two parallel ranges of mountains, thus giving the impression later on crossing the head of the gulf that it might connect.
2. Samuel Purchas, His Pilgrims, Part IV, 1625. See also Nuttall, New Light on Drake, p. 42.

This incident would have occurred in October of 1578 on one of the occasions when Drake was seeking fresh water among the islands below the straits after the loss of the Marigold and separation from the Elizabeth. According to Carder's account, Drake had commanded him and his companions to man "our small Pinnace or shallop" to wait upon the ship. In the night, foul weather suddenly arose, causing them to lose sight of the ship. They were unable to rejoin and subsequently managed to regain the strait and return part way along the South American coast where a series of misadventures took their toll of Carder's companions and ultimately resulted in the loss of the pinnace. Carder alone survived and spent some time with Indians and then with the Portuguese, for whom he worked as a seaman. His employment led to his capture by an English expedition which returned him to England at the end of November, 1586.

That, very briefly is Carder's story. In his concluding words, he stated the following:

> My strange adventures and long living among cruell savages being known to the right honourable the Lord Charles Howard, Lord High Admirall of England, he certified to the Queen's Majesty thereof with speech and brought me to her presence at White Hall, where it pleased her to talk with me a longe houre's space of my travailes and wonderfull escape and among other things of the manner of Master Dowties execution, and afterwards bestowed twenty-two angels on me, willing my Lord to have consideration of me, with many gracious words I was dismissed, humbly thanking the Almighty for my miraculous preservation and safe return to my native Countrie.

There is a catch to Carder's story, however. It is exceedingly strange that no mention is made in any other account of the loss of these men and the pinnace, nor is any mention made of a pinnace accompanying Drake's fleet through the strait. Under the circumstances of the weather which followed Drake's entry into the Pacific, it is extremely difficult to believe that an open boat could have survived towing behind the Golden Hind, and since it was said to be of five tons, it was too large to be carried on board. There would have been no opportunity for setting up one of the prefabricated pinnaces after passing through the straits. Is it possible then that there was much more to attract the Lord High Admiral's attention than that which was related and that the

pinnace might instead have been the bark that had been left at Nova Albion? Assuming that Carder may have been attempting to return to England in the bark from Nova Albion, were there still other men remaining behind?

At this point we are not disbelieving Carder's story, but merely open a suggestion that it may have been told to conceal another. In 1586, the existence of the Portus Novae Albionis in 38 degrees was still a matter for secrecy and further, if Englishmen and treasure still remained there, it would have been imprudent to permit that information to pass into Spanish hands.

The foregoing speculation regarding the aftermath of Drake's departure from Nova Albion is naturally highly circumstantial and nothing can as yet be adduced to answer the questions. It is to be hoped, however, that consideration of these questions may turn up new evidence that will resolve them.

CHAPTER XII

ARCHAEOLOGICAL INVESTIGATION

Deductive reasoning based on revaluation of sixteenth century sources led the Guild to the site of Drake's encampment on Drakes Bay. Archaeological evidence of his stay was expected, but none was found despite extensive search. When the Guild started its search it was only in the Drakes Bay area that unmistakable evidence of sixteenth century European contacts with the Indians had previously been found. Most opinion associated this evidence with the ill-fated expedition of Rodriguez Cermeño though there was no positive reason in favor of this except the fact that Cermeño was shipwrecked at Drakes Bay.

On the assumption that previous finds at Drakes Bay could be either Spanish or English, Guild members concentrated their efforts there on archaeological investigation of Indian middens to recover artifacts that could be clearly ascribed to one expedition or the other, and more importantly, to investigate sites that might reveal traces of Drake's camp. The location of Cermeño's camp was also sought, so that the sites of the two expeditions could be clearly differentiated.

After discovery of Drake's Cove late in 1952, emphasis shifted to that area, and it was confidently expected that the stone walls of Drake's fort would be found in the stable beach area so strongly indicated as the site in the Portus Novae Albionis inset. This area was first photographed from the bluffs above for surface indications that might show the outline of the fort, and, in addition, in April, 1953, the 30th Engineers Base Topographic Battalion, U.S. Army, assisted the Guild by making a series of oblique aerial photographs which aided mapping of the site.

A very faint suggestion that the fort may once have been on the beach area was shown in a color transparency taken from the hill above the site. This showed a subtle shift in the color of the foliage, a roughly rectangular area of lighter green foliage surrounded by darker green which appeared to be in plausible extent and location with the fort shown in the inset. The light area was interpreted to be indicative of a compacted floor of the fort.

The suspect area was gone over with a mine detector, but because of the inadequacy of the instrument, nothing of significance was revealed. Test pits were planned to intercept traces of stone walls on the perimeter of the area. Because of the limited number of Guild members and volunteers and the practical necessity of generally limiting the work to week-

ends, work progressed slowly. From 1953 to 1956 a total of twenty-six digs were made at the site. In nearly all cases, the depth of the pits was limited to the water table, which was usually found at five to six feet.

The first of the test pits and trenches was made on the bay side of the suspect area March 7, 1953 (pit No. 3). [1] At 12 inches depth, wet pine bark was found with fragments of completely rusted, thin, iron band, and a thin slab of damp, mushy wood painted a dark, bottle green over light green with bits of yellow and a dot of red. [2] These were soon realized to be too near the surface and in too good a state of preservation for the circumstances, even though appearing to be very old and in character with what might be expected. Nothing else but sand was found down to five feet.

In April test pit No. 4 on the north perimeter revealed a layering of beach stone, consisting of local shale rubble and rounded stones up to 18 inches in size, lying between 24 and 48 inches depth. Of interest were pea sized pieces of charcoal among the stones, and black smudges in the sand and on several of the stones indicating fire. Below the stones was only sand down to water at five feet with no indication that the stones were connected with the fort.

Charcoal and ash would certainly have been present in great abundance at Drake's camp, and its presence would be a good indication of its site, though not absolute. Indian sites on the shore characteristically have a high ash and charcoal content with large quantities of broken shell, bones, and discarded implements, a combination of which is the distinctive mark of a midden. With the exception of site Mrn. 233 on the north side of the cove, no trace of Indian habitation was found in the area under consideration except an obsidian arrow point discovered at a depth of

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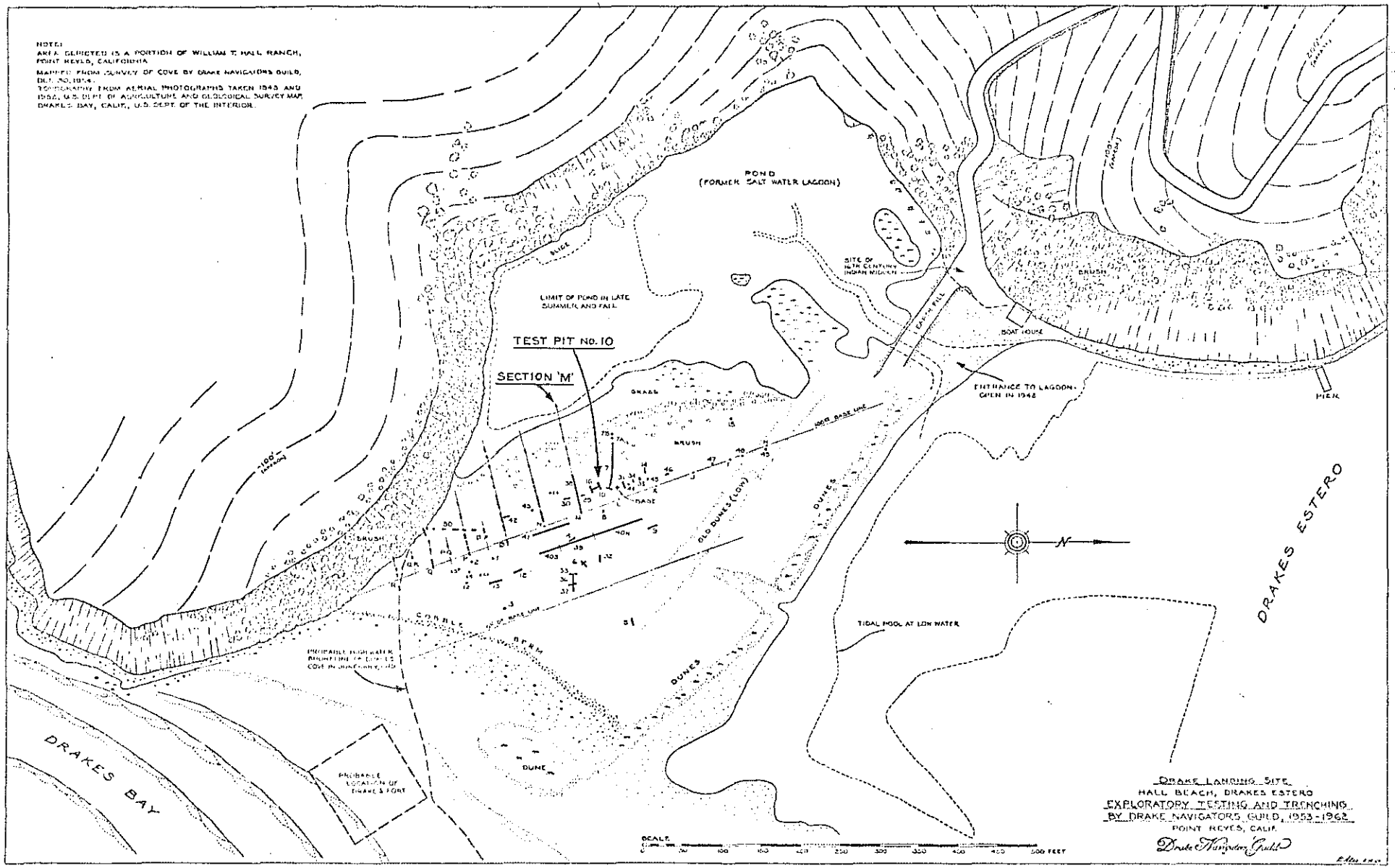
1. Test pits Nos. 1 and 2 were made in the area for traces of Indian habitation prior to recognition of the site as being Drake's Cove.
2. This painted piece of wood was identified as spruce by the Forest Products Laboratory, U.S. Dept. of Agriculture. Species of spruce occur both in Europe and America, but it is not possible to identify the exact species from the wood alone. The nature of the paint pigment was not determined.



ARCHAEOLOGICAL INVESTIGATIONS IN DRAKE'S COVE

six inches in one pit. (No. 29).

Aside from lost or broken tools and utensils, fragmentary materials that might be expected among the camp debris would be tar, or pitch, used for paying seams and protection to the ship's hull from weathering; tallow, used in combination with sulphur or brimstone, as an anti-fouling coating on the underwater hull; bits of coal and its burned by-products from the blacksmith's forge that is known to have been carried in the ship. (1) The use of tar and tallow is described in an entry in Nuño da Silva's log, January 14, 1579, which reads: "We careened the ship and greased her sides with grease, brimstone and tar." Tallow was used also aloft for greasing topmasts and parrals and for softening leather on the yards and sails. Wax is known to have been taken by Drake on the South American Coast (2) and this may have been rendered into candles ashore here rather than risk the hazard of accidential fire on board the ship. Wax was also used in canvas work, and it is likely that sails were overhauled and repaired on the beach.

All of these materials were eventually found in the course of excavation or exploration of the site. It cannot be determined at present, however, if any of this derives from Drake's activities or from the last century of occupation by white settlers. All may be of relatively modern origin, but some may be from the sixteenth century, even though found on the surface.

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1. See H. M. Penzer, ed., The World Encompassed, p. 74. Drake may have used the last of his coal at Nova Albion. In the Celebes he "... had a Smith's forge set vp, both for making of some necessarie shipworke, and for the repairing of some iron-hooped caskes, without which they could not long haue serued our vse: and for that our Smiths coales were all spent long before this time, there was order giuen and followed for the burning of charcoale, by which that want might be supplied."
2. The deposition of Custodio Rodriguez states that Drake took two boxes of wax from a bark at Payta, Peru. See Nuttall, New Light on Drake, p. 141. The boxes were probably approximately the average chests carried in the Manila galleons; 2' x 2-1/2' x 10". Complicating the wax finds is the fact that a part of the cargo of Cermeño's ship, San Agustin, consisted of wax.

ARCHAEOLOGICAL INVESTIGATION

Test pit No. 6, excavated in May, 1953, near the north perimeter of the suspect area, brought to light a 5 in. x 1-1/2 in. x 1/2 in. thick piece of white pine with a white coating on one side that was particularly interesting because sand particles and a reddish clay were embedded in it. This was found at the 20 inch level resting on top of a layering of fairly large stones, which in turn lay on a hard packed silt layer at the 30 inch level. A pocket of stone in a layer was found just below the silt. The painted wood lay in conjunction with a partially burned slab of bark, fragments of coke or clinker, tar, and charcoal, among which were a moon snail shell, large barnacle shell, and a cockle. Hopefully, the white painted wood suggested a piece of sheathing from the Golden Hind come to rest on the inner shore of Drake's Cove. This was eventually disallowed, however, by the disclosure that the coating was white lead and built up of numerous, exceedingly thin coats. (1)

At the end of May and on into 1955, digging on the west side of the area brought the search to what was to become the most significant layer of stone within the cove. Test pits and trenches Nos. 7, 10, and 11 revealed a concentration of almost consistently large stones running in a line for more than 200 feet in a north-northwest to south-southeast direction. The stones lay in a gently sloping layer of one or two stone thickness, beginning at a depth of 18 inches and going down to nearly six feet, with the slope trending toward the estero. This layer differs from others in that nearly all of the stones are of a large size with very little rubble or gravel. Beneath the stones there is only sand and a scattering of water-worn pebbles. A single fire-blackened stone was found in the layer.

At 6 to 12 inches below the surface the upper end of the stone layer merged into a cap of tightly packed, broken shale rubble and soil 6 to 10

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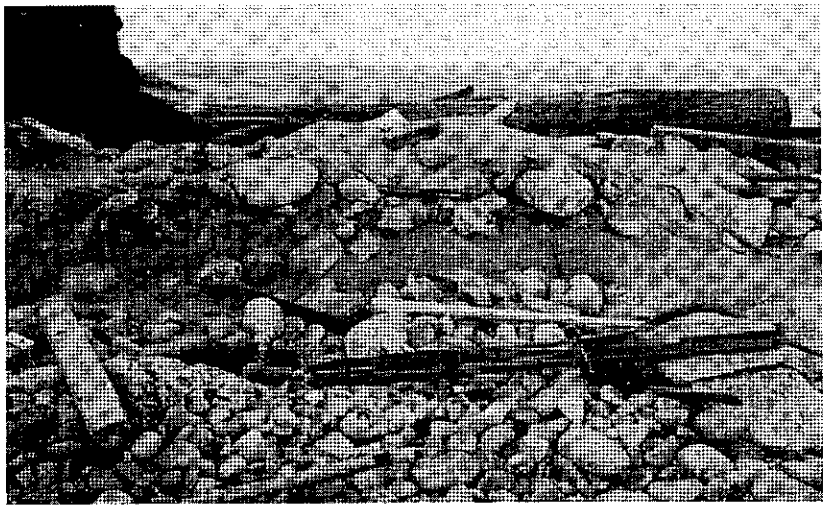
1. The wood and painted surface was examined by the Forest Products Laboratory, U.S. Dept. of Agriculture. It was pointed out that white pine is not native to Europe. The white paint measured 0.027 inch thick; tests disclosed that it consisted of white lead. Golden Hind's sheathing would probably have been of pine or fir from the Baltic countries, and it would have been payed with tallow and brimstone. Some South American woods could have been substituted for renewal, however.

WAVE ATTACK ON OUTER BEACH AT DRAKE'S COVE DECEMBER 20, 1960, SHOWING THE MANNER IN WHICH DEBRIS IS MOVED INTO THE COVE.

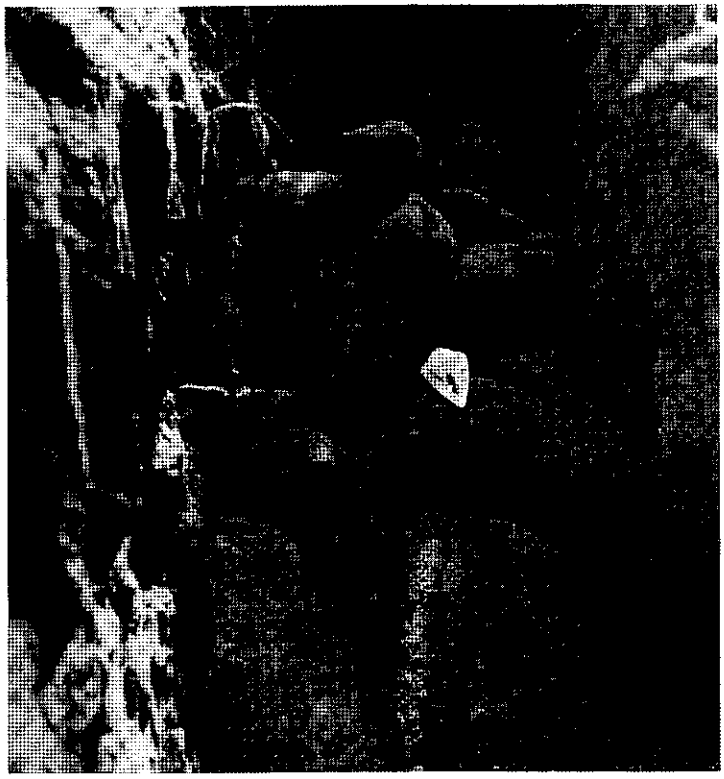
AERO Photographers

BANK OF LARGE AND SMALL STONES CAST UP BY THE SEA ON THE FACE OF THE OUTER BEACH.

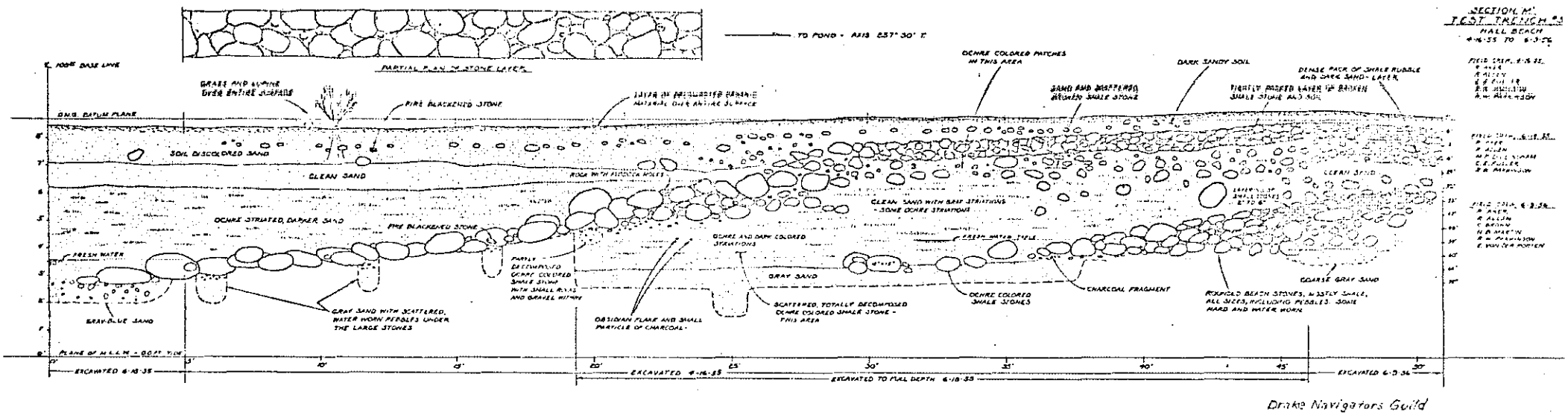


Matthew P. Dillingham

TEST PIT NO. 10 IN THE INNER COVE AREA. THIS SLOPING LAYER OF LARGE STONES, IN CONTRAST WITH OTHER STONE CONCENTRATIONS, IS BELIEVED TO HAVE COME FROM DRAKE'S FORT ON THE OUTER BEACH.



Matthew P. Dillingham



TRENCH NO. 38, SECTION M, DRAKE'S COVE

The stones sloping toward Drakes Estero formerly lay on the bank of a bar in Drake's Cove. Stones in the outer layer at left may have come from Drake's fort after its destruction by winter storm waves. The coarse, gray sand at the right joins with a layer of black silt that continues to the bottom of the present pond and is overlain by strata of mixed stone and sand.

inches in thickness, overlying sand and scattered shale stone. This cap appears to be a later addition. Roughly, seven to eight feet inland from the first layer of stone, another bank of stone was encountered, this one composed of many sizes, including gravel. In contrast to the first layer, this one is relatively thick; its base is horizontal and lies over a strata of coarse, gray sand.

The general reaction was that here at last, in the single layer of stone, was evidence of at least one wall of the fort, tumbled and eroded by the sea. Its alignment seemed consistent with what had been expected; all that appeared necessary now was to find the ends of this wall and locate the cross walls. In the summer of 1955, a long trench parallel to the stone layer was dug in an attempt to intercept the cross walls. In 140 feet of trenching, however, none were found. A number of iron oxide configurations which resembled hollow cones, nails, chain, wire, and a dagger hilt, were found here in a hard packed "floor" at the four foot level. These were later found to be natural formations of bog iron.

After three seasons of work, it became clearly evident that the entire area under consideration had been moved and washed by the tide and sea, which accounted for the floors and layerings found in many of the pits. It was apparent that remains of Drake's fort were not likely to be found in situ on this site, unless one could consider the singular layer of stones to lie in approximate relation to one of the walls.

In 1956, two additional digs were directed toward determining the extent of the layer of stones in the hope that artifacts might be found lodged among them, or that the stones might show tool marks. This work was concluded in June, and the stones were found to run in a continuous line to the center of the cove where a slough formerly entered the inner lagoon, which is now a pond. No artifacts were found. The case for archaeology now seemed hopeless, unless something could be fortuitously dredged out of the disturbed area below the water table at the original bed of the cove.

The entire concept of the cove was revised after September 20, 1958, when exploratory test pits dug on the shore of the pond at the edge of the filled area disclosed that the pond floor continued under the fill as a layer of heavy, black silt. The fill adjacent to the pond therefore existed only as a spit or bar composed of sand and rubble lying between

the pond and the bank of large stones which lay on its outer face. The significance of this discovery was the suggestion that the entire area enclosed between the hills was an open cove in Drake's time.

Digging was now planned to obtain a series of cross sections of the bar at 50 foot intervals and particularly to explore the area where it met the outer hill on the bay side of the cove, that is, the area where Drake's spit would have joined with it. In November, a tide plane was established for the site to relate the levels and strata found in the trenches to the height of tide. There has undoubtedly been some change in the height of sea level since Drake's time, but evidence from the wave-cut terrace on the shore of the estero and the height of Indian middens above sea level on Limantour Spit suggest that this is of little consequence. Digging continued at intervals until September, 1961.

The work disclosed the presence of at least five distinct layers of material overlying the strata of black silt. All but the uppermost formed the bar which was found to originate at the hill on the bay side of the cove. The large stones lay on the sloping face of the outer layer of the bar in the manner previously described, though as the hill was approached, the line of the layer curved outward, away from the hill. Tar was found adhering to small stones on a layer, or stratum, overlying the large stones near the base of the hill; no tests were made to determine its nature, whether asphaltic or pine tar, but it is probable that it derives from modern times.

A small lump of wax which has the appearance of paraffin was found at the base of the hill on a layer of a dark mixture of clay and sand, which is a continuation of the pond floor. Its discovery serves to attribute at least two layers of clearly defined strata of rubble and sand on top of the bar to recent times, and it also demonstrates that even within the last century the extent of fill in this comparatively sheltered area has been considerable.

At the conclusion of this work, over ninety pits and trenches had been dug in the cove area since discovery of the site. It was evident that still more trenching would be necessary to obtain a complete picture of the underlying structure, but the findings were sufficient to provide a reasonable validation for identifying the Portus Novae Albionis inset with the cove site. The Guild's work was only intended to be exploratory,

as it was expected that a major archaeological effort would be conducted in the future.

The most important finding here is that archaeological investigation has not shown negative evidence. An artifact that would clearly identify Drake with the cove would be desirable but should not be necessary in view of the positive pictorial identification.

Artifacts from Drake's fort and the overhaul of the Golden Hind very likely exist in the area, but will be difficult to find, inasmuch as it is clearly evident that the fort and the beach on which it stood have been overtopped and stripped away by the sea. Most of the materials were probably carried into the cove and would now lie well below the water table of the present filled area, though items could easily turn up on the surface of the beach or at various levels because of repeated movement of the sand at the shoreline. Always, there is bound to be confusion as to what is English or Spanish or even relatively modern. It is quite possible that because of the above reasons, clear-cut archaeological evidence of Drake's visit may never be found.

The absence of significant artifacts that can clearly be related to Drake's expedition by the excavations at Drake's Cove and other sites is somewhat comparable to the problem which confronted the National Park Service at Fort Raleigh on Roanoke Island, North Carolina. (1) Fort Raleigh was constructed in 1585 by Ralph Lane, Governor of Virginia, during the first of the ill-fated attempts to colonize Sir Walter Raleigh's Virginia colony. Though the fort and adjoining settlement (2) were occupied for several years and finally abandoned, surface indications of the site were all but obliterated. Soil differences revealed by extensive trenching showed the outlines of a sixteenth century fort similar to those described in military texts of that period.

In all, it took about a mile of trenching to produce the contours of the fort and test the surrounding area for other structures. Of the

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1. See J.C. Harrington, Search for the Cittie of Ralegh, Archaeological Research Series No. 6, National Park Service.
2. The habitation area, which was believed to have been set apart from the fort, was searched for but never found.

artifacts found in the excavations at the fort, Archaeologist J.C. Harrington says:

> Relatively little material of European origin was found in the fort excavations, and almost all of it could date from the period of the Raleigh colonizing ventures. This does not provide, in itself, a proof of a late 16th-century date for the structure, even though none of the objects exhibit characteristics that preclude such a dating. These objects include one nearly complete iron sickle and possible fragments of a second, a carpenter's auger, several large wrought-iron spikes, a few wrought-iron nails, three latten casting counters, two copper nuggets, one glass bead, several fragments from Spanish olive jars, a portion of a majolica jar, one brick fragment, and a small piece of roofing tile.
>
> The principal contribution of these objects of European origin is their value, in conjunction with historical evidence, in dating the structure.....(1)

Excavation of the outlying area to locate habitations produced far less rewarding results, the most significant items recovered being four sherds which are probably from small goldsmith's crucibles of a type common in the sixteenth century. Of the items recovered in the fort escavations, only the casting counters give a clue to English origin. These coin-like counters for manual reckoning were made by Hans Schutes of Nuremburg, Germany, and bear his name, but popular English design elements, such as the rose and fleur-de-lis show that they were made for the English market. None, however, was found in a situation that would date it positively as of the Fort Raleigh period.

The nearest approach to tangible evidence of Drake at the cove is the layer of large stones lying on the face of the ancient bar underlying the fill. If the stones are in fact from Drake's fort, then we can visualize them as lying on a bar which would have bordered his careening basin and separated it from a shallow basin, or lagoon, lying at the base of the hills much the same as the present pond. At high water, the bar would probably have been covered, and during the phase of channel movement where the estero entrance is far to the east at Limantour Spit, the

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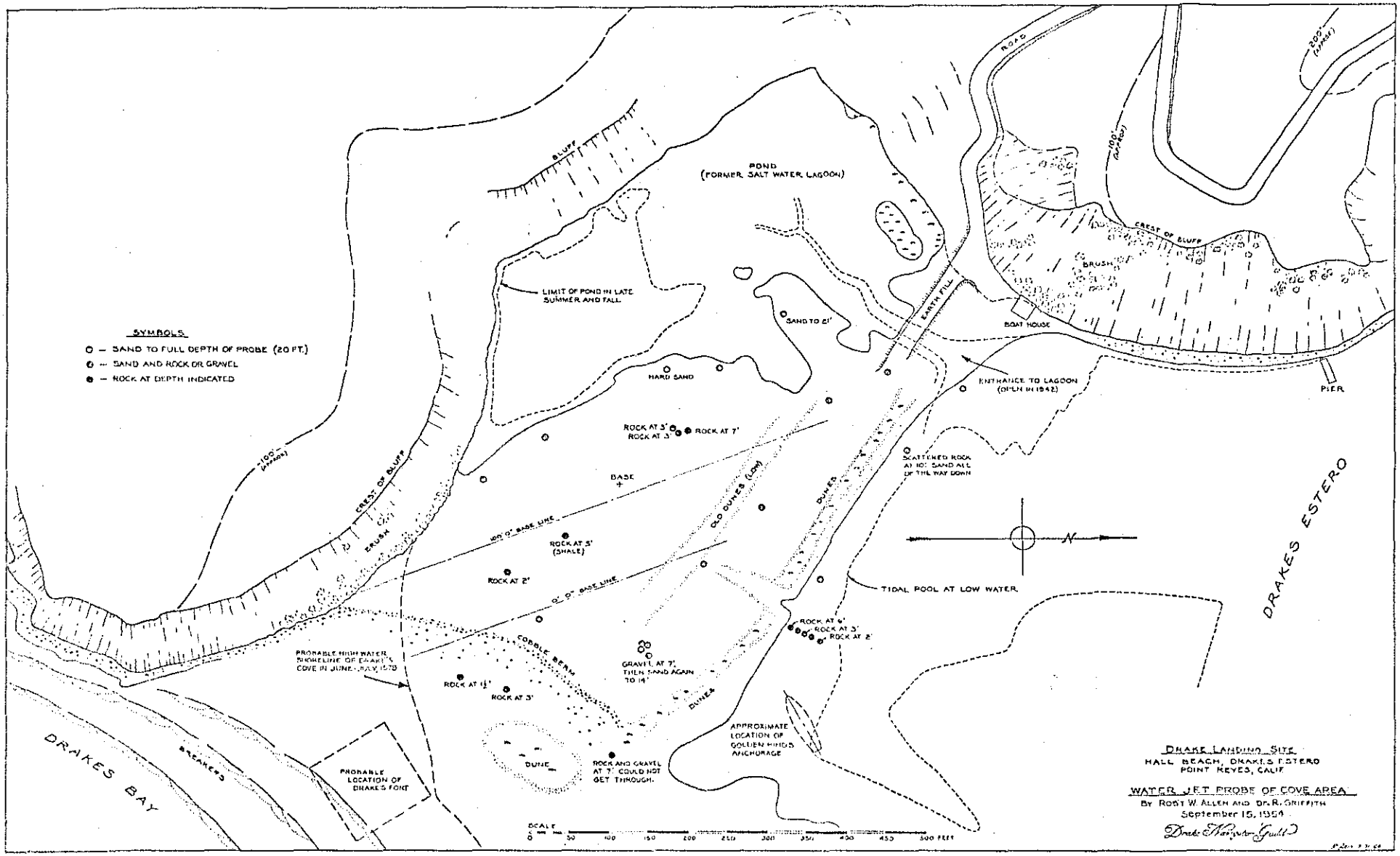
1. See J.C. Harrington, Search for the Cittie of Raleigh, p. 17.



WATER-JET PROBES IN DRAKES COVE

main channel of Drakes Estero would have flowed past this bar just as it has along outer parts of the cove in recent years, thus scouring the bed for the careening basin. In 1954, a water-jet probe to depths up to 20 feet found no evidence of bed-rock or other formation to preclude this assumption.(1)

The layer of stones on the bar is unique in comparison with other layers and banks found in the digging and observed on the outer beach where stones have been cast up by the sea. Nearly all of the stones on the bar are of large size and spread out in a shallow layer over a bank of sand. The implication is strong that they had been moved here in a relatively short time from a concentration of such stones. In building walls of stone, or even a facing of stone on sand walls, it can be expected that all of them will be hand-picked for size and suitability. All the stones represented by this layer would be just about sufficient for the walls of a fort measuring one hundred feet square.

Reconstruction of Drake's fort in accordance with a strict interpretation of the inset of Portus Novae Albionis places it in a direct line with the outer face of the bar and the angle of attack of the sea from Drakes Bay. With overtopping of the beach by winter storms and wind driven waves, the stones from the fort would have been moved as a mass into the cove and distributed along the face of the bar just as large stones are found to be moved today over the beach and into Drakes Estero. It is conceivable that future excavation may find some artifact or material from Drake's activities among these stones.

INDIAN MIDDENS

Finding of the Plate of Brass stimulated archaeological work in the

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1. The test was conducted by Guild Members R. W. Allen and Dr. Robert Griffith. A total of 29 probes were made to depths up to 20' throughout the filled area of the cove using a 16' length of 1/2" pipe with a jet tip and a high pressure hose. A pressure-tank farm spray unit supplied about 250 pounds pressure. The nature of materials could be determined by the feel transmitted to the operator's hands. For depths over 16' the pipe was followed into the sand by several feet of hose.

Drakes Bay Indian middens. Beginning in 1940, the Department of Anthropology of the University of California initiated a program of archaeological exploration of former Indian village sites in this area with the hope of discovering sixteenth century materials of European introduction that would aid in dating the types of Indian culture found there. The work was initially carried out under the direction of Dr. Robert F. Heizer, Director of the University of California Archaeological Survey and later by Dr. Clement W. Meighan. (1)

At the end of this phase of the Archaeological Survey at Drakes Bay in 1952, the total amount of material classified as probable sixteenth century of European introduction included the following specimens:

1 - 125 fragments of Chinese porcelain of the Wan Li and late Ming periods (1573-1619 A.D.).
2 - 58 hand wrought iron spikes presumed to have come from the wreck of the San Agustin in 1595.
3 - Seven large iron rods an inch in diameter found at the porcelain level of site Mrn. 307. (2)
4 - Eleven fragments of Oriental stoneware, representing a large vessel which was apparently broken at the site.

All of the above items, except the stoneware, were considered to have come from the San Agustin. It was concluded that the stoneware reached the site some time before Cermeño's visit, and though Drake was considered, it was thought that other possibilities must be given equal weight. In the light of subsequent studies and archaeological work conducted by Edward Von der Porten, a Guild Director, it is probable

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1. See R. F. Heizer, "Archaeological Evidence of Sebastian Rodrigues Cermeño's California Visit in 1595," California Historical Society Quarterly, XX Number 4 (December, 1941), Clement W. Meighan, "Excavations in Sixteenth Century Shellmounds at Drake's Bay, Marin County," Reports of the University of California Archaeological Survey, No. 9, Paper 9 (November 20, 1950), 27-32, and Clement W. Meighan and Robert F. Heizer, "Archaeological Exploration of Sixteenth-Century Indian Mounds at Drake's Bay," California Historical Society Quarterly, XXXI (June, 1952), 98-108.
2. These are sometimes listed as 6 because of an error in numbering.

that much of it, if not the greatest part, did originate with that ill-fated expedition. (1) It would be incorrect, however, to attribute all of it to the San Agustin in view of the positive identification of Drake's landing site on the shore of the estero. The most that can be said for all of the artifacts found in the Drakes Bay area to date, with the exception of a few, is that they must be considered as either Drake or Cermeño.

Guild members took part in archaeological surveys and occasional digging as early as 1951, on several occasions under the direction of Dr. Aubrey Neasham, Regional Historian for the National Park Service, (2) and subsequently under University of California archaeologist, Dr. Clement W. Meighan. Emphasis shifted now from mere dating of the middens to a specific effort to find distinct identification of Drake or Cermeño.

Surveys for new Indian sites were conducted by the Guild starting in 1952 and resulted in discovery of the sites designated by the Guild as D.N.G. 1, D.N.G. 2, and D.N.G. 3 on Limantour Spit; D.N.G. 4 located at the mouth of the lagoon immediately west of Drakes Estero; D.N.G. 5 located at almost the highest point on a ridge separating Drakes Estero from the ocean. All but D.N.G. 3 and D.N.G. 5 are definite sixteenth century sites. A small test excavation was made at D.N.G. 2 in 1956 which produced six pieces of Oriental blue-on-white porcelain. (3)

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1. See Edward P. Von der Porten, Drakes Bay Shell Mound Archaeology, 1951-1962, 1963, and Edward P. Von der Porten, DRAKE-CERMEÑO: An Analysis of Artifacts, 1965.
2. Not published. In the Fall of 1948, Dr. Neasham, aided by the California Historical Society and University of California, initiated test excavations at a small beach on the southwest side of Drakes Bay where the fisheries landing is located, and near the site suggested by Davidson as Drake's landing place. Results were inconclusive. Some excavations were also conducted in Drakes Bay Indian sites.
3. This site was reported by the Drake Navigators Guild to the University of California Archaeological Survey June 7, 1956, and to Dr. Aubrey Neasham, State Historian, and was assigned the designation Mrn. 298.

ARCHAEOLOGICAL INVESTIGATION

In the fall of 1962 a field archaeology class, headed by Edward Von der Porten, was instituted in the Community Service Program of the Santa Rosa Junior College. (1) The field work of the class was done mainly at Drakes Bay where the accessibility of the sites, variety of artifacts, and intriguing problems relating to the history of the area made the work particularly interesting. The site selected for the most intensive work in the 1961-62 season was D.N.G. 1 with thirty 5' x 5' pits dug. The site yielded much blue-on-white porcelain and some pottery sherds as well as a few metal objects.

This site and D.N.G. 2 are probably among those mentioned by Cermeño when he made his first exploration of the shore: "... landed on the beach, where I found near by many Indians -- men, women and children -- who had their dwellings there. These were pits made in the sand and covered with grass,..."

In 1959 work in the middens on Limantour Spit was conducted by Dr. Adan E. Treganza, of San Francisco State College, for the State of California with excavations at Mrn. 298. (2) He also undertook work on Limantour Spit in 1964-66 under contract to the National Park Service. (3) This work recovered an additional number of blue-on-white porcelain sherds and several lumps of tar.

Since 1940 the total archaeological effort has turned up approximately eight hundred artifacts of sixteenth century origin in Drakes Bay sites. Reviewing the statistics pertaining to the artifacts, it is remarkable that the well documented expedition of Cermeño and the wreck of the San Agustin produced so little diversity in type of materials. Not only was the wreck abandoned at Drakes Bay, but so also was Cermeño's camp, inasmuch as all of the nearly eighty survivors had to continue the voyage home in a small launch with little or no opportunity to take any-

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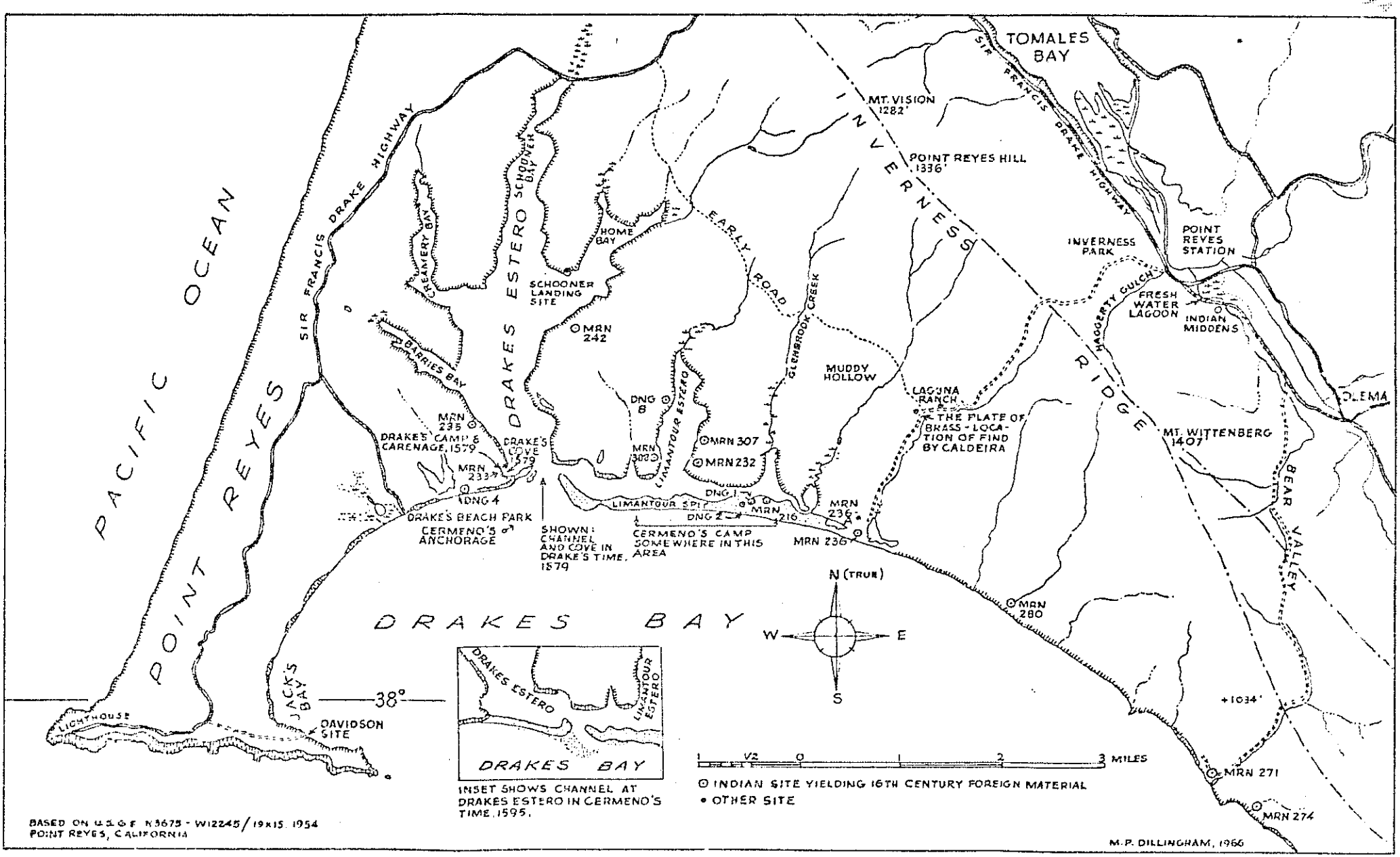
1. See E. P. Von der Porten, Drakes Bay Shell Mound Archaeology, 1951-1962, 1963.
2. See Adan E. Treganza, "The Examination of Indian Shellmounds in the Tomales and Drakes Bay Areas with Reference to Sixteenth Century Historic Contacts," unpublished ms. on file with the Office of the State Historian, 1959.
3. See A.E. Treganza and T.F. King, eds., Archaeological Studies in Point Reyes National Seashore, 1959-1968.



IMPORTANT HISTORICAL SITES AT DRAKES BAY

thing with them except bare essentials. By far, the largest number of artifacts of the Drake-Cermeño period were the porcelain sherds, next were iron spikes and a few drift bolts, then a few sherds of terra cotta and stoneware, and finally, a small number of objects made of metal, and miscellaneous substances. (1) Materials or artifacts which are clearly attributable to Cermeño's camp or the San Agustin are not included in the following review except where there is a possibility of overlapping identification with Drake's expedition.

PORCELAIN WARE

The porcelain sherds are of particular interest for two reasons; first, they provide a definite tool for dating the middens; second, they could be common to both expeditions. Since 1940, over 650 sherds have been recovered by various groups, and most of them are now in collections held by the University of California, the Drake Navigators Guild, and San Francisco State College. (2) Almost all of the specimens have been attributed to Chinese export ware of the Wan-li period (1573-1619) and a coarser type designated as sixteenth century trade ware not identifiable with any specific period, but probably produced at the same time as Wan-li ware. (3)

Nearly all the pieces represented by the sherds are utility ware bowls and plates of the same size and shape. It has been impossible to

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1. For distribution and analysis of these artifacts, see E. P. Von der Porten, DRAKE-CERMEÑO: An Analysis of Artifacts, 1965.
2. The University of California collection is reported in R. Heizer, Archaeological Evidence; C. Meighan, "Excavations in Marin"; C. Meighan and R. Heizer, "Archaeological Exploration," and Richard K. Beardsley, "Temporal and Areal Relationships in Central California Archaeology," Reports of the U.C.A.S., Nos. 24, 25, pp. 55-57 and Figure 10. The Drake Navigators Guild and San Francisco State College collections are reported in E. P. Von der Porten, The Porcelains and Terra Cottas of Drakes Bay, 1968.
3. Attribution of the Drake Navigators Guild and the San Francisco State College collections was done by Dr. John A. Pope, Director of the Freer Gallery of Art, Smithsonian Institution.

differentiate the wares to either English or Spanish expedition by dates of manufacture. Styles did not change appreciably in the short time span between the two expeditions, nor is there any notable difference between the ware from one Indian site or another. Generally, the porcelains have been attributed to the wreck of the San Agustin, though there is no written evidence that she carried any. Oddly, all direct reference to the circumstances of the loss of the ship and salvage of goods and cargo seems to be missing from Cermeño's accounts. Edward Von der Porten noted a significant clue on eight specimens of the sherds found on Limantour Spit in D.N.G. 1 and D.N.G. 2 that makes it very probable, however, that they were carried.

These eight sherds were noted to be sand and water-worn only on the exterior surfaces and were broken afterwards. The probability of this wear occuring in the relatively quiet waters of the estero in the course of trade with Drake or accident in unloading from the Golden Hind is extremely remote, nor is wind and sand erosion too probable. In the case of the San Agustin, however, the abrasion can be accounted for in the following manner:

Porcelains were apparently packed in chests, the average size for the early Manila galleons, the pieza, measured 2-1/2 feet x 2 feet x 10 inches. (1) Those taken by Drake were explicitly stated to have been in chests. Later the porcelains are known to have been packed in clay to prevent breakage, and it seems probable that they were in this instance also. Being heavy, the chests would have been stowed low in the hold on the ballast.

A study of the circumstances surrounding the wreck of the San Agustin suggests that the ship went aground four to five hundred yards offshore in the breakers outside Drakes Estero. The Cermeño accounts stated that the Spanish were unable to save any of the food supplies or other property on board. (2) The inaccessibility of the wreck could ac-

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1. See W. L. Schurz, The Manila Galleon, p. 158.
2. See H.R. Wagner, Spanish Voyages, pp. 165, 249. See also R. Aker, The Cermeño Expedition at Drakes Bay, 1965. Father de la Ascension wrote that "... While they were setting up the fragata in this port an onshore wind came up which drove the ship upon the coast, and she was lost with what property she contained."

count for nothing being saved from it and, thus, the small diversity of durable goods found in the middens. Apparently, however, some goods that were cast up on the beach were salvaged, as it was mentioned by Father de la Ascension when Vizcaino put into Drakes Bay in 1603 that a quantity of wax and a great many cases of silks had been left on shore. (1) Nothing was said about porcelains, though the omission does not necessarily exclude them. Being heavy, there is a good chance that the chests did not come ashore very soon after the wreck; the bouyant wax and silk probably floated ashore and littered the beach soon afterwards. Chests of porcelain, however, which did not break up in the surf zone or become buried under the sands would have tumbled along the bottom until they were cast up on the beach, probably after Cermeño departed. In this circumstance, we may visualize a damaged chest lying for some time in the surf zone with a part of its contents exposed to the abrasive action of sand and water; the bowls or dishes being nested and tightly packed in clay so that only the outer surfaces are abraded. Later, they are discovered by the Indians, taken to the village, subsequently broken, and then discarded. On this basis, there is good evidence for attributing much of the porcelains to Cermeño.

It is also known, however, that off the coast of Central America Drake had taken four chests full of "fine erthen disshes very finely wrought of fine white Erth brought by the Spanyards from the countrey of Chyna." (2) These were taken from a Spanish coaster coming from Acapulco, the port of arrival for the Manila Galleons. There is nothing to show that Drake took any of the porcelains back to England. That he esteemed them is testified by his trouble to take them, but at the time he did so he was anticipating a quick passage home in company with a second small ship. At Nova Albion he faced a voyage half way around the world, by way of the East Indies, and with only one ship. A chest of porcelain packed in clay would weigh approximately 500 pounds, thus a weight of close to a ton for the four, and in the light of this would he have valued them enough to carry the entire weight of them home? Some porcelain may have already been in use on board the Golden Hind, and knowing that the Indians lacked pottery ware of their own, the por-

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1. See H. R. Wagner, Spanish Voyages, p. 249.
2. See "Anonymous Narrative," H. R. Wagner, Sir Francis Drake's Voyage, p. 271.

celain bowls and dishes would have made tempting gifts or trade items. There is no proof that any of the porcelains are Drake's but the possibility exists and must be taken into account.

Von der Porten points out that although the number of sherds recovered gives an impression that the quantity of porcelains is great, they represented fewer than 200 vessels. All of them together would not fill even one of the Manila galleon chests, which held up to 600 pieces.

SPIKES AND NAILS

As of 1965, a total of 65 hand forged, wrought iron spikes of a type used in sixteenth century shipbuilding has been found in eight middens at the same level as the porcelain sherds. The greatest number, 53, were found in Mrn. 232 with only one or two in other sites and five in Mrn. 235. (1) They have been dated to the Drake-Cermeño period by metallurgical tests combined with a study of their association in the middens and confirmed by the square heads and square shanks gradually tapering to the sharp point typical of a sixteenth century spike. The lengths vary from 1-1/4 inches to 11 inches. Most have been bent, probably from several causes, one of which would have been from the wrenching of planks from the San Agustin wreck by waves, another that they were bent or clinched in construction of the ship, and finally that in Indian habitations they may have been bent over in planks for convenience or safety. Most have probably come from long since decayed or burned planks, as it would have been nearly impossible for the Indians to extract them from heavy beams or planks.

It would be logical to assume that most of the spikes and nails came from the San Agustin, as most, if not all, probably have, but here again we have a situation where some could be either Cermeño or Drake. There is a possibility that the second ship Drake brought here was broken up at Drake's Cove and therefore a chance that some of the spikes could

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1. For distribution, see E. P. Von der Porten, DRAKE-CERMEÑO: An Analysis of Artifacts, 1965.

be credited to it. In any case, it could as easily be argued that it would have been in keeping with Drake's generous nature to attempt to introduce iron to a people who obviously existed in a stone age culture, particularly if he had any to spare, though there is no evidence that the Indians valued or used in any way the spikes that have been found in the middens. Spikes given as gifts would logically have been straight, either new or hammered straight by Drake's blacksmith.

The almost complete absence of spikes in the middens on Limantour Spit is particularly indicative of a Spanish camp on that spit, as it is known from the Cermeño accounts that the Spaniards gathered wreckage of the San Agustin for their own use. They could not have prevented the acquisition of materials at other sites within the estero or on the West side of Drakes Estero, but they could easily gather everything that came ashore on the spit. (1)

DRIFT BOLTS

Iron drift bolts were used to join heavy timbers, such as floors to the keel and keelson, knees to the ship's side and deck beams, etc. Those found at Mrn. 307 can be rather quickly dismissed as coming from Drake as they are too large to have come from the 15 ton bark left here. One of the bolts measures 46 inches in length. They would be appropriate for the San Agustin, however, but there is serious doubt that they are sixteenth century and are probably from the nineteenth century. (2)

TERRA COTTA

The terra cotta fragments found in D.N.G. 1 have been identified

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1. The accounts record that a fight ensued over wreckage taken from some Indians settled on the beach near Cermeño's camp and caused them to leave for the inland villages. See H.R. Wagner, Spanish Voyages, pp. 165-166.
2. See E.P. Von der Porten, DRAKE-CERMEÑO: An Analysis of Artifacts, 1965, pp. 41-46.

as a small flat bottomed Spanish utility bowl and large, heavy jars of the sixteenth century. One of the sherds is sand and water abraded on all sides, and probably comes from the wreck. The other specimens may be from Cermeño's camp. (1)

STONEWARE JAR

A vessel that has been suggested as possibly being from Drake's expedition is a large jar represented by eleven fragments of brown, glazed stoneware found on the shore of Limantour Estero at Mrn.307 in 1949 by Clement Meighan and a crew of University of California students. The jar was apparently broken at the site near a spring and was found in association with porcelain sherds. It was identified as Indo-Chinese ware of approximately 1570-1600 by Prof. H. Otley Beyer at the University of Manila. (2)

Because the sherds of the jar were found at a greater average depth than those of the porcelain in the same midden, it was believed that it predated Cermeño's expedition. However, the difference between average levels, about 14 inches, is too great to allow for the normal, insignificant deposition of materials within the very narrow time span separating the Drake and Cermeño expeditions. Even from the earliest date that can be assigned to the jar, within the last half of the sixteenth century, the range of deposition is still too great.

In view of the differences in levels at which the stoneware and porcelain sherds were found, it can logically be assumed that the stoneware was deposited before the porcelain. Depths at which porcelain was found ranged from the surface to a maximum of 20 inches, with an average of 7 inches, while depths of the stoneware ranged between 16-1/2 and 33 inches, with an average of 21 inches. Burrowing by small rodents is known to cause vertical displacement, but in this case we do not find a complete mixing; the bulk of the stoneware is clearly below the porcelain.

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1. See E. P. Von der Porten, DRAKE-CERMEÑO: An Analysis of Artifacts, 1965; pp. 50-55.
2. See C. Meighan and R. Heizer, "Archaeological Exploration," p. 103.

A factor that probably accounts for the great difference in levels between the two wares is mechanical displacement by human trampling, or more likely, by large animals such as elk which roamed the Point Reyes Peninsula in large numbers. The animals could have visited the spring in the winter when the site was temporarily abandoned by the Indians for less inclement inland villages. In that circumstance, we could expect the sherds to be trampled deep into the soil at a time when the ground was particularly wet and soft. Then at a later time, perhaps soon afterwards, the porcelain sherds were deposited at the site and distributed through the years by the accumulations of soil. The heavy fragments of stoneware were less apt to be displaced to higher levels by rodent action than the porcelain fragments.

Apparent deposition of the stoneware before the porcelain, though curious, by no means serves to differentiate between the Drake and Cermeño expeditions, all of the specimens could belong to either of the expeditions. Although it is known that Drake had earthen jars of water with him on leaving Guatulco, trans-Pacific Spanish ships also customarily carried fresh water in large numbers of earthen jars, and it is probable that the San Agustin had many of them. Such jars would have been in use in Cermeño's camp for storing water, and it is likely that several would have been left there. Jars would have been used by watering parties of both expeditions to collect water at a spring, but whether either would have done so at a village site seems less probable for Drake than for Cermeño. Drake's first contact with the Indians appears to have been made at the site of his camp, and there was apparently a spring nearby. Alternatively, the jar could have been acquired by the Indians from either expedition.

Also, it seems more probable that the Indo-Chinese stoneware came westward in Cermeño's ship, but we do not know where Drake acquired his jars, except that he apparently began to acquire them on the coast of Chile. (1) It is quite possible that all of his were of Spanish

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1. See the account of Nuño da Silva, H. R. Wagner, Sir Francis Drake's Voyage, pp. 343, 346, 347. DaSilva states that in latitude 30° South, "... twelve men went ashore and took in six pots of fresh water from a river there." He later makes specific reference to Spanish pots being trailed astern to slow the Golden Hind as she overtook the Cacafuego.

manufacture, though the Oriental jars would tend to circulate throughout the ships in the Pacific trade.

HALL SITE -- Mrn. 235

Of all Drakes Bay Indian sites, this one is the most significant to Drake's encampment. It is most certainly the site mentioned as the one corresponding to the village mentioned in World Encompassed as being "neere about 3 quarters of an English mile distant" from the English encampment. The site is situated at the base of a steep gully facing the estero, is well protected from the wind, and is adjacent to clam beds and hunting areas. It was partially excavated by University of California in 1941 and subsequently by Dr. Neasham and the Drake Navigators Guild. The site is large, and only a small part of it has been excavated. Much of it has been eroded by the estero. (1) Land clearance for pasturage above the site resulted in its being buried under earth and brush in 1959.

Five porcelain sherds date the site to the sixteenth century, and included among other artifacts found are five hand-wrought iron spikes typical of the same period. Five unusual items of European origin from the same level at which the sixteenth century items were found are of particular interest because these can more reasonably be attributed to Drake than to Cermeño. Drake's camp was within easy walking distance from this site, and the Indians were almost daily visitors; whereas, Cermeño's camp was over three miles away on the other side of the estero.

The first of four of the unusual items is a copper cone, 2-1/2 inches long by 3/4 inch diameter at the mouth, found at 18 inches by M. P. Dillingham when he worked the site with Dr. Neasham in 1951. (2)

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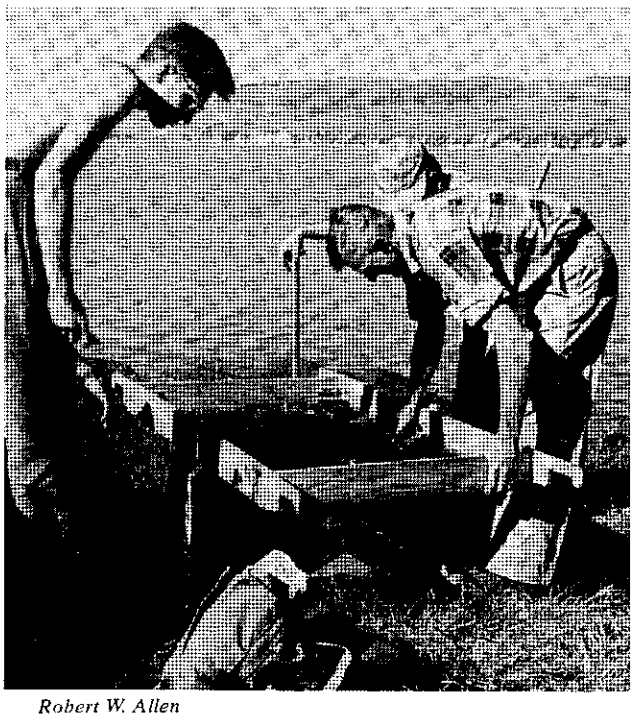
1. See E. P. Von der Porten, Drakes Bay Shell Mound Archaeology, 1951-1962.
2. See R. Aker, M. P. Dillingham, and R. Parkinson, Nova Albion Rediscovered, p. 145 and plate on p. 143; and M. P. Dillingham and R. Aker, A Review of the Findings of Dr. Adan E. Treganza Relative to the Site of Drake's Landing in California, 1960.

Matthew P. Dillingham

THE MIDDEN, Mrn. 235, LOCATED ON THE SHORE WITHIN THE SMALL COVE AT LEFT CORRESPONDS WITH AN INDIAN VILLAGE MENTIONED IN *World Encompassed.* IT HAS YIELDED A NUMBER OF ARTIFACTS OF SIXTEENTH CENTURY EUROPEAN ORIGIN THAT COULD HAVE COME FROM DRAKE.



Robert W. Allen

GUILD MEMBERS SIFTING FOR ARTIFACTS AT Mrn. 235 WITH A ROCKER SCREEN.

THE SHEET-METAL COPPER CONE BELOW, FOUND IN 1951 AT Mrn. 235, WAS FOUND IN ASSOCIATION WITH SIXTEENTH CENTURY PORCELAIN SHERDS.

Matthew P. Dillingham

It was found embedded in moist clay at the edge of the lens of a fire pit. A small bit of tar adhered to the tip. Pieces of similar tar were found at the same level on this occasion and on other field trips. It is not known if the tar is pine tar or bitumen; if of the latter, it could be either native acquired or from Drake's repair operation, or even from Cermeño.

When the tip was submitted by Dr. Neasham to Harold L. Peterson, Chief, Historical Investigations Branch of the National Park Service, July 30, 1952, he replied:

> .... The cover or brass cone-shaped artifact is... interesting and could well date back to the second half of the 16th or first half of the 17th centuries. It is made exactly like the 'ground irons' that were put on the base of pikes and gun forks of that period. It has the same crude seam, the same hole in the same location as specimens found on such objects in my own and other collections. It is, however, too small for such a purpose and the material is most unusual for such an object. Usually, iron was used, although a few gun forks are known with brass forks and tips. There is some possibility that it could be a scabbard tip since some round scabbards were used on rapiers of the period, but this piece seems exceptionally crude for such a purpose and the single hole for attachment is not usual. I am afraid that I can go no further in this tentative identification, but I do believe that there is a possibility that this item could date from the early period.

Though confirmation is lacking, an alternate use for a tip of this size may have been for the pointing of the ends of rope to prevent them from fraying and to make the reeving of tackles easier. Another mentioned by Mainwaring is "... chiefly to see that none of the end is stolen off and cut away." (1)

The copper tip, used in this way, would probably be more appropriate to the gunners than the seamen. The gunner's responsibility

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1. See G. E. Mainwaring and W. G. Perrin, The Life and Works of Sir Henry Mainwaring, pp. 199-200.

included a considerable quantity of tackling for handling the guns, and it is conceivable that such tips could have been part of his stores. Polished, they would have made acceptable trinkets for the Indians. The tar adhering to the tip of the cone was probably applied by an Indian to either affix it to a decorated basket or to a string as a charm in the same manner that they affixed bits of shell and other ornaments.

The second item, found near the copper cone and at the same level, is a small shred of dark red wool cloth. It too was found embedded in the moist clay at the edge of the fire lens. Considering the level at which it was found and that it was in clay, the seemingly perishable nature of this artifact should not rule out sixteenth century origin, as remains of woolen cloth have been found in the clay covered ship mounds of the Viking period.

Although cloth could have come from Cermeno or his shipwreck, Drake is known to have taken a large quantity of clothing described as native wearing apparel from a ship at Guatulco, and also clothing from the ship from Acapulco on which Don Francisco de Zaráte was traveling. (1) He was, therefore, well provided with clothing and material for such when he reached Nova Albion and as his original plan called for an attempt to pass through the Northwest Passage near the Arctic Circle, he probably had a surplus on board, from which he could bestow upon the Indians "... good and necessary things to couer their nakednesse." (2)

A third item is a peach pit found at the same level as the copper cone and also at the edge of the fire lens, embedded in the moist clay. Again, the clay is a factor that would aid in the preservation of a perishable item. Drake is known to have taken preserves, on at least one occasion, from the ship of San Juan de Anton, (3) and if he had not bestowed a sample of the fruit on the Indians, the seed may have been given to them on the assumption that it could be planted and thereby augment their meager diet.

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1. See Z. Nuttall, New Light on Drake, pp. 105, 242, 250. See also H.R. Wagner, Sir Francis Drake's Voyage, p. 347.
2. See p. 159 , supra.
3. See Z. Nuttall, New Light on Drake, p. 142.

A fourth item is a clinker found near the copper cone at the same level and near fragments of tar. As previously mentioned, Drake is known to have had a forge, and there is a reference in World Encompassed to his having "Smith's coales." Some of the coals could have been given to the Indians to impress them, or they may have picked up the clinkers after watching the forge in operation at Drake's Cove.

In 1959, at a depth of 19 inches, a field crew under the direction of Edward Von der Porten recovered a fifth item that resembles a crude compass needle approximately 4" x 1/4" x 3/32", tapering slightly toward one end, and to a point at the other end. Near the center, somewhat near the balance point, there is a short projection that may have been associated with the pivot. Investigation has failed to identify this object. The best that can be said for it at present is that it may be a compass needle, and if so, it would be of a type used for survey instruments, or a simple portable compass that might have been used by military men, rather than a mariner's compass. Drake was outfitted for military operations on land, and as the need for such was now past, compasses of this type would have been surplus. The needle is very slightly magnetized, and though most iron has some magnetism, the sixteenth century compass needles were of soft iron and periodically magnetized with lodestones.

CONCLUSION

In the final analysis, despite many years' work and the number of artifacts recovered that can be attributed to sixteenth century European introduction, archaeology has not proved that Drake was at Drake's Bay. With the commingling of artifacts from the Drake and Cermeño expeditions, the short time separating them, and goods and materials common to both, no artifact can positively be identified as belonging to either. The conclusions are generally possible only because historical evidence has set the stage, so to speak, and thus enables the findings to be related to the actions that we know to have taken place.

It is still possible that some day an item that clearly pertains to Drake will turn up. One such would be an English, iron arrow point. We know that Drake had archers with him, and a comparison was made to the ineffectiveness of the Coast Miwok bow and arrow -- "... more fit for children than for men." It would have been a simple matter for

Drake's blacksmith or armourer to make a few iron arrow points for the Indian visitors. There is even a chance that some were seen by Cermeño, as with respect to the Indians' bows and arrows, he remarked "... we could find no other kind of iron with which to cut a weapon or anything else." (1)

Finds of distinct Drake artifacts in the middens would, of course, tend to confirm Drake's presence at Drakes Bay, but they would not locate his campsite. A find, even if unearthed on the suspected site of the camp would not positively confirm that site unless traces of the camp itself were found, such as footings or outlines of the walls. The possibility of finding construction details is clearly impossible at this date.

Conjecture will continue to play an important part in the analysis of the results of archaeological discoveries at Drakes Bay, as it is only by this means that, in nearly all cases, the specimens can be associated with the events which occurred. Probability plays an important role in this conjecture.

The pattern of artifact distribution tends to support the historical research that places the general location of Cermeño's camp on Limantour Spit (2) -- the combination of Spanish terra cottas, a large water jar, quantities of bitumen, and the noticable absence of ship's spikes on a shore that should have been littered with the San Agustin's wreckage. Historical research has determined that the wood was salvaged by the Spanish and taken away from the Indians nearby the camp.

On the west side of Drakes Estero, at Mrn. 235, a pattern also seems to exist with a grouping of unusual artifacts, but at the present time conjecture is hampered by absence of positive attribution and the possibilities can only be suggested. The copper cone, similar in all respects except material to ground irons could be attributed to the same artificers, or armourers, who made "ground irons", but it remains, to be proved at least that the metal is sixteenth century.

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1. See H. R. Wagner, Spanish Voyages, footnote 30, p. 370, and R. Aker, et al., Nova Albion Rediscovered, pp. 152-153, and Von der Porten, DRAKE-CERMEÑO: An Analysis of Artifacts, p. 60-61.
2. Ibid., p. 63.

Carbon 14 analysis, while too broad in range to date the peach pit, could at least take it out of the later European occupation period in the seemingly unlikely chance that it is not a modern intrusion; so also the wool cloth. Microscopic analysis of the cloth and its dye might be revealing with respect to attribution. Metallurgical tests need to be made on the "compass needle" to establish its dating.

Although the archaeological work of the past 29 years has been fruitless insofar as identification of Drake's encampment is concerned, it has nevertheless added supporting evidence to the descriptions given in the Drake accounts, as well as to those of the Cermeño expedition in 1595.

On the shore of Drakes Estero and Limantour Estero eleven known village sites have yielded probable sixteenth century artifacts and materials of European introduction that could have been common to both the Drake and Cermeño expedition. The location of these sites compares favorably with the description in Famous Voyage: "... In this Baye we ankered and the people of the Countrey, hauing their houses close by the waters side, shewed themselues vnto vs, ..." We have seen that one site, Mrn. 235, corresponds to a specific location of a village described in World Encompassed, and the descriptions of the Indians' houses finds confirmation through excavations in the middens.

It is particularly noteworthy and important that in no other area in which Drake is supposed to have landed have sixteenth century artifacts and materials of European introduction been found. (1)

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1. See Adan E. Treganza, The Examination of Indian Shellmounds within San Francisco Bay with Reference to the Possible 1579 Land Fall of Sir Francis Drake, 1957; and Adan E. Treganza, "The Examination of Indian Shellmounds Within San Francisco Bay With Reference to the Possible 1579 Landfall of Sir Francis Drake: Second Season," ms., 1958 (?).

CHAPTER XIII

CONCLUSION

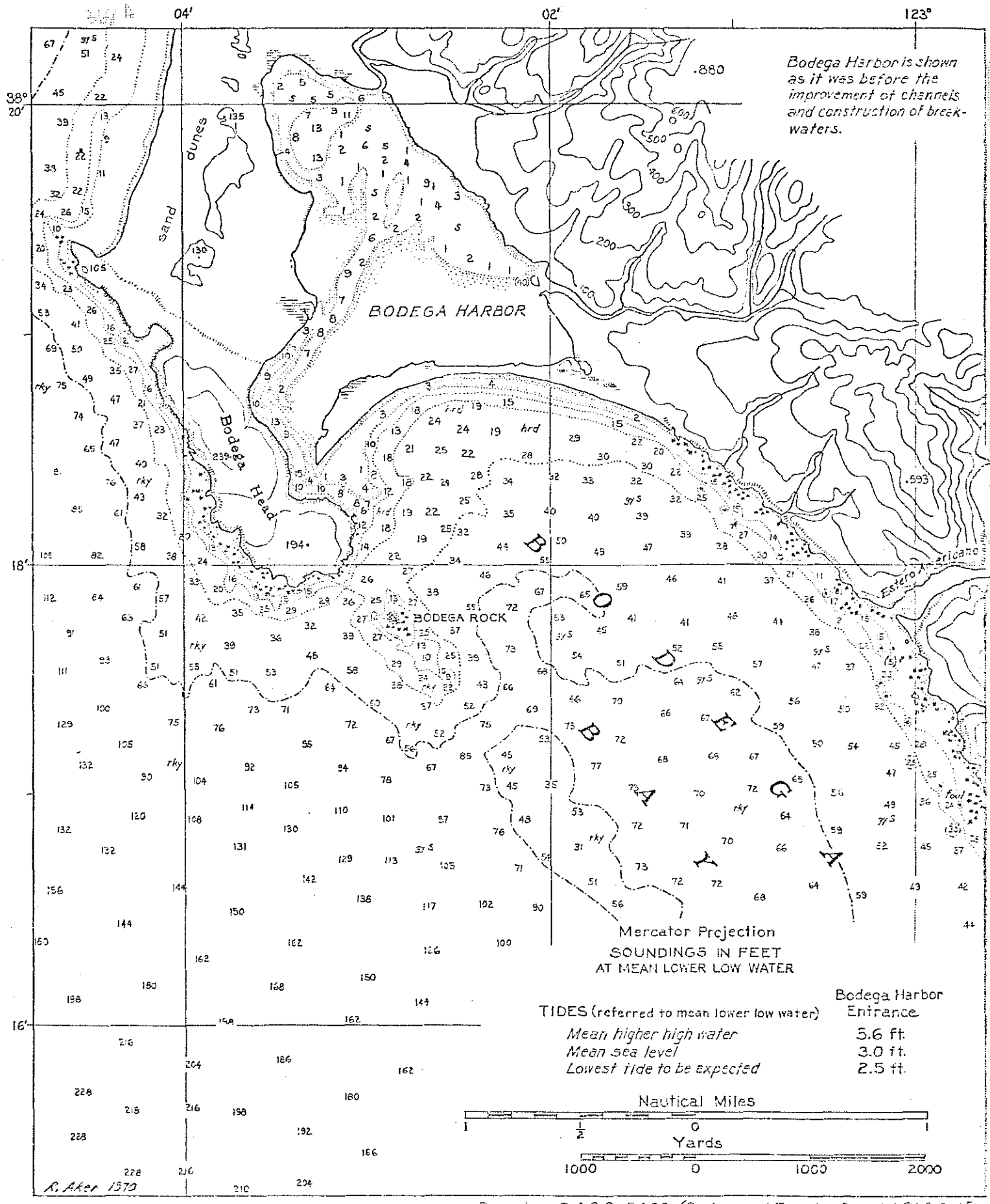
In the foregoing chapters we have followed a trail of evidence that has led to Drakes Bay and a specific site within it that is clearly identified with Drake's landing place and encampment. Early in the course of the Guild's search it was recognized that the body of evidence would have to be applied to each potential site in the entire suspect area to make certain that there were no other sites that were more qualified than the cove site. The result of this search and evaluation is that there are none.

The descriptions of the Indians given in the accounts clearly restricted the general area of the search to within Coast Miwok territory. This area is strongly bolstered by the given latitude of 38 degrees. In the area there are only four localities besides Drakes Bay where Drake might have come to anchor and found harborage; these are Bodega Harbor, Tomales Bay, Bolinas Lagoon and San Francisco Bay. Of these the descriptions of weather in the sources give positive indication for a coastal site, thus ruling out San Francisco Bay. Furthermore, the shore of none of these sites is so markedly different that it would have evoked the comment that, "The inland we found to be farre different from the shoare"; the difference being between a barren, inhospitable coast and an inland described as "a goodly country, and fruitfull soyle, stored with many blessings fit for the vse of man."

Finally, at none of these sites is there any configuration that closely matches the Portus Novae Albionis. The features of the inset themselves depict a specific, small area in which its likeness must be sought; a place where spits and bars form at the mouth of a waterway where it meets the sea. From the orientation of the inset, it is also a place on the left hand side of the waterway as one enters from the sea.

BODEGA HARBOR

Bodega Bay compares favorably with Hakluyt's description of a fair and good bay, though it could not have evoked the surprise of being "sent" in by a god-send as implied in his statement, because its sweep is immediately discernable from an entering vessel. In configuration and orientation, Bodega Bay is similar to Drakes Bay but very much smaller, being only about 1-1/2 miles wide. Bodega Rock and the shoal extending



Based on C. & G.S. 5603 (Bodega and Tomales Bay, 1st Ed. & 2nd Ed.)

BODEGA HARBOR

south of it break the westerly swells to an extent as they approach the bay, and good anchorage can be had in 5 to 6 fathoms of water on a sandy bottom 1/2 mile from the beach inside Bodega Head -- closer if the vessel's draft permits. The U.S. Coast Pilot states that this part of Bodega Bay affords shelter from northwesterly weather but warns that it is dangerous anchorage in southerly or westerly weather, [1] and as a consequence, the bay could never be considered seriously as a careening place.

Bodega Bay correlates poorly with Dudley's map showing the bay entered by Drake. Bodega Rock is very prominent 1/3 mile southeast of Bodega Head, but no sign of it shows on Dudley's map. Dudley shows an inlet which is quite clearly in the northeast corner of his bay, whereas the inlet to Bodega Harbor is on the southwest side, adjacent to Bodega Head. In addition, Bodega Harbor is a comparatively large body of water separated from the outer bay by a narrow barrier beach which has no counterpart in Dudley's bay.

In other important respects too, Bodega Bay fails to meet the criteria established by the accounts. There are no white cliffs here that could have led to the naming of the land Nova Albion on their account, and if Drake had gone south far enough to clearly see those at Drakes Bay, he certainly would not have gone back to Bodega Bay, nor could he have seen them in passing after he departed Bodega Bay. [2] The "Ilands of Saint James," which correspond to the Farallones and were described as being "not farre without this harborough," do not lie without Bodega Bay and are screened from sight by Point Reyes, even if they could be seen at this distance. Bodega Bay is situated in the midst of moorlike country which extends so far inland and with so gradual a change that it is unlikely that Drake's party could have penetrated enough to mark the inland as being "farre different from the shoare."

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1. U.S. Coast Pilot, Pacific Coast, U.S. Coast and Geodetic Survey, 1917 edition, p. 107.
2. On a course from Bodega Bay to the Farallones, the cliffs are screened by Point Reyes and cannot be seen until one is several miles south of the point, where they are then too distant to be seen for what they are. Also, it must be borne in mind that the land was named by virtue of the cliffs before departure, the name Nova Albion being used on the Plate of Brass.

CONCLUSION

Allowing that Drake might have had a look into Bodega Bay, he probably would have rejected Bodega Harbor in any event, for the depths of water over the bar as reported by later explorers, and in recent times, show it unlikely that he would have found sufficient water for the Golden Hind to enter. The report of Archibald Menzies in his journal of the Vancouver expedition to this coast gives an interesting early picture of Bodega Harbor. (1) Menzies was Surgeon on the expedition and went in the H. M. S. Chatham, an armed tender of 135 tons burthen (similar in size to the Golden Hind), sent to examine Bodega Bay. Menzies' description of the land approaching Bodega Bay and within are invaluable for the appearance of the land before settlement. He noted that it was hilly and of moderate height, presenting the appearance of fine pasturage country (which it is today) and checkered with pine forests. His description of Bodega Bay and the Chatham's entry into the bay makes it obvious that even if Drake had investigated it -- and there is no mention of it in the accounts -- he would not have found it suitable for his purposes.

The Chatham's cutter was sent in to examine the harbor, and on going in, it was found that the entrance channel was "only about 8 feet deep even at high water & that too very narrow scarcely half a Cable's length across." Inside, it was not thought worthwhile to examine the channel further. Menzies noted that the country on the east side of the harbor was apparently covered only with "shrivell'd grass without trees or bushes of any kind." The arid aspect of the surroundings suggested that fresh water would be scarce, or unprocurable.

To correlate with the Portus Novae Albionis inset, it is mandatory that the site be sought on Bodega Head just inside the entrance to the lagoon. There is a natural cove here which corresponds roughly to the hard features of the inset, but the straight inner shore is lacking and there is no evidence that a sand spit forms at the end of Bodega Head. The cove itself forms a bend in the tidal channel and thus exposed to the tidal current, it would have been unsuitable as a careening basin.

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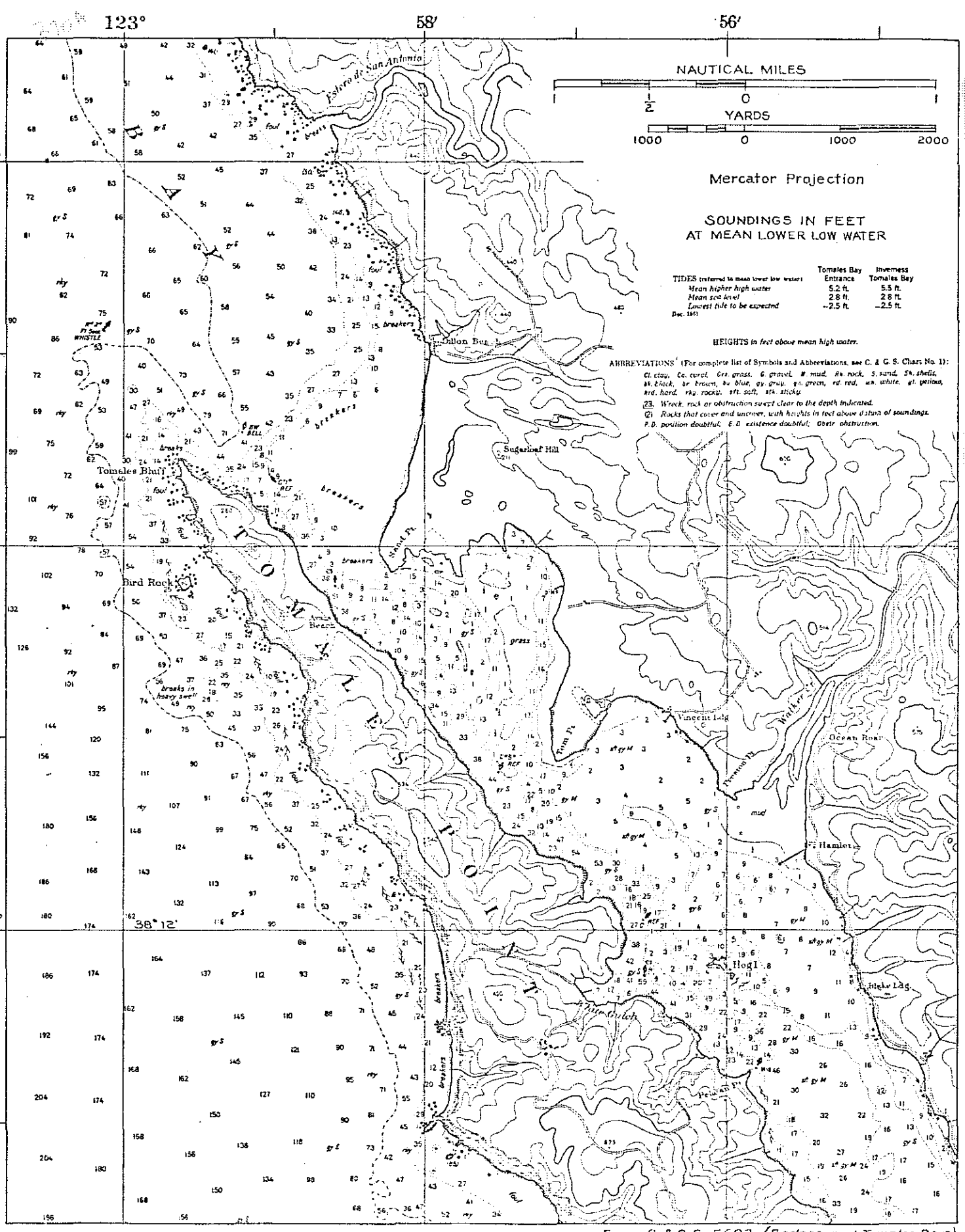
1. See Alice Eastwood, "Archibald Menzies Journal of the Vancouver Expedition," Extracts covering the visit to California, with an introduction and notes by Alice Eastwood, California Historical Society Quarterly, II (January, 1924), pp. 265-340. See Appendix V for portion dealing with Bodega Bay.



From C. & G.S. 5603 (Bodega and Tomales Bays)

ENTRANCE TO TOMALES BAY

CONCLUSION

TOMALES BAY

If Drake had seen the potential of Tomales Bay, there is a fair chance that he would have used it for his purposes, despite the hazards of its outer bar; he had entered places previously that were little better, as for example, Port San Julian. However, it may well be doubted that he saw it. Tomales Bay is screened on the seaward side by the overlapping extension of Tomales Point and, as with Bodega Harbor, it is necessary to be well into Bodega Bay to clearly see Tomales Bay. The entrance is much obstructed by shoals exposed to the full brunt of the westerly swells that break heavily on them. This fact alone and the chance of becoming embayed in the south end of Bodega Bay would be enough to cause a prudent navigator to avoid the area.

Don Francisco Antonio Mourelle, Second Pilot of the schooner, Sonora, on the Bruno Hezeta expedition made some interesting observations on Tomales Bay which are given in Appendix IV. (1) He arrived at the bay October 3, 1775, and his description is one of the earliest known. The Sonora did not enter Tomales Bay, however, because of heavy seas on the bar but she did anchor outside the mouth under the lee of Tomales Point. Of the aspect of the land Mourelle wrote: "The mountains near this port are entirely naked in every part of them; but we observed that those more inland were covered with trees. The plains near the seacoast had a good verdure, and seemed to invite cultivation."

The next morning, the Sonora sailed on towards San Francisco. However, while still at anchor at 2 o'clock in the morning the sea ran so high that the waves broke aboard, and the boat alongside was smashed.

Tomales Bay, which extends southeast some 12 miles inland with an average width of 1-1/2 miles, could have provided Drake with a choice of excellent careenages in several deep coves on the southwest shore, all accessible by deep water channel and with good beaches adjoining. Close by any one of these he would have found fresh water and firewood. At San Diego, Menzies and his fellow officers were shown a plan of Tomales Bay by the Spanish Commandant of the port, and his observation is of interest: " . . . . From the plan which he showed us of this opening it appears to be a very snug & secure harbor, the entrance of it

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1. See translation by Daines Barrington, Voyage of the Sonora in the Second Bucareli Expedition, Thomas C. Russell, ed., pp. 54, 58.

is narrow & the best channel near the southern shore where there is three fathoms & half, but after getting in the water deepens to 8 & 10 fathoms: ...." (1)

Tomales Bay shares the same inconsistencies with the accounts that Bodega Bay does with respect to the white cliffs and orientation with the Farallones, and is even more inconsistent with respect to the inland being far different from the shore. The southwest shore is totally different from the northeast shore, the former being heavily overgrown with forest and dense vegetation for the most part while the latter is grassy and almost treeless. The quality of the inland country could have been ascertained by sight from Tomales Bay and Drake could have reached the headwaters very quickly in the ship's boat. The observation that the inland was far different from the shore could not have been made at Tomales Bay.

The Portus Novae Albionis must necessarily be sought on the northeast side of the Tomales Bay entrance where topographic agreement with the inset is lacking, this being an area of low land and dunes, with insufficient depth of water to accommodate the Golden Hind. Logically, Drake would not have selected the barren northeast side of the bay when he would have found so many advantages on the other.

BOLINAS LAGOON

Bolinas Lagoon, which lies inside Bolinas Bay, has received little attention from historians bent on locating Drake's landing site. Located in 37° 54', Bolinas Bay is an open bight on the coast 3-1/2 miles wide. It affords shelter in northwesterly weather but is entirely open to the south. Because of the 1-1/4 mile extension of Duxbury Reef on the west side of the bay, there is no likelihood that Drake could have entered this bay in the sense of Hakluyt's statement of being sent into a fair and good bay.

Again, only the inner lagoon could have interested Drake. Modern

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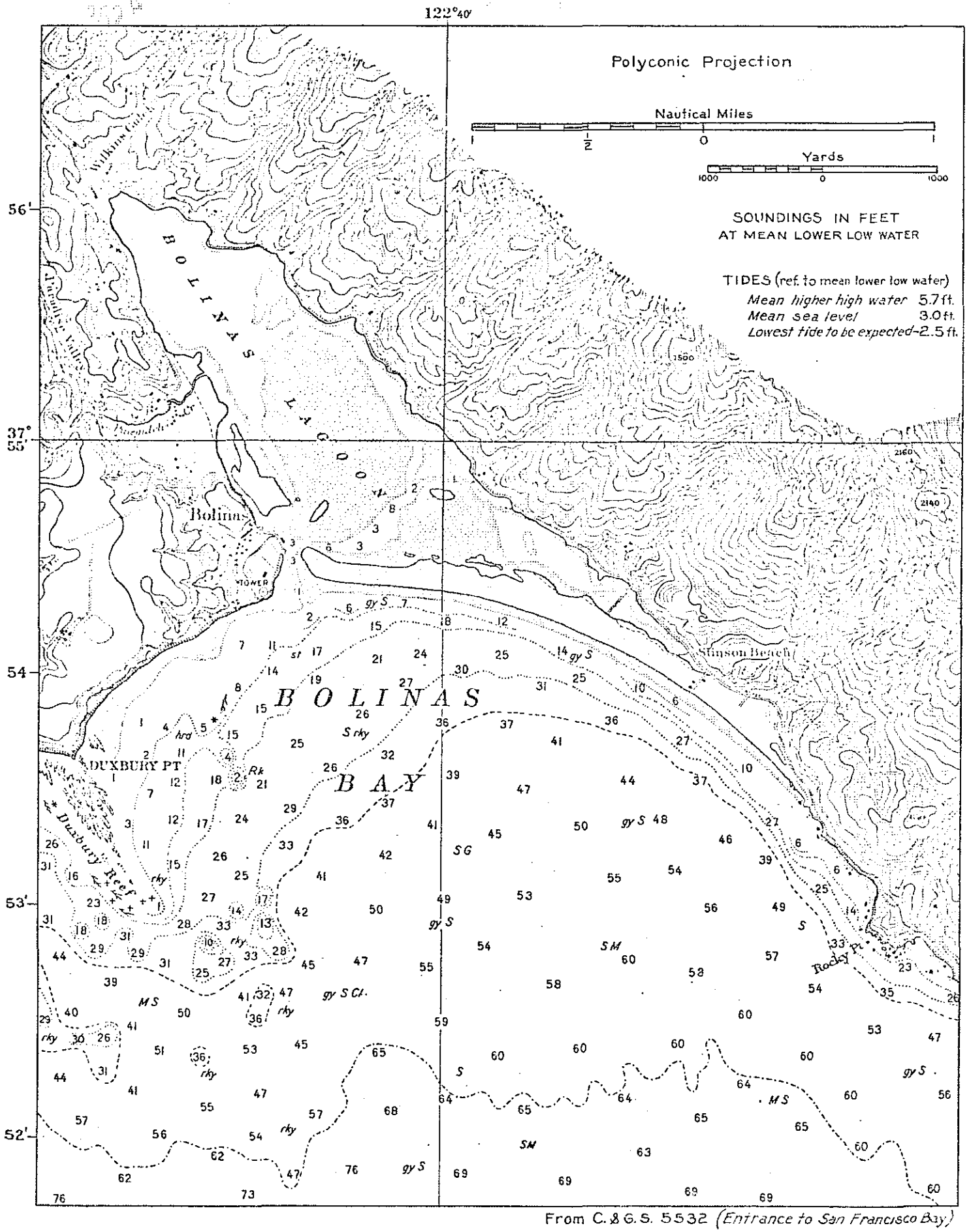
1. Eastwood, "Archibald Menzies Journal," California Historical Society Quarterly, II (January, 1924), pp. 334-5.



BOLINAS LAGOON

charts show a depth of only 1 foot of water over the bar at the entrance at mean lower low water. (1) The tidal prism of Bolinas Lagoon is realtively small, and there is little reason to expect that the entrance channel has changed much since Drake's time. Munro-Fraser tells of extensive logging operations on the slopes behind the lagoon during the early days of San Francisco's development, and notes that "Bolinas Bay is available only for crafts of the smallest description, and then passage over the bar cannot be affected except at flood tide." (2) During the historic period only lighters and shallow draft schooners were able to enter the lagoon through its narrow passage.

There is no marked difference at Bolinas Lagoon between the shore and the inland today, but prior to the historical period, the steep hills plunging down to the lagoon seem to have been heavily forested. We are told by Munro-Fraser that "The whole slope of Tamalpais in early days was more or less wooded, but by far the greater portion has been denuded." The verdant growth of redwoods and fir growing down almost to the shores of the lagoon would have precluded such descriptions as "squalidness," "barrennesse," and "trees without leaves," which occur in the source accounts.

The white cliffs at Drakes Bay are not a dominant feature of this coast and must be seen from within that bay to make a significant impression. With little question that Drake was at Drakes Bay, the one telling argument against Bolinas Lagoon is that Drake would have had virtually no reason to forsake the promise of Drakes Bay for some unknown destination farther down the coast. It may also be argued that Mt. Tamalpais, which lies close at hand behind Bolinas Lagoon, would have offered a natural vantage point for a visual survey of the newly discovered land -- a point from which Drake could have seen the impressive magnitude of San Francisco Bay, which would have invited exploration with respect to the northwest passage.

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1. See Chart No. C. & G.S. 5532, San Francisco Entrance, U.S. Coast and Geodetic Survey.
2. See. J. P. Munro-Frazer, ed., History of Marin County, California, pp. 88-89.

CONCLUSION

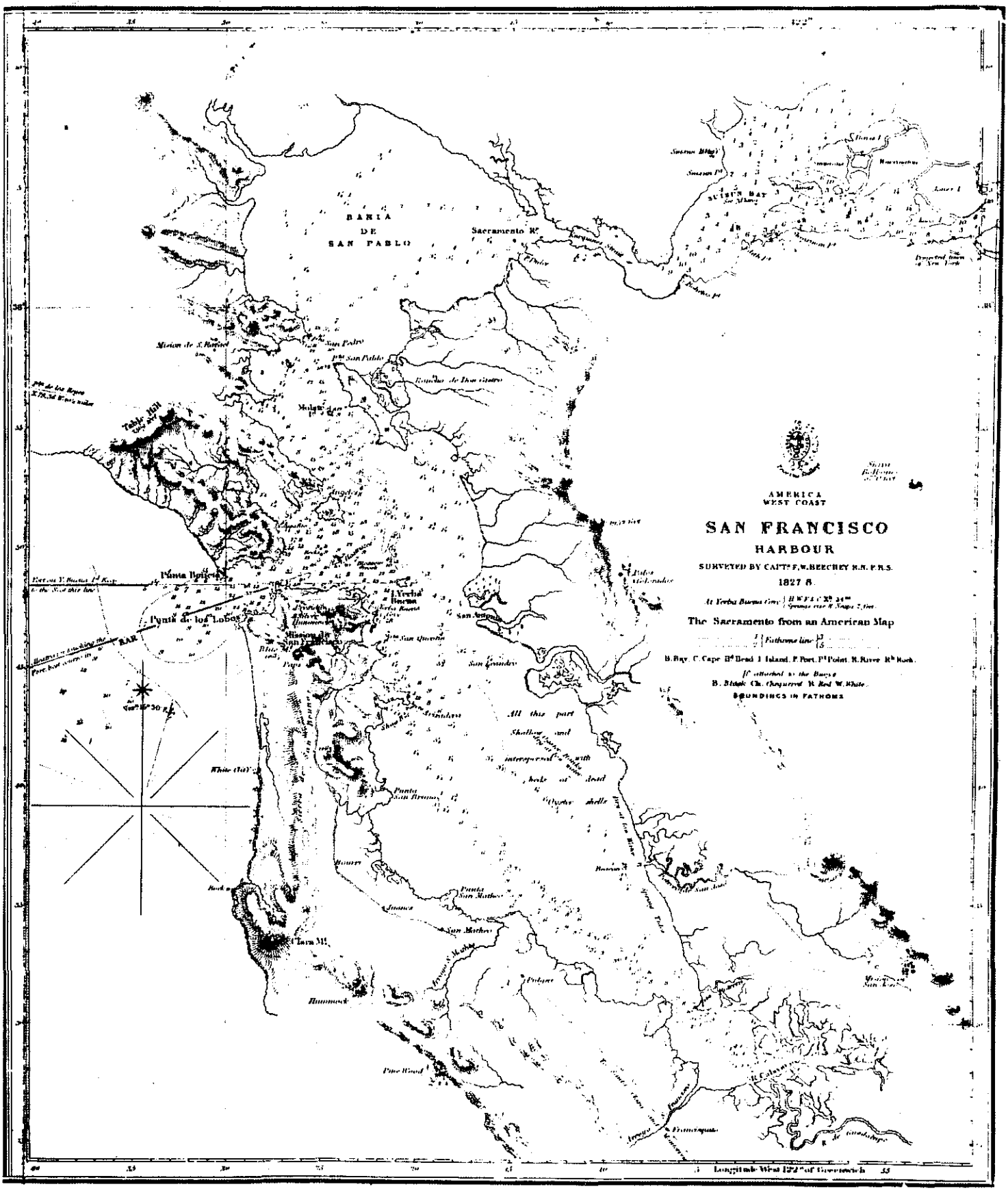
SAN FRANCISCO BAY

For more than a century professional and lay historians both have argued for or against a Drake site within San Francisco Bay. In recent years the issue has become more confused by the discovery of the Plate of Brass at Greenbrae in 1936 after it had been discarded there by Caldeira, who found it originally at Drakes Bay in 1933. As a portable artifact which was not found in situ at either place, the site of the Plate's discovery should be given minimal importance in the review of evidence for a particular site, yet a whole case has been woven around this one factor by several San Francisco Bay protagonists. To restate their various arguments in this paper would unduly tax the attention of the reader.

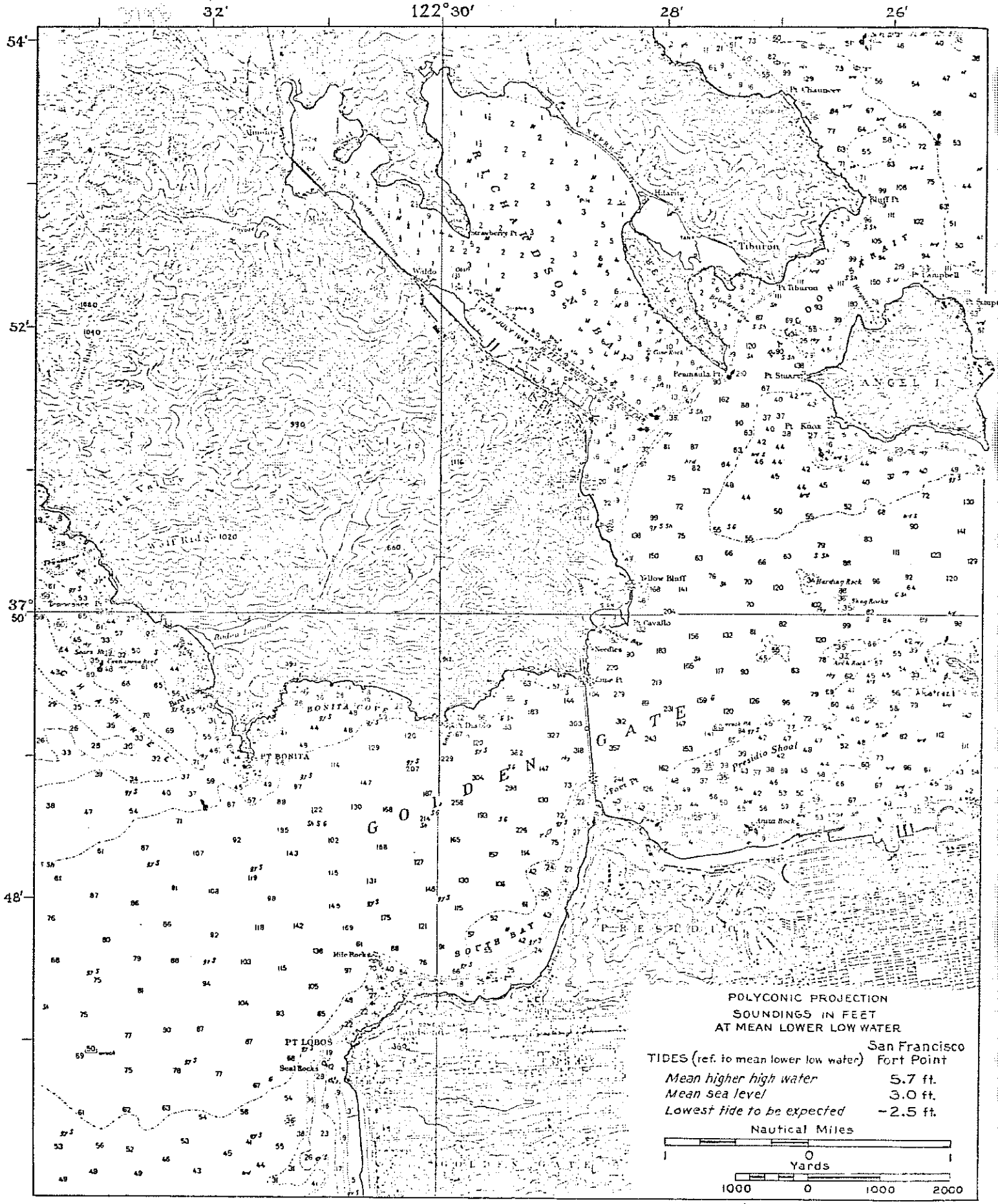
Essentially, San Francisco Bay is not the place described in the source accounts. Although portions of the Bay lie on the 38th parallel of latitude, and although the bay lies within Coast Miwok territory, it is an inland bay which is not subject to the weather described in World Encompassed by such statements as "neither could we at any time, in whole fourteene days together, find the aire so cleare as to be able to take the height of sunne or starre"; or "During all which time notwithstanding it was in the height of summer, and so neare the sunne, yet were wee continually visited with like nipping colds as we had felt before."

We have already mentioned, in connection with Bolinas Lagoon, that Drake would have had little reason to continue southward from Drakes Bay in search of a better site for his careenage and encampment, thus trading the known for the unknown. And this observation also applies to San Francisco Bay. We must consider too that it would have been illogical to name San Francisco Bay for some white cliffs seen at Drakes Bay, when the overwhelming magnificance of San Francisco Bay would have suggested countless names.

Undoubtedly, Drake would have considered it a god-send to have entered the unexpected vastness of what is now one of the world's great ports, and with a good westerly wind behind him and the right tide, he could have had the impression of being sent in as Hakluyt related. However, it would have taken him several days to ascertain what it was that he had entered. Significantly, the Spanish discoverers of San Francisco Bay named it Estero de San Francisco, and it may be doubted that even Drake would have referred to this inland water as a bay. Most certainly,



CAPTAIN FREDERICK WILLIAM BEECHEY'S CHART OF SAN FRANCISCO BAY, 1827-8. THIS IS THE EARLIEST ACCURATE CHART OF THE BAY SHOWING ITS APPEARANCE BEFORE LAND-FILL ALTERED THE SHORELINE.



From C.&G.S. 5532 (*Entrance to San Francisco Bay*)

ENTRANCE TO SAN FRANCISCO BAY

thoughts of the Northwest Passage or even the mythical city of Quivera would have passed through his mind as he observed the vista of waterways stretching to the northeast and to the south. The effort of searching the inner reaches and the visual impressions would certainly have ellicited comment from the survivors of the voyage. Yet not a word regarding either aspect has reached us; the terms used to describe the port discovered by Drake are singularly modest.

There is no parallel between the harbor depicted by Dudley and San Francisco Bay or its entrance. The soundings shown on his map are not comparable to the depth of water in the San Francisco entrance and the inlet at the head of his bay cannot be compared to the Golden Gate, nor is there anything to represent the inner bay.

Within San Francisco Bay there is no marked difference between the inland and a camp site on the Marin County shore that would have aroused comment because of a short journey "vp into the land, to see the manner of their [Indian] dwelling, and to be better acquainted with the nature and commodities of the country." The nature of the inland can be seen for a great distance from the deck of a ship within the bay.

No site in San Francisco Bay has a true likeness to the Portus Novae Albionis, despite arguments to the contrary which compare the point in the inset to the Tiburon Peninsula in Marin County and the island to Belvedere Island. (1) Topographic similarity is totally lacking as is also similarity of configuration; there is no indication of so prominent a feature as Angel Island, nor is there any clear indication of San Pablo Strait or the several small islands at the north end of the bay.

In summing up the argument against San Francisco Bay, it must be observed that despite extensive exploration no San Francisco Bay Indian midden has produced sixteenth century European materials, while no less than 12 sites on Drakes Bay have produced such materials in quantity and diversity.

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1. See Robert H. Power, "Portus Novae Albionis Rediscovered?", Pacific Discovery, VII (May-June, 1954).

CONCLUSION

SUMMARY

The actual steps in the establishment of the site have been:

a. Selection of the general area most favored by the evidence (Drakes Bay).
b. A study of the requirements for a specific site, recognizing the necessity of an inner harbor for careening.
c. The search in the field for a site on the shores of the inner waters of the general area favored by the evidence (Drakes Estero).
d. The discovery of a site that resembled the Portus Novae Albionis inset on the inner waters of the general area (Drake's Cove).
e. The careful correlation of the body of evidence with the site and the development of additional evidence, none of which has contradicted the original finding.

The case for Drake's Cove rests not on one piece of evidence -- or even two or three -- but on the total web which has been woven as research has progressed. Drake's Cove fulfills the specific requirements imposed by the contemporary accounts and charts:

1. Drake's Cove is located on a bay at 38 degrees.
2. It is located within former Coast Miwok territory.
3. Drakes Bay accords with the accounts of Drake's approach to the bay.
4. White cliffs lie toward the sea from Drake's Cove.
5. The "Ilands of Saint James" lie not far without this harbor.
6. The area is subjected to heavy and continuing fogs during the summer.
7. The area is subjected to penetrating cold and strong winds from the north and northwest during the summer.
8. The inland over Inverness Ridge is "farre different from the shoare."
9. There is a known sixteenth century Indian village located within earshot "neere about 3-quarters of an English mile distant" (3750 feet).
10. The white cliffs and downs at Drakes Bay -- reminiscent of home -- are conducive to naming the land Nova Albion.

11. The site agrees with the definition and contemporary usage on the Hondius Broadside Map of the word "Portus."
12. The site meets the requirements of Dudley's "Il Porto Bonissimo."
13. The site closely correlates with the Portus Novae Albionis in all respects.
14. The site meets the scale of the Portus Novae Albionis inset.
15. There was sufficient water over the bar to have enabled Drake to enter the inner waterway (Drakes Estero).
16. Cermeño's visit to Drakes Bay in 1595 describes conditions similar to those described in the Drake accounts 16 years earlier.
17. Tide predictions indicate conditions favorable for careening or graving at Drake's Cove.
18. The site is well suited for careening or graving.
19. The site is bordered by hills on the landward side from which Indians always made a descent to the camp, according to the accounts.
20. The site is located near where the Plate of Brass was first found.
21. There is an abundant supply of stone at the Cove for a fort.
22. The area abounds in foods of the type described in the narratives, and it offers an adequate supply of driftwood and fresh water.
23. The site was sufficiently extensive to accommodate an encampment on level, open ground adjoining the careening site.
24. The flora and fauna described in the accounts agree with the general area of the encampment and the specific site.
25. It is only at Drakes Bay that sixteenth century European artifacts have been found.
26. The accounts have not described the magnificence or complexities of exploring San Francisco Bay.

It is apparent that all of these conditions are not to be found at other purported sites, as shown on the following chart:

Factors which exclude other sites:

Bodega Bay	1, 3, 4, 5, 8, 9, 11, 12, 13, 14, 18, 20, and 25.
Bodega Harbor	1, 3, 4, 5, 8, 9, 11, 12, 13, 15, 20, and 25.
Tomales Bay	1, 3, 4, 5, 6, 7, 8, 9, 13, 15, 20, 24, and 25.

Bolinas Bay	1, 3, 4, 8, 9, 10, 11, 12, 13, 14, 18, 20, and 25.
Bolinas Lagoon	1, 3, 4, 8, 9, 10, 12, 13, 14, 15, 18, 20, 24, and 25.
San Francisco Bay	3, 4, 5, 6, 7, 8, 9, 10, 13, 20, 25, and 26.
Inside of Point Reyes at Drakes Bay	4, 9, 11, 12, 13, 14, and 18.

APPENDIX I

DRAKE ON THE SPANISH MAIN -- PRECEDENTS FOR NOVA ALBION

Extracts from Sir Francis Drake Revived, London, Nicholas Bourne, 1628, [1] reprinted in Documents Concerning English Voyages to the Spanish Main, 1569-1580, Edited by Irene A. Wright, Hakluyt Society, Ser. 2, Vol. 71, 1932, pp. 245-326. [2]

This account deals with Drake's third voyage to the West Indies and the Main in 1572 and 1573. Not only does the account offer an enthralling, highly readable narrative, but it throws much light on Drake's characteristic actions and methods, as well as giving us a precedent for his procedures at Nova Albion.

Captain Drake sailed for the Main in the Pascha of Plymouth, of 70 tons, together with the Swan of 25 tons from the same port. In both ships there were 73 men and boys -- about the number that he had with him at Nova Albion. The oldest of his crew was 50; all the rest were under 30 years of age. At least two such expeditions sailed from England that year and twenty from Harve -- all bent on mixed trade and privateering. All of these ventures appear to have had powerful backing.

Drake appears to have been in the employ of John Hawkins and William Winter and acting under the tacit policy of their government which at that time permitted English subjects to make unlimited reprisals of their own against Spain. [3] Sir Julian Corbett [4] points

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1. The title page gives the following information: "Faithfully taken out of the Report of M. Christopher Ceely, Ellis Hixom and others, who were in the same Voyage with him. By Philip Nichols, Preacher. Reviewed by Sir Francis Drake himselfe before his death, and much holpen and enlarged by divers Notes with his owne hand here and there Inserted."
2. Miss Wright's footnotes have been omitted.
3. James A. Williamson, The Age of Drake, pp. 113-117.
4. Sir Julian S. Corbett, Drake and the Tudor Navy, Vol. I, pp. 158, 159, and footnote pp. 164-165.

out that his little squadron was fitted out with equipment abreast of the latest ideas of the time in English military science. Also, the nature of the arms served out prior to action at Nombre de Dios on the Main, shows that he was a man acquainted with the complicated arrangement of a regular infantry tertia, that is, a three-fold organization consisting of staff weapons comprising pikes, fire-pikes and partizans, fire-arms comprising muskets and calivers, and archers and sword-and buckler-men. The archers were armed with arrows of "fine roving shafts," specially made in England to Drake's own specifications. On the Voyage of Circumnavigation which followed this venture, the archers still held a prominent place in Drake's company.

On July 6, 1572 Drake reached the Spanish Main within sight of the Sierra Nevada de Santa Marta in present day Columbia. On the 12th he arrived on the Darien coast at the secret harbor he had named "Port Phesant," which he had occupied the year before. The port would seem to have been at or near Cabo Tiburon. The haven was small, only a mile more or less across, and is described as "a fine, round Bay, of verie safe harbour for all winds, lying betweene two high points, not past halfe a cable's length [360 feet. 1 cable is 120 fathoms or 720 feet.] over at the mouth, but within eight or ten cable's length everie way, having ten or twelve fadome water more or lesse, full of good fish, ..."

"Port Phesant" had not remained secret in Drake's absence; upon landing, a message from another of Hawkins's officers who had been there and left five days before was found nailed fast to a great tree warning Drake that the Spaniards had been there and removed his cache of stores.

[p. 257]

> This advertisement notwithstanding, our Captaine meant not to depart before he had built his Pinnases, which were yet aboard in peices, for which purpose he knew this Port a most convenient place. And therefore, assoone as we had mored our Ships, our Captaine commanded his Pinnases to be brought ashore, for the Carpenters to set up, himselfe employing all his other companie in fortifying a place which he had chosen out as a most fit plot, of three quarters of an acre of ground, to make some strength or safetie for the present, as sufficiently as the meanes he had would affoord;

which was performed by felling of great trees and bowsing and haling them together with great Pulleis and halsers, untill they were inclosed to the waters, and then letting others fall upon them, untill they had raised with trees and boughes thirtie foote in height round about, leaving onely one gate to issue at neere the waters side. Which every night (that we might sleepe in more safetie and securitie) was shut up, with a great tree drawn athwart it.

The whole plot was built in a Pentagonall forme, to wit, of five equall sides and angles, of which angles two were towards the sea, and that side betweene them was left open, for the easie launching of our Pinnases. The other foure equall sides were holely (excepting the gate before mentioned) firmely closed up. Without, insteed of a trench, the ground was rid for fiftie foote space, round about.

The rest was verie thicke with trees, of which many were of those kindes which are never without greene leaves, . . .

Later, Drake sought a temporary base under Punta San Blas, then known as Cativas Headland, [1] where he could hide out and leave his ship safely at anchor out of sight to deceive the Spaniards to think that he had left the coast. On August 21st he arrived at an anchorage here that was subsequently named "Port-plentie" for the great quantity of goods that were brought here from raids on passing shipping.

[pp. 274-275]

. . . As soone as we arrived where our Captaine intended, and had chosen a fit and convenient road (out of all trade) for our purpose, we reposed our selves there for some fifteene dayes, keeping our selves close, that the bruit of our being upon the Coast might cease.

But in the meane time wee were not idle, for besides such ordinarie workes, as our Captaine everie moneth did

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1. See map, Wright, Documents . . . , at end.

> usually inure us to, about the trimming and fitting of his Pinnaces, for their better sailing and rowing, hee caused us to rid a large plot of ground, both of Trees and Brakes, and to build us houses, sufficient for all our lodging, and one especially for all our publique meetings, wherein the Negro which fled to us before did us great service, as being well acquainted with the Countrey, and their meanes of building. Our Archers made themselves Butts to shoot at, because wee had many that delighted in that Exercise, and wanted not a Fletcher to keepe our Bowes and Arrowes in order. The rest of the company, everie one as hee liked best, made his disport at Bowles, Quoits, Keiles (1), &c. For our Captaine allowed one halfe of their company to passe their time thus, everie other day interchangeably, the other halfe being enjoyned to the necessarie workes about our Ship and Pinnaces, and the providing of fresh victuall, Fish, Fowle, Hogs, Deere, Conies, &c., whereof there is great plentie. Here our Smiths set up their Forge, as they used, being furnished out of England with Anvill, Iron, Coales, and all manner of necessaries, which stood us in great stead.

At the end of fifteen days, Drake left with two pinnaces for the "Rio Grande," today's Magdalena River, and in his absence his brother, John Drake, who had been left in charge of the base, found a new anchorage on the mainland, not only more secure than the former by its remoteness, "but especially in that it lieth among a great many of goodly Ilands full of Trees, where, though there be channels, yet there are such Rockes and shoales that no man can enter by night, without great danger, nor by day without discovery, whereas our Ship might be hidden within the Trees."

When Drake returned, preparations were made to move the entire company to the new base, which was named "Fort Diego."

[pp. 280-281]
Sept. 18.

> As soone as we could trimme our Shippe, being some two dayes, our Captaine sent away one of his Pinnaces towards the bottome of the Bay, amongst the shoales and sandy Ilands, to sound out the channell for bringing in of our Ship

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1. Skittles

neerer the maine.

Sept. 19.

The next day we followed, and were with warie pilatage directed safely into the best channell, with much adoe to recover the Roade, among so many flats and shoales. It was neere about five leagues from the Cativaas, betwixt an Iland and the maine, where we moared our Ship. The Iland was not above foure Cables length from the maine, being in quantitie some three Acres of ground, flat and very full of trees and bushes.

Sept. 22.

We were forced to spend the best part of three dayes, after our departure from our Port-plentie, before wee were quiet in the new-found Roade, . . .

It was learned here from the Cimaroons that a stay of five months would be required to await the end of the rainy season before an intended raid could be made on the treasure-trains from Panama. Preparations to pass the time were accordingly made as follows:

[p. 281]
Sept. 23.

This answer although it were somewhat unlooked for yet nothing discontented us, but rather perswaded us farther of their honest and faithful meaning towards us. Therefore our Captaine, to entertaine these five moneths, commanded all our Ordnance and Artillerie a shoare, with all our other provisions, sending his Pinnaces to the maine, to bring over great trees, to make a Fort upon the same Iland, for the planting of all our Ordnance therein, and for our safeguard, if the Enemy in all this time should chance to come.

[p. 282]
Sept. 24

Our Symerons cut downe Palmito boughes and branches and with wonderfull speed raised up two large houses for all our Company. Our Fort was then made (by reason of the place) triangle wise with maine timber and earth, of which

the Trench yeelded us good store, so that we made it thirteene foot in height.

Oct. 7.

But after we had continued upon this Iland foureteene dayes, our Captaine, having determined with three Pinnaces to goe for Carthagene, left his brother John Drake to governe these who remained behinde with the Symerons, to finish the Fort which hee had begun. For which he appointed him to fetch boords and plancks, as many as his Pinnace would carrie, from the prize which wee tooke at Rio Grand and left at the Cativaas, where shee drave a shore and wracked, in our absence, but now shee might serve verie commodiously to supply our uses, in making Platformes for our Ordnance. Thus our Captaine and his brother tooke their leave, the one to the Eastward, and the other to the Cativaas.

With his mission completed in mid April of 1573, Drake quit "Fort Diego" with a captured Spanish fregata in which he intended to return to England and rode at anchor some few days among the Cabezas, (1) the small islands lying nearby in the Gulf of San Blas. Here also he brought one other fregata loaded with "Maiz, and Hens and Hogs, and some Honey," captured with the intent of providing another vessel for his departure from the Main. Both were careened here in preparation for the voyage.

[p. 324]

. . . And being at anchor, presently we hove out all the Maiz aland, saving three Buts which we kept for our store and carying all our provisions a shoare, we brought both our Fregats on the Carine, and new tallowed them. Here we stayed about a seavenight, trimming and rigging our Fregats, boarding and stowing our provisions, tearing abroad and burning our Pinnaces, that the Symerons might have the yron-worke.

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1. Also named Cabecas. See map, Corbett, Drake and the Tudor Navy, p. 163.

APPENDIX II

DEFINITIONS FROM SIR HENRY MAINWARING'S SEAMAN'S DICTIONARY, c. 1620-1623

Extracts from The Life and Works of Sir Henry Mainwaring, Vol. II, edited by G. E. Manwaring and W. G. Perrin and published by the Navy Records Society, London, 1922.

Sir Henry Mainwaring was on a par with Drake on naval matters in England, and though his dictionary was compiled between 1620 and 1623, it is close to being contemporary with Drake's time and therefore sheds important light on nautical terminology and usage of that era. The work was written primarily for the edification of the 'Gentleman Captains' of the day who attained their position through social status and were not trained seamen. It was circulated in manuscript form for a number of years until the English Parliment had it printed for the good of the nation in 1644.

Mainwaring was born in 1587 in Shropshire County, England, and received a university education at Oxford, afterwards, apparently, enlisting his services in the wars in the Low Countries. By 1610 he had developed an insatiable love of adventure on the high seas which ultimately led him into a profession of piracy, which he conducted from bases on the Barbary Coast. So completely successful were his naval tactics that the Spanish and French governments finally prevailed on James I in 1615 to bring Mainwaring to terms. The King gave him a choice of either accepting a free pardon if he would abandon piracy and return to England, or else face an English fleet of such strength as to compel him to surrender.

Accepting the King's pardon, Mainwaring returned to England and soon became active in the navy and was frequently consulted as an authority. He spent the remainder of his life in the service of the crown. It was while he was Lieutenant of Dover Castle and Deputy Warden of the Cinque Ports that he wrote his Seaman's Dictionary.

DEFINITIONS

The text of the dictionary as published in The Life and Works of Sir Henry Mainwaring is a composite collated by the editors from the following four early manuscripts:

Additional MS. 21571. - A copy dated 1625 that once belonged to William Fielding, 1st Earl of Denbigh and son-in-law to the Duke of Buckingham. It is denoted in the footnotes by the letter (D).

Harleian MS. 2301. - Original owner unknown, but this copy appears to be of a little earlier dating than the Denbigh MS. (H)

Sloane MS. 207. - Dedicated by Mainwaring to Lord Zouch, Lord Warden of the Cinque Ports. (Z)

Scott MS. - Dedicated by Mainwaring to George Villiers, the Marquis of Buckingham, Lord High Admiral of England. This is the earliest of the manuscripts, and as Buckingham was made a Duke in May of 1623, it necessarily preceded that date. (B)

Additional matter not found in (B) is enclosed in square brackets. The spelling has been modernized, but attention is called to any spellings that seemed to have a special interest.

The following extracts from the dictionary were selected to define the intent of certain wording in the Drake accounts as well as to illustrate the methods of seamanship that may have been used by him at Nova Albion.

Anchoring, or Anchorage is when we let fall an anchor, or more, into the sea, with cables to them, so that the ship may ride fast by them. We say, there is good anchoring, where there is shoal water, for in deep waters the sea hath more force against the ship, and the anchors are very long a-weighing upon any occasion; ground that is not too soft or oozy, in which the anchors can have no fast hold: nor too hard and rocky, [1] so that it may cut the cables. The best ground to ride in is a stiff clay or a hard sand. Also where they may ride out of the way of the tide, and lastly, where they may ride land-locked, so that the sea-

1. 'Nor knotty,' D.

gate [1] can have no power against them: to which may be added that the lee shore on every side is so soft that if a ship come aground she can have no hurt. [For a road, we say there is good anchoring where] [2] there is good ground, and also where they may have sea room to set sail if their cables break or the anchors come home. That place which hath all these commodities, is good to ride in, and here we say is good anchoring or good anchorage. Bad anchoring or bad anchorage is a place where all or many of the contrary conditions are to be found.

[A Bay is when two points or headlands lie so far off into the sea that, drawing a straight line from the one to the other, there is made towards the mainland a hollowness or part of a circle which is filled with water, be it more or less, that same is called a Bay unless there be any passage navigable through, for then it beareth the name of a strait, and not of a bay. But commonly we do not give it the name of a bay unless there be some eminent depth and indraught, as it is usually termed. And it matters not whether the distance betwixt the points be little or much, for the Bay of Biscay, the Bay of Portingale, [3] the Bay of Mexico and divers others are many score leagues over from headland to headland, and also in depth, and Torbay [4] in Devonshire, with many the like, is not above (blank) mile over.] [5]

A Boom. . . In coming into harbors where the channel is narrow and crooked, and the land about it overflown, they used to set poles with bushes, or baskets, at the tops to direct how men should steer along the channel by them: and these are also in many places called booms, but in some others they are called beacons. [6]

Bowline [7] is a rope which is fastened to the leech or middle part of the outside of the sail, the use whereof is to make the sail stand the sharper or closer by a wind. . . [When we sail by a wind as near as we can lie, we usually say, to express it in what manner we did sail, We

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1. Ground swell. Ed.
2. B reads 'or else that.'
3. The indentation of the coast between Finisterre and Peniche was exaggerated in old maps.
4. 'Tarbey'
5. Found only in D.
6. Note the use of 'harbor' in context with channels. Ed.
7. 'Bowling.'

went or sailed by a bowline; as much as to say by a wind.] (1)

Breaming is when a [boat or] ship is brought aground or on the careen to be trimmed, that is, to be made clean; they burn off the old weeds or stuff which has gathered filth. (2) This they usually do with reeds, broom, old ropes or the like, [and then they scrape that stuff, being hot, off with iron scrapers; and so continuing heating the ship they rub the planks as clean as may be with dry mops, that the new stuff wherewith they pay the ship may stick on the better, and the ship be the longer before she be foul again].

A Card, or Sea Card is a geographical description of coasts, with the true distances, heights and courses, or winds laid down in it; not describing any inland, which belongs to maps. The differences and uses of them will require a long discourse, and they are set down in most books which write of navigation, and therefore I leave them to those books.

Careen. Careening is the best way of trimming a ship under water, both for that the carpenters may stand upon the scaffolds most commodiously to caulk the seams or do any other thing that shall be requisite; also for the saving of the ground timbers, which, especially in ships of great burthen and weight, must needs be much wrung, though they be laid never so strong: besides, it is a most necessary trimming for great ships which are either old or weak built, and also for any ships that have but small floor, and are built so sharp under water that they will be in danger of overthrowing when they shall be brought aground. This careening is to be done in harbour, where the slower the tide runs the better: and it is most commonly used in such places, where there are no docks to trim a ship in, nor no good graving places, (3) or else that it doth not ebb so much that a ship may sew dry. For the manner of careening it will be too long and unnecessary to set down all the particulars; in general, it is thus: they take out all, or leave but little of the provision, ballast, ordnance, or the like, in the ship; they (4) have a lower ship by

1. See John Drake's Second Deposition, Lima, Peru, 1587. Ed.
2. D reads: 'they burn off the weeds, stuff, filth or foulness which the ship hath gathered under water.'
3. D, 'places to grave a ship on.'
4. D, 'and you must.'

her which she must be hauled down on the side and righted again with tackles, yet with the weight of ballast above, or below in the hold, they do effect the chief force of the business and so never strain the ship's masts much. Note that all ships are not of a like condition to careen; for some ships will be very hard to come down though they have no ballast in them, and those are Flemings, built with two standing strakes: these must have some weight upon the deck to help them down and yet these will right themselves very easy, and therefore need not much in hold to help to right them. Some (as our English built and the like) will come down easy and be hard to right, and therefore we keep somewhat in all these (to right them) in hold; and have nothing on the deck, some will come down easily and right themselves well. Some will do neither, so that there is not one way for all, but as we see the condition of the ship we fit things and work accordingly. Any kind of bringing the ship over to lie on one side, she being afloat, [1] is called careening, though it be but a few strakes; as we say, she was careened three, four or five strakes. If a ship lie down much with a sail they will say, she sails on the careen.

Channel. By channel is meant the deepest part of any river or harbour's mouth; . . .

Fathom. A fathom [2] is six foot; . . . also we reckon in soundings by fathoms.

To Grave. Graving a ship is bringing her to lie dry aground, and then to burn off the old filth and stuff with reed, broom, or the like, and so to lay on new stuff. Some use only tallow, but that will quickly grow foul; others tallow and soap, which will also quickly grow foul. The most common and best is with train oil, rosin and brimstone boiled together, for this will last longest clean. The laying on of the stuff is called paying the ship.

Ground and Grounding. When a ship is brought of purpose to be trimmed on the ground, or otherwise, that is called grounding the ship. There are three manners of laying a ship aground; that is, either laying her head upwards towards the bank and stern towards the offward

1. D, 'on float.'
2. 'Fadom.'

[or offing], and is termed laying her pitch-long to: this is used to ships that are crank with the ground, for this way they take the best advantage for the ship to bear herself. The second is to lay her all alongst the shore and to heel her to shoreward: this is used to ships which have reasonable good floors and will bear themselves sufficiently well. The third is laying her alongst the shore, and heeling her to offward: this we use to ships which have great broad and long floors (as Flemings, which have standing strakes): the reason is for that otherwise we should hardly come to her keel. . .

Ground Timbers are those timbers which are first laid upon the keel, and so bolted through the keelson into the keel, and are those which make the floor of the ship; and are therefore called ground timbers because the ship doth rest upon these when she lies aground.

To Kedge, or Kedging. When in a narrow river we would bring up or down a ship, the wind being contrary to the tide and we are to go with the tide, then they use to set the foresail, or fore-topsail and the mizen, and so let her drive with the tide. The reason of using these sails is to flat her about if she come too near the shore. Also they use a small anchor in the head of the boat with a hawser that comes from the ship; which anchor they let fall in the middle of the stream, if the ship come too near the shore, and so wind her head about by that, and so lift up the anchor again when she is about: from this use the anchor is called a kedger, or kedge-anchor.

Land-locked. When we are in any road or harbour, so that the land lies round about us and the sea lie not any point open upon us, we say we ride land-locked. These are ever good roads and harbours, for no sea can come in to wrong the ship.

Lee. This word is many ways used, but generally the lee is understood for that which is opposite the wind. The lee-shore, that is the shore against which the wind blows; yet to be under the lee of the shore is to be close under the weather shore; that is, whence the wind doth come. . .

A Road is any place where a ship may ride near the land, and yet cannot ride land-locked for all winds. A good road is where there is good ground for anchor hold, shoal water, and so as that howe'er the

wind blow, there can no great sea-gate come in; being the land may be in the wind on one side, and some sands, rocks, or the like, to break off the sea on the other. Also we say, if it be a place (as in divers places of Barbary and others) where the sea will give a man warning (that is, the sea will come swelling in before the wind, as at Saffi)[1] of any foul weather, so that a man may have time to set sail and go to some other road, on the other side of the bay, headland, or the like, this we call shifting of roads. A wild road is a road where there is little land on any side, but lies all open to the sea; as to ride upon a headland, or alongst a shore where there is no bay, nor anything to break off the sea, or wind if it come off the sea. A bad road is the contrary to the good.

Sewing, or to Sew. When the water is gone from the ship so that she lies dry, we say the ship is sewed; or if it be but gone from any part (as her head) we say the ship is sewed ahead; if it be a place where the water doth not ebb so much that the ship may lie dry round, we say she cannot sew there.

Sheathing is, as it were, casing of a ship. It is done with thin boards, hair, and tar laid betwixt the ship's sides and those boards. This is done only under water or a very little above. The use whereof is to keep the worms from eating through the planks, as generally in all places to the southward they do. The thinner the boards, the better, for then the worm will presently[2] be at the tar (which he cannot abide) and so hath not means nor room to work in and out of the plank; and so will eat away more when it is thick than when it is thin.

Shores are any pieces of timber or anything else that is fit to bear up another from sinking or falling, as when a ship is in danger of overthrowing aground we lash fast masts or yards to their sides, they bearing on the ground; and these we call shores, shoring her up. Also some timbers that are set to bear up a deck, when it is weak or overcharged with weight, are called shores.

Swifting. When we bring ships aground or careen them we use to swift the masts, to ease them and strengthen them, which is done in

1. 'Saphy', 'Saphee': in Morocco.
2. Immediately.

this manner: they lash fast all the pendants of the swifters and tackles with a rope close to the mast as near their blocks as they can; then they carry forward the tackles, and so bowse them down as hard and taut as they can; and this eases the mast, so that all the weight of the mast doth not hang by the head, as otherwise it would, and also doth help to keep it from rising out of the steps.

Tides. This word tide is common both to the ebb and flood, for it is called tide of ebb as well as tide of flood. A windward tide is when the tide runs against the sea and wind; then the sea breaks most and goes highest, but a ship at anchor strains her cables least. A leeward tide; that is when the tide and wind both go one way, then the sea is smoother. A tide-gate, that is, where the tide runs strong. To tide it over or up to a place; that is to go with the tide of flood or ebb, and so stop the contrary tide at an anchor till the same tide come again; and this is used when the wind is contrary but doth not overblow, for then they cannot stop at an anchor, and if they keep under sail they will lose more in one leeward tide then they shall get in two windward tides. When they say it flows tide and half tide in any place the meaning of it is thus: (for the speech is most unproper to common understanding, implying as much as if it did flow a tide and a half in some places together, and but half an ebb), that the tide doth run three hours (which is four points) longer in the offing than it doth by the shore. By longer is not meant more hours (for it doth ever ebb and flow six hours) but thus: if it be high water at the shore at twelve o'clock, it shall not be high water in the offing till it be three o'clock (which is the compass and time for the running of half a tide): so, according as it ebbs or flows more, they say it runs tide, half, and half quarter (that is, five points). When they come into a harbour or over a sand they say they will bring their tide with them; that is to come with the flood which may carry them over. Note that where it flows tide and half tide, that though the tide of flood run aloft, yet the tide of ebb runs underfoot, that is close by the ground. And so for the tide of ebb it will flow underfoot.

Neaps, or Neap Tide. When the moon is in the midst of the second and last quarter, then we have neap tides. The etymology of the word I know not, but the meaning of it is this: the neap is opposite to the spring, and there are as many days allowed for the neap or falling of the tides as are for the spring or rising of the tides. These do cause, that where

it doth not ever [1] flow high enough, we are forced to stay for the launching and grounding of ships, and also for going over some bar, till a spring. Note, in neap tides the water is never so high nor so low as in the spring tides; also the tide never runs so swift in neaps as it doth at springs. Note that as the highest of the spring is three days after the full, or change of the moon, so the lowest of the neap is four days before the full or change, and then we say it is dead neap. When a ship lacks water so that it doth not flow high enough to bring her off the ground, or out of a dock, we say she is be-neaped. So if a ship is within a barred harbour that there lack water to carry her over till the spring, we say she is be-neaped.

The Spring or Spring Tide. When after the dead neaps the tides begin to lift and grow higher, we say it is spring. Near upon three days before the full and change of the moon, the spring begins; and the top or highest of the spring is three days after, then the water doth high most with the flood and low most with the ebb; which is the reason that at these times we launch and grave all our great ships. The tides also run much stronger and swifter, than in the neaps.

To Warp is to have a hawser or any other rope (sufficient to haul up the ship) and an anchor bent to it, and so to lay that out over the bar over which we are to go, and so by that to haul the ship forward. It is used when we want a wind to carry us out or into a harbour, and this is called warping.

To Wash a Ship. That is used at sea when we cannot come aground or careen her. We make her heeled over, with her ordnance and men upon the yard arms, to a side; and so wash that side and scrape it, so much as is out of water, which is commonly some five or six strakes. This is done in calms or in a smooth road.

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1. i.e., always.

APPENDIX III

THE ORDER OF THE CARENA

The order of the Carena given to the ships that go out of Spaine, to the Indies.

A description of careening from Hakluyt's Voyages, Dent edition, 1928, pp. 351,352.

The shippe of what burthen soever shee bee must give a Carena, as they call it in the Spanish tongue, which is in English, shee must be throughly calked, and fortified, as well with carpenters to set knees into her, and any other tymbers appertaining to the strengthening of a shippe, as with calking: which is to put occam into her sides: and that kinde of calking is not used, as ours is here in England: but first before they put in any threede of occam, they with certaine crooked yrons, with an hammer in one hande, and the crooked yron in the other, doe forcibly pull out all the olde threede that hath bene in the shippe the voyage before, and so drive in new.

If the seame of the shippe be worne to any bredth, as many olde shippes be, by reason of often raking them, upon that seame there is clapt a piece of caste leade, nayled upon the calking, and seame with speciall nayles, which leade is cast a handes bredth, and as thinne as may bee for the same purpose, and at every voyage it is taken off and renued, and by that meanes their shippes are very stanch a yeere or two.

The Carenero or the Calker doeth give in suerties, that if the shippe so cast over, as they doe commonly use to cast them, in such sort as any man may goe drie upon the keele, as I have done, and without any butte, pipe, or any other kinde of timber under her sides, more than with counter-poyze of stones in her, made within certaine timber as though it were a cheste; and with the stones the Carenero doeth bring her as hee will, high and low, leaning or rysing: and if shee miscarrie in her Carena, then is the Carenero bound, it if bee either by fire, water, or sinking, or any other misfortune, to pay for the valew of the ship.

The Carena of a shippe of one hundred tunnes being done so substantially as they use to doe it, will cost two hundred Duckets, of two hundred tunnes, foure hundred Duckets, of three hundred tunnes, sixe hundred Duckets, and so according to the greatnesse of the shippe.

The Order of the Carena. . .

It would be done here in England for one third part of the money, by reason that the necessaries that goe to it are better cheape here by much, and the calkers farre better cheape by two parts.

This Carena may not be given at any hand but in a river where no tempest can arise, as in this river of London in such a place, where at al times the sayd ship may ride aflote: it may not be done in any dangerous harbour, where the winde may bring up the waves of the Sea, neither where the Sea may heave and set. (1)

The calking of Sivill is so substantially done, that in one day one calker doeth not throughly calke past one yard and an halfe in one seame, or two yards at the most, and to that he doeth, the master calker is at hand to oversee him, and this done, the Carenero doeth with his ballast set her upright, and so shee beginneth to lade.

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1. This paragraph is of particular importance with respect to Drake's need to careen his ship at Nova Albion, and the requirement should be considered as having an influence on his selection of a site for the performance of the work. Ed.

APPENDIX IV

DESCRIPTION OF TOMALES BAY AND A SEARCH FOR THE PORT OF SAN FRANCISCO FROM THE EXPEDITION OF BRUNO HEZETA, 1775.

Extract from the journal kept on board the schooner, Sonora, by Don Francisco Antonio Mourelle, Second Pilot of the Fleet constituting the Sea Division of the Expedition sent out by Antonio Bucareli y Ursala, Viceroy of New Spain, to explore the Northwest Coast of North America and to survey the Port of San Francisco.

Mourelle's account of the discovery of the waterway now known as Tomales Bay, which was named la Bodega after the Sonora's commanding officer, Juan Francisco Bodega y Quadra, is of interest as being the earliest known description of that harbor. Bodega, however, did not enter Tomales Bay because of the heavy seas encountered on the bar at that time and merely anchored outside the mouth near Sand Point and under the lee of Tomales Point. Nor did the health of his crew permit him to sound the waterway inside or tarry longer than could be helped.

The Sonora was a surprisingly small vessel for the work which she was engaged in singlehandedly. Her length is given as only 36 feet, breadth 12 feet and depth 8 feet. (1) However, since length usually referred to length of keel, her length on deck would probably have been about 45 feet. Depth referred to depth of hold. Her draft would have been about 6 feet, more or less. She was manned by a crew of 14 men besides her officers.

The objective of looking for the Port of San Francisco, or Estero de San Francisco, as it was generally known, is of interest since it was known to exist in the vicinity of the Farallon Islands from its discovery on land by the Portolá expedition and the subsequent explorations of Fages and Riviera. Despite the landmarks provided by the islands, the difficulty of locating the entrance from seaward made it necessary to return to Point Reyes from the Farallones and then follow the coast closely until the entrance was reached. It is also noteworthy that Bodega was reluctant to enter the Golden Gate because he lacked a boat

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1. Daines Barrington, Miscellanies, London, 1781, p. 473

from which to sound the channel beforehand, and consequently passed it by and proceeded on to Monterey.

During the time that the Sonora was in the Northwest, the San Carlos, also belonging to the Hezeta expedition and under the command of Juan de Ayala, had entered San Francisco Bay on the evening of August 1st, the first ship to enter the bay.

The following extract from Mourelle's account is from the translation by the Hon. Daines Barrington published in his Miscellanies, London, 1781 and edited and published by Thomas C. Russell, Voyage of the Sonora in the Second Bucareli Expedition, San Francisco, 1920, pp. 54 to 58, inclusive.

Mourelle Account.

[October 3, 1775. Coming down the coast.]

After this last return to the coast, we endeavored to make for the port of S. Francisco, which having discovered in 38.18. we entered a bay which is sufficiently sheltered from the N. and S.W. We soon afterwards distinguished the mouth of a considerable river, and some way up a large port exactly resembling a dock (e); we therefore concluded this to be the harbour of S. Francisco (which we were in search of), as the History of California places it in 38.4.

We wished, on this account, to enter this port, which we should have easily accomplished, if the sea had not run very high. We began however to doubt whether this was really the harbour of S. Francisco, because we did not see any inhabitants, nor the small islands which are said to be opposite. In this state of suspense we cast anchor near one of the points which we called de Arenas, in six fathoms and a clay bottom.

A vast number of Indians now presented themselves on both points (f)

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e. Digue

f. Sc. Those just now named by the journalist de Arenas. [The present Sand Point at the mouth of Tomales Bay. Ed.]

who passed from one to the other in small canoes made of Tule (g), where they talked loudly for two hours or more, till at last two of them came along side of the ship, and most liberally presented us with plumes of feathers, rosaries of bone, garments of feathers, as also garlands of the same materials, which they wore round their head, and a canister of seeds, which tasted much like walnuts. Our captain gave them in return bugles, looking glasses (h), and peices [sic] of cloth.

These Indians are large and strong, their colour being the same as that of the whole territory (i); their disposition is most liberal, as they seemed to expect no recompense for what they had furnished us with: a circumstance which we had not experienced in those to the Northward.

We were not able to sound the interior parts of this port, on account of our sick, who were to be as soon as possible landed in a place of safety, in order that they might have the better chance of recovering.

Whilst we were in this port (which we did not conceive to be that of S. Francisco) we had no further intercourse with the inhabitants, and we prepared to clear the point de las Avenas [sic], in order that, with a N. W. wind, the next day we might, with less difficulty, leave this part of the coast. Having effected this, we cast anchor in six fathoms, the bottom being a clay.

This port, which we named de la Bodega (j), is situated in 38.18 N. Lat. and 18.4 W. Long. from S. Blas.

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g. Some sort of wood, and probably well known in the province of Mexico. [These were the canoes made of tule reeds. Ed.]

h. In the former intercourse with the more Northern Indians the Spaniards never produced this article of barter, which seems to have been ill-judged economy. They were now returning however, and must have thrown away these trifles at S. Blas.

i. It is not very clear whether the Journalist means by this of Mexico, or the whole N. Western continent of America.

j. The Captain of the Schooner. The Latitude of this harbour coincides nearly with that discovered by Sir Francis Drake; but the Spaniards would scarcely insert this brave heretic in their Calendar.

DESCRIPTION OF TOMALES BAY

On the 4th of October, at two in the morning, on the first flow of the tide, in a contrary direction to that of the currents, the sea ran so high that our whole ship was entirely covered by it, at the same time that the boat on the side of her was broken into shivers.

There is not sufficient depth of anchorage at the mouth of this port, for a vessel to resist this violence of surge, when it is occasioned by the causes before-mentioned.

If we had been apprized of this circumstance, we should have either continued where we were first at anchor, or otherwise sailed further from the mouth of the harbour.

In all parts of this port, which we had an opportunity of sounding, the bottom is nearly of the same depth [k]. The entrance is very easy with the prevailing wind of N. W. but in leaving it, if the wind blows from the same quarter, it is necessary to get further out to sea from the Points [l]. If the wind blows from the S. W. E. or S. it is not necessary to take this precaution[m].

We observed, that the tides in this latitude are regular, as in Europe, it being high water at noon, when the moon is new.

The mountains near this port are entirely naked in every part of them [n]; but we observed that those more inland were covered with trees.

The plains near the sea-coast had a good verdure, and seemed to invite cultivation.

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k. A draft was made of this harbour.

l. Sc. de las Arenas. [Sand Point and Tomales Point. Ed.]

m. Because then the wind and currents do not oppose each other. [The footnote is in error here as with a N. W. wind it would be nearly impossible to sail out of the mouth of Tomales Bay. Consequently, Bodega sought an anchorage clear of Tomales Point where the N. W. wind would not hinder his sailing. Ed.]

n. This probably arises from their being exposed to the N. W. which is the prevailing wind.

DESCRIPTION OF TOMALES BAY

About eight in the morning of the 4th of October the sea became more calm, on which the Indians came round us as before, in their canoes, offering us the same presents, which had the same return.

At nine we set sail, and having doubled the point del Cordon (o) we steered S.S.W. the wind being moderate, and at W. in order to reach a Cape, which appeared to the S. at the distance of about five leagues.

On the fifth we sailed near those small islands which the charts and history of California place at the entrance of the harbor of S. Francisco; but as we were very clear that the harbour which we had just left, was not that thus called, we continued to steer N.E. (and between some of these islands) in order to reach the Cape before mentioned, when we intended to approach the coast, and look out for the port of S. Francisco.

At noon on this same day we had an observation, and found these islands to be in 37.55 N. Lat. lying to the S.W. of the Cape at the distance of three leagues. [Observed latitude was 37° 53']

As soon as we reached the Cape we ran along the coast which lay to the E. and N.E. about the distance of a cannon's shot; and by six in the evening we were not above two miles distant from the mouth of the harbour of St. Francis; but having no boat (p), or other convenience for this purpose, we resolved to stand for Monterey, and double another Cape which projected still further from the coast (q).

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o. This point undoubtedly is marked in the Spanish Chart. [The point is the present Tomales Point. From here the Sonora proceeded to Point Reyes, five leagues distant. Ed.]
p. It having been demolished by a heavy sea not long before.
q. That is, than the before-mentioned Cape. [The point referred to is probably Pigeon Point or Point Año Nuevo. Ed.]

APPENDIX V

GEORGE VANCOUVER'S DESCRIPTION OF THE COAST FROM BODEGA BAY TO THE PORT OF SAN FRANCISCO 1792

Extract from A Voyage of Discovery/ to the/ North Pacific Ocean/ and/ Round the World;/ In which the Coast of North-west America has been carefully examined/ and accurately surveyed/ undertaken/ By His Majesty's Command,/ Principally with a View to ascertain the existence of any Navigable Communication between the/ North Pacific and North Atlantic Oceans;/ and performed in the years 1790, 1791, 1792, 1793, 1794 and 1795, In the Discovery Sloop of War, and Armed Tender Chatham,/ under the Command of Captain George Vancouver./ A New Edition, with Corrections,/ Illustrated with nineteen views and charts/ in Six Volumes/ London: Printed for John Stockdale, Piccadilly./ 1801

George Vancouver spent three seasons on the northwest coast of North America from 1792 to 1794, principally exploring the region of what is now British Columbia. He explored in the Northwest during the summer months but wintered in California and the Hawaiian Islands.

Vancouver's approach from the Northwest Coast to the vicinity of Drake's landing place in California in November of 1792, affords an interesting comparison for considering Drake's possible observations and actions. Like Drake, Vancouver was particularly interested in looking for harbors on the coast; he arrived as a visitor unfamiliar with the area and saw it while it was still in its natural state; his small sailing ships were basically similar in size and rig to Drake's Golden Hind and had the same limitations.

The following extract covers Vancouver's examination of Bodega Bay and subsequent approach and entry into San Francisco Bay at the conclusion of his first season's work in the Northwest. On the evening of November 12th he anchored outside Bodega Bay about two miles west-southwest of Bodega Head, but weighed anchor early the next morning because of the danger of cutting the cable on the rocky bottom. During the day an offshore breeze prevented entry into Bodega Bay and impending bad weather made it unwise to linger, but he was able to cross the mouth of the bay.

Bodega Lagoon was observed as a "small inlet" though it seems

doubtful that the entrance was seen. That there was a lagoon, or port, was known from the Spaniards and from a description given by the master of an English trading ship that had been there some years before. Tomales Bay is merely associated with one or two openings in the coast "immediately within the south point "(Tomales Point), one of which was probably the Estero de San Antonio. The full scope of Tomales Bay would have been screened from view by Tomales Point, and very little of it could have been seen.

Before reaching Point Reyes, a south-southeast gale forced Vancouver to stand away from the coast, but clearing weather during the night enabled him to return to the point in the morning and continue from there into San Francisco Bay.

Vancouver's foreknowledge of San Francisco Bay enabled him to set a course for the entrance from outside Point Reyes. His encounter with Fourfathom bank on the northside of the Golden Gate and the tide there should be compared with Drake's unhindered and fortuitous entry into the "faire and good Baye" in the height of 38° latitude described in Famous Voyage.

San Francisco Bay was termed a "very spacious sound" by Vancouver, and it was not called a bay by either the English or the Spaniards.

[November 12, 1792. After standing offshore with a southeast wind and heavy rain.]

[Vol. II, p. 410]". . . Monday the 12th, when, on the return of a favorable gale, we stood for the land, which at noon extended by compass from N. 15 W. to S. 77 E.; the nearest shore bore N.E. about five leagues distant, latitude 38° 17', longitude 236° 59'. As we approached the shore, advancing to the southward, the country became nearly destitude of wood and verdure, at least that part of it in the vicinity of the sea shore, which was nearly straight and compact. The more interior hills, rising behind those forming the coast, were tolerably well wooded.

"Being near the assigned situation of the bay in which Sir Francis Drake anchored, and that of [p. 411] a port called by the Spaniards

bodega, our attention was directed to the appearance of a port to the eastward, for which we immediately steered. By sun-set we were close in with the shore, which extended from N. W. by W. to S. S. E. 1/2 E., so that we were considerably embayed. We were now off the northern point of an inner bay that seemed divided into two or three arms, the soundings had been regular from 40 to 28 fathoms, the bottom a bed of coral rock, sand, and shells. Being anxious not to leave any opening on the coast unexamined, and as the evening was serene and pleasant, I was induced to anchor, though on a rocky bottom, off this point for the night, which bore by compass from us N. E. by E. two miles distant, that my design might early in the morning be carried into execution. Our situation here was by no means pleasant; during the night two deep sea lines were cut through by the rocks, and at four in the morning of Tuesday the 13th [Nov.], the buoy was seen drifting past ship, and was proved to have been severed in the same way. Lest the cable should share the same fate, no time was lost in weighing the anchor; fortunately however the cable had not received any injury. A light breeze from the land permitted us to stand across the bay, which we soon discovered to be port Bodega; its north point according to our observations is situated in latitude [p. 412] 38° 21', longitude 237° 21'. This point is formed of low steep cliffs, and when seen from the south has the appearance of an island, but is firmly connected with the main land. To the east the land retires and forms a small inlet, apparently favorable to anchorage; it has a flat rock on which the water broke in its entrance, and has not any other visible danger excepting that of being exposed to the south and S. E. winds. Not being able to sail into the bay, we stood towards its south point, which lies from the north point S. 30 E. at the distance of seven miles. Within these limits appeared three small openings in the coast, one already noticed to the eastward of the north point, the other two immediately within the south point; across these a connected chain of breakers seemed to extend, with three high white rocks, which nearly blockaded passage. Although very solicitious of gaining more intelligence, this was all the information I was able to procure of this place, which required to be minutely surveyed by our boats before the vessel should enter; the state of the weather was ill calculated for such service; it was very dark and gloomy, and the depression of the mercury in the barometer indicated an approaching storm. Our soundings when under 35 fathoms were on a rocky bottom, and considering that any further examination at this time was not important, I [p. 413] steered along the coast to the southward for the point de los Reys, so named by the Span-

iards, which at noon bore by compass, S. 22 E. distant about two leagues: the latitude by an indifferent observation, 38° 7'. My apprehensions of bad weather were not ill-founded; after a few hours calm we were again visited by a S.S.E. gale, attended as before with heavy rain; this soon reduced us to close-reefed topsails, and brought with it a heavy sea. Soon after midnight, the wind suddenly shifted to the westward, the sky became clear, and we again steered for the land; about nine in the morning of Wednesday the 14th we passed point de los Reyes, which I found to be situated in latitude 38° 0', longitude 237° 24'. This is one of the most conspicuous promontories southward of cape Flattery, and cannot easily be mistaken; when seen from the north, or south, at the distance of five or six leagues, it appears insular, owing to its projecting into the sea, and the land behind it being lower than the land near the coast; but the interior country preserved a more lofty appearance, although the mountains extended in a direction further from the coast than those we had lately noticed. From the south point of port Bodega, which is formed by steep rocky cliffs with some detached rocks lying near it, the coast makes a shallow open bay, which is bounded by a low sandy beach; to [p. 414]wards the S.E. part of which the elevated land of point de los Reyes again commences, and stretches like a peninsula to the southward into the ocean, where its highest part terminates in steep cliffs, moderately elevated, and nearly perpendicular to the sea, which beats against them with great violence. Southward of this point the shore, composed of low white cliffs takes, for about a league, nearly an eastern direction, and there forms the north point of a bay [1] extending a little distance to the northward, which is intirely open, and much exposed to the south and S.E. winds.

"The eastern side of the bay is also composed of white cliffs, though more elevated. According to the Spaniards, this is the bay in which Sir Francis Drake anchored; however safe he might then have found it, yet at this season of the year it promised us little shelter or security. The wind blowing fresh out of the bay from the N.N.W., I did not think it proper to lose this opportunity of proceeding with all dispatch to St. Francisco; where there was little doubt of our obtaining a supply of those refreshments which were now much wanted by the whole crew.

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1. Drakes Bay. Ed.

"Off point de los Reys are situated some rocks, called Farallones; those we saw were tolerably high, and appeared to be in two distinct clusters of three or four rocks each, lying in a S.E. and [p. 415] N.W. direction from each other. The highest rock of the northernmost group lies from the extremity of point de los Reys, S. 13 W., distant 14 miles; the southernmost S.S.E., at the distance of 17 miles. From the unquestionable authority I learned, that a third cluster of rocks, scarcely above the surface of the sea, lies 12-1/2 miles distant from the above point S. 36 W.

"With a favorable gale and pleasant weather we sailed, at the distance of two or three miles, along the coast; which, from point de los Reys to port Francisco, takes a direction S. 62 E. distant eight leagues. At noon the observed latitude was 37° 53', longitude 237° 35'; in this situation point de los Reys bore by compass N. 72 W.; the supposed bay of Sir Francis Drake N. 45 W.; a low sandy projection point, (1) off which some breakers extended nearly two miles to the E.S.E.(2) being our nearest shore, N. 34 W., about a league distant; the southernmost land in sight S.E.; and the south-easternmost of the Farallones S. 35 W.; to the eastward of the low sandy projecting point, the coast suddenly rises in abrupt cliffs, with very unequal surfaces, presenting a most dreary and barren aspect. A few scattered trees were growing on the more elevated land, with some patches of dwarf shrubs in the vallies; the rest of the country presented either [p. 416] a surface of naked rocks, or a covering of very little verdure.

"We had approached, by two in the afternoon, with a small distance of the entrance into port St. Francisco, and found a rapid tide setting against us; the depth of water regularly decreased from 18 to 4 fathoms, which appearing to be the continuation of a shoal (3) that stretches from the northern shore, then distant from us not more than a league, I hauled to the S.W. in order to avoid it, but did not succeed in reaching deeper water, as the bank we were upon extended a long way in that direction, as was evident from the confused breaking sea upon it, and the smooth water on either side of it. We therefore made for the port, and soon

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1. Bolinas Point. Ed.
2. Duxbury Reef. Ed.
3. Fourfathom Bank. Ed.

increased the depth of water to eight and ten fathoms, until we arrived between the two outer points of entrance, (1) which are about two miles and a half apart, and bear from each other N. 10 W. and S. 10 E.; here we had 15 and 18 fathoms water, and soon afterwards we could gain no sounding with a handline.

"Although favored with a pleasant breeze which impelled us at the rate of four or five knots an hour, it availed us no more than just to preserve our station against the ebb setting out of the port. We did not advance until four o'clock, and then but slowly, through the channel leading into this spacious port; lying in a direction N. 61 E. and S. 61 W.; it is nearly a league in length, with some rocks and breakers lying at a little distance from either shore. Those on the southern side were furthest, detached, and most conspicuous, especially one, (2) about a mile within the S. W. point of entrance, which seemed to admit of a passage within it; but we had no opportunity of ascertaining that fact, nor is it of any importance to the navigation, as the main channel appeared to be free from any obstruction, and is of sufficient width for the largest vessels to turn in. Its northern shore, composed of high steep rocky cliffs, is the boldest; the southern side is much lower, though its south-eastern point is formed of steep rocky cliffs, from the base of which a tract of sandy country commences, extending not only along the southern shore of the channel, and some distance along the exterior coast to the southward, but likewise to a considerable height on the more elevated land that borders thereon; and interspersed with huge massy rocks of different sizes, which with the Farallones, render this point too conspicuous to be mistaken. Having passed the inner points of entrance, we found ourselves in a very spacious sound, which had the appearance of containing a variety of as excellent harbours as the known world affords. The Spanish establishment being on the southern side of the port, our course was directed along that shore, . . . "

The Discovery passed the Presidio and anchored in Yerba Buena Cove, from which she later shifted to the anchorage off the Presidio. While in the latter anchorage, Indian tule canoes of the type described

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1. Point Bonita on the north side and Point Lobos on the south side. Ed.
2. Mile Rock. Ed.

by Cermeño at Drakes Bay, and probably seen also by Drake, were described in detail by Vancouver as they came out from shore to the ship with a message from the Spanish Commandant, who offered his assistance.

[Vol. III, p.7] ". . . A message to this affect was brought by three of the native Indians who spoke Spanish, and who came on board in a canoe of the country; which with another, (though perhaps the same) seen crossing the harbour the evening we entered it, were the only Indian vessels we had met with, and were without exception the most rude and sorry contrivances for embarkation I had ever beheld. The length of them was about ten feet, the breadth about three or four; they were constructed of rushes and dried grass of a long broad leaf, made up into rolls the length of the canoe, the thickest in the middle, and regularly tapering to a point at each end. These are so disposed, that on their ends being secured and lashed together the vessel is formed, which being broadest in the middle, and coming to a point at each extremity, goes with either end foremost. These rolls are laid and fastened so close to each other, that in calm weather and smooth water I believe them to be tolerably dry, but they ap [p, 8] peared to be very ill calculated to contend with wind and waves. The wind now blew strong with heavy squalls from the S. W. and in the middle of this spacious inlet the sea broke with much force; notwithstanding which, as soon as these people had delivered their message, they crossed the inlet for the purpose of catching fish, without seeming to entertain the least apprehension for their safety. They conducted their canoe or vessel by long double-bladed paddles, like those used by the Esquimaux."

The following are the particulars of H. M. S. Discovery: length between the head of the stem and the rudder post -- 99 feet 2 inches; breadth -- 28 feet 3-1/4 inches; depth in hold -- 12 feet 4 inches.

APPENDIX VI

VANCOUVER EXPEDITION - ARCHIBALD MENZIES' DESCRIPTION OF BODEGA BAY AND ENTRY INTO SAN FRANCISCO BAY, 1793

Extract from "Archibald Menzies Journal of the Vancouver Expedition. Extracts covering the visit to California, with an introduction and notes by Alice Eastwood," California Historical Society Quarterly, Vol. II, No. 4, (January, 1924), pp. 265-340. (1)

Menzies was a surgeon and naturalist accompanying the Vancouver expedition. The portion of his account which follows is from his description of the second season's work on this coast after wintering in the Hawaiian Islands and exploring the coastal region of what is now British Columbia in the summer of 1793.

October 8, Vancouver departed the British Columbia region for the south to refit his ships, the Discovery and the Chatham. In the vicinity of Trinidad, Lt. Peter Puget was ordered to make the best of his way with the Chatham, an armed tender of 135 tons burthen, to examine the inlet called Port Bodega by the Spaniards, described by Menzies as being "a little to the northward of Porta de los Reyes." Bad weather had prevented it from being explored the year before.

Menzies siezed the opportunity to go on the Chatham to examine that part of the coast, and his observations afford an interesting, early description of Bodega Bay and vicinity.

October, 1793

"By the 19th we got to within a few leagues of our intended Port & stood for it to the South east ward with a light breeze & fair weather but rather hazy; the land abreast of us was hilly but of a very moderate height & presented the appearance of a fine pasturage Country checker'd with Pine forests. In one place we saw a fire fresh kindled making great smoke, which no doubt was intended as a signal to alure us nearer the Coast, but no Natives came off to us; it was so late in the evening when

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1. Miss Eastwood's footnotes are omitted.

we reached the entrance of the Port that we could not venture to run in, we therefore stood off & on all night.

"And early next morning it was foggy but as soon as we could distinctly see the land we stood in through a narrow passage about half a mile wide with a steep rocky bluff on our left hand (2) & a small rocky Island on our right which was named Gibson's Island in honor of the Master of a small English trading vessel who anchored here some years ago on his way to the northward from San Blas & describd the place with tolerable precision. Before the entrance our Soundings were ten fathoms which gradualy decreasd in the passage to four fathoms, with this depth we stood some way into the Bay & anchord in six fathoms over a sandy bottom about a mile & a quarter from Gibson's island which bore S 30° W by compass.

"The Bay (3) was open to the southward for a considerable space but the oceanic swell was very much broke off by a reef which extended some way across from the south end of Gibson's Island; The North side presented a sandy beach with low land, over which they could see from the mast head a considerable extent of inland water & a small Channel leading into it from the North West corner of the Bay near the bluff head land we passed coming in. Soon after we anchord the Cutter was hoisted out in which Mr. Johnstone was sent to examine this place, particularly the passage & depth of Water leading into it, in this he was accompanied by some of the Officers & myself; The soundings were found to decrease very gradually as we neard the northern shore & the Channel leading into this back water which might with more propriety be termd a lagoon than a harbour was only about 8 feet deep even at high water & that too very narrow scarcely half a Cable's length across & winding round a low sandy point; it deepend a little/as we enterd the lagoon, but it was not thought worth while to examine it farther.

"We landed on the west side & ascended the high ground which formd the bluff headland/in expectation of a fine prospect which was however very limited from a thick fog that enveloppd the inland country; Here we found a cross that did not appear to be long erected, it was formd of a

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2. The present Bodega Head. Ed.
3. The present Bodega Bay. Ed.

piece of the stave of a Cask fastend to a pole by a rope yarn; the grass & brush wood on this headland had been lately burnd down so that I had little opportunity here to augment my botanical collection....

"As we walkd towards the Channel going into the Lagoon where the boat was waiting for us, we came suddenly on a small hut & at a little distance saw some Natives who on observing us immediately sat down & as we approached them they kept calling out the word Amico signifying friend which we had no doubt they learnd from the Spaniards, as we afterwards found that they spoke many words of the language of that Nation. This party consisted of one man who was quite naked with five women & some Children. Most of the women had no other cloathing than a dressed Deer skin wrapped round their middle & reaching down to their knees, some had indeed a small garment thrown over their shoulders made of pelts cut up into small thongs with the fur on & wove together like a Mat into a square form. They shew'd no kind of fear or alarm at our approach, one of the women had some fish in a small basket which she frankly offerd us under the name of Piscau; Mr. Johnstone distributed some Beads & small Trinkets amongst the Women & Children, after which we crossed over to the low sand point where we found three men setting whom we supposd belongd to the same/party, these men were likewise perfectly naked & each of them was armd with a Bow & a Quiver full of Arrows of the same shape & make with those we saw at Port Trinidad but they readily parted with them for any little trinkets that were offerd them in the way of barter.

"We strolled about on the low land between the Bay & the Lagoon which was composed of sandy banks & small hillocs on which we shot several Plovers & other small birds. We sawon the Lagoon large flocks of Pelicans & vast flights of common Curlews flying about, but both were so shy that we could not get near enough to have a shot at them.

"The Lagoon was observd winded round to the North west ward environd by low land so that we did not see its termination; the East side of the Bay rose gradually to a moderate height & was apparently at this time coverd only with shrivell'd grass without trees or bushes of any kind, but our prospect was very confin'd on account of the fog.

"As we were about embarking in the Cutter about a dozen & half more Natives came down from the Country & joind those on the Point,

consisting nearly of equal number of Men & Women, the former like the others were quite naked & the latter were as scantily dressed as those women already mentioned; They shewd no kind of fear or distrust in our mixing amongst them, from which it would seem that they were not unaccustomd to such Visitants, particularly as they did not appear the least alarmd or surprizd at our using & handling our fire arms.

"These Natives were stouter & better made than those we saw about the Missions to the Southward, they had broad flat visages, high cheek bones and depressed Noses, as if the bridge of it had been a little flattend in by art, they had strong streight black hair tied by some on the crown of the head & by others/behind; We observed no ornaments about them except that most of them were tatooed with a streak falling from each shoulder across the breast like a cresent.--In their manners they seemed to be remarkably friendly & docile readily parting with any thing they had which they thought would be any wise acceptable to us: If we understood them right by their frequently pointing up the Lagoon & repeating the word Spaniard, they either signified that some of that Nation were then residing in that direction or had lately been exploring the Lagoon; and as we observed in our walk the dung & tracks of horses & black cattle it is very probable that these have been brought here by the Spaniards for the purpose of establishing a settlement in this place, for we can hardly suppose that these animals have strayed so far from the settlement of San Francisco.

"The soil here in general was a loose sandy compost pretty deep & of a dark brown colour, but more inland I should suppose it would be more compact & from the similarity in the general appearance of the country, much the same as at San Francisco & Monterrey. We saw no fresh water & the arid aspect of the Country would indicate its being a scarce article if at all procurable at least on the western side of the Lagoon.

"After taking leave of these peaceable Indians we returned a little past noon to the Vessel on board of which they had made the Latitude by Observation 38° 19'-30" North. Soon after we weighd Anchor & made Sail to the South east ward, for the fog had continued so thick that we had scarcely seenany thing of the land in that direction; we had scarcely gone above four Miles when we passed the entrance of an opening of

nearly a mile wide leading apparently in a south east direction,[4] this we supposd to be Port Bodega & though we were not above a mile & a half from it yet the fog was so exceeding thick that we got but a very limited & indistinct glimpse of the land, on which account it was not thought prudent to run for an uncertainty & entangle ourselves with a lee-shore in such thick & dark Weather, we therefore steerd to the Southward for P^ta. de los Reyes which we passed about six in the evening within two miles of it, & from thence directed our course for Port San Francisco till about two next morning when we ran nearly the distance of it, & seeing land ahead we hauld off till day light, in hopes of being able then to make out the passage leading in more distinctly.

"On the morning of the 21st we had thick fog but fair Weather, & as we conceivd ourselves to the Northward of our intended Port we stood to the South east ward with a light breeze close along shore, which is here much broken with low sandy bays & intervening steep rocky cliffs & it being so very dark these bays made like openings & we edged pretty close in to two of them before the mistake could be detected: About 8 in the forenoon we opend the Port of San Francesco & though the wind was rather against us, yet having the advantage of a strong flood tide in our favor, we got in about ten and anchord close to the Discovery which we found moord in her old birth. . .

"Though Sr. Sal at San Francisco positively denied their having any settlement to the Northward of that place, yet we were now informed by the Commandant that he had been in the course of last summer with a party establishing a Settlement in that opening about six leagues to the Northward of Point de los Rayes, which the Chatham was prevented from exploring by the fogginess of the weather on the 20th of last month: From the plan which he shewd us of this opening it appears to be a very snug & secure harbour, the entrance of it is narrow & the best Channel near the southern shore, where there is three fathoms & half, but after getting in the water deepens to 8 & 10 fathoms: The same plan likewise included a sketch of that Lagoon or Harbour if it can be calld so which we visited in the Chatham's Boat & which they have named Port Bodega, & the other to the Southward of it which goes to the South East they calld Port Juan Francisco."

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4. The present Tomales Bay. Ed.

APPENDIX VII

ELK AT POINT REYES

Extract from A Tour of Duty in California . . . , by Joseph Warren Revere, Lieutenant, U. S. Navy, New York, C. S. Francis & Co., 1849.

In July 1846, following the annexation of California to the United States from Mexico, Lt. Revere of USS Portsmouth was placed in command of the military district north of San Francisco Bay, garrisoned at Sonoma by a newly raised Company B, California Mounted Riflemen.

At the time, organized dissenters to the annexation, though centered at Los Angeles, made predatory excursions in all directions, much to the annoyance of the well-affected rancheros, travelers and persons disposed to remain neutral. In the pursuit of a party of these, Lt. Revere made an excursion to the "Punta de los Reyes," and on concluding this unsuccessfully at the rancho of Rafael Garcia, he chose the next day to accompany neighboring rancheros on an elk hunt on Point Reyes. His narrative and description of the animals, besides shedding an early sidelight on that peninsula, give an interesting comparison with the description in World Encompassed of those seen by Drake in that vicinity. "... infinite was the company of very large and fat Deere which there we sawe by thousands, as we supposed, in a heard." It should be noted that the time of year is nearly identical in both accounts; Drake's observation of the animals was evidently made on the occasion of his journey inland near the end of his stay late in July.

"After enjoying Garcia's hospitality for the night, we found, on rising next morning, several of the neighboring rancheros, who had arrived, on their way to the Punta de los Reyes, for the purpose of hunting the elk, with which it abounds. Sending all my men, except two, back to Sonoma, I resolved to remain and witness the sport; and getting fresh horses from Senor Garcia, we started for the point. I observed that the Spaniards had no arms; but they pointed to the riata, the unfailing companion of the rancheros, and exclaimed, "este es el rifle del ranchero!" -- this is the ranchero's rifle. On our way, however, I observed one of the party dismount, near a small grove, and selecting a straight light pole, take from beneath his sarape a crescent-shaped weapon, which he fixed to the top of the pole. This instrument they call, from its shape, the "luna", and it is used for hamstringing the elk, which

then falls an easy prey to the hunter.

" The cool bracing air of the morning, promised us fine sport, as the horses, on whose exertions the sport mainly depends, would not be exhausted from the heat. But, as the Irishman devoutly remarked, "Providence never opens one door but it shuts another", -- a reflection verified in the present instance, by the rising of a dense fog, which prevented us from seeing any considerable distance, and forced us to be circumspect in picking our way over a very broken and hilly part of the country. Crossing a deep valley, up which I could not see for the mist, we surmounted a high hill, and I saw in a moment that we stood on an isthmus or neck of land, connecting a lofty promontory -- lying right before us -- with the main land. At the same time I discerned the sea on either hand, and heard the musical roar of the surf, as it tumbled ashore on the right. Suddenly one of my men exclaimed, in a low tone, "hush!" and, rifle in hand, dismounted for a shot. Following the direction of his glance, towards the promontory, I perceived a band of elk, which must have numbered not less than four hundred head of superb fat animals -- the apparently cumbrous horns of the bucks thrown back on their shoulders, and the leaders seeming to hesitate whether it should be a fight or a foot race. Pacific councils, however, prevailed, and the whole body were soon in full retreat, the old bucks occasionally stopping to gaze at us, while the does and fawns made the best of their way up the slope. Our horses scenting them at the same time -- for the horses of California scent large game almost as acutely as dogs -- became greatly excited, and could hardly be checked from dashing forward in pursuit. The rancheros seemed to despise the stealthy advance on foot of the Americans with fire-arms, and as the game could not escape us, being surrounded on all sides by the sea, except on that occupied by our well-mounted party of six men, they planned a mode of attack, which they communicated to us. Two of them gave their horses the rein with an "adelante!" and the noble beasts sprang forward in full pursuit of the now flying herd. At this season (August) elk are fatter than at any other, and cannot compete with the horse in speed; whereas, a couple of months later, the fleetest horse could hardly overtake them. Their speed was now inconsiderable, the rancheros soon coming up with them and scattering them in various directions. Our friend with the "luna" had hamstrung several of the poor creatures, and his companion had entangled with his riata a noble buck, which was plunging and tearing violently, the riata being at its greatest tension, and the little horse to whose saddle it was made

fast, standing stiff and stark, with his eye-balls staring, and every nerve braced to meet the pulls and tugs of the elk; while the Californian sat coolly in his saddle, and addressing the elk by the familiar title of "cunado", (brother-in-law), pleasantly assured him that he "only wanted a little of his lard wherewithal to cook tortillas!" -- a joke which the struggling victim was in no humor to relish.

"From the contemplation of a scene so new to me, I was aroused by Don Egedio, (Giles) who loudly called to me to shoot; and, turning my horse, I spurred him nearer the precipice, between which and myself the remainder of the band seemed disposed to rush, on their way back to the mainland. My horse was an admirably trained animal for the purposes of hunting after the fashion of California, but he would not stand still enough for a shot from the saddle; and to have dismounted would have been to lose him, as he would have, pursued the elk. But a shot I was determined to have, on some terms, and so, when it seemed to my rather obfuscated vision that I was opposite the thickest of the band, I wheeled, seized my double-barrelled gun, and pulled both triggers at a venture. My horse, unused to fire, jumped some twenty feet, more or less, and I dropped my gun but kept the saddle. My shot accidentally took effect, for when I was able to rein up, I returned to the spot and saw a poor doe lying in a reclining posture, the blood welling rapidly from a frightful wound inflicted by two heavy buckshot cartridges which had taken effect in the animal's shoulder. The unfortunate fixed upon me her large full eye, expressive at once of fright, sorrow, and reproach, and the mournfulness of the scene was heightened by the presence of a half-grown fawn, baaing and bleating around its dying mother. Sentiment, however, soon subsides on the hunting ground; and after my friend with the "luna" had cooly drawn his knife across the throat of the doe, I felt little compunction in bringing down the sorrowing fawn. In the meantime, our friends on the point had not been idle, having taken a toll of two more of the flock as they passed, one of which was caught with the riata by a Spaniard and an Indian vaquero, and the other shot by one of my men. It usually requires two men with riatas to kill the animal, the object being to trip him up and then give him the coup-de-grace; but one man sometimes does it alone with a riata and luna, and there are rare instances where a single expert hand trips-up the anianl with his riata and then finishes him.

"The herd had now retired to the mountains, and were dispersed

among crags and precipices, almost inaccessible to horses. Our party collected and rode down the point, where we found three hamstrung animals which had wriggled and screwed themselves into the most retired places. Our friend of the luna, however, insisted with many round, full-mouthed oaths, that he had disabled nine and wounded some others in a desperate manner, with the points or horns of his iron. But these people are not to be implicitly believed, and after traversing the point in every direction, we could find but one more elk, which had fallen over the precipice and lay half his length in the sea -- the vultures and sea-birds already hovering over him in great numbers, impatiently awaiting the moment when death should make him their own.

"We proceeded to what was called the rancho, but on arriving found nothing but a broken down corral -- passing on the way a herd of cattle so little civilized that the very antelopes were grazing amongst them. There was, however, a good cool spring of delicious water near at hand, where we made our bivouac; and the Indians now coming in numbers -- like vultures, by instinct -- brought in all our game, amounting to six fat elk. Our sport had "burned daylight" so fast that the sun was near the limits of the western horizon, and with our Indian assistants -- but too happy to be of use where eating was in question -- we soon prepared a most delicious supper of elk meat. The savory saddle, the juicy and tender haunch, the delicious rib, were all discussed in turn, and such as liked it feasted on the luscious liver -- a most delicate morsel -- and also on the kidney and brains. Our Indian friends were officiously assiduous in cooking the meat, and eating two pounds where we ate an ounce; and as I had fasted all day, I imitated my companions, and fairly gorged myself to such a degree that I felt much in the condition of an anaconda which has swallowed an elephant; or, like the little boy who, after his Christmas dinner, informed his anxious mother that he felt "as if his jacket was buttoned up." After joining my companions, therefore, in a comfortable drink of brandy and water "cold, without", we all wrapped ourselves in sarapes and blankets; and stretched out upon the ground with our feet to the fire -- while the silvery moon stole over the inland mountains and bathed us in serenest light -- we fell asleep. So did not our Indian visitors. They had called up their whole settlement, and were stuffing, wrangling, and gambling with jackstraws all night long. Awakened by their infernal clamor, I drove them off with a few judicious cuffs; but after they had quietly removed, they recommenced their hideous orgies ere I could fall asleep again.

"The next morning I was awakened at sunrise by Don Egidio's cheerful voice, singing away as merrily as a lark, as he prepared to try out the tallow of the slaughtered elk -- an object which the worthy Giles had had in view quite as much as the sport. An oval-shaped hole, about two feet deep, but shallower at one end than the other, was made in the ground, and the shallowest part of it filled with the fat and fatty parts of the elk; a fire of light sticks was made over this greasy heap, and, when well going, fed with the fatty scraps, the pure melted tallow running down into the deeper parts of the trench. A hide, doubled in the middle, and laced at the sides with thongs, was then brought, and the melted tallow dipped up and poured into it until it was filled, when the mouth of the skin was laced up, and the result was a hard bag of solid tallow. The tallow from the six elks filled two large hides, each weighing at least four hundred pounds. From the superior hardness, whiteness and delicacy of the elk's tallow, it is in much request among the rancheros for cooking purposes, and the hides are also worth something.

"The Punta Reyes is a favorite hunting-ground, the elk being attracted by the superior quality of the pasture -- the land lying so near the sea, that the dews are heavy and constant, adding great luxuriance to the wild oats and other grains and grasses. The elk are very abundant at this season, and more easily killed than cattle. We passed many places on our way back, where mouldering horns and bones attested the wholesale slaughter which had been made in previous years by the rancheros of the neighborhood. I took a pair of the freshest and finest horns I could find, and put them on a led horse. They touched the ground on each side of the horse; but I was told they would not compare with some, under the arch of which -- the points resting on the earth -- the most profligate man in the world could walk uprightly with his hat on!

"Our ranchero friends having determined to remain, and pursue their sport and profit, we took leave of them and returned to headquarters."

APPENDIX VIII

TIDE AND MOON PHASES PREDICTIONS FOR DRAKES BAY, 1579

The following is a copy of a letter from Mr. Robert W. Knox, acting Director of the U. S. Coast and Geodetic Survey, Washington, D. C., to the Supervisor, Western District, relative to a request by Captain A. S. Oko of the Drake Navigators Guild for tidal data for Drakes Bay, year 1579.

28 May 1953

TO: Supervisor, Western District
U. S. Coast and Geodetic Survey
Room 121 Customhouse
San Francisco 26, California

SUBJECT: Tidal Data for the Year 1579

This is in reply to your letter of 4 May 1953 relative to a memorandum entitled "Drake and the Tides--1579" from the Drake Navigators Guild, Point Reyes, California.

The conversion of dates from the Julian to the Gregorian calendar needs clarification. It is true that the Gregorian calendar was adopted by England in 1752 and that eleven days were eliminated by the change. In 1579, however, the change would involve the elimination of only 10 days. The conversion of the dates in question, therefore, is as follows:

A. Julian (oldstyle)	B. Gregorian (present dates)
1579	
June 5	June 15
June 17	June 27
June 21	July 1
July 23	August 2

Due to the diurnal inequality in the tide in the vicinity of Drakes Bay the largest tides are associated with the maximum declination of the moon to a greater extent than with new and full moon, and moon in perigee. Because of the complexity of the variations we have computed the tides for the period in question and are enclosing a copy for use in the

studies of the Drake Navigator's Guild. It is believed that most of the questions can be answered best by reference to these predictions.

The tides at the entrance to Drakes Estero are about the same as in Drakes Bay, but inside Drakes Estero they are probably somewhat later and smaller.

We regret that we have no observational data relative to the currents in Drakes Bay. It is estimated, however, that except for the entrance to Drakes Estero the currents are weak

The approximate dates (new style) of the phases of the moon for the period specified in 1579 are as follows: new moon June 7, first quarter June 14, full moon June 21, last quarter June 28, new moon July 6, full moon July 20, new moon August 5. If any additional information relative to the moon is required reference should be made to the Nautical Almanac Office, U.S. Naval Observatory, Washington 25, D.C.

Very truly yours,

signed: Robert W. Knox

Acting Director

Enclosure

Note: In the following table, the tides are given according to the Gregorian calendar (new style). Ed.

TIDE PREDICTIONS

DRAKES BAY, CALIFORNIA, 1579

Day	JUNE High Time	JUNE High Ht.	JUNE Low Time	JUNE Low Ht.	JULY High Time	JULY High Ht.	JULY Low Time	JULY Low Ht.	AUGUST High Time	AUGUST High Ht.	AUGUST Low Time	AUGUST Low Ht.
	h. m.	ft.	h. m.	ft.	h. m.	ft.	h. m.	ft.	h. m.	ft.	h. m.	ft.
1					10 30	4.2	3 20	−0.9	11 10	4.3	3 55	−1.0
					20 20	6.1	14 30	3.4	21 10	6.0	15 15	3.2
2					11 15	4.3	3 55	−1.2	11 25	4.3	4 25	−0.8
					20 45	6.2	15 00	3.5	21 45	5.9	15 55	2.9
3					11 45	4.3	4 30	−1.3	11 50	4.4	4 55	−0.6
					21 25	6.3	15 35	3.5	22 35	5.7	16 45	2.6
4					12 20	4.3	5 05	−1.2	12 15	4.6	5 35	−0.3
					22 05	6.2	16 15	3.4	23 35	5.4	17 25	2.3
5					12 50	4.2	5 35	−1.1	12 40	4.8	6 00	0.2
					22 40	6.0	16 55	3.3	—	—	18 15	2.0
6					13 15	4.3	6 05	−0.8	0 05	4.9	6 40	0.6
					23 25	5.7	17 35	3.1	13 15	5.0	19 20	1.6
7					—	—	6 40	−0.4	1 15	4.4	7 25	1.1
					13 40	4.4	18 25	2.9	14 05	5.2	20 35	1.3
8					0 10	5.2	7 15	0.1	2 35	4.0	8 05	1.6
					14 10	4.6	19 25	2.6	14 45	5.5	21 45	0.9
9					1 05	4.6	7 55	0.6	3 55	3.7	9 00	2.1
					14 55	4.8	20 50	2.2	15 40	5.7	23 00	0.4
10					2 25	4.0	8 40	1.1	5 25	3.7	10 00	2.5
					15 30	5.1	22 15	1.7	16 30	5.9	—	—
11					4 00	3.6	9 30	1.6	6 55	3.9	0 05	−0.2
					16 20	5.5	23 35	1.0	17 30	6.1	11 15	2.8
12					5 40	3.5	10 35	2.1	8 05	4.2	1 05	−0.7
					17 15	5.8	—	—	18 30	6.3	12 25	2.9
13					7 10	3.7	0 25	0.2	9 00	4.5	1 45	−1.0
					18 00	6.2	11 40	2.4	19 25	6.4	13 30	2.8
14					8 10	4.0	1 25	−0.5				
					18 50	6.5	12 35	2.6				
15	8 10	4.0	1 45	0.0	9 10	4.3	2 20	−1.1				
	19 25	6.9	13 05	2.3	19 40	6.7	13 35	2.7				
16	9 15	4.3	2 35	−0.8	10 00	4.6	3 05	−1.6				
	20 05	6.7	13 45	2.5	20 30	6.9	14 40	2.8				
17	10 05	4.6	3 20	−1.4	10 40	4.8	3 45	−1.7				
	20 45	6.9	14 45	2.6	21 20	6.8	15 20	2.7				
18	11 10	4.7	3 55	−1.8	11 25	4.9	4 30	−1.9				
	21 25	7.0	15 30	2.7	22 05	6.6	16 15	2.7				
19	11 50	4.7	4 45	−2.0	12 15	5.0	5 10	−1.7				
	22 15	6.9	16 25	2.8	22 50	6.3	17 00	2.6				
20	12 25	4.9	5 30	−2.0	12 45	5.0	5 55	−1.3				
	22 55	6.6	17 05	2.9	23 40	5.8	17 55	2.5				
21	13 20	4.9	6 15	−1.7	13 25	5.0	6 40	−0.8				
	23 45	6.1	18 05	3.0	—	—	18 50	2.4				
22	—	—	7 05	−1.3	0 35	5.2	7 20	−0.1				
	14 10	5.0	19 05	3.0	14 15	5.0	19 55	2.2				
23	0 35	5.6	7 50	−0.7	1 35	4.6	8 05	0.7				
	14 55	4.9	20 15	2.9	14 50	5.0	21 10	2.0				
24	1 30	4.9	8 35	0.0	2 45	4.0	8 50	1.4				
	15 45	5.0	21 30	2.6	15 25	5.0	22 15	1.6				
25	2 45	4.3	9 30	0.7	4 25	3.6	9 40	2.1				
	16 30	5.1	23 00	2.1	16 10	5.1	23 25	1.0				
26	4 25	3.8	10 25	1.3	6 15	3.5	10 35	2.7				
	16 50	5.2	—	—	16 55	5.2	—	—				
27	6 05	3.6	0 15	1.5	7 40	3.7	0 40	0.5				
	18 00	5.4	11 25	1.9	17 45	5.4	11 35	3.1				
28	7 35	3.7	1 10	0.8	8 50	3.9	1 35	−0.1				
	18 40	5.5	12 25	2.5	18 25	5.6	12 35	3.4				
29	8 35	3.9	2 05	0.1	9 35	4.1	2 15	−0.5				
	19 20	5.7	13 05	2.9	19 05	5.8	13 20	3.5				
30	9 35	4.1	2 45	−0.5	10 10	4.2	2 55	−0.8				
	19 45	5.8	12 50	3.2	19 50	6.0	13 50	3.5				
31					10 45	4.2	3 30	−0.9				
					20 30	6.0	14 40	3.4				

Time meridian local civil. The hours of the day are numbered consecutively from 0h (midnight) to 23h (11:00 p. m.). 12h is noon. All hours greater than 12 are in the afternoon (p. m.).

Heights are reckoned from the datum of soundings on the largest scale charts of the locality which is about approximately feet feet below mean lower low water.

Predicted by _____ Date

Verified by _____ Date

Form 148
TIDE PREDICTIONS
DEPARTMENT OF COMMERCE
U.S. Coast and Geodetic Survey
July 1936

APPENDIX IX

CLIMATOLOGICAL DATA

Extracts from the United States Coast Pilot, Pacific Coast, California, Oregon, and Washington, U.S. Department of Commerce, Coast and Geodetic Survey.

Ninth (1963) Edition, pp. 88-91

"General. - The Pacific coastal region of the United States and the adjacent ocean areas are located along the eastern portion of the Pacific high pressure system. This HIGH, when well developed, forms the principal circulation control forcing most of the LOWS that develop to follow a course northward of the United States. This action damps out weather changes that might otherwise occur and bring to the weather along the coast a stability factor that would not otherwise exist. Air which reaches the coast as a result of the prevailing westerly winds has acquired much water vapor during its passage over the ocean with resultant high humidities over the coastal regions. The marine influence is also evidenced in a cooling effect in summer and warming influence in winter.

"Pressure and annual changes in weather pattern. - During the summer the North Pacific HIGH reaches its greatest development. In July the center, with highest pressure about 1,025 millibars, is located in the latitude of San Francisco near 150° W. Average pressure in excess of 1,015 millibars prevails over most of the ocean area north of 20° N. almost to Alaska and west from the Pacific Coast to about 160° E. At this season of the year the Aleutian LOW is almost nonexistent.

"By October the HIGH has contracted, particularly on the north in the direction of the Aleutian LOW which has formed over Alaska and the Bering Sea with pressure of 1,002.5 millibars and below prevailing over southwestern Alaska including the Aleutian Islands. This low-pressure area which appears as a permanent system on the charts is actually the result of frequent migratory lows that move through the area during the winter season.

"In October, the Pacific HIGH extends from the U.S. coast across the Pacific Ocean and into the Asiatic Continent and reaches a maximum of 1,020 millibars in the vicinity of 30° - 35° N. and 135° - 140° W. Weakening of the HIGH continues with the approach of the winter season

and by November it is little more than a weak belt of high pressure lying between the Aleutian LOW and the equatorial belt of low pressure. Lows continue to form along the polar front and tend to make their path through the area covered by the Aleutian LOW. In winter these traveling depressions moving eastward cause considerable day-to-day variation in pressure, particularly in the area north of 40° N.

"During the spring months there is a gradual return to the summer pattern with the HIGH spreading northward and the LOW becoming further contracted. Migratory LOWS become less frequent and enter the continent farther north. Day-to-day fluctuations in pressure are much smaller than in the winter months.

"Winds. - Over the northern portion of the Pacific HIGH north of 40° N., and including the Oregon and Washington coasts, the prevailing direction of the wind is westerly. There is a tendency for the winds to shift to the north of west during the summer when pressure over the United States is lower than that over the Pacific Ocean, and to the south of west during winter when pressure over the continent is higher than it is over the ocean. These prevailing westerly winds north of the HIGH extend westward across the entire North Pacific and reach northward throughout the area of this summary and on toward the Arctic Circle.

"Along the California coast south of 40° N. the prevailing wind during the greater part of the year is from the northwest, a direction that brings it nearly parallel to the coast. The average velocity of these winds off the ocean is generally low during the greater part of the year. There are, however, occasions when warm dry descending winds from the northeast and east come roaring through the major passes of the coastal mountains. These winds, often accompanied by desiccating temperatures, may exceed 45 knots and at times carry considerable dust.

"Gales. - There is considerable difference in frequency of gales between the northern and southern portions of the coast. Gales are most frequent in the winter, averaging 5 to 8 percent of observations along the Washington coast and only about 1 percent along the southern California coast. In summer, the coastal area of Washington averages less than one percent of observations with gales while the coast of Oregon southward to central California averages 1 to 2 percent. Gales are very infrequent along the southern California coast in summer.

"The direction from which gales blow shows a marked seasonal variation. In winter they may occur from any direction but more blow from the southeast, south, or southwest than all other directions combined. Few or none come from the northeast or east. In summer gales are almost exclusively from the northwest and north.

"Along the coast of Washington (45° to 50° N.) the season of maximum gales extends from early October until April. This is the period when differing air masses and fronts address the coast. The fact that most gales during this period are from the southeast, south or southwest indicates that they occur in the warm sector of the LOW. During June, July, and August, gales from any direction are rare. From northern Oregon to Northern California (40° to 45° N.) the season of maximum gales along the coast lasts from November through February. During these months most of the gales blow from the southeast and south with a few from the north and northwest. March and October are transition months. From April through September gales are fewer and those that do occur are usually from the northwest or north.

"Farther south along the California coast (35° to 40° N.), northwest gales are more frequent and occur at all seasons although they are most frequent from March through July. Northwest gales are as frequent or more frequent than gales from any other direction in all months. There is a secondary maximum of southeast and south gales from November through March.

"Fog. - Both summer- and winter-type fogs are common along the Pacific coast, with the summer type being more frequent and extensive. The generally light anticyclonic winds which prevail during the warm months, when the North Pacific HIGH remains stable, are conducive to both the formation and maintenance of fog.

"During most of the year the temperature of the water off the coast is lower than that of the ocean farther to the west, the greatest differences occurring in July, August, and September. The cooling effect of these coastal waters upon the easterly moving air above it is a primary factor in the prevalence of summer fogs. Under these conditions the warm, moist air from the westward easily attains its dewpoint and the resulting fog drifts toward the coast and moves inland.

"In winter fog is much less prevalent than during the summer. It is more local in character and, although it may extend over a considerable range in latitude, it seldom extends any great distance to sea. However, when the so-called summer or advection type of fog, which may also occur in winter, unites with fog which has formed over the land, a sheet of fog may extend a considerable distance to sea.

"The seaward extent of fog varies greatly. The band of densest and most frequent fog occurs over the narrow stream of colder water just off the coast and is frequently limited to a band of 50 miles or less. At other times fog covers large areas both in latitude and in longitude, and may extend for hundreds of miles to sea.

"The months of maximum occurrence of fog off the Pacific coast vary somewhat with the different localities and, of course, with the individual year. . . . Along the coast proper, from Tatoosh Island to the lower California coast, the period of most frequent fog is from July to October, and that of least frequent from December to May.

"The maximum frequency of fog along the coast of Washington and Oregon is 16 percent at Tatoosh Island, occurring in August. Between Tatoosh Island and Brookings, Oreg., where 14.5 percent of observations in July record fog, smaller frequencies are encountered. From Brookings to north of the Golden Gate the maximum percentage frequency is reached near Blunts Reef. In the vicinity of Eureka, where there are coastal plains, maximum frequency of fog is in the fall, and is of the radiation type. Humboldt Bay, the harbor of Eureka, however, is an area of dense sea fog, and the shoals near there are dangerous to vessels in thick weather. Between Blunts Reef and San Francisco are two of the most foggy spots on the Pacific coast: Point Arena and Point Reyes. Point Reyes is often spoken of as being the actual center of heaviest and most frequent fogs on the Pacific coast; this is true when an average over a long period of record is considered. Owing to the persistency of the fog cover, through which it is said the sun's rays sometimes fail to penetrate for 3 or even 4 weeks at a time, Point Reyes has close to the lowest midsummer temperature of any observing station in the United States.

"Golden Gate, the entrance to San Francisco Bay, is a region of frequent fog, and shipwrecks have been numerous there. Often a sheet of fog forms in early forenoon off the bold headlands on either side of the

Golden Gate and becomes more formidable in size as the day wears on. As the temperature rises in the warm inland valleys, a steadily increasing indraft takes place. Then the fog, perhaps 1,500 or more feet in height, approaches the shore and enshrouds a good portion of all of San Francisco Bay. Under favorable temperature conditions, the fog will overspread the shore and rise up the more than half-mile height of Mount Tamalpais.

"There are several well-marked types of fog in the vicinity of San Francisco. First and most prominent is the summer afternoon sea fog described above which moves inland at an average rate of 14 knots. The second type, a low-lying dense land or river fog, forms during winter mornings and drains slowly seaward at the rate of perhaps a knot. It is essentially a valley fog and is most marked in the lowlands, ...

"In summer the afternoon sea fog varies in depth from 100 to about 1,500 feet, the depth decreasing as the distance inland increases. On summer afternoons the velocity of the wind at San Francisco with almost clocklike regularity rises to over 19 knots, and a solid wall of fog comes through the Golden Gate, causing a fall in temperature.

"Precipitation. - Along the Pacific coast of the United States most of the precipitation falls during the winter with the summer being generally dry. While this pattern prevails along the entire coast the amount of rainfall and the length of the season increases gradually from south to north. . . ."

Weather, San Francisco Bay, p. 126.

"In common with the more northerly section of the Pacific coast of the United States, the San Francisco Bay entrance experiences fog more frequently during the summer than during other seasons. Fog is generally brought in from seaward by westerly winds about sundown, and ordinarily continues until about noon of the following day. In winter, morning or tule fogs frequently occur, these forming over the lowlands of the central valley and over the bay.

"During summer the fog often drifts in only as far as the Golden

Gate, partially obscuring the bridge and shoreline, while the remainder of the bay is comparitively clear. Sausalito and Richardson Bay have much less fog than the Golden Gate.

"Westerly winds prevail in this section of the Pacific coast throughout the greater part of the year; northerly winds are most prevalent during December and January. Southerly gales occur in the winter. The wind normally attains its greatest velocity about 4:30 p.m. and its least velocity about 6 a.m.

"During certain times of the year, especially in May and June, the northwesterly winds attain high velocity. This is also true regarding the north-northeasterly winds of November, December, and occasionally January. In the winter the most prevalent high wind is from the southeast and is followed by a southwesterly wind.

"The San Francisco Bay region has comparatively few storms. Except in the winter, very few low-pressure areas move from the ocean across California; nearly all the storms that enter the United States from the west pass far northward of central California."

The tables of weather data on the following pages for the months of June and July, compiled by the U.S. Weather Bureau, were extracted from the Third Edition (1917) of the U.S. Coast Pilot, Pacific Coast, as it includes Point Reyes as well as other stations on the coast. Point Reyes is not listed in later editions.

CLIMATOLOGICAL DATA

MONTH OF JUNE

	COLUMBIA RIVER ENTRANCE*	EUREKA	POINT REYES	SAN FRANCISCO
Air temperature in degrees F.				
Mean for month	55.0	54.6	52.8	57.0
Mean, maximum	59.5	59.1	57.9	65.0
Mean, minimum	50.5	49.8	47.7	52.0
Highest	96	85	87	100
Lowest	44	40	38	46
Average relative humidity, %	86	86	85	80
Average amount of clouds, 0 - 10	7	5	5	4
Precipitation				
Average fall	1.77	1.06	.26	.17
Number of days 0.01 inch or more	14	6	1	2
Maximum fall in 24 hours	1.76	1.99	1.53	1.23
Wind				
Average velocity in statute miles	16.6	8.0	26.9	12.9
Highest velocity in statute miles	74	47	94	48
Average number of times (observations at 8 a.m. and 8 p.m.) from:				
N	4	18	4	0
NE	1	2	0	0
E	2	1	0	0
SE	5	5	0	0
S	5	4	2	2
SW	5	7	2	14
W	6	6	1	38
NW	32	16	21	5
CALM	0	1	0	1
Number of days with wind 40 miles or over	3	0	16	0
Number of days with dense fog	2	3	13	1

* North Head (Columbia River Entrance), Washington.

CLIMATOLOGICAL DATA

MONTH OF JULY

	COLUMBIA RIVER ENTRANCE	EUREKA	POINT REYES	SAN FRANCISCO
Air temperature in degrees F.				
Mean for month	57.7	53.3	53.5	57.3
Mean, maximum	62.2	59.8	58.6	64.5
Mean, minimum	53.4	51.5	48.3	52.5
Highest	97	73	91	98
Lowest	46	43	40	47
Average relative himidity, %	88	88	88	84
Average amount of clouds, 0 - 10	6	6	7	4
Precipitation				
Average fall	.54	.11	.12	.01
Number of days 0.01 inch or more	8	2	0	1
Maximum fall in 24 hours	.82	.75	.39	.23
Wind				
Average velocity in statute miles	15.8	6.4	22.0	13.4
Highest velocity in statute miles	62	47	90	41
Average number of times (observations at 8 a.m. and 8 p.m.) from:				
N	6	15	6	0
NE	0	2	0	0
E	1	1	0	0
SE	3	2	0	0
S	6	6	3	1
SW	3	9	2	19
W	4	7	1	41
NW	39	19	19	1
CALM	0	1	0	0
Number of days with wind 40 miles or over	1	0	10	0
Number of days with dense fog	6	8	23	3

APPENDIX X

A SUMMARY OF STATEMENTS CONTAINED IN THE SOURCE ACCOUNTS RELATIVE TO DRAKE ON THE NORTHWEST COAST

	Plate of Brass, 1579	Anonymous Narrative, 1581 ?	French Map, 1581 ?	Dutch Map, 1582 ?	Madox Diary, 1582	John Drake, I, 1584	John Drake, II, 1587	Famous Voyage, c. 1596	Stow, 1592	Hondius Broadside Map, c. 1595	Blundeville, 1594	Davis, 1595	Camden, 1597	De Bry, 1599	De Herrera, 1606	World Encompassed, 1628	Monson, 1640	Dudley, 1647
Highest point reached: 42°								x		x			x	x				
43°								x				x[1]						
44°			x	x														
45°											x				x			
46°									x									
47°						x	x					x				x		
48°									x	x			x	x				
Landing and Encampment at 38°								x	x	x			x	x		x		x
38° 30'																x		x
39°			x	x														
44°		x																
48°					x	x	x											
Variation 8° East																		x
A bay, bad															x			
A bay, fair and good, etc.								x						x				
A bay											x							
A commodious rode												x						x[2]
A Harborow		x																
A convenient and fit harborough															x			

1. Hughes annotation, 1595, See p. 122, supra.
2. Shown on Dudley's maps.

SUMMARY OF STATEMENTS

	Plate of Brass, 1579	Anonymous Narrative, 1581 ?	French Map, 1581 ?	Dutch Map, 1582 ?	Madox Diary, 1582	John Drake, I, 1584	John Drake, II, 1587	Famous Voyage, c. 1596	Stow, 1592	Hondius Broadside Map, c. 1595	Blundeville, 1594	Davis, 1595	Camden, 1597	De Bry, 1599	De Herrera, 1606	World Encompassed, 1628	Monson, 1640	Dudley, 1647
Il Porto Bonissimo (very best of ports)																		x
Porto di Nuova Albion																		x
Portus Novae Albionis										x								
Depths of water in port shown																		x
California (Caliphurnia)				x[1]	x		x											
Ship's Land					x													
On the backside of Newfoundland												x						
On the backside of Labrador					x													
Nova Albion	x		x	x				x		x	x		x	x				x
Albion																x	x	
New England						x												
Limits of Nova Albion defined			x															
Spaniards not in Nova Albion								x					x	x		x		
June 5, course changed and made landfall								x						x		x	x	
June 10, turned south									x									
June 17, arrived Nova Albion	x							x[2]										
June 21, ship moved nearer to shore																x		
June 26, many Indians visit encampment																x		
July 23, departed Nova Albion																x		
July 25, departed Nova Albion									x								x	

1. Shown on New York Public Library copy, a revised edition.
2. In California excerpt of Famous Voyage, see p.127, supra.

SUMMARY OF STATEMENTS

	Plate of Brass, 1579	Anonymous Narrative, 1581 ?	French Map, 1581 ?	Dutch Map, 1582 ?	Madox Diary, 1582	John Drake, I, 1584	John Drake, II, 1587	Famous Voyage, c. 1596	Stow, 1592	Hondius Broadside Map, c. 1595	Blundeville, 1594	Davis, 1595	Camden, 1597	De Bry, 1599	De Herrera, 1603	World Encompassed, 1628	Monson, 1640	Dudley, 1647
End of August, departed Nova Albion		x																
Remained month and a half						x	x								x			
July 24, 25, at Isles of St. James																x		
Storms at sea						x												
Clouds at sea						x												
Mists at sea						x												
Cold at sea						x		x	x	x	x		x	x		x		x
Cold at Nova Albion																x	x	x
Fog along shore									x							x		
Fog at Nova Albion																x		
No sight of sun in 14 days, Nova Albion																		
Snow along shore								x				x		x				
North winds at Nova Albion																x		
Northwest winds at Nova Albion																x		
Northwest winds at sea																x		
Sailing on the bowline (closehauled)							x											
Good wind to enter a bay								x										
Indians seek shelter under lee bank																x		
Temperate climate, more cold than hot								x										x
Grounded Golden Hind for repairs, etc.		x																
Breamed Golden Hind					x													
Graved Golden Hind					x													

SUMMARY OF STATEMENTS

	Plate of Brass, 1579	Anonymous Narrative, 1581 ?	French Map, 1581 ?	Dutch Map, 1582 ?	Madox Diary, 1582	John Drake, I, 1584	John Drake, II, 1587	Famous Voyage, c. 1596	Stow, 1592	Hondius Broadside Map, c. 1595	Blundeville, 1594	Davis, 1595	Camden, 1597	De Bry, 1599	De Herrera, 1606	World Encompassed, 1628	Monson, 1640	Dudley, 1647
Repaired Golden Hind						x	x											
Caulked Golden Hind							x											
Graved and Trimmed Golden Hind									x									
Trimmed Golden Hind		x															x	
Leak at sea															x			
Sought water																		x
Watered ship		x				x												
Landed men and provisions															x			
Took in wood						x												
Two vessels at Nova Albion							x							x[1]				
Fort										x								
Bulwarks, also field works, etc.								x						x		x		
Fenced place								x								x		
Walls of stone																x		
Huts							x											
Tents								x						x		x		
Islands off shore			x	x		x									x			
St. Bartholomew, Island of							x								x			
St. James, Island of							x								x	x		
Nova Albion, an Island										x[2]				x	x			
Isles of St. James not far without																x		
White banks and cliffs								x		x[2]				x		x		
Cliffs										x			x					

1. Implied in two illustrations in text.
2. In text on borders of map.

SUMMARY OF STATEMENTS

	Plate of Brass, 1579	Anonymous Narrative, 1581 ?	French Map, 1581 ?	Dutch Map, 1582 ?	Madox Diary, 1592	John Drake, I, 1584	John Drake, II, 1587	Famous Voyage, c. 1596	Stow, 1592	Hondius Broadside Map, c. 1595	Blundeville, 1594	Davis, 1595	Camden, 1597	De Bry, 1599	De Herrera, 1606	World Encompassed, 1628	Monson, 1640	Dudley, 1647
Mountains								X		X				X		X		
Hills										X[1]				X		X		
Indians at top of hill																X		
Fort, or tents, at foot of hill																X		
Indians came down from hill																X		
Squalidness of country																X		
Barrenness of country																X		
Face of earth appeared deformed																X		
Trees without leaves																X		
Ground without greenness																X		
Birds stayed in nests																X		
Journey up into land, or country										X[1]				X		X		
Upland countries																X		
Inland far different from shore																X		
Goodly country and fruitful soil							X						X			X		X
Riches and treasure in upland countries																X		
Indian Village 3/4 mile away																X		
Several Indian villages seen								X								X		
Indian houses described								X		X[1]				X		X		
Gifts to Indians								X		X[1]				X		X		
Indians return gifts								X								X		
Indian words quoted				X				X								X		
Sacrifices							X	X		X			X	X		X		
Indians, unusual strength																X		

1. In text on borders of map.

SUMMARY OF STATEMENTS

	Plate of Brass, 1579	Anonymous Narrative, 1581 ?	French Map, 1581 ?	Dutch Map, 1582 ?	Madox Diary, 1582	John Drake, I, 1584	John Drake, II, 1587	Famous Voyage, c. 1596	Stow, 1592	Hondius Broadside Map, c. 1595	Blundeville, 1594	Davis, 1595	Camden, 1597	De Bry, 1599	De Herrera, 1606	World Encompassed, 1628	Monson, 1640	Dudley, 1647
Indians run																x		
Indians fish near shore								x		x[1]				x		x		
Indians sing								x		x[1]			x	x		x		
Indians dance								x		x[1]				x		x		
Indians described in detail																x		
"Canow", Indians canoe at Nova Albion																x		
Mussels							x									x		
Seals							x									x		
Bulrushes, rushes								x		x[1]				x		x		
Deer								x		x[1]		x	x			x		
Tobacco								x		x[1]			x					
Tabáh																x		
Down																x		
Petáh																x		
Fishes like Pilchard																x		
Shells of pearl																x		
Down of red feathers																x		
Native horses																		x
Conies, rabbits								x				x	x			x		x
Drake crowned					x			x		x[1]		x	x			x		
Drake crowned twice			x							x[1]			x[2]					
Post (land claim monument), pillar		x						x		x[1]		x	x			x		
Sixpence, part of land claim monument	x	x						x		x[1]		x	x			x		

1. In text on borders of map.
2. By implication from two illustrations showing double crowns.

SUMMARY OF STATEMENTS

	Plate of Brass, 1579	Anonymous Narrative, 1581 ?	French Map, 1581 ?	Dutch Map, 1582 ?	Madox Diary, 1582	John Drake, I, 1584	John Drake, II, 1587	Famous Voyage, c. 1596	Stow, 1592	Hondius Broadside Map, c. 1595	Blundeville, 1594	Davis, 1595	Camden, 1597	De Bry, 1599	De Herrera, 1606	World Encompassed, 1628	Monson, 1640	Dudley, 1647
Plate, land claim										x[1]								
Plate of lead, land claim		x																
Plate of brass, land claim	x															x		
Nailed coin to post, or fastened, etc.		x						x		x[1]			x	x				
Coin hole in plate	x														x			
Account seen and corrected by Drake			x															

1. In text on borders of map.

APPENDIX XI

COMPARISON OF LATITUDES RECORDED IN ACCOUNTS OF DRAKE'S VOYAGE OF CIRCUMNAVIGATION

In the listing that follows this commentary, latitudes of various places visited on Drake's voyage of circumnavigation are extracted from World Encompassed and other accounts and compared with the true latitudes of those places as near as they can be ascertained to compare their degree of accuracy. In the absence of his log, there is no way of knowing how many or which of the stated latitudes were computed by Drake; but it is probable that most given in World Encompassed were his. Latitudes given by Edward Cliffe and John Cooke, both of whom returned to England in the Elizabeth, may be from their own navigation or the log of the Elizabeth.

The latitudes of Cape Kantin and Mogador, and possibly also Cape Blanco, on the west coast of Africa may have been derived from charts or a rutter used by Drake. This part of the African coast was known to him and other English navigators and had been long known to the Portuguese. Mogador was designated as a rendezvous for Drake's fleet in case of separation and its latitude undoubtedly known; Maio Island's latitude in the Cape Verde Islands may also have been taken from charts. Drake had been in these islands in 1567 in the employ of the Hawkins brothers. These are given here, however, because they illustrate the degree of accuracy that could be attained in the last quarter of the sixteenth century.

After leaving the Cape Verde Islands it is most probable that Drake verified charted positions by his own observations, as Nuño da Silva recorded that "He caused a chart of the coast of Brazil to be translated into English from the Portuguese, and as we went along the coast he kept on verifying it down to 24° which is as far as the Portuguese charts reach."

Many latitudes in the East Indies are given in World Encompassed, and most of them could not have come from charts. One possible exception may be the Island of Ternate whose latitude in the account shows a relatively large error of 21.5 minutes where one might expect a small error. The position of this island would certainly have been shown on the large chart of the world that Drake had made in Lisbon before starting the voyage as the Portuguese had long had a special interest in the Moluccas. With the exception of Ternate and Java, the latitudes given for this part of the voyage are necessarily compared with latitudes derived from a reconstruction of Drake's track in the East Indies.

COMPARISON OF LATITUDES

Consideration must be given to several circumstances when comparing the latitudes from the Drake accounts. The first of these is whether the observations were made on shipboard or at sea or whether they were made on shore. Latitudes obtained at sea were apt to be less accurate than those obtained on shore because of the errors introduced by ship's motion, particularly when using an astrolabe. For that reason, when it was important to establish an accurate geographical position, the observation for latitude was made on shore whenever possible.

Secondly, it is important to consider by what instrument the observations were made, as the errors resulting from them could be different. In the latter half of the sixteenth century the instruments used for measuring the height of the sun or stars (usually the pole star) for determination of latitude were the astrolabe and cross-staff. The astrolabe consisted of a heavy brass ring six or seven inches in diameter, graduated in degrees on the perimeter and provided with an alidade pivoted at the center. On each side of the center of the alidade, sight vanes were provided, and at the outer ends a pointer indicated the angle being measured in degrees. In use, it was necessary to suspend the astrolabe by a ring so that the 90° point would align by gravity to the true vertical, or the zenith point of the heavens. At sea the astrolabe could only be hand-held to keep it steady, and at the same time, for observations of the sun, it was necessary to pass a ray through a pin hole in the upper sight vane of the alidade into a hole in the lower sight vane (stars were sighted through the peep holes by an assistant). It was necessary to continue this procedure for a number of minutes until the highest altitude was reached at transit, after which the altitude decreased. It may be readily appreciated that this was not an easily accomplished feat when complicated by ship's motion.

The cross-staff worked on an entirely different principle; instead of measuring the angle subtended between a celestial body and the true vertical or horizontal, the cross-staff measured the angle subtended between the body and the horizon which for practical purposes was assumed to be a true horizontal plane though in reality it is not. The instrument consisted simply of a straight, squared wood staff and a sliding crosspiece. In use, one end of the staff was held at the corner or the eye while the user slid the cross toward or away from him until he sighted the lower edge of the cross on the horizon and, simultaneously, the center of the

sun at the upper edge of the cross. (1) The degrees of arc subtended were then read off a scale on one edge of the staff at the point where the cross intersected it. With practice and skill the cross-staff eliminated the difficulty of attempting to stabilize the astrolabe at sea while measuring the altitude of celestial bodies, but it too had its limitations. Its graduations ended at 20° and therefore it could not be used for altitudes lower than that. Then, although it was graduated to 90°, it was physically impractical, if not impossible, to use it for altitudes much over 60°. Waters points out that roughly between 20° N and 20° S, the cross-staff could not be used at any season of the year because the sun's altitude is too great between those latitudes. (2)

In addition to the problems entailed in its use, the cross-staff introduced a parallax error caused by the impossibility of making the sighting end of the staff, or apex of the altitude angle subtended by the cross-staff, coincide with the center of the eye's lens through which the altitude was observed. This error varied from one individual to another and occurred no matter how carefully the end of the staff was positioned in relation to the eye. Edward Wright, in the latter part of the sixteenth century, reckoned that this might cause an error of from 10' to more than 1°, particularly for high altitudes and small staffs. (3) Further, it is very unlikely that a correction for dip of the horizon was applied to altitudes obtained with the cross-staff at the time of Drake's voyage, and this omission introduced an error of 4' to 5', depending on the height of the ship's deck from which the altitude was taken. Thus, considering cases where the cross-staff was probably used at sea by Drake, those latitudes frequently show errors of 20' to 30'.

It must be considered also that, with either instrument, observations were taken by open sight methods, as the telescope was not developed until 1608. Angular calibration of the astrolabe and the staff appears to have been limited to even degrees, and fractions thereof depended on interpolation, the accuracy of which depended upon the judge-

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1. See William Bourne's instructions for the cross-staff (c. 1574) in E. G. R. Taylor, ed., A Regiment for the Sea, pp. 207-208.
2. See D. W. Waters, The Art of Navigation, pp. 54-55.
3. Ibid., p. 222.

ment of the individual navigator as there were no verniers.

Corrections for atmospheric refraction and parallax of the sun, which are taken into account in modern navigation, are relatively insignificant. For an altitude of 20° the combined correction is on the order of 2' 31" and decreases to 0' at 90°. These corrections are applicable to either the astrolabe or cross-staff.

Another source of error that must be taken into consideration, whether with respect to the astrolabe or the cross-staff, is the declination of the celestial body observed. Declination is the angular distance of the body north or south of the equator or equinoctial, and this, combined with the altitude of the body at the time of transit, gives latitude. From tables of declination of the sun for each day of the year, one can determine approximately what the altitude was for each of Drake's latitudes, assuming that they were based on sun sights. With the best navigators of the time, Drake probably used an almanac for the sun with four declination tables to take account of leap years. Waters states that the order of accuracy of these tables was within 5' to 10', which for practical purposes was quite sufficient. (1)

A further source of error resulting from the declination tables was the correction for longitude. The tabulations were made for declination at the time of transit of the prime meridian, which at this time in England was that which passed through the Azores and for all other meridians an interpolation correction had to be made for whether the sun transited east or west of the prime meridian. For the ordinary navigation on the European and West African coasts and even as far as the West Indies the correction could be ignored for practical purposes. For places more than six hours east or west of the prime meridian a significant error could result when the daily rate of change was as much as 23'. In turn, the accuracy of the correction depended upon the accuracy of the longitude, though generally the errors resulting from longitude errors would be small.

With respect to the declination tables, we are faced with the question of how Drake handled the dates and longitude correction in the

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1. See D. W. Waters, The Art of Navigation, p. 52

Western Pacific and the East Indies and the effect that his manner of using the tables had on his latitudes. Sailing west across the 180° meridian, the date must be advanced one day. Drake evidently did not take this principle into account, as his shipboard date was one day behind upon his return to Plymouth. The latitudes in the Far East suggest that some correction was made, but at the same time there seems to be a small error that is common to most of them. In that region, all of the latitudes were necessarily obtained from observations made with the astrolabe because of the high altitude of the sun.

In the listing below, the latitudes of places visited by Drake are derived from charts, sailing directions, or maritime positions listed in American Practical Navigator: Bowditch, published by the Hydrographic Office, U.S. Navy Department. To simplify comparison, seconds of latitude are rounded off to the nearest minute, and quoted references to latitudes are converted to the modern equivalent of degrees and minutes.

	Latitude	Difference
25 December, 1577		
Cape Kantin, West Coast of Africa.	32° 32' N	
World Encompassed	32° 30' N	2'
Cliffe account	32° 30' N	2'

The Cape was sighted in the morning; no landing is mentioned.

26-31 December, 1577		
Mogador Island, West Coast of Africa	31° 30' N	
World Encompassed	31° 40' N	10'
Cliffe account	31° 30' N	0

Drake landed on the island and set up a pinnace.

7 January, 1578		
Cape Ghir, West Coast of Africa.	30° 38' N	
World Encompassed, "cape De Guerre."	30° N	38'
Cliffe account	30° N	38'

No landing is mentioned. World Encompassed leaves the position open, it being given as "30 deg. [ ] min.", as though the figure was uncompleted or uncertain.

COMPARISON OF LATITUDES

	Latitude	Difference
16 January, 1578		
Cape Blanco, West Coast of Africa.	20° 46' N	
World Encompassed	20° 30' N	16'
Cliffe account	20° 30' N	16'

World Encompassed indicates that the Cape was reached at night and reference to the Crosiers, or Southern Cross, in this account and in Cliffe's makes it evident that the latitude was obtained from an observation of this constellation. Cliffe gives the method of calculation in detail which reads in part: "And the Crociers, being the guards of the South pole, he raised 9 degrees 30 min. The said Crociers be four starres, representing the form of a crosse, and be 30 degrees in latitude from the South pole: and the lowest starre of the sayd Crociers is to be taken when it is directly under the uppermost; and being so taken, as many degrees as it wanteth of 30, so many you are to the Northwards of the Equinoctiall." Thus, 30° minus 9° 30' equals 20° 30' N. Latitude.

The rule of thumb was certain to be inexact, and its application in other instances in low northern latitudes and southern latitudes may have contributed to large errors.

28-30 January, 1578		
Maio Island, Cape Verde Islands.	15° 14' N	
World Encompassed	15° 0' N	14'
Cliffe account	15° 0'	14'

Drake anchored at a landing on the west side of the island and spent some time ashore here.

31 January, 1578		
Fogo Island (center), C. Verde Islands.	14° 53' N	
World Encompassed	14° 30' N	23'

This island was observed in passing and the position given is probably estimated.

COMPARISON OF LATITUDES

	Latitude	Difference
14 April, 1578		
Lobos Island (Punta del Este) Rio de la Plata.	35° 02' S	
World Encompassed	35° - S	2'
Cliffe account	35° - S	2'

World Encompassed mentions only the Cape ("Cape Saint Mary") at the mouth of the river, but Cliffe specifically describes the island and locates it "being in 35 degrees of Southerly latitude." Drake landed a few leagues within the estuary and remained two days, during which time he probably verified his latitude from an observation ashore.

26 April, 1578		
Point Medano, East Coast of S. America.	36° 53' S	
World Encompassed	36° 20' S	33'

The accounts do not name this point, but positive identification can be made from the descriptions given in World Encompassed and by Cliffe. The latitude given in World Encompassed is given as an approximation as "about 36 deg. 20 min. and somewhat better South latitude." A shoal is mentioned lying three or four leagues off the point, which would be Medano Bank.

12 May, 1578		
Cabo Blanco, East Coast of S. America.	47° 12' S	
World Encompassed	47° - S	12'
Cliffe account	47° - S	12'
Cooke account	47° 04' S	8'

Drake spent a couple of days here in a small cove on the south side of the Cape and spent some time ashore. He gave the name "Cape Hope" to this Cape.

17 May - 3 June, 1578		
Bahia de los Nodales, East Coast of S. America. assumed anchorage.	47° 57' S	
World Encompassed	47° 30' S	27'

World Encompassed indicates that the anchorage was found in the northern part of the bay, named by Drake "Seal Bay," and some time spent ashore on a small island close by the mainland.

The Swanne was broken up and burnt here for ironwork and firewood.

	Latitude	Difference
17-18 June, 1578		
Porto Santa Cruz (entrance), East Coast of South America	50° 08' S	
World Encompassed	50° 20' S	12'

Temporary anchorage was made in the bay outside the mouth of the river here, which is alluded to by Fletcher in his account, but in World Encompassed only the outer bay is mentioned.

20 June - 17 August, 1578		
Port St. Julian, East Coast of South America	49° 17' S	
World Encompassed	49° 30' S	13'
Cliffe account	49° 30' S	13'

The true latitude given here is for the island on which Drake encamped. It should be noted that the time of year is the dead of winter, and the altitude of the sun would have been in the neighborhood of 20°.

20 August, 1578		
Strait of Magellan, eastern entrance (center)	52° 27' S	
World Encompassed	52° - S	27'
Cliffe Account	52° 30' S	3'

World Encompassed qualified this and the following latitudes relative to the strait that they were concluded "by all our men's obseruations."

(?) August, 1578		
Cape Froward, Strait of Magellan (middle of strait)	53° 56' S	
World Encompassed	53° 15' S	41'
Cliffe account	53° 20' S	36'

World Encompassed gave the latitude for the "middest" part of the strait, but Cliffe makes it clear that what he considered to be "neere about the midst" was the bend at Cape Froward.

COMPARISON OF LATITUDES

	Latitude	Difference
6 September, 1578		
Strait of Magellan, western entrance (center)	52° 37' S	
World Encompassed	52° 30' S	7'

Drake had intended to land on Cape Deseado to set up a monument for Elizabeth but could not because of the force of the wind.

24-28 October, 1578		
Cape Horn	55° 58' S	
World Encompassed	56° 0' S	2'

Though there are some who dispute whether Drake saw Cape Horn, the weight of evidence is in favor of the probability that he did. He spent a couple of days in the region, went ashore, and was blessed with fair weather. The time of year was approaching summer, and the nights were but two hours long.

5 December, 1578		
Valparaiso, West Coast South America.	33° 02' S	
World Encompassed	35° 40' S	2° 38'

This latitude in World Encompassed may be a typographical error as Drake had come south from a bay only 6 leagues distant which the account placed in "32 deg. or thereabout," possibly Quintero Bay. The position should probably read 32° 40'.

18-20 December, 1578		
Port Herradura, West Coast of South America	29° 57' S	
World Encompassed	29° 30' S	27'

A landing party went ashore here for water in the morning of the 19th, but the English were discovered by the Spaniards and driven off in the afternoon. Drake apparently did not go ashore himself.

22 Dec., 1578 - 19 Jan., 1579		
Salada Bay (careenage), West Coast of South America.	27° 41' S	
World Encompassed	27° 55' S	14'
Nuño da Silva's log	29° 10' S	1° 29'

COMPARISON OF LATITUDES

	Latitude	Difference

The Golden Hind was careened here, probably in the cove inside Pta. Cachos, Chasco Cove, and a pinnace was assembled. Nuño da Silva's log records that he observed the sun 8 Jan. and found 29 1/6 degrees of latitude. The sun's altitude in this period was over 80°, which makes a difficult observation.

26 January, 1579

Bahia de Mejillones, West Coast of South America.	23° 06' S	
World Encompassed	22° 30' S	36'

Anchor was cast off an Indian fishing town here called "Mormorena" in World Encompassed probably corresponding to the present town of Mejillones. The latitude was probably not taken on shore here.

7 February, 1579

Arica, West Coast of South America.	18° 29' S	
World Encompassed	20° - S	1° 31'

The very large difference from the true latitude here and the context in which it was used in World Encompassed makes it seem unlikely that the position was derived from Drake's navigation.

15-16 February, 1579

Callao de Lima, West Coast of South America.	12° 04' S	
World Encompassed	12° 30' S	26'

Drake entered the roadstead of Callao at night and departed in the morning.

20 February, 1579

Paita, West Coast of South America.	5° 05' S	
World Encompassed	4° 40' S	35'

The account merely states that Drake "fell" with this port.

COMPARISON OF LATITUDES

	Latitude	Difference
1 March, 1579		
Cape San Francisco, Pta. Galera, West Coast of South America.	0° 51' N	
World Encompassed	1° - N	9'

". . . the first of March wee fell with cape Francisco." At midday the Cacafuego was sighted. The sun would have been nearly overhead here.

16-24 March, 1579		
Island of Caño. West Coast of Central America.	7° 43' N	
R. Hakluyt, Voyages, 1600 edition.	8° - N	17'

A position for this island is given only by Hakluyt in his special account of Drake in California. A Spanish prisoner of Drake's related that at departure, Drake "went to the Island of Caño, where, with the compass, he took observations of the land and the sun, wrote notes and took his course towards Cabo Blanco." See Nuttall, New Light on Drake, p. 186.

13-16 April, 1579		
Guatulco, West Coast of Mexico.	15° 45' N	
World Encompassed	15° 40' N	5'
Hakluyt, Voyages, 1600 edition.	15° 50' N	5'

The town was taken and held by the English during the entire stay here.

(?) June, 1579		
Cape Mendocino, coast of California.	40° 26' N	
Blundeville account	40° - N	26'
Dudley account	40° - N	26'

Dudley stated that Drake and the Spanish pilots found Cape Mendocino at 40°. It was probably only seen in passing at sea as no landings were said to have been made by Drake.