

CHAPTER IV

THE VOYAGE NORTH

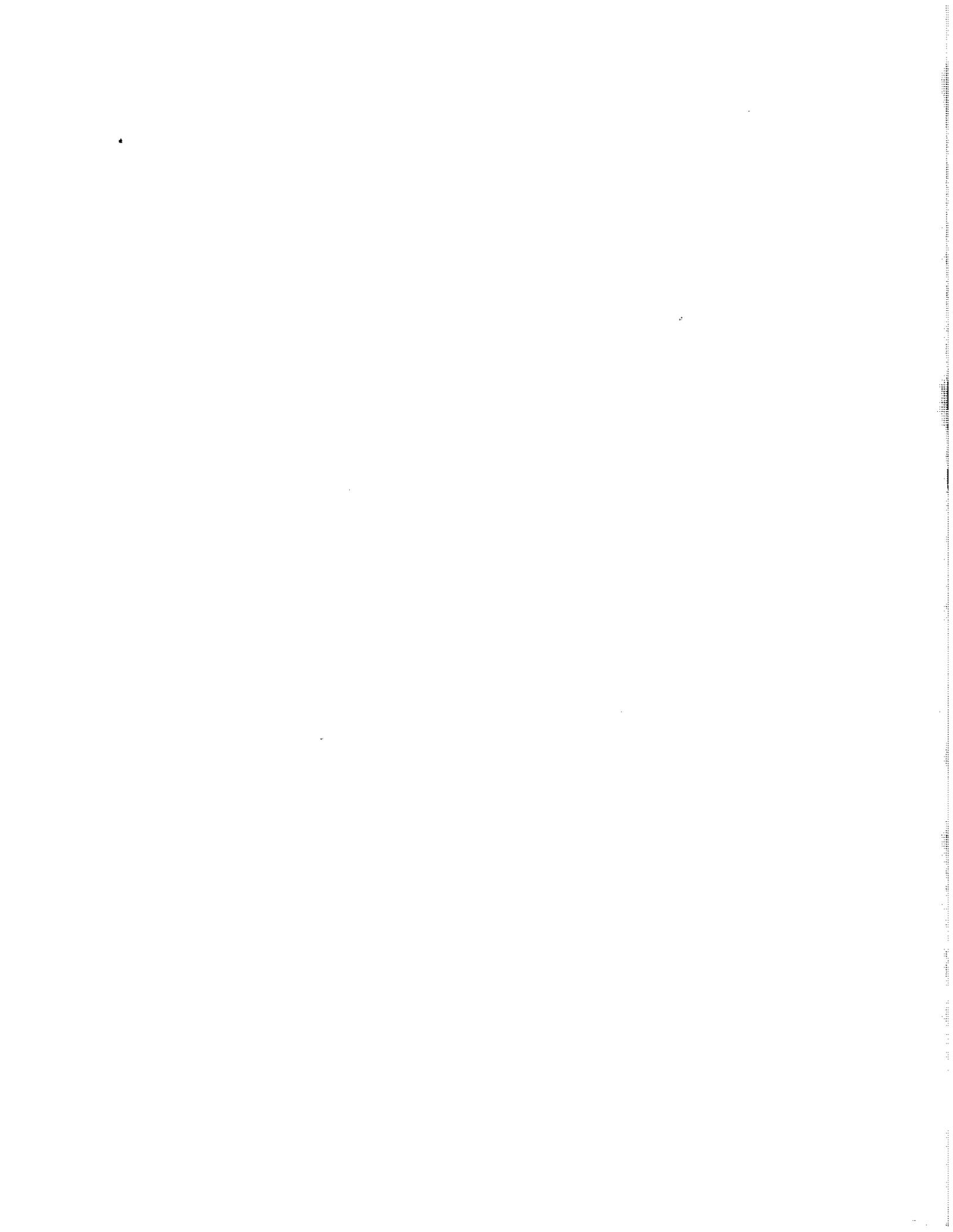
When day broke at Guatulco on the morning of Good Friday, April 17th, The Golden Hind and her small consort were under sail on the open sea. Within the harbor, Nuño da Silva, the Portuguese pilot whom Drake had left in an empty ship in the harbor, was shouting out repeatedly to those on shore to take him off the ship. ⁽¹⁾ In his own account of the incident, made sometime afterward, he stated that Drake was holding a course to the west, ⁽²⁾ a statement confirmed by World Encompassed, which states that he set his course directly into the sea.

It was logical for Drake to get well out to sea, as his own experience thus far on the coast, as well as that of his Spanish prisoners, would long since have convinced him that inshore he would encounter frequent calms and light airs. Aside from any natural desire to quickly conclude the voyage, another factor which made it urgent to reach the Northwest Coast as soon as possible, was the knowledge that if a strait was found leading to Frobisher's supposed entrance to the Northwest Passage near the Arctic Circle, it was imperative to pass through it during the summer months.

Unfortunately, none of the accounts clearly defines the route taken to the Northwest, and all known contemporary maps which trace it, show it as closely paralleling the coast, which seems out of agreement with the few details given in the accounts. However, by inspecting these details in the light of present day knowledge of the hydrography and meteorology of the North Pacific and the practices of the sixteenth century navigator, the course made good can be determined with a fair degree of certainty.

There is little doubt that Drake's navigation to the Californias was based on a knowledge of the Manila-Acapulco trade route, so a brief examination of the latter is necessary for understanding his approach to the problem. By the time of Drake's appearance on the west coast of America, 15 years had elapsed since the Manila trade was opened and Sarmiento makes it clear that the winds and weather prevailing on the coast were then thoroughly known by practice and experience to those who

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1. See deposition of Juan Pascual, Nuttall, New Light on Drake, p. 377.
 2. See Nuño da Silva's second relation, Nuttall, New Light on Drake, p. 269



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navigate the route. (1) Wagner points out that after 1575 the voyages were numerous with sometimes three or four vessels departing Manila during each year for Acapulco.

Spanish navigation in the North Pacific was favored by the clockwise wind circulating around the elongated lobe of the semi-permanent high, whose long axis is located roughly on the 30th parallel in the middle of the Pacific Ocean. The area of highest pressure is usually located between the Hawaiian Islands and the California-Oregon Coast. Although the Spaniards did not know anything about the reason for this phenomenon, they were familiar with the relatively constant wind systems surrounding it.

Sailing west from Acapulco no later than April, the galleons rode the northeast trade winds on approximately the twelfth parallel nearly the entire voyage to the Philippines. The passage could be made easily in three months, always sailing before the wind. Eastbound from Manila, the galleons left the Philippines late in May or June to take advantage of the southwest monsoon winds which are generated when the North Pacific high contracts and moves north with the onset of summer in the northern latitudes. These winds, which were known to the Spaniards as the vendaval, carried them up to about 15° latitude in the Marianas and then the southeasterly winds on the western end of the high allowed them to work northeastward up to about the fortieth parallel where westerly winds were encountered in the northern sector of the high. William Lytle Schurz, describing the route in The Manila Galleon, states that many of the earlier galleons sailed to above the fortieth parallel, where the westerly winds were believed to be more dependable. Of particular interest is a statement by Antonio de Morga, published in 1609, that it was customary in his time for the galleons to go up to forty-two degrees, (2) a latitude that apparently had some significance in Drake's navigation.

Schurz writes that long before the galleons sighted the coast of North America they encountered signs of the land, or señas, on the surface of the sea. (3) The first of these were the jellyfish called aquas

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1. See narrative of Pedro Sarmiento, Nuttall, New Light on Drake, p. 84.
 2. From Antonio de Morga, Suceso de las islas Filipinas, Mexico, 1609. See William Lytle Schurz, The Manila Galleon, p. 277.
 3. Schurz, The Manila Galleon, pp. 238-239.

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malas, usually met with several hundred miles out; then a hundred leagues from the shore, the perrillos, or seals; next the bulb and root of the kelp plant called porras; and finally, close to shore, the balsas, which were large bunches of matted leaves and roots of kelp with sea otter, or lobillos, playing among them.

Schurz points out that in the early history of the line the usual procedure, after the westerlies were gained in the high latitudes, was to continue directly ahead until land was sighted before changing course for the run down to Acapulco. He writes; "A convenient and customary point for demarcation in early times was the headland of Cape Mendocino, as Espiritu Santo on Samar and San Lucas on Lower California were similar landmarks at other points on the route."⁽¹⁾ He cites Morga, who wrote, "Then the coast is discovered, and it is very high and clear land. Without losing sight of land, the ship coasts along it with NW, NNW, and N winds, which generally prevail on the coast, blowing by day toward the land and by night toward the sea again."

The above are essentially the facts that Drake would have gleaned from the Spanish pilots concerning navigation between the Philippines and New Spain. Several indications in World Encompassed and Famous Voyage tend to confirm the likelihood that there was a knowledge of this navigation on board the Golden Hind, one example of which is the discussion in World Encompassed concerning the prevailing winds on the Northwest Coast; "and that the North and Northwest winds are here constant in June and July,⁽²⁾ as the North wind alone is in August and September, we not onely found it by our owne experience, but were fully confirmed in the opinion thereof, by the continued obseruations of the Spaniards."⁽³⁾ In addition, Drake had charts of the galleon route taken from Colchero, the "China Pilot," and by these he would have been able to plot a course to the Northwest Coast. Sarmiento's prediction that Drake could be expected to go to Cape Mendocino in 43° North Latitude, where the prevailing westerlies would be in his favor to take him across the top of the continent to the vicinity of Labrador, should be recalled. That something of this sort was contemplated by Drake is evident by the fact that World Encompassed

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1. Schurz, The Manila Galleon, p. 239.
 2. These are the months during which Drake was on the Northwest Coast.
 3. See p.157, supra.

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specifically describes his navigation up to 42 degrees of latitude, when he was still two days from his enforced landfall.

Only three accounts give significant particulars of Drake's navigation to California, and the most detailed of these is World Encompassed. The next account giving considerable important detail is Famous Voyage apparently taken from certain of the notes used in compiling World Encompassed. As mentioned earlier, Hakluyt was apparently confused by both the intent of this phase of the voyage and the sequence of events, but he did attempt to make corrections in later issues of the account. However, in addition to these notes, he seems to have had some other information, perhaps first hand, which differs from World Encompassed. Finally, the two depositions of John Drake give the most important details required to retrace Drake's course. Although John Drake's statements were drawn from memory and he may not have disclosed all of the facts, his closeness to Drake gave him a unique opportunity to gain a first hand knowledge of the navigation that few others on board could have had access to. As far as his knowledge of navigation to California was concerned, he probably told the truth to the best of his recollection, and was factual for the most part with the exception of the highest latitude reached.

The pertinent facts from World Encompassed are as follows:

From Guatulco we departed the day following, viz., April 16, setting our course directly into the sea, whereon we sayled 500 leagues in longitude, to get a wind: and between that and June 3, 1400 leagues in all, till we came into 42 deg. of North Latitude, where in the night following we found such alteration of heate and nipping cold, that our men in general did gieuously complaine thereof, . . . for it came to that extremity in sayling but 2 deg. farther to the Northward in our course, that though sea-men lack not good stomaches, yet it seemed a question to many amongst vs, whether their hands should feed their mouthes, or rather keepe themselves within their couerts from the pinching cold that did benumme them. . . . The land in that part of America, bearing farther out into the West then we before imagined, we were neerer on it then wee were aware; . . . The 5 day of Iune, wee were forced by contrary windes to runne in with the shore, which we then first descried, and

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to cast anchor in a bad bay, the best roade we could for the present meete with, . . .

A very similar account by Hakluyt first appeared inserted in the 1589 edition of Principall Navigations as follows:

. . . We therefore set saile, and sailed in longitude 600. leagues at the least for a good winde, and thus much we sailed from the 16. of Aprill, till the 3. of June.

The 5. day of June, being in 42. degrees towards the pole Arctike, we found the aire so colde, that our men being greeuously pinched with the same, complained of the extremitie thereof, and the further we went, the more colde increased vpon vs. Whereupon we thought it best for that time to seeke the land, and did so, finding it not mountainous, but lowe plaine land, & clad, and couered ouer with snowe, so that we drewe backe againe without landing, . . .

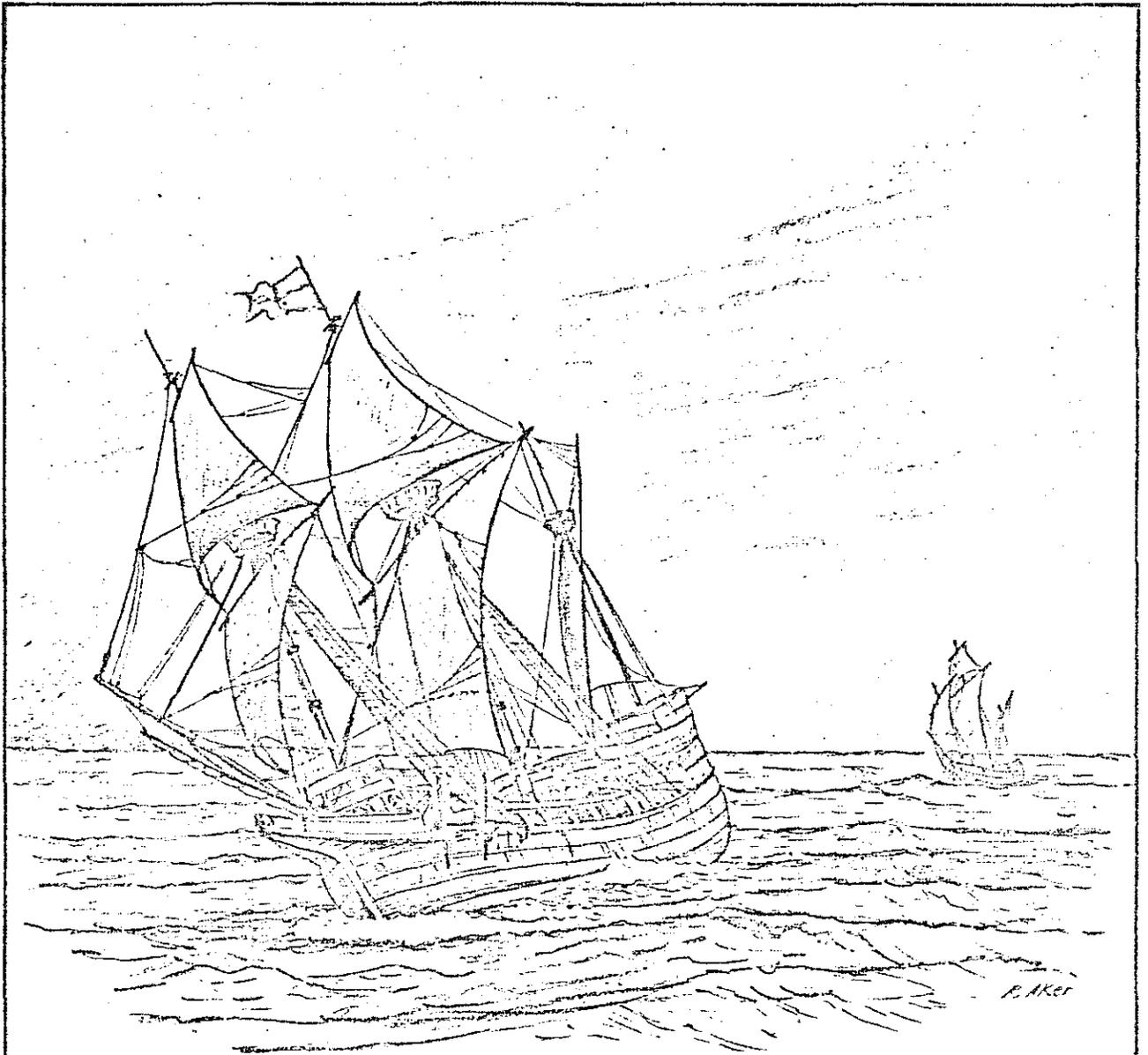
In the 1600 edition, "in longitude" was omitted; however, it must have soon been realized that the change made the distance for "thus much we sailed" from the 16th of April to the 3rd of June impossibly small; for in a third version appearing simultaneously in this edition of Principal Navigations, dealing with the California part alone, the distance was changed to 800 leagues.⁽¹⁾ Despite Hakluyt's apparent confusion, his initial statement should be given serious consideration, for if his original statement had been 500 leagues, as in World Encompassed, a later, presumably more authoritative source may have caused him to substitute "in longitude 600. leagues at the least."

John Drake, in his first deposition, stated that Drake sailed always to the northwest and north-northeast, and added in his second deposition that he voyaged 1000 leagues until he reached 44^o, always on a bowline, where the wind changed and he went to the Californias.⁽²⁾ The statement of sailing always on a bowline indicates that Drake was always sailing close to the wind, or close-hauled, to make northing.

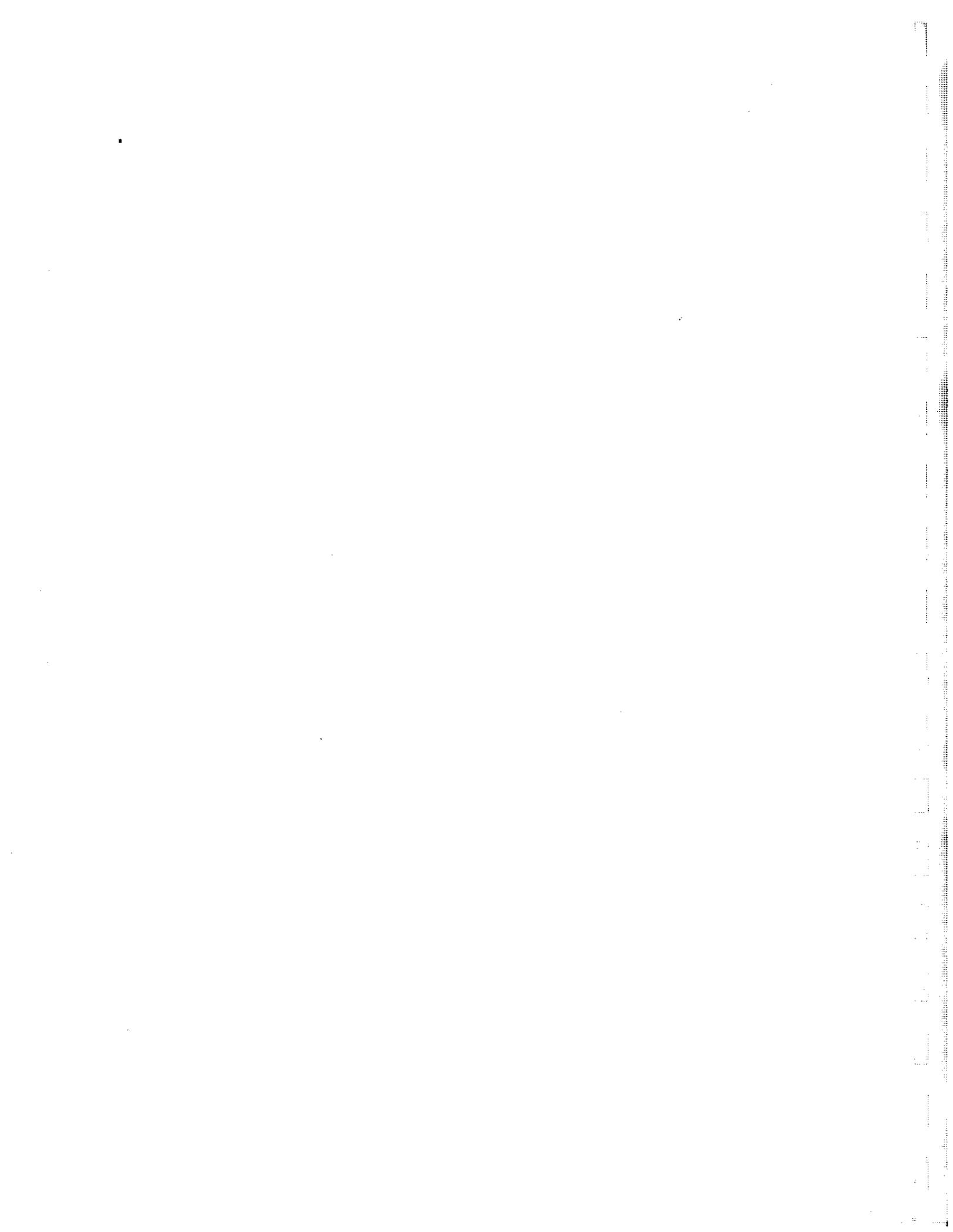
1. See p. 127, supra.

2. See pp. 88-92, supra.

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THE "GOLDEN HIND" IN THE NORTH PACIFIC,
MAKING NORTHING CLOSE-HAULED, SAILING ON A BOWLINE.



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From the referenced accounts, then, we have three different distances in sailing to the Northwest Coast and two great disparities in the difference of longitude. (1) We are given at least one useful course by John Drake, or what is more likely, the direction to be made good to landfall; north-northeast. His northwest course is nearly impossible to make good from Guatulco to the Northwest Coast, however, and it must be assumed that this is merely the general direction to Drake's destination rather than a course sailed.

When considering the recorded distances, it must be remembered that the English league of the sixteenth century equalled only three 5000-foot English miles, or 82 percent of the modern league of three 6080-foot nautical miles, of which 20 equal one degree of arc on the earth's circumference at the equator, or one degree of latitude. In the sixteenth century 20 English leagues were also taken to be equal to a degree of latitude, and consequently, serious navigation errors were bound to result because of this faulty measure. Distances were reckoned according to the vessel's logged, or estimated, sailing speed, and the logged, or estimated leagues, when plotted on a chart, were bound to run ahead of true position. Conversely, leagues on a course picked off the chart were bound to be fewer in number than would be actually made on that course. Many navigators were aware that the league was too small in proportion to the length of a degree, but they preferred to keep it so to avoid the danger of making an unexpected landfall by being ahead of their reckoning, particularly as they had no way of checking their position when sailing east or west. In sailing north or south, they could check position or distance by observed latitudes. Any difference between the estimated and actual distance was credited to winds and currents, leeway, or compass error. (2)

The statements of sailing 500 or 600 leagues in longitude to get a wind raise a question not only as to what wind was meant, but leave some doubt as to whether the distance sailed was westward along a parallel

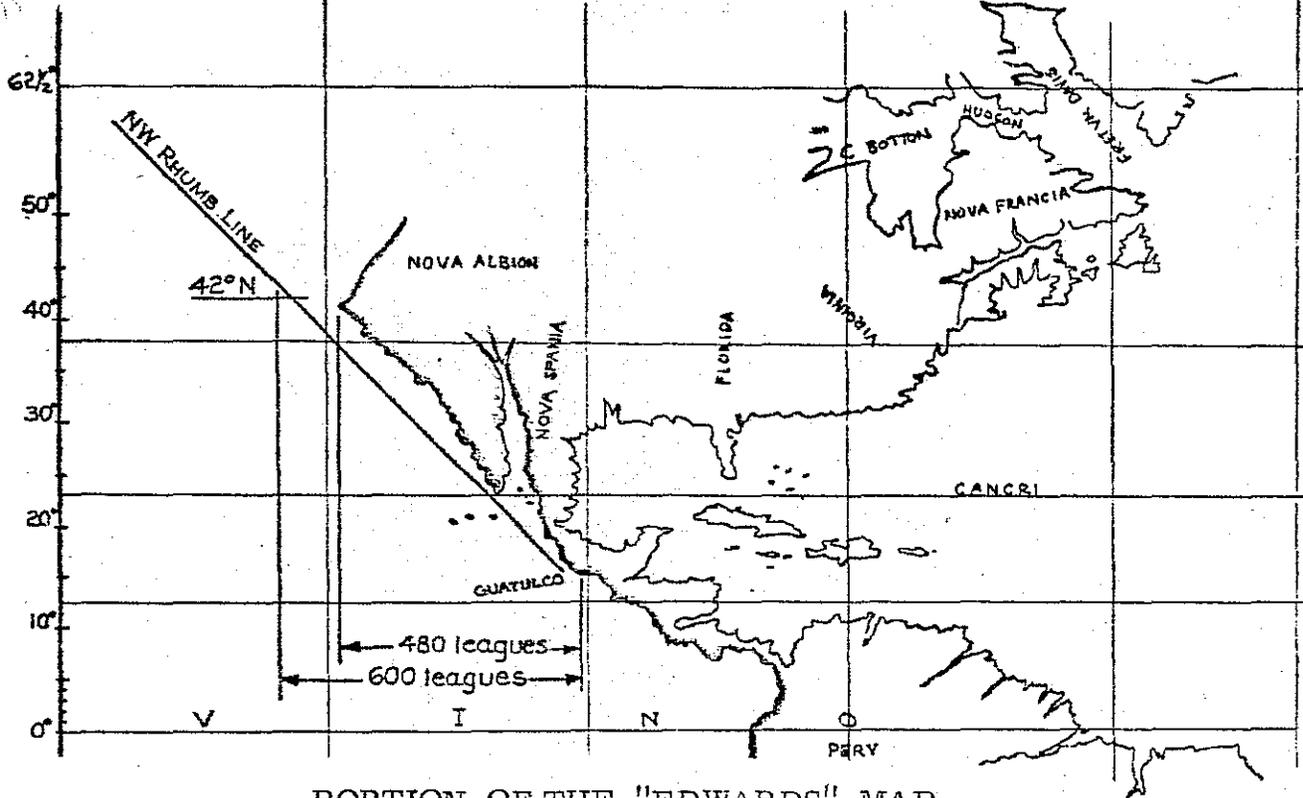
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1. In modern navigation, linear distance measured on a parallel of latitude is referred to as departure to distinguish it from the angular measure referred to as longitude.
 2. For description of the length of a degree in the sixteenth century, see D. W. Waters, The Art of Navigation, pp. 64-65.

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from Guatulco, whether it meant the farthest distance made good in longitude on the track, or if it was the difference in longitude at 42° North Latitude. If we accept the wind as being the Northeast Trades, inspection of a modern pilot chart for April and May reveals that these would have been reached at a far less distance from Guatulco than either figure. John Drake's statement of always sailing on a bowline indicates that Drake was taking every opportunity to get to the northwest as quickly as possible and would not have intentionally run that distance along a parallel as World Encompassed and Famous Voyage might seem to imply. The most logical explanation of the statement is that the expected wind was the prevailing westerlies which the Manila galleons found in the middle latitudes of the North Pacific, and because of the emphasis on 42° in the accounts, it would seem that the "good winde" was expected to be found at that height. Drake needed the westerlies to take him eastward back to the coast and, hopefully, through the Northwest Passage he expected to find above Cape Mendocino.

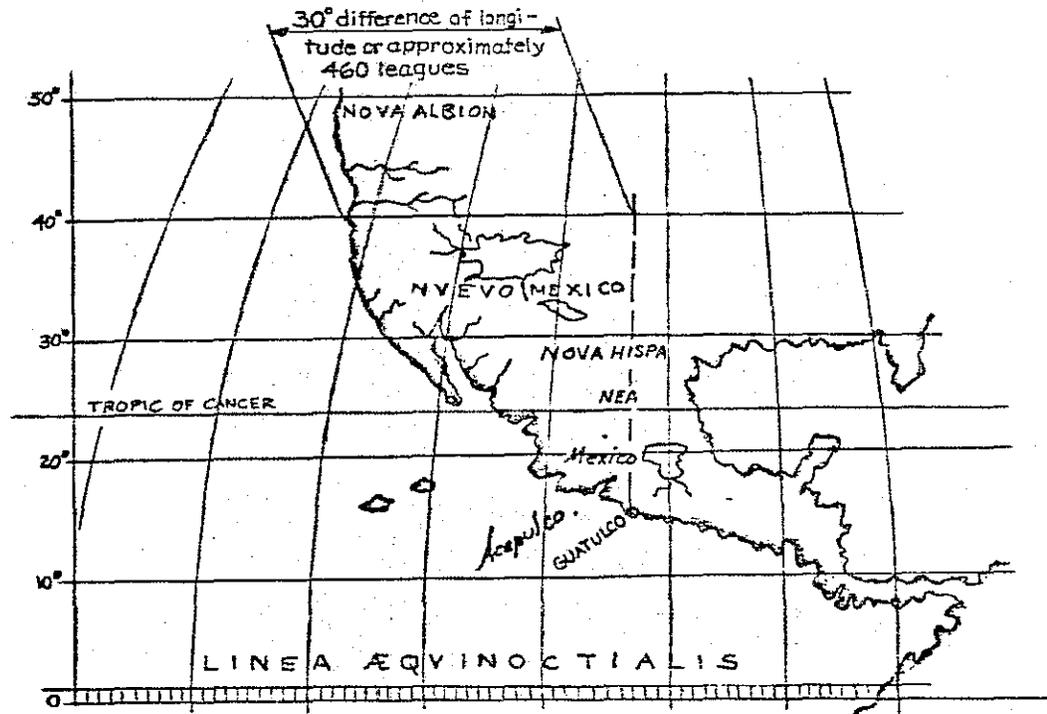
Reconstruction of the probable track shows that neither figure of 500 or 600 leagues is sufficient to reach the westernmost position for any advantage to be taken of the Northeast Trades to make northing. Because of the predominance of adverse winds farther east, it is improbable that Drake could have sailed as far north in the number of days he did had he not been in the Trades. The statements of distances made good in longitude to get a wind therefore seem to refer clearly to the 42nd parallel.

The great difference between the two distances in longitude is curious, however, and unless it is the result of typographical error, it must be assumed that there was some valid reason for the two statements. The 500 leagues figure seems related to something anticipated, and the 600 league figure to what Drake found by navigation. We know that he captured Spanish sea-charts for the Manila Galleon route in the North Pacific, and it is quite likely that these defined the west coast of North America to the best knowledge available. Drake's destination and route to the northwest would logically be planned according to what was shown on these charts, and because of his practice of holding councils before all major decisions, the details were very likely common knowledge on board the Golden Hind. Some inkling that this was the case is contained in the statement in World Encompassed concerning Drake's landfall on the Northwest Coast: "The land in that part of America, bearing farther out into the West than we



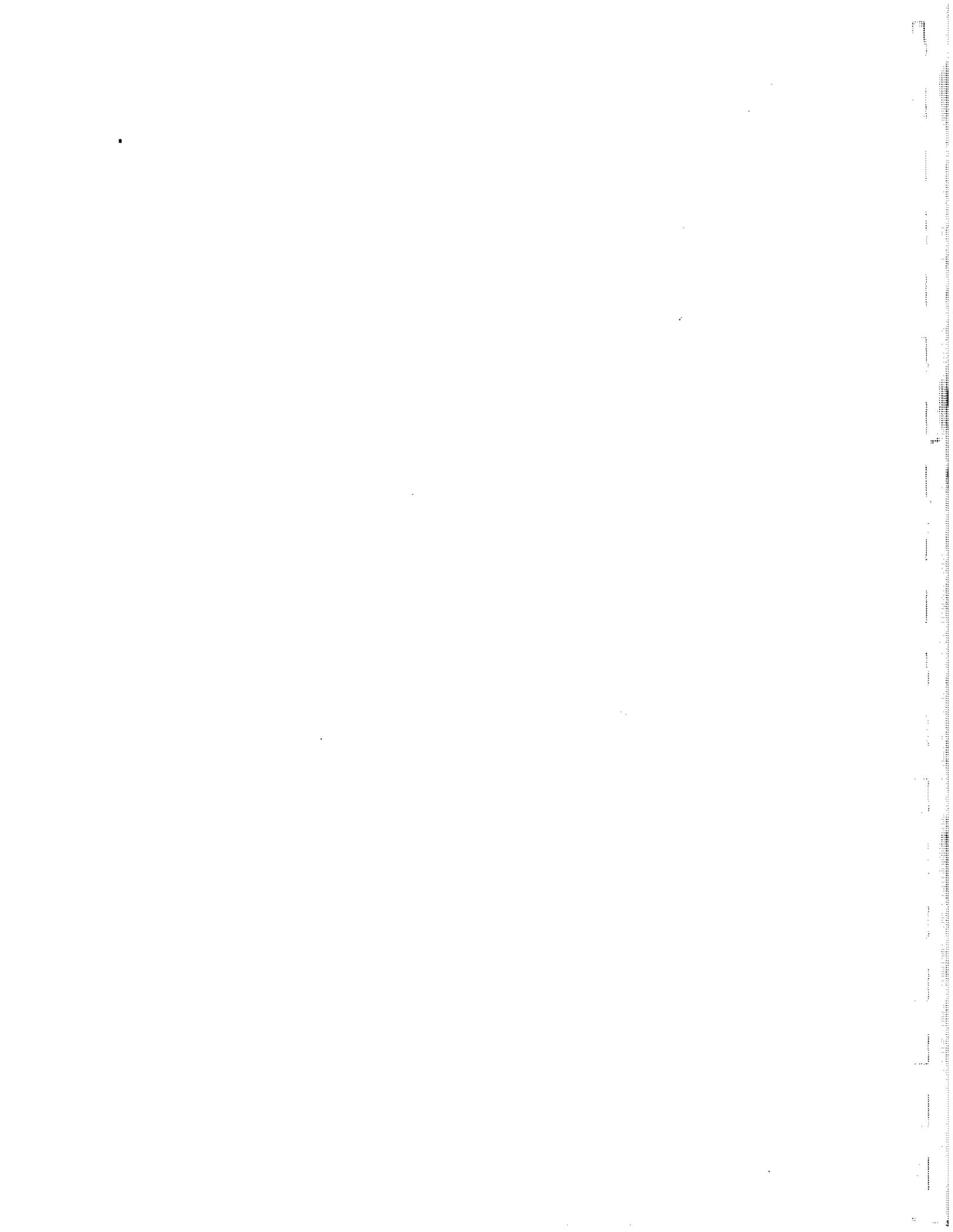
PORTION OF THE "EDWARDS" MAP

This early 17th century manuscript map of unknown origin illustrates the probable navigation to the northwest coast of America presented to Drake by the Spanish charts seized by him. The map is drawn on a plane chart projection and probably based on an older map. Reproduced by H. R. Wagner, Cartography of the Northwest Coast of America.



PORTION OF HAKLUYT'S "PETER MARTYR" MAP OF 1587

This map, believed to be of Spanish origin, illustrates the difference of longitude from Mexico to the Northwest Coast often found on early Spanish maps, or maps derived from Spanish sources.



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before imagined, we were nearer on it then we were aware." (1)

No Spanish sea chart of the Manila-Acapulco trade route has come to light to verify the possibility that 500 leagues could have been derived from such a source, but two contemporary maps strongly support this view. One of these is Hakluyt's "Peter Martyr" map published in Paris in 1587, which features the North and South American continents and the Pacific Ocean to the Orient. Wagner described this map as being of outstanding interest, and he cited the fact that the prime meridian passes through Toledo as an almost certain indication that the original was Spanish. (2) On this map, the difference of longitude in English leagues between Guatulco and the Northwest Coast at 42° is very nearly 500. The other map, published about 1580 by Lopez de Velasco, (3) shows the Manila Galleon route across the Pacific, and though rather crudely drawn, it also shows a difference of longitude between the approximate location of Guatulco and the Northwest Coast at 42° that agrees closely with the "Peter Martyr" map.

To test the possibility that Spanish pilots might have charted the west coast of North America by a method that would produce a difference of longitude of 500 English leagues between the coast at 42° and Guatulco, a coastwise track was plotted between these places on a plane chart similar to those used in the sixteenth century. Unlike the Mercator chart, a plane chart does not allow for the curvature of the earth's surface by increasing the length of a degree of latitude as the poles are approached. The degrees of latitude are shown of equal length at all latitudes. Courses and latitudes can be plotted on this chart with reasonable accuracy, but distances shown are in error, a fact not understood, or given much concern, by the majority of sixteenth century pilots and navigators.

The track was first plotted on a modern Mercator chart of the west coast of North and Central America with courses laid down approximately as they would have been sailed by Spanish pilots coming from the Philippines, coasting from point to point; that is, working down from 42°. These courses were then transferred to the plane chart, just as the pilots would

1. See p. 155, supra.

2. See H. R. Wagner, Sir Francis Drake's Voyage, p. 407.

3. See R. A. Skelton, Explorer's Maps, p. 164.

have plotted their track by courses and latitudes, with all changes of courses plotted in the same latitude as on the Mercator chart. In sailing oblique courses, such as these, very little account needed to be taken of the distance sailed by log or estimate. Positions were plotted according to the course estimated to have been made good and its intersection with a latitude obtained by observation of sun or stars,⁽¹⁾ As a consequence, there would have been no error in the ship's position due to the difference between the faulty length of the logged league and the true length of a degree of latitude. As the voyage of the Manila galleons down the West Coast in the late fall was favored by fair winds predominately from the north and northwest, and currents which more or less parallel the coast, errors due to current set and wind drift would have little effect on the east-west position, or longitude.

Several interesting facts are shown by the reconstructed plane chart. First, plotting the coastline reveals that the difference in longitude between Cape Mendocino and Guatulco is almost exactly 500 English leagues of 20 to a degree of latitude as measured by the scale of the chart. This distance is not correct because of the inaccuracy of this type of projection, but it is the inaccurate result of the sixteenth century that we seek to verify. On a modern chart this distance is about 432 leagues.

Second, the northwest course, or rhumb, mentioned by John Drake, when plotted directly from Guatulco, is found to intersect the 42nd parallel about 30 leagues off the Northwest Coast, thus giving fair evidence that Drake's intention was to parallel the northwest rhumb to a point some 500 leagues west of Guatulco.

Finally, evidence that Hakluyt considered the 600-league figure to apply at the 42nd parallel is shown by the fact that the direct distance between that position and Guatulco on the plane chart is almost exactly 800 leagues, the distance he gave in his California account.

Drake's route into the North Pacific can only be approximated as to courses likely to have been made good. The actual sailing track was most

1. See Martin Corte's description of plotting the ship's position in the sixteenth century. D. W. Waters, The Art of Navigation, pp. 75-76.

"...having arrived at 43°, that is, Cape Mendocino, these winds cease [southwest] and the west winds blow, with which he [Drake] would continue sailing with the wind astern towards the east to the land of Labrador which is in the neighborhood of England [i.e., the same latitude]."

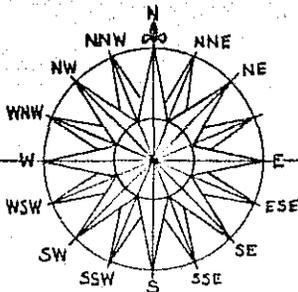
Pedro Sarmiento de Gamboa, c.1580

LANDFALL: "The land in that part of America bearing out into the west than we before imagined, we were nearer on it then we were aware." *The World Encompassed*

50°
40°
30°
20°
10°

44° N Latitude, June 5
42° N Latitude, June 3
Point of arrival at 42° N given by Hakluyt in *The Famous Voyage*

REGION OF PREVAILING WESTERLY WINDS



REGION OF PREVAILING NORTHEAST TRADE WINDS

John Drake stated in his first deposition that from Guatulco they sailed always to the northwest and north-northeast. In his second deposition he stated that they sailed a thousand leagues, always on a bowline, to 44°, then the wind changed and they made for California.

The total distance from Guatulco to 44° N on the track shown on this chart equals 1062 leagues. The direct distance equals 800 leagues.

RECONSTRUCTION OF CONTEMPORARY STATEMENTS RELATING TO DRAKE'S COURSE IN THE NORTH PACIFIC

Expected trend of the coast leading to the Northwest Passage.

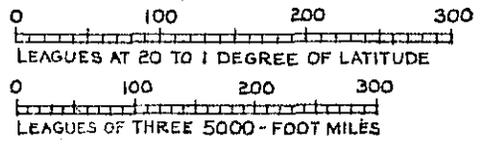
Probable intended point of arrival from Guatulco to 42° N latitude as determined by Spanish charts.

CAPE MENDOCINO

True location of coast corrected for longitude

"Sailed 800 leagues at the least for a good wind" (Drake's California account)

ACAPULCO



"We sayled 500 leagues in longitude to get a wind" *The World Encompassed*

"We ... sayled in longitude 600 leagues at the least for a good wind" *The Famous Voyage*

GUATULCO
Departure
April 16, 1579

This reconstruction is plotted on a plane chart, the basic chart projection used by the sixteenth century navigators. The coastline shown is plotted from true bearings and latitudes in the manner that it would have been charted by Spanish pilots coasting from Cape Mendocino to Acapulco, and it was probably shown roughly similar on the Spanish charts seized by Drake.

Bearings and courses read true on the plane chart, but because the projection makes no compensation for the convergence of the meridians towards the poles, distances on the chart are incorrect except due north and south or along the equator.

Further error in distances resulted because the true length of a degree of latitude was unknown. The English navigator reckoned 20 leagues of three 5000-foot miles to a degree. His league was therefore too short by 3,240 feet. Logged distances sailed could not be accurately plotted nor would charted distances represent the distance sailed.



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certainly a very irregular series of traverses sailed according to the direction of the winds encountered from day to day. If we accept John Drake's testimony, the track consisted of two basic courses, which were one to the northwest and the other to the north-northeast. Both the John Drake and World Encompassed distances indicate the track made a large loop into the Pacific. However, John Drake's distance is not enough to get advantage of the Northeast Trades which would have been needed to get as far north in the number of days given in the accounts. Unless he was greatly in error, it appears more likely that he estimated the distance made good, disregarding the traverses sailed. He was in good position to know the charted results of the navigation far better than most persons on board. On the other hand, the "1400 leagues in all" given in World Encompassed is more than necessary to get advantage of the Trades and is hard to link with John Drake's final north-northeast course. More than likely, it is just what it implies, the total distance of all the traverses sailed. The author of the notes used in this section of the account could easily have obtained this data from several persons on board whose duty it was to record the traverses.

It was found that the most feasible method of plotting the track taken by Drake was to work from Guatulco to the eastern limit of the Northeast Trades and back from the landfall at 44° North to the northern limits of the Trades, then plot a close hauled-track between the two extremities within the Trades. The U. S. Hydrographic Office Pilot Charts for April, May and June were used to determine courses compatible with average wind conditions.

Leaving Guatulco, Drake's course made good would have been mostly west until he reached the region of the Northeast Trades because of the large percentage of adverse winds from the north and northwest. Once he made the eastern limit of the Trades, some 230 leagues west of Guatulco, he would have made good progress to the northward with a predominance of wind from north to northeast, allowing courses varying from north-northwest to west-northwest. The course made good in the Trades would have roughly paralleled the edge until he ran out of them^{at} about 30° or 32° North and 132° West. North of the Trades, winds are variable until westerlies predominate at about latitude 37° , and it is only logical to assume a mean course of north-northeast as given by John Drake. Between June 3rd and June 5th, somewhat to the north of 42° , the indications are that a strong northwesterly wind was encountered, possibly reaching

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moderate gale force in squalls, and in this situation a more or less northeasterly course would have been enforced. On the 5th, probably no more than half a day's sail was required to reach land.

From this reconstruction of the track, 1000 leagues are found to be nearly equal to the distance direct from Guatulco to the point where Drake ran out of the Trades and from thence to landfall at 44° North. This is a distance that would have been shown as the distance made good on a plane chart. To compare the 1400 league figure, it should first be converted from the three English mile units to modern leagues, or nautical miles, and then compared with the track as it plots on a Mercator chart. The converted distance thus sailed from Guatulco to the 42nd parallel works out to be 1,152 modern leagues, or 3,456 nautical miles, as against 1002 leagues, or 3006 nautical miles made good by reconstruction of the track. The distance made good is thus about 87 percent of the distance sailed.

On the basis of total distance, Golden Hind sailed an average of 72.7 nautical miles per day. In view of the probability that sail was reduced at night and that the ship was beating against adverse winds, this was a respectable average for a small sailing ship, particularly if it is borne in mind that the passage was limited by the capabilities of the much smaller, 15-ton consort.

Now the mystery why 500 leagues in longitude changed to more than 600 clearly emerges as the result of erroneous reckoning of the English league. Had Drake navigated north by plotting courses and latitudes alone, he would probably have made his destination about 500 leagues difference of longitude west of Guatulco, but reconstruction of the track shows a major percentage of courses sailed west rather than north. In sailing near east or west, longitude was necessarily reckoned from the course and distance logged, or estimated, as even small errors in observed latitude make a large error in longitude when it is used with the course to plot the position. The sixteenth century navigator plotted the small, 15,000 foot leagues on his chart as though they were 20 leagues to a degree of latitude, with the result that his plotted distance exceeded his true distance by four leagues for every 20 so plotted.

After leaving Guatulco, Drake's courses would have been mostly west until well into the Trades, and in that distance alone, he would have

DRAKE'S COURSE IN THE NORTH PACIFIC APRIL 16 - JUNE 5, 1579

The track shown is reconstructed from statements given by John Drake in his depositions and descriptions from *The Famous Voyage* and *The World Encompassed*. The track represents only an approximation of courses made good in the general direction of northwest and north-northeast mentioned by John Drake. His statement that they were always on a bowline, or close-hauled, implies a determined effort to work northward in those directions.

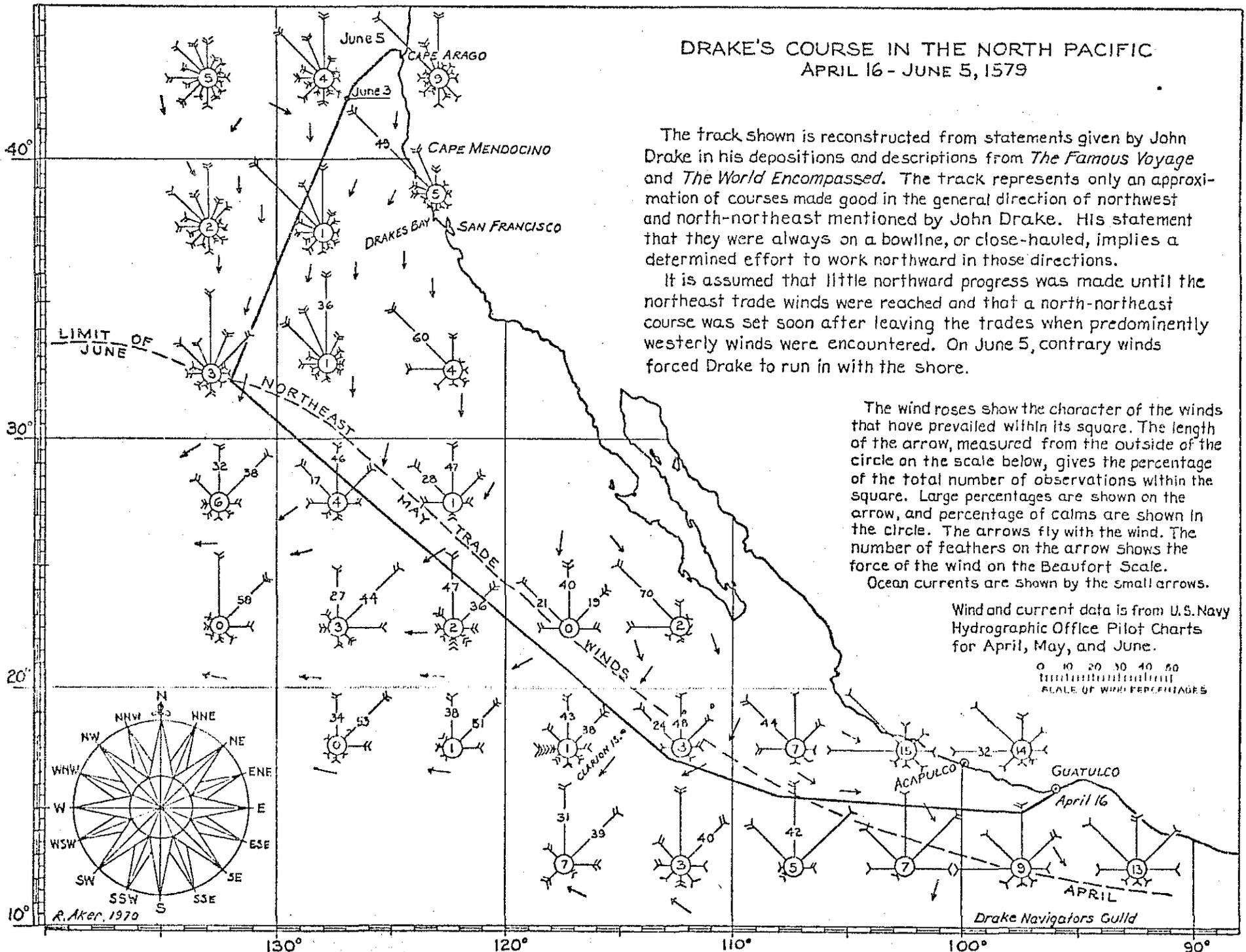
It is assumed that little northward progress was made until the northeast trade winds were reached and that a north-northeast course was set soon after leaving the trades when predominantly westerly winds were encountered. On June 5, contrary winds forced Drake to run in with the shore.

The wind roses show the character of the winds that have prevailed within its square. The length of the arrow, measured from the outside of the circle on the scale below, gives the percentage of the total number of observations within the square. Large percentages are shown on the arrow, and percentage of calms are shown in the circle. The arrows fly with the wind. The number of feathers on the arrow shows the force of the wind on the Beaufort Scale.

Ocean currents are shown by the small arrows.

Wind and current data is from U.S. Navy Hydrographic Office Pilot Charts for April, May, and June.

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SCALE OF WIND PERCENTAGES



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plotted as many as 66 leagues in excess. Within the Trades, northerly winds are encountered 45 percent of the time, according to the Pilot Chart, which compel courses again close to west with the result that another 30 or more leagues in excess could have accumulated. North of the Trades, the course was mostly nearer north than east, and positions on this track would have been plotted by course and latitude so that there would have been little effect to offset previous errors.

Presumably, when Drake found himself to be more than 600 leagues west of Guatulco on the 42nd parallel by his reckoning, he assumed that he was well offshore, when in fact, as it turned out, he was relatively close. However, instead of concluding that there might have been an error in navigation, he presumed that the coast lay farther west than previously believed or as shown on his Spanish sea charts. It is interesting to note that 600 leagues converted to difference of longitude in degrees gives about 40° , a value reflected in several maps of English origin published after Drake's voyage. (1)

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1. For practical purposes, difference of longitude in minutes of arc along a parallel of latitude is equal to the secant of the latitude multiplied by the departure in nautical miles. In the sixteenth century, tables and diagrams were available to the mariner in navigation manuals for making this conversion, as for example: William Bourne, A Regiment for The Sea, E. G. R. Taylor, Ed., p. 240-242. Thus, Bourne, in his 1574 edition, gives "The pooles .42. degrees rayسد latitude .44 miles goeth to one degree of longitude," and thereby 44 into 600 leagues, or 1,800 miles, gives 40.91 degrees difference of longitude (calculated value: 40.37 degrees).

The French Drake Map shows a difference of longitude between the position of Guatulco and the Northwest Coast of about 44° ; J. Hondius's Typus Orbis Terrarum, 1589, shows about 40° ; Molyneux's terrestrial globe shows about 40° ; Edward Wright's map of North and South America of 1600 shows 42° or 43° . There is indication on Hondius's and Wright's maps that they were based on Spanish sources that gave a considerably lesser difference of longitude.

CHAPTER V

THE LANDFALL

By June 3rd Drake had reached the 42nd parallel, the region of the prevailing westerlies and the height of Cape Mendocino, where the Northwest Coast could have been expected to turn toward the east. By strict interpretation of John Drake's first deposition, the Golden Hind would have been sailing a north-northeast course, and it seems probable that Drake considered himself to be well out to sea, as indicated in the accounts by mention of his surprise at finding himself so close to land. There was no intention, apparently, to close with the land at this time, and to have tried would have invited the possibility of losing advantage of the wind and the opportunity to make northing, and further, invite the risk of being set on a lee shore. Thus on gaining the required northing well out at sea, Drake may have planned on running east to the vicinity of Frobisher's passage on the assumption, based on the belief of contemporary geographers, that an open sea would be found above the North American continent.

The weather in this area of the North Pacific at this time of year is normally fair on the eastern side of the North Pacific High. Days are bright and sunny, the air comfortably warm, and the sea a sparkling, crystal clear indigo blue. According to the Pilot Chart, north of 35° winds are mostly westerly, shifting only under the influence of passing weather disturbances. This fair sailing was destined to change quickly, however.

World Encompassed records that during the night of June 3rd "... we found such alteration of heate, into extreme and nipping cold, that our men in generall did grieuously complaine thereof, some of them feeling their healths much impaired thereby; neither was it that this chanced in the night alone, but the day following carried with it not onely the markes, but the stings and force of the night going before, to the great admiration of vs all; for besides that the pinching and biting aire was nothing altered, the very roapes of our ship were stiffe, and the raime which fell was an vnnatural congealed and frozen substance, so that we seemed rather to be in the frozen Zone then any way so neere vnto the sun, or these hotter climates."

The author of the foregoing probably Francis Fletcher, elaborates on the cold, unpleasant, state of the weather with considerable detail and feeling through several pages of the account. Some modern writers have been prone to accuse him of exaggeration, but his descriptions are valid

THE LANDFALL

and describe conditions that are actually met with on the Northwest Coast in the month of June. Clearly, this abrupt change of weather was not a passing whim of nature, as he said "Neither did this happen for the time onely, or by some sudden accident, but rather seemes indeed to proceed from some ordinary cause, against the which the heate of the sun preuailes not." To make it clear that this was not the result of sailing into latitudes where colder climate was to be expected, he added that the cold "came to that extremity" in sailing but two degrees farther north, and that there was a question among many whether they should expose their hands to feed themselves or keep them under cover.

Two causes brought about this sudden transition. One most certainly was a weather front encountered in the night of June 3rd; a cold air mass from a weak storm front moving down from the Aleutians, typical of many that frequently make themselves felt in Oregon and Washington, and even as far south as Northern California, early in June. The front normally brings an abrupt shift of wind and change of weather with strong to gale force northwesterly winds accompanied by squalls of rain and occasionally hail. A light deposit of snow is sometimes left at high elevations. The "unnatural congealed and frozen substance" mentioned can be identified as hail or sleet which probably collected to form slushy accumulations in the ship's waterways during the night. The next day, the sun doubtlessly showed through the broken clouds that are a characteristic of this type front, but it brought no warmth as it had the day before. The effect of the sudden temperature change was likely all the more felt by the fact that in the days preceding, Drake had been sailing in the balmy, warm sector of this disturbance.

That the change of weather was not an abnormal phenomenon, but one that seemed to proceed from "some ordinary cause," was certainly well stated. The plot of Drake's track shows that at almost the same time the weather front was encountered, he sailed into the California Current, a cold current paralleling the coast from the State of Washington to as far south as the mouth of the Gulf of California, and extending 200 to 300 miles offshore. This current is the prime source of the almost continuous fog and cold weather that prevails inshore along the West Coast in the summer months and which was to plague Drake and his companions for the whole of their stay in California.

There is a basis of fact in the statement in World Encompassed

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that on closing with the land "the neerer still wee came vnto it, the more extremitie of cold did sease vpon vs." Generally, as one approaches the coast in summer, the coldest air temperature can be expected to be found closest to the land, where the California Current is also stronger than at sea. Prevailing northerly and northwesterly winds on the coast generate the current, but at the same time these and coriolis effect cause the surface water to move away from the land with the result that it is replaced by an upwelling of cold water alongshore from the ocean's depths. The relatively warm and moist maritime air of the North Pacific, moving eastward in summer with the prevailing winds, is chilled and condensed into fog as it passes over the cold surface water near the coast.

The surprise at finding that in a few days the ship's tackling and rigging had "growne to that stiffnesse, that what 3 men afore were able to performe, now 6 men, with their best strength and vttermost endea-
vour, were hardly able to accomplish" is explainable by the fact that it had dried out in the tropics and continued in that state through the North Pacific High until it was quickly saturated by the rain and sleet and damp air of the California Current, with the result that the fibres of the hemp cordage swelled and stiffened the ropes very quickly without allowing any intermediate time for breaking them in to their new dimensions; it should not be misconstrued that the rigging was iced and frozen, as some have misinterpreted.

On June 5th, contrary winds forced Drake to run in with the shore, to "seek the land" as Hakluyt put it, which was then first seen to be nearer than had been expected. The wind had undoubtedly shifted by now to northerly, probably bringing colder air and the violent gusts of wind referred to in World Encompassed, against which he could not make headway.

It is not entirely clear from the accounts if the course was changed before or after sighting land, but in any case Drake was not far off it at this time. Inasmuch as the sea-dating changed at noon, it is highly likely that land was sighted in the afternoon, and thus was no more than a few hours sailing away; probably less than 30 miles. ⁽¹⁾ The señas usually

1. It is more probable that land was sighted in the afternoon of the 5th

THE LANDFALL

looked for by the Spaniards were evidently not seen, unless Drake had no knowledge of them, but the bad weather may have been to blame. With a north wind, Drake had the option of standing out to sea, heaving-to, or seeking the land and taking his chances on finding a haven where he could hold his position on the coast. On the open sea he would have been driven back far to the south if the weather persisted.

Haven was found on the same day, according to World Encompassed:
wee . . . cast anchor in a bad bay, the best roade we
could for the present meete with, where wee were not without
some danger by reason of the many gusts and flaws that beate
vpon vs, which if they ceased and were still at any time, im-
mediately vpon their intermission there followed most uile,
thicke, and stinking fogges, against which the sea preuailed
nothing, till the gusts of wind againe remoued them, which
brought with them such extremity and violence when they
came, that there was no dealing or resisting against them.

Few authorities have attempted to localize the first land sighted by Drake and the "bad bay" in which he sought temporary refuge. Davidson was positive that he had not gone farther north than 43° and had anchored in Chetko Cove in Southern Oregon, latitude $42^{\circ} 03'$, that being the first available anchorage that could have given some shelter from the north-westerly winds and yet be characterized as a bad bay. (1) In later years,

(cont'd.) rather than the next morning of that date, the dates in World Encompassed for the a. m. usually being followed by "in the morn-
ing." Also, considering that from June 3rd, Drake made two more degrees of latitude in his northing, the distance on a NNE course being 130 miles, or an average of 65 miles per day, is compatible with his daily average of about 73 miles to 42° North. The accounts do not indicate that adverse winds or sea might have greatly affected that average until the wind became contrary on the 5th. Thus, from noon, there would have been about 7-1/2 hours sailing time to the end of twilight, and on running in under duress of weather, the speed of the ships could not have been exceeded four or five knots before anchorage was found.

1. See Davidson, Francis Drake on the Northwest Coast of America, pp. 82-98. Davidson relies on Hakluyt's statement in the 1600

THE LANDFALL

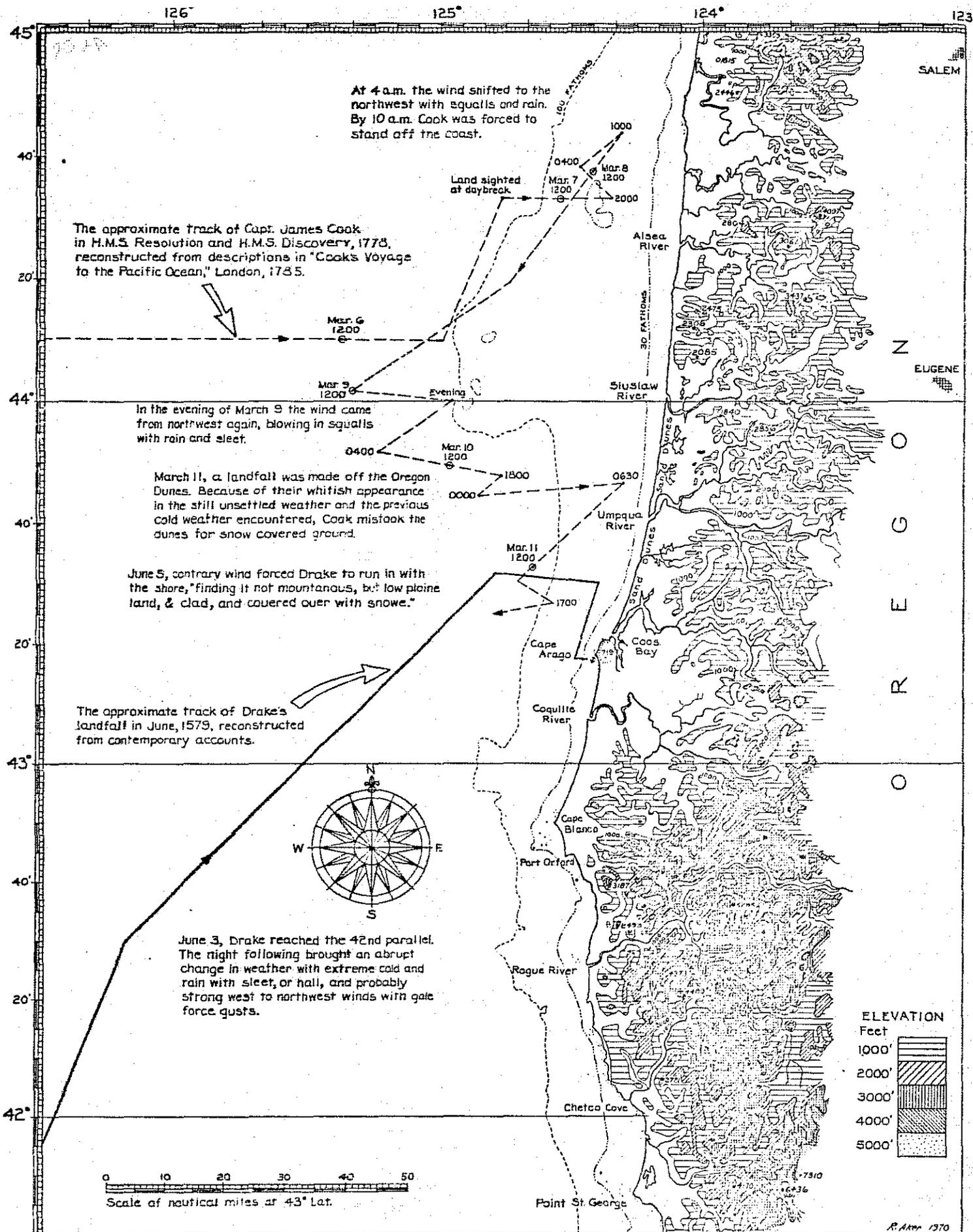
R. P. Bishop, in "Drake's Course in the North Pacific," made a study of Drake's track to show that he had first sighted Vancouver Island in British Columbia and had found his anchorage on its shore before turning south, June 10. He bases his argument on the 48° latitude recorded in the accounts and assumes that landfall was not made on the 5th, but some days later. (1) Neither location, however, completely satisfies the contemporary description.

In Chapter III on The Latitude it was noted that 44° was most favored as that in which the coast was first sighted and anchor cast. John Drake clearly stated the case: "Then they left and sailed... until they reached forty-four degrees when the wind changed and he went to the Californias." Because of weather, this latitude may well be a dead-reckoning position, but good observations for latitude could have been obtained as high as 42°. A reasonable margin of error consistent with observations made at sea should be credited to this figure.

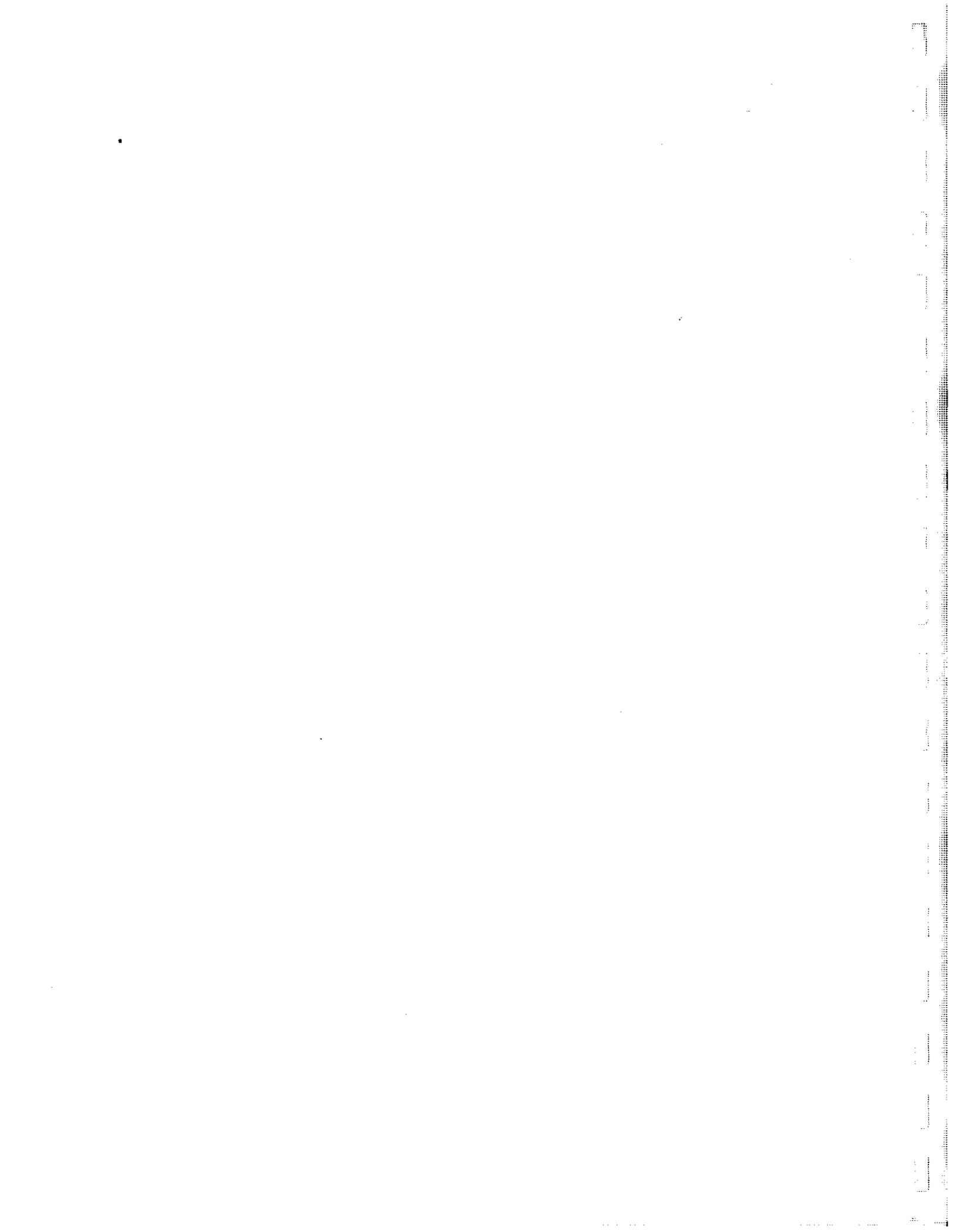
Surprisingly good descriptions of the landfall are given in the accounts, but in both World Encompassed and Famous Voyage they suffered from editing and were not recognized by later readers for what they were.

(cont'd.) edition of Famous Voyage, "the 5. day of June, being in 43. degrees," and supports this with reference to the highest limit of Drake's track shown on Hondius's Broadside Map. In his opinion it was a physical impossibility for Drake to reach 44° from his position at noon of June 3rd because of a heavy northwester and a large swell, which he interprets as arising the following day, though none of the accounts make any reference at this point to unusual stress from wind or sea, other than being forced to run in with the shore by contrary wind on the 5th.

1. R. P. Bishop, "Drake's Course in the North Pacific," British Columbia Historical Quarterly, July, 1939. The course conceived by Bishop assumes that Drake had sailed 500 leagues west from Guatulco before heading north in the Trades, and thus, on June 5, the date given in the accounts for seeking the land, he was far out at sea in 44° latitude. He concludes that the actual date of sighting land is not given and thereby allows five days to reach Vancouver Island against the prevailing northwest winds. World Encompassed clearly states, however, that land was first sighted on the 5th, and in addition, Vancouver



LANDFALLS OF DRAKE AND COOK ON THE OREGON COAST



THE LANDFALL

Camden, for example, is very brief and appears unbelievable. What Drake saw is dramatically revealed by the observations of another stranger to this region, Captain James Cook, who came to the Northwest Coast in 1778 on his third and last voyage in search of the Northwest Passage. Cook sailed from the Hawaiian Islands in two ships, Resolution and Discovery, and stood in for the coast at 44° . Although he reached this region about three months earlier in the year than Drake, his account bears comparison with World Encompassed.

On the 1st of March, our latitude being now $44^{\circ} 49'$ North, and our longitude 228° East, ⁽¹⁾ we had one calm day. This was succeeded by a wind from the North, with which I stood to the East close hauled, in order to make the land. According to the charts, it ought not to have been far from us. It was remarkable, that we should still carry with us such moderate and mild weather, so far to the Northward, and so near the coast of an extensive continent, at this time of the year. The present season either must be uncommon for its mildness, or we can assign no reason, why Sir Francis Drake should have met with such severe cold, about this latitude, in the month of June. Viscaino, indeed, who was near the same place, in the depth of winter, says little of the cold, and speaks of a ridge of snowy mountains, somewhere on the coast, as a thing rather remarkable.

The weather continued fair, and on the 6th, at noon Cook was in $44^{\circ} 10'$. In approximately that height, "... at day-break, the next morning, the long-looked for coast of New Albion was seen, extending from North East to South East, distant ten or twelve leagues."

At the time land was sighted, Cook was 30 to 36 miles offshore, and light airs and calms prevented his closing with the coast. That night he stood off the land with a light breeze from the southwest "under an easy

(cont'd.) Island does not accord with the statement in Famous Voyage that the land then sighted was "not mountainous, but lowe plaine land."

1. Equivalent to 132° West Longitude and about 360 miles from the coast. Ed.

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sail, waiting for daylight to range along the coast." At four o'clock the next morning, March 8th, the wind shifted to northwest and blew in squalls with rain, and throughout the day the weather prevented Cook from closing the coast, as also on the days following until the 11th of March. During this time the wind was from the northwest and blowing in squalls with hail and sleet, and the weather was thick and hazy.

On the morning of March 11th:

"... at half past six, we were within three leagues of the land, which extended from North by East, half East, to South, half East; each extreme about seven leagues distant. Seeing no signs of a harbour, and the weather being still unsettled, I tacked and stretched off South West, having then fifty-five fathoms water over a muddy bottom.

That part of the land, which we were so near when we tacked, is of a moderate height, though, in some places, it rises higher within. It was diversified with a great many rising grounds and small hills; many of which were entirely covered with tall, straight trees; and others, which were lower, and grew in spots like coppices; but the interspaces, and sides of many of the rising grounds, were clear. The whole, though it might make an agreeable summer prospect, had now an uncomfortable appearance; as the bare grounds toward the coast were all covered with snow, which seemed to be of a considerable depth between the little hills and rising grounds; and in several places toward the sea, might easily have been mistaken, at a distance, for white cliffs. The snow on the rising grounds was thinner spread; and farther inland, there was no appearance of any; from whence we might, perhaps, conclude, that what we saw toward the sea, had fallen during the night; which was colder than any we had experienced since our arrival on the coast; and we had sometimes a kind of sleet. The coast seemed every where almost straight, without any opening or inlet; and it appeared to terminate in a kind of white sandy beach; though some on board thought that appearance was owing to the snow. Each extreme of the land that was now before us, seemed to shoot out into a point. The Northern one was the

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same which we had first seen on the 7th; and on that account, I called it Cape Perpetua. It lies in the latitude of $44^{\circ} 6'$ North, and in the longitude of $235^{\circ} 52'$ East. The Southern extreme before us, I named Cape Gregory.⁽¹⁾ It's latitude is $43^{\circ} 30'$, and its longitude $235^{\circ} 57'$ East. It is a remarkable point; the land of it rising almost directly from the sea, to a tolerable height, while that on each side of it is low.

The modern Oregonian would be quick to dispute Cook's description of finding snow on the coast in March. What he had mistaken for snow on the bare ground along the coast was clearly the Oregon Dunes, which extend a considerable distance inland. The hummocks often reach the height of low hills, and the sand drifts in amongst the trees and underbrush very much in the manner of snow, completely covering the trees in many places as the dunes drift inland. When seen from some distance offshore on a dark, overcast day, the light color of the sand presents a strikingly whitish appearance which contrasts conspicuously with the dark pine and fir trees which grow in and among the dunes.

The comments of Captain George Vancouver, coasting north in this region about a league off Cape Arago, Oregon, April 26, 1792, are pertinent and show Cook's observation to be in error. Commenting on the beaches north of the cape, which Cook named Cape Gregory:

... it is fair to presume, that the excessive bad weather led Captain Cook and his officers to consider the extremely white sand on the sea shore and on the hills to be snow. With us it put on the same appearance, excepting where it was interrupted by the clumps of trees, and until it was intirely lost in the forest. There could be no doubt of its being mistaken in winter for snow; but as the general temperature of the thermometer since our arrival on the coast had been at 59 and 60, the error of such conclusion was sufficiently manifested.

Like Cook, Drake also closed with this part of the coast during very poor, extremely cold weather. Both navigators thought they saw snow

1. This is Cape Arago in latitude $43^{\circ} 18' 30''$. Ed.

THE LANDFALL

and were conditioned by the weather to believe their identification correct. Camden's statement now becomes clearly meaningful -- it is a description of Drake's first impression of the Northwest Coast: "... discerning nothing but darke and thicke clouds, extremity of cold and open Cliffes coured thicke with snow." Hakluyt's meaning also becomes clear if we interpret his statement as a first impression of the landfall and not as a description of the entire coast: "Whereupon we thought it best for that time to seeke the land, and did so, finding it not mountanous, but lowe plaine land, & clad, and couered ouer with snowe, so that we drewe backe againe without landing."

The same description, somewhat amplified, is found in World Encompassed, but the editor wrongly interpreted it as a description of the entire coast;

From the height of 48 deg., in which now we were, to 38, we found the land, by coasting alongst it, to bee but low and reasonable plaine; euey hill (whereof we saw many, but none verie high), though it were in June, and the sunne in his neerest approach vnto them, being couered with snow.

Despite the handiwork of the editor, "From the height of 48 deg., in which now we were, to 38," this statement is clearly a description of the Oregon Dunes and the back country. That the details are similar to Cook's description, and even Camden's description of open cliffs covered thick with snow, is logically explained by these low, sand hills.

Very few places on the West Coast can be called "low and reasonable plaine." South of Cape Blanco to San Francisco there are none, unless one considers the area around Humboldt Bay, and Hakluyt's qualifying statement that it was not mountainous makes it evident that the landfall must be sought north of Cape Blanco. The coast north of here is described by the U. S. Coast Pilot for the Pacific Coast as being considerably different from that to the south. The coastal mountains are much lower, the difference being more marked by the high mountains inland. The shore consists of high, yellow sand dunes and cliffs, broken by bold, rocky headlands of moderate height and backed by low, pine covered hills.

Several sixteenth century maps of the Northwest Coast picture a

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mass of snow capped mountains named Sierra Nevadas near the coast, just as such mountains are in fact found on the coast below Cape Blanco and behind Cape Mendocino. These are free of snow, normally, but it is not unusual for them to bear a mantle of snow in winter, and it is quite likely that they were thus seen by the early Manila galleons when they were on the coast in late fall or early winter on the voyage to Acapulco. Hakluyt's statement suggests that Drake expected to find these mountains.

Chapter III on The Latitude pointed out that Drake's sea latitudes were invariably 20 to 30 minutes too high, and consequently we should assume that 44° was too high by that amount. Robert Dudley's $43 - 1/2^{\circ}$ probably comes closer to the fact and may represent a latitude revised by Drake on the basis of his observation on shore at his landing place in 38° . So also, Hakluyt's 43° may have its basis in the revised figure.

Cape Arago in $43^{\circ} 18'$ provides the only satisfactory answer to World Encompassed's "bad bay". The next bay south is Port Orford, but World Encompassed makes it fairly evident that the bay was entered on the same day that land was sighted. It would be unreasonable to presume that nearly a degree of northing was lost before anchoring with the intention to continue northward at the first opportunity. There is no suitable place within reasonable distance north of Cape Arago that satisfies the description.

Cape Arago projects about a mile from the general trend of the coast, standing out as an isolated hill rising to 719 feet. Its seaward face, a sparsely wooded tableland 50 feet high with rugged, broken cliffs, is about 2-1/2 miles long, north and south. Immediately under the southern point of the cape, shelter from northerly winds can be found outside of South Cove; the sea and swell is broken here by rocks extending southward from the point. This is undeniably a bad bay. By contrast, Port Orford is an excellent refuge from northerly weather. No landing was made from Golden Hind or her consort, probably for the reason that it was hazardous at Cape Arago, but this could have been done easily at Port Orford. No Indians are mentioned, and had they been seen, they surely would have been described by Fletcher. Yet, when Vancouver anchored 3-1/2 miles offshore a few miles below Port Orford, an Indian canoe was seen soon after paddling towards his ships with the greatest confidence and came alongside immediately. It is inconceivable that

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Drake would not have been visited had he anchored in the haven of Port Orford.

Since Cape Arago is unusually conspicuous on an otherwise low and featureless stretch of coast, common sense would dictate anchorage in its lee. Cook commented that it was a remarkable cape, and Vancouver approached it within a league, giving it the following description:

... This cape, though not so projecting a point as cape Orford [present Cape Blanco]⁽¹⁾, is nevertheless a conspicuous one, particularly when seen from the north, being formed by a round hill on high perpendicular cliffs, some of which are white, a considerable height from the sea. Above these cliffs it is tolerably well wooded, and is connected to the main land, by land considerably lower. . . About a league north of the pitch of the cape, the rocky cliffs composing it terminate, and a compact white sandy beach commences, which extends along the coast eight leagues, without forming any visible projecting point or headland.

Ironically, on the north side of Cape Arago, the extensive inlet known as Coos Bay could have served all Drake's needs for a port with any number of back-water coves where he could have careened. The entrance would have been extremely dangerous in northerly weather, however, and not visible from a few miles offshore. Neither Cook or Vancouver saw any sign of it.

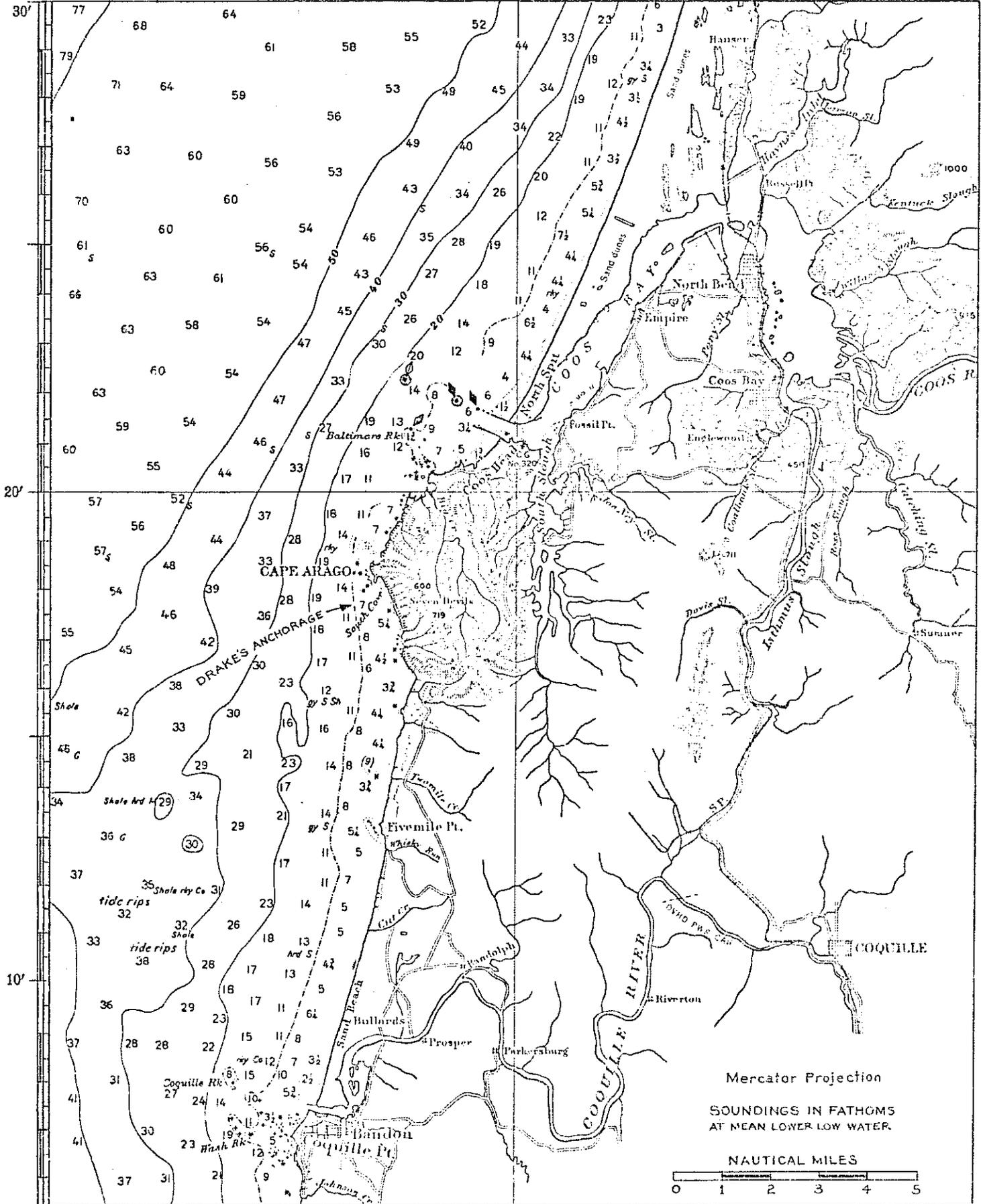
Drake's quest for the Northwest Passage ended at Cape Arago. World Encompassed states: "In this place was no abiding for vs; and to go further North, the extremity of the cold (which now vtterly discouraged our men) would not permit vs; and the winds directly bent against vs, hauing once gotten vs under sayle againe, commanded vs to the Southward whether we would or no." Stow gave the date for starting south as June 10th.

The account suggests that there were misgivings about giving up

1. Brackets by Ed.

43° 30'

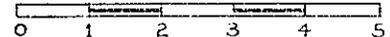
124° 20'



Mercator Projection

SOUNDINGS IN FATHOMS
AT MEAN LOWER LOW WATER.

NAUTICAL MILES



From C. & G. S. 5802 (Cape Blanco to Yaquina Head)

CAPE ARAGO



THE LANDFALL

so soon and attempts to justify the situation by the following reasoning:

And also from these reasons we coniecture, that either there is no passage at all through these Northerne coasts (which is most likely), or if there be, that it is unnaugable. Adde hereunto, that though we searched the coast diligently, euen vnto the 48 deg., yet found we not the land to trend so much as one point in any place towards the East, but rather running on continually North-west, as if it went directly to meet with Asia; and euen in that height, when we had a franke wind to haue carried vs through, had there beene a passage, yet we had a smooth and calm sea, with ordinary flowing and reflowing, which could not haue beene had there been a frete [strait]; of which we rather infallibly concluded, then coniectured, that there was none. . . .

The coast north of Cape Arago actually trends a few degrees east of north, though in truth not a point (11-1/4 degrees), but it is accurately reflected in the statement of the Anonymous Narrative of "still finding a very lardge sea trending toward the north." (1) However, the author of the above quotation from World Encompassed could also have been thinking in terms of a sighting by magnetic compass, in which case the trend would have been slightly west of north. The assumption was evidently being made that the unseen land to the north would follow the pattern of the coast found to the south. We can see in the statement a definite expectation of finding the coast to trend toward the east above Cape Mendocino and some disillusionment that it did not.

How the "franke wind," which meant a following or fair wind and, therefore, referring here to the prevailing westerlies, could have given an indication of a strait may be guessed if we assume that the author envisioned a large ocean passage from this vicinity to a strait above Labrador. With the prevailing westerly winds, it could have been readily expected that an east flowing current would have been generated with an in-draft into such a passage, and it would be felt on the coast as a north-easterly or northerly current. This was probably looked for but not experienced. Sailing directions for Coos Bay, for example, warn that

1. See p. 97, supra.

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great caution is essential in thick weather as the currents in the vicinity are variable and uncertain.

Also, it must be considered that such a passage would have been anticipated to have a pronounced tide with strong indrafts and outflow, such as was known to be the case for the Strait of Magellan, and these too might be expected to make themselves felt some distance from the passage. A current can make its presence known by its effect on wind driven waves, as when they oppose it, for example, a westerly wind opposing an ebb tide from the hypothetical strait or passage, the velocity and length of waves is decreased and their height is increased. This effect was well known to the sixteenth century seaman and is described by Mainwaring, who says that "then the sea breaks most and goes highest," but "when the tide and wind go both one way, then the sea is smoother." The state of the tide could be roughly determined by the hour angle of the moon, and the expected tide thus compared with the state of the sea. The possibility of a strait existing just beyond ken was dismissed, however, because there was seen only "a smooth and calm sea, with ordinary flowing and reflowing" of the tide on the coast. (1)

Conditions favored Drake by forcing him to turn south. Had he continued on his course with good weather, he would have eventually lost infinite days and weeks exploring the labyrinth within the Strait of Juan de Fuca searching for the lead that would take him across North America, with elation of supposedly discovering the Northwest Passage turning into despair and frustration.

1. The northerly gale winds that would have been encountered here were probably expected to generate a noticeable swell from the north but probably did not, thus leading to the conclusion that there was insufficient fetch to generate a sea because of an unseen land mass. In other words, it was assumed that in the absence of a strait, the coast continued with a northwest to southeast trend as in the lower latitudes, or as shown on many of the maps of the period.

CHAPTER VI

THE SEARCH FOR A FIT AND CONVENIENT HARBOR

On June 10th when Drake turned south and put the prevailing north-westerly winds behind him, he was faced with poor prospect of finding a port in which to refit before continuing his voyage across the Pacific. Through his interrogation of captured Spanish pilots, he was undoubtedly aware that no suitable ports on this coast were known to the Spaniards. Even Cabrillo's discovery, 37 years before of the harbor of San Miguel (now San Diego) seems to have been forgotten or exact knowledge of its location was lost. Indeed, only a few years after Drake's voyage, the viceroy of Mexico sent an expedition to the Northwest Coast for the stated purpose of discovering a harbor that could be used for replenishing the eastbound Manila Galleons on their long and wearing passage from the Philippines to Acapulco. The fact that Drake found a port where none were otherwise known to exist probably gave rise to the opinion recorded in World Encompassed: "The Spaniards neuer had any dealing, or so much as set a foote in this country, the vtmost of their discoveries reaching only to many degrees Southward of this place."

In all the stretch of coast from 43°⁰, the vicinity of Cape Argo in Oregon, to 38° the vicinity of San Francisco Bay, there are no natural protected harbors that could have served his need, except possibly Humboldt Bay at Eureka, and the entrance to this bay, or lagoon, is obstructed by a dangerous bar which may have discouraged entry if the port was seen. It is notable that Humboldt Bay is not mentioned in the accounts of Rodriguez Cermeño when he made his exploration of these parts in 1595 even though he claimed to have coasted within half a league, a little more than one nautical mile off the land, in clear weather.

It is not surprising then that the accounts state that Drake searched the coast diligently for some five degrees of latitude without landing, although according to Anonymous Narrative, he was "... keping along the cost as nere land as hee might." The Golden Hind was unquestionably hove-to each night well offshore, and time was probably lost also waiting for the morning fog to lift before continuing on; during seven days of coasting, she averaged about 50 miles a day.

Drake undoubtedly logged a description of the Oregon and California shore as he coasted south, but none of it appears in any of the accounts with the exception of the few details of landfall and the fact that he apparently recognized Cape Mendocino and found its latitude to differ greatly from the commonly given latitudes of 42° or 43° or higher. In

THE SEARCH FOR A FIT AND CONVENIENT HARBOR

this respect, Robert Dudley's comment regarding Cape Mendocino on his Carta Particolare is of interest: Some common charts place Cape Mendocino in 50° and Cape Fortuna in 60° which are gross errors, because Drake and the Spanish Pilots found Cape Mendocino to be in 40° of latitude." (1) (The Cape is actually located in 40° 26'.) Some confirmation of Dudley's statement is afforded by Blundeville's account of 1594 as he also places the Cape in 40°, despite the fact that on the Molyneux Globe, to which Blundeville largely refers for Drake's route, it is shown in about 42°. (2) The implication derived from Dudley's statement is that Drake apparently acquired conflicting information regarding the location of the Cape before he left Mexico and had been led to expect that he would find it in a higher latitude.

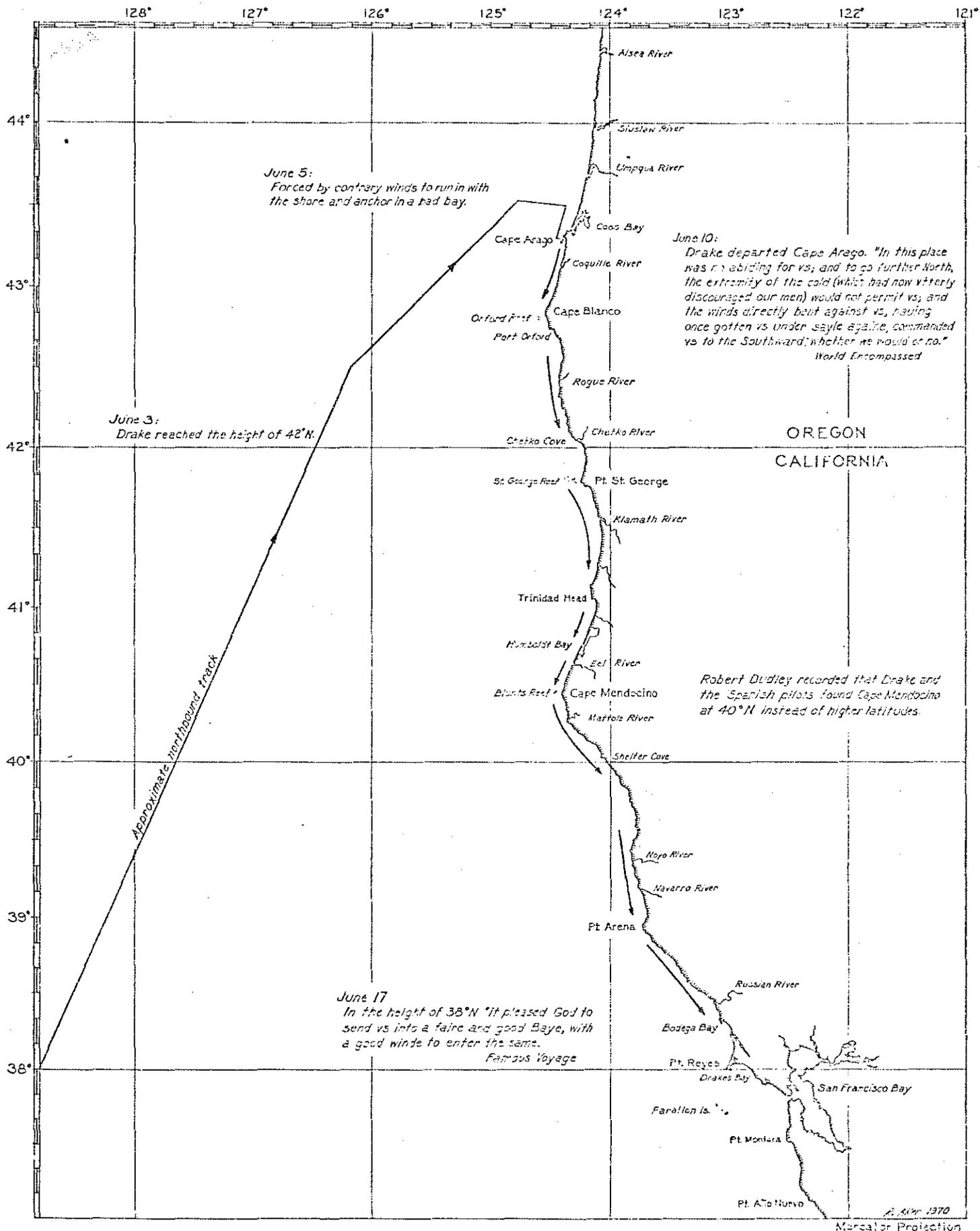
Cape Mendocino, besides being an impressive landmark unlike any other cape north of it, marks a pronounced change in the direction of the general trend of the coast line on both its north and south sides; the north side bearing north-northeast from the cape for a distance of over 37 miles, or several hours of sailing before the coast resumes its northwest-southeast trend. It is described in the U.S. Coast Pilot as one of the most prominent points on the West Coast -- a bold, mountainous headland, the seaward face of which is steep and rocky. It is backed by a rolling grass-covered hill of 1200 feet elevation. Other high hills rising steeply from the shore are adjacent to it.

Lest some readers be tempted to conclude that identification of the Cape was a haphazard guess that could be applied to any number of places on the coast, it must be borne in mind that its identity did not rest alone on its latitude but more precisely on a description recorded in a pilot's derrotero, or coast pilot. Drake was able to identify the Cape in the latitude of 40° or thereabout probably because he had taken such a derrotero from the China Pilot, Colchero, and had seen no such cape farther to the north. (3) In the early days of the Manila Galleon line, Cape

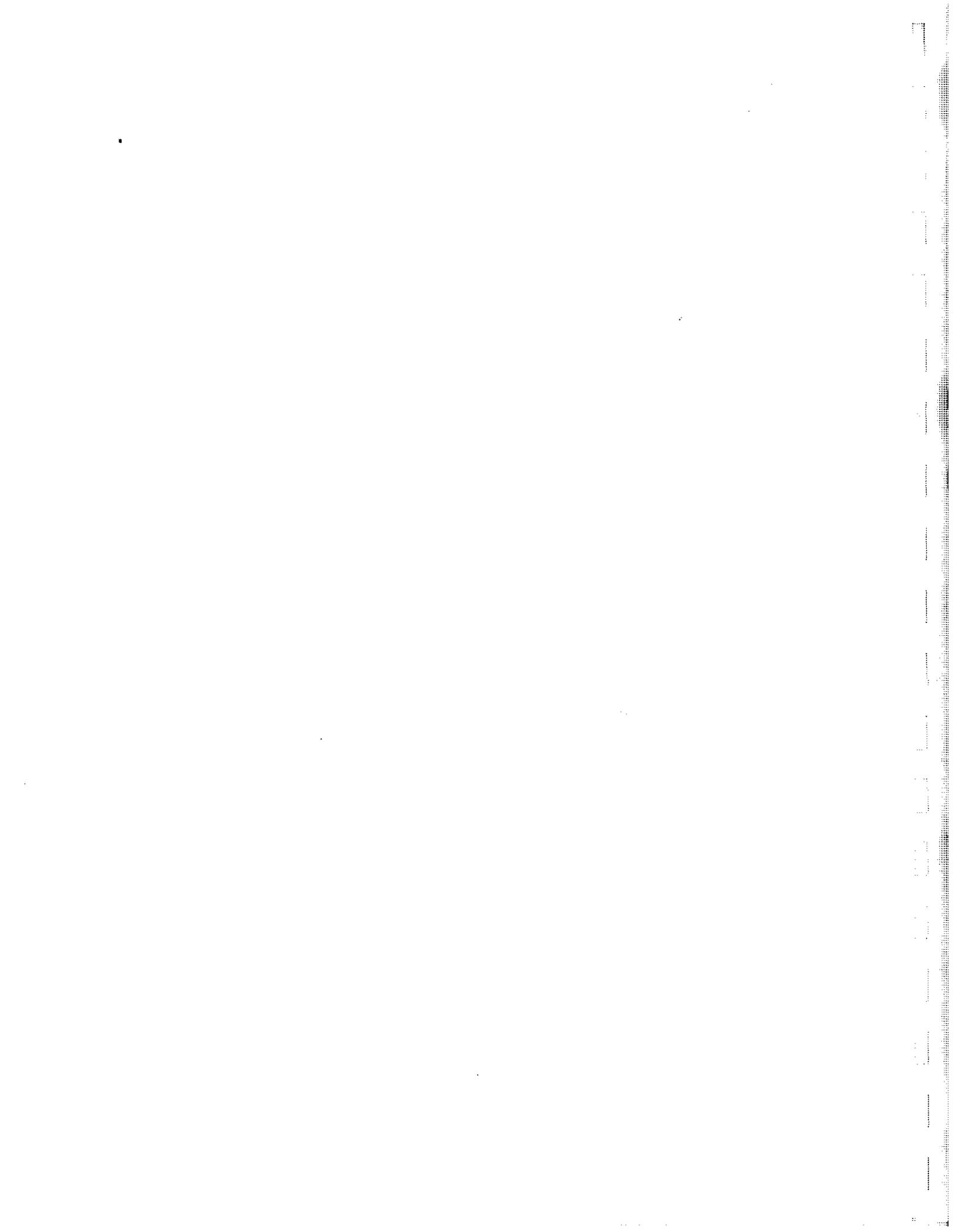
1. See p. 184, supra.

2. See p. 100, supra.

3. In the deposition of Cornelies Lanberd, who was taken prisoner with Colchero, it is stated that Drake took Colchero's two sailing charts and the derrotero belonging to him. The same deposition identifies

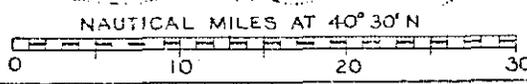
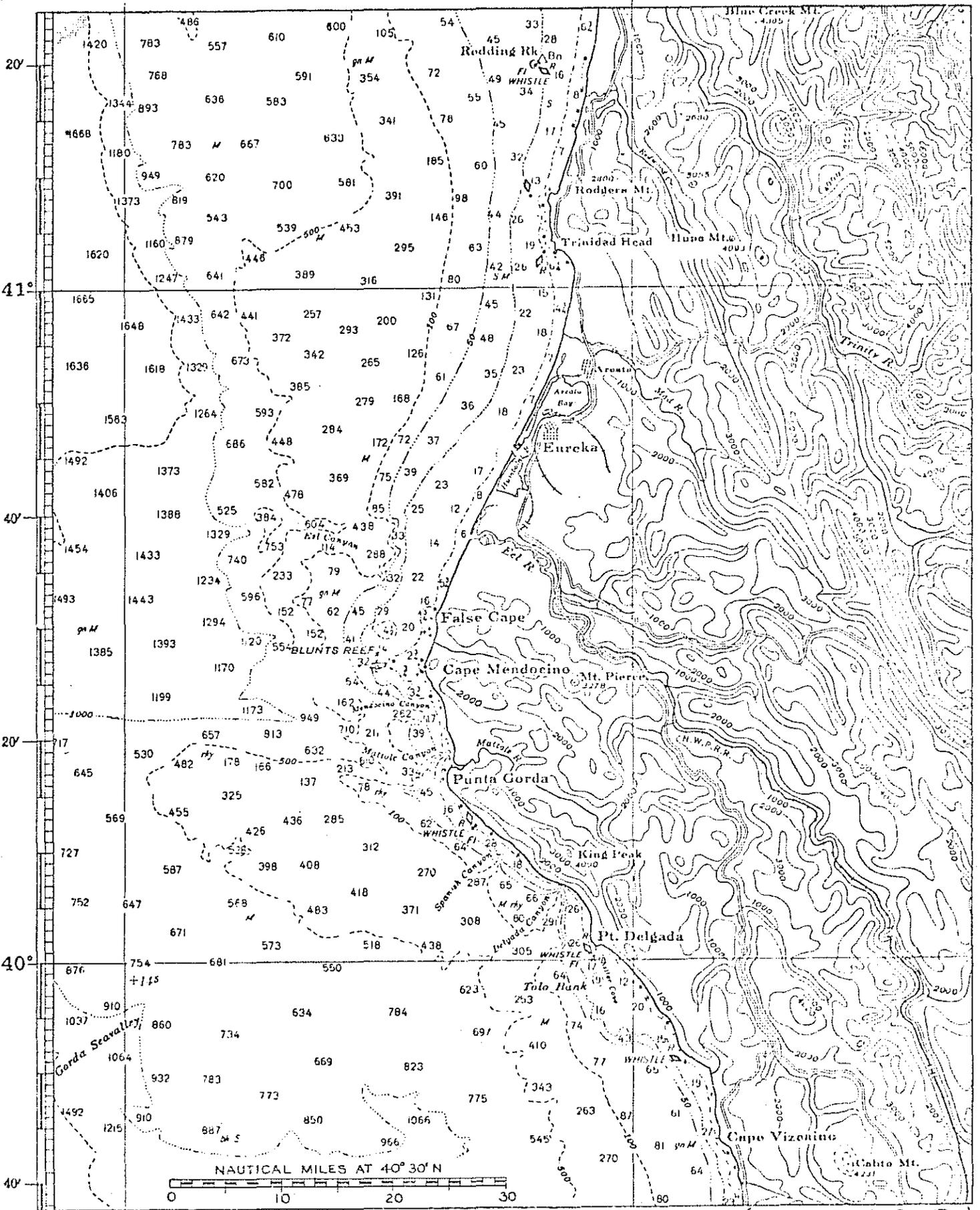


CAPE ARAGO TO THE GULF OF THE FARALLONES



125°

124°



Mercator Projection

From C.&G.S. 5021 (Monterey Bay to Coos Bay)

CAPE MENDOCINO



THE SEARCH FOR A FIT AND CONVENIENT HARBOR

Mendocino was usually their first California landfall and it was not unusual for latitudes to be off a degree or two. The Cape was easily identified by Cermeño who laconically described it as follows: "A reef was discovered [Blunts Reef] which might be about a league in the sea, which was Cape Mendocino (This was so) because from there the coast runs southeast, and in the other direction, from the west (point) it runs north a quarter northeast." (1)

A derrotero made on the Viscaino expedition in 1602-1603 unmistakably describes the Cape and its approaches from the north, despite the fact that the given latitude is at least a degree too high. Beginning from the vicinity of Trinidad Head, it reads: "From this the coast of lower land [Humboldt Bay area] runs south about eight leagues, where the land makes another point, massive and bare, with some white bluffs which rise out of the sea. This point in almost $41-1/2^{\circ}$, is called Cabo Mendocino.... From here the coast runs south-southeast to the latitude of $39-1/2^{\circ}$ [to Point Arena]. (2)

At some time during June 17th, after the morning mists had lifted and revealed the shore, Drake would have become aware that he was sailing into a bight of land formed by the great seaward projection of Point Reyes. At about the same time he would have been abeam of Bodega Bay, the first port after Humboldt Bay which might have served for careening the Golden Hind. While it can only be conjectured as to just how much Drake saw of the shore on this occasion, from the distance he must have kept offshore to clear Point Reyes and to avoid becoming embayed by it on a lee shore, it is possible that he saw only the general indentation of Bodega Bay and little more. It is a point of interest,

(cont'd.) Colchero as a pilot whom the Viceroy of Mexico was sending to go as pilot of the fleet for China, i. e., to take the new Governor, Gonzolo Ronquillo to the Philippines. See H. R. Wagner, Sir Francis Drake's Voyage, pp. 121 and 372.

1. See H. R. Wagner, Spanish Voyages to the Northwest Coast in the Sixteenth Century, p. 157
2. See "The Bolaños-Ascension Derrotero," Wagner, Spanish Voyages, Appendix VII, p. 435. The derrotero was compiled by Father Fray Antonio, who is said to have accompanied Vizcaino as second cosmographer, Brackets by Ed.

THE SEARCH FOR A FIT AND CONVENIENT HARBOR

however, as previously mentioned, that the French Drake Map shows two bays close together at the point where Drake's course is shown to enter and depart from the land, and there is thus some indication, perhaps, that it shows a combination of Bodega and Drakes Bay, though there is no indication from the course as to which bay is intended as Drake's port. Robert Dudley, who also shows two bays close together on his Carta Particolare and MS Map #85, places Drake in the southernmost.

Bodega Bay is a relatively slight indentation, six miles wide, on the coast between Bodega Head to the north and the entrance of Tomales Bay to the south and extends inward only 1-1/2 miles between the headlands. The bay offers shelter from northwesterly weather at its northern end, but anchorage here is dangerous during southerly or westerly winds; the greater part of the bay is entirely open to the prevailing westerly winds. From the distance that Drake was probably coasting offshore, a couple miles or more, Bodega Bay appears as only a minor break in a long, low plateau and is not impressive. Though it must be acknowledged that it does afford anchorage at the northern end, it was not an anchorage alone that Drake sought; he had passed several such anchorages on his way south, as for example, Port Orford and Trinidad Bay.

Ironically, perhaps, the inner waterway or harbor that Drake needed, and which either Bodega Harbor, as the lagoon inside of Bodega Head is known, or Tomales Bay could have offered, cannot be seen from any distance offshore as both are screened from view by their headlands. To see the entrance to Bodega Harbor, it is necessary to be well inside Bodega Bay. Coming from the north, the mouth of Tomales Bay might be discerned from the masthead, but the breakers on its bars would probably discourage close inspection. Both Bodega Harbor and Tomales Bay are shallow and have devious, obstructed entrances. In any event, either would have been seen to disadvantage at midday as both would have been marked by offshore shoals and rocks which would have been particularly apparent as low water occurred about noon. See tide tables for Drakes Bay, June-Aug., 1579, Appendix VIII.

The unlikelihood of seeing either of these waterways is borne out by Cermeño's expedition in 1595, which passed Bodega Bay in clear weather, but made no record of it or the inner waterways. Nor does it seem to have been seen by the Vizcaino expedition in 1603.

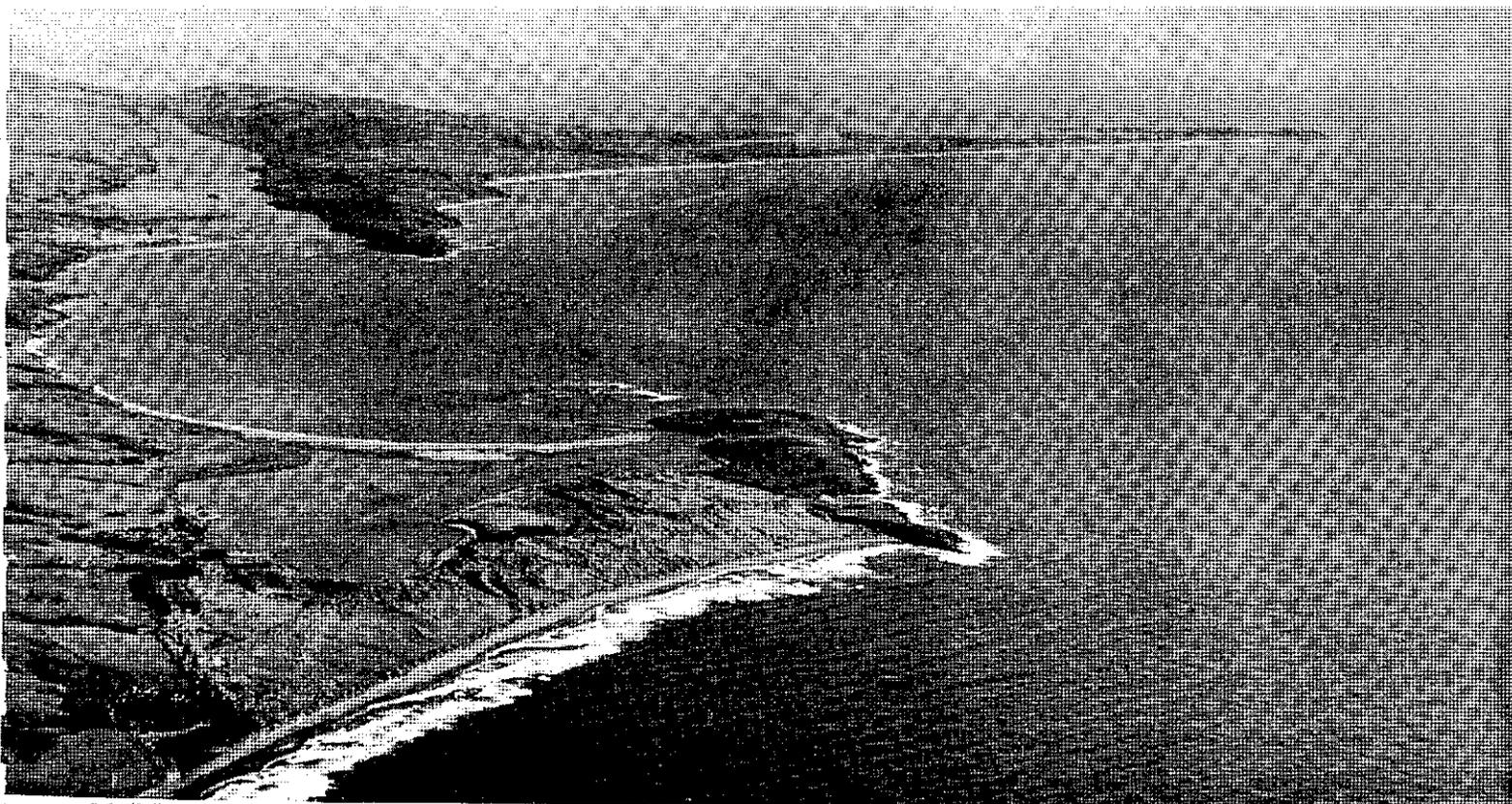
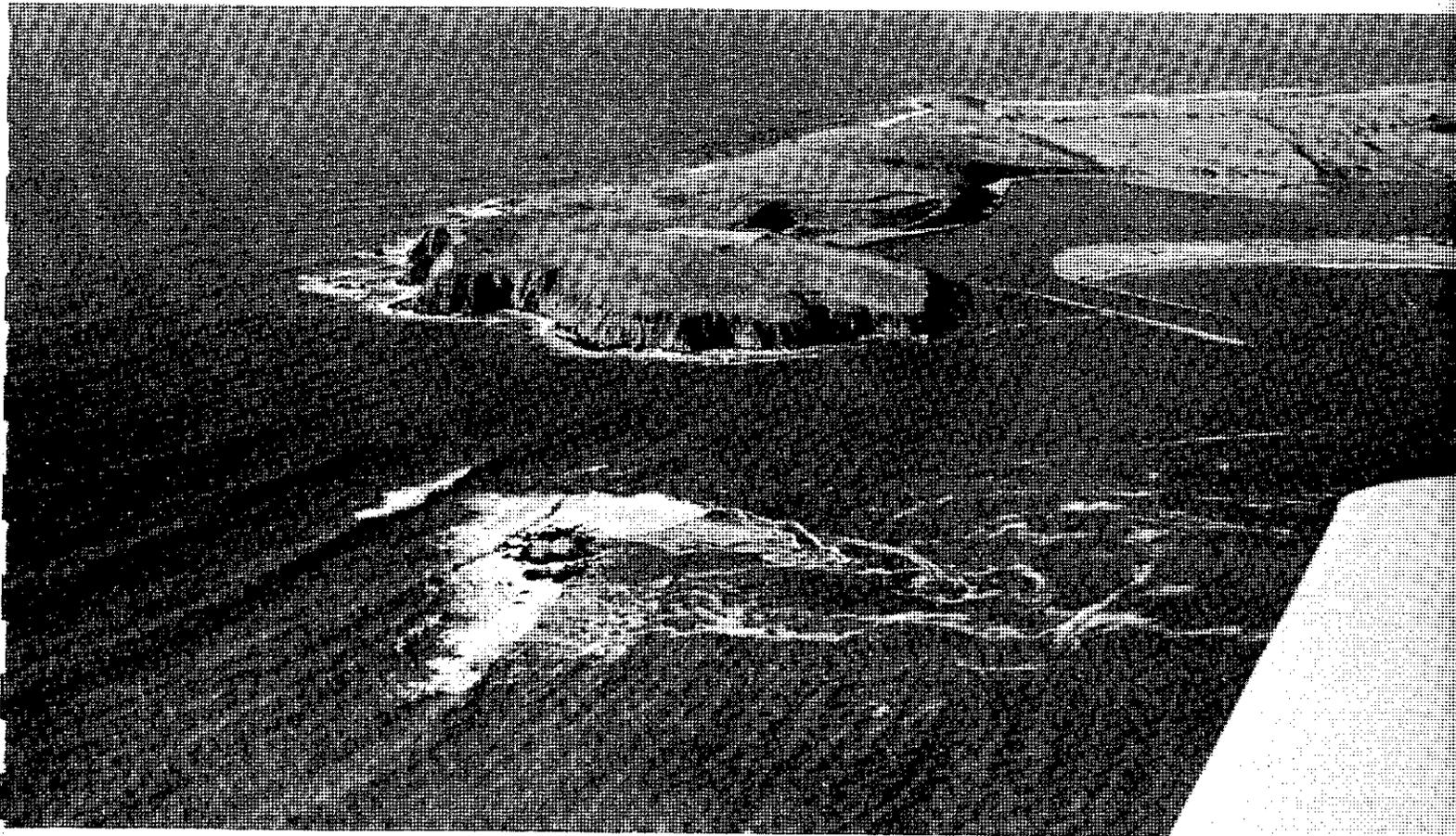


PLATE
Robert W. Allen

BODEGA BAY LOOKING SOUTH WITH TOMALES BAY
CONTINUING BEYOND AND POINT REYES TO THE RIGHT



Robert W. Allen

BODEGA HEAD LOOKING NORTH

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THE SEARCH FOR A FIT AND CONVENIENT HARBOR

Although it may appear that we are lightly passing over Bodega Harbor and Tomales Bay, neither port agrees with the details of the accounts in full context. A review of their lack of correlation will be taken up at the conclusion of identification of the port actually discovered by Drake, when their deficiencies will become more apparent without detailed repetition of evidence.

Point Reyes, projecting over 10 nautical miles into the sea from the general trend of the shore, is a relatively low point of land terminating in a massive granite headland nearly 600 feet high standing in precisely 38° North Latitude. In clear weather, the Point can be seen from a distance of 25 miles though it is doubtful that Drake could have seen it that far. From off Bodega Head it would have been only 18 miles distant, perhaps showing under an afternoon overcast, but there is fair probability that Drake was already by that time changing course to the southward to clear the Point.

Despite the controversy that has surrounded the site of Drake's port on the California coast, the following single passage by Richard Hakluyt in Famous Voyage describing Drake's return to the south along the coast becomes particularly significant at Point Reyes and can be considered sufficient in itself to identify that place: "... we drewe backe againe without landing, till we came within 38. degrees towards the line. In which height it pleased God to send vs into a faire and good Baye, with a good winde to enter the same."

On reaching the southern extremity of Point Reyes, Drake faced a broad sweep of open sea to the east and southeast. Picture the sight that met him as he cleared this point with a strong afternoon wind behind him -- now suddenly 10 miles or more off the general trend of the shore, the continuation of which presented a rugged coast backed for the most part by mountains rising steeply out of the sea just like the miles of unfriendly shoreline passed to the northward. Had the weather been clear Drake might have perceived the full sweep of the Gulf of the Farallones, but from the weather as described in World Encompassed, it is probable that he viewed this seascape under an overcast of fog, typical of the cold and overcast days usually found during the summer along this part of the coast.

The entrance to the magnificent harbor of San Francisco Bay lay

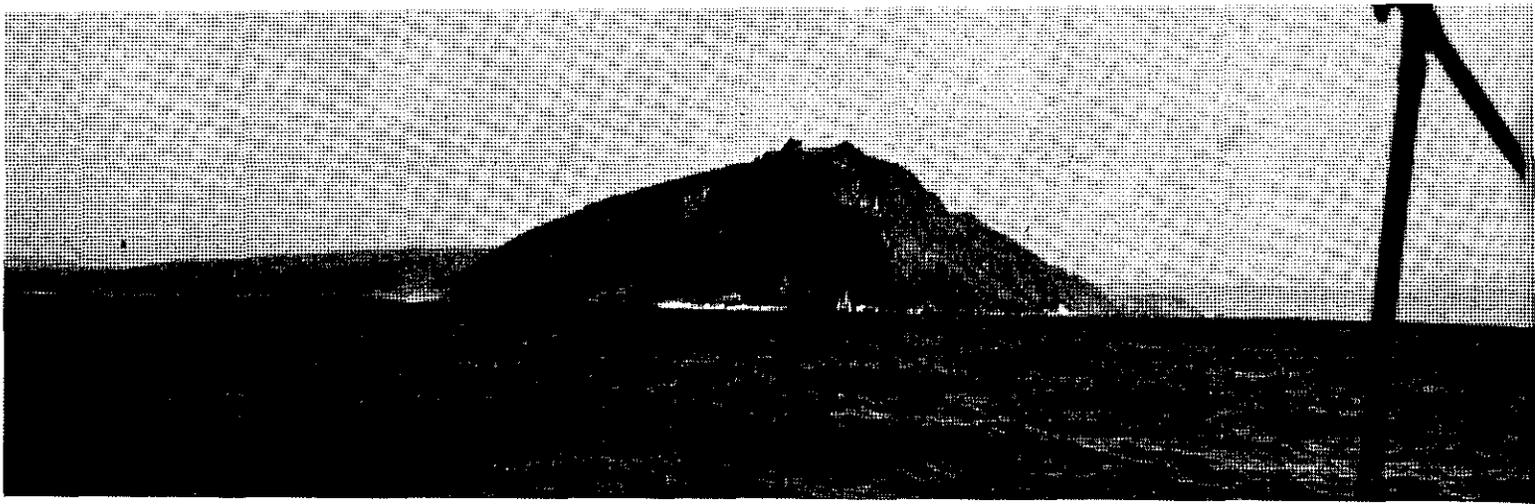
THE SEARCH FOR A FIT AND CONVENIENT HARBOR

27 miles southeast, but only foreknowledge of its location would have led Drake to shape a course in that direction, as the Golden Gate is completely screened from view by its headlands, and from this distance doesn't even show as a break in the high coastline. At masthead height of Golden Hind, the lookout's horizon was but 10 miles away, and due to the earth's curvature the surface of the Golden Gate lay more than 200 feet below his line of sight.

Bolinas Bay was also too far distant, about 17 miles, to attract attention from Point Reyes and would therefore have given no cause to run in for it. However, as with Bodega Harbor and Tomales Bay, neither San Francisco nor Bolinas Bays satisfy the full context of the accounts for correlation and will also be treated at the conclusion of this identification.

Under these circumstances, Drake now had to make a decision and act quickly as the wind and sea behind him would soon carry Golden Hind and her consort out into the open sea and too far south to make it profitable to beat back. Close at hand, the land at the end of the rocky headland of Point Reyes could be seen to fall directly into the sea with no offshore rocks or discolored water to signal any danger to navigation. The nearly vertical bluff on the south face could be seen to continue for three miles almost due east to an abrupt end and beyond that, open water to the coast. There was a choice of passing up the inviting shelter of a lee under the Point or running southeast to a shore that appeared inhospitable. Drake may have sensed an opportunity to find anchorage deep inside the bight formed by Point Reyes and the shore though he could not have had any inkling yet of the bay within. We can assume from World Encompassed that it must have been late in the afternoon now and so perhaps anchoring was preferred to hauling offshore into the fog again for the night.

Whatever the reason, whether to ride comfortably for the night or merely on a whim to have a look, we know from Hakluyt's statement that in the same 38th parallel of latitude on which Point Reyes lies, Drake was "sent" eastward into a fair and good bay. The originator of the statement, perhaps Drake, implies that it was a god-send and likely this was the way it seemed. So narrowly could the opportunity have been lost. Drake could have, and probably did, stand in to within less than a mile from the south shore of Point Reyes. Cermeño recorded that he ran along under full sail in San Agustin, a vessel of comparable size to Golden



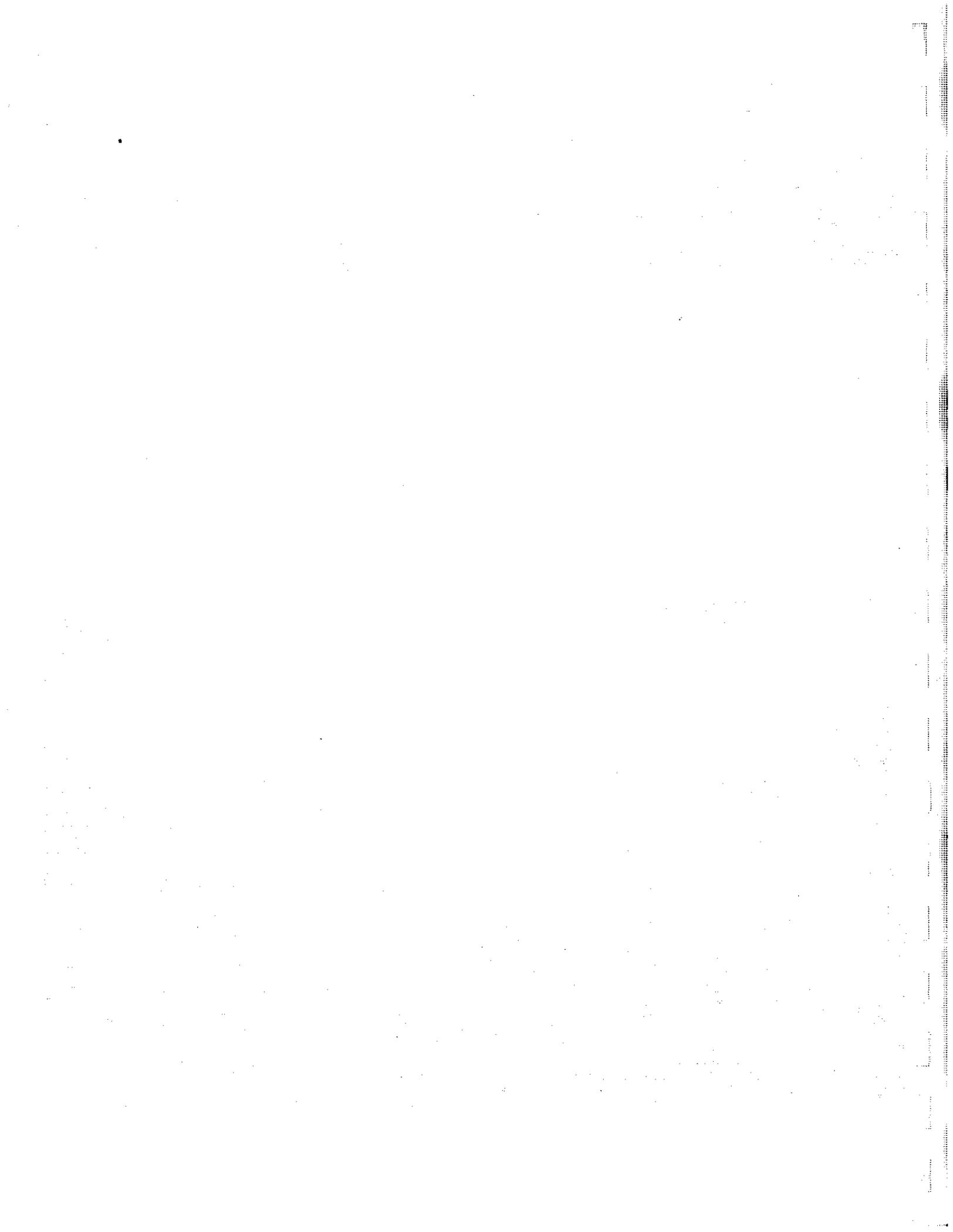
Robert W. Parkinson

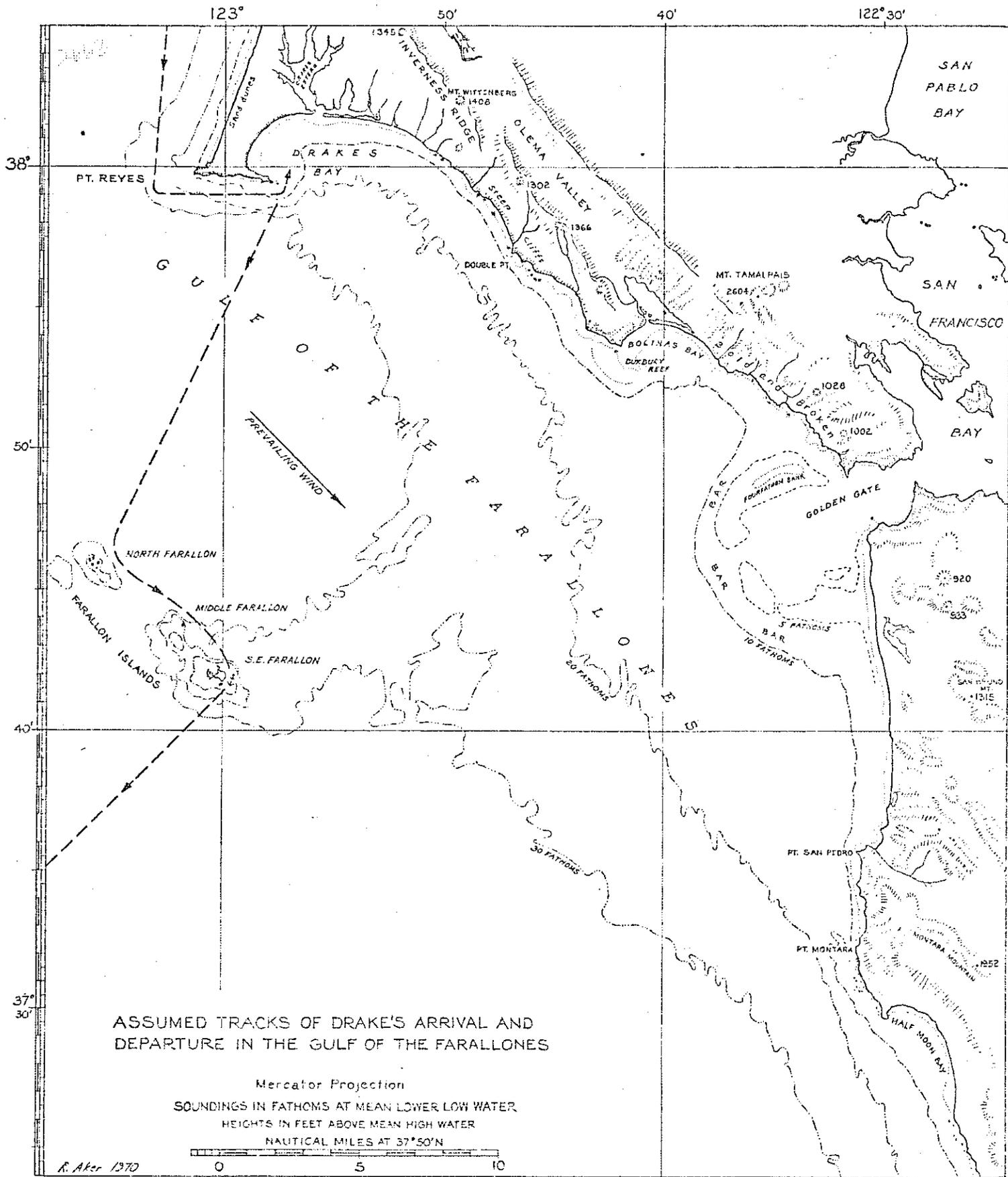
POINT REYES, LOOKING EAST



AERO Photographers

POINT REYES





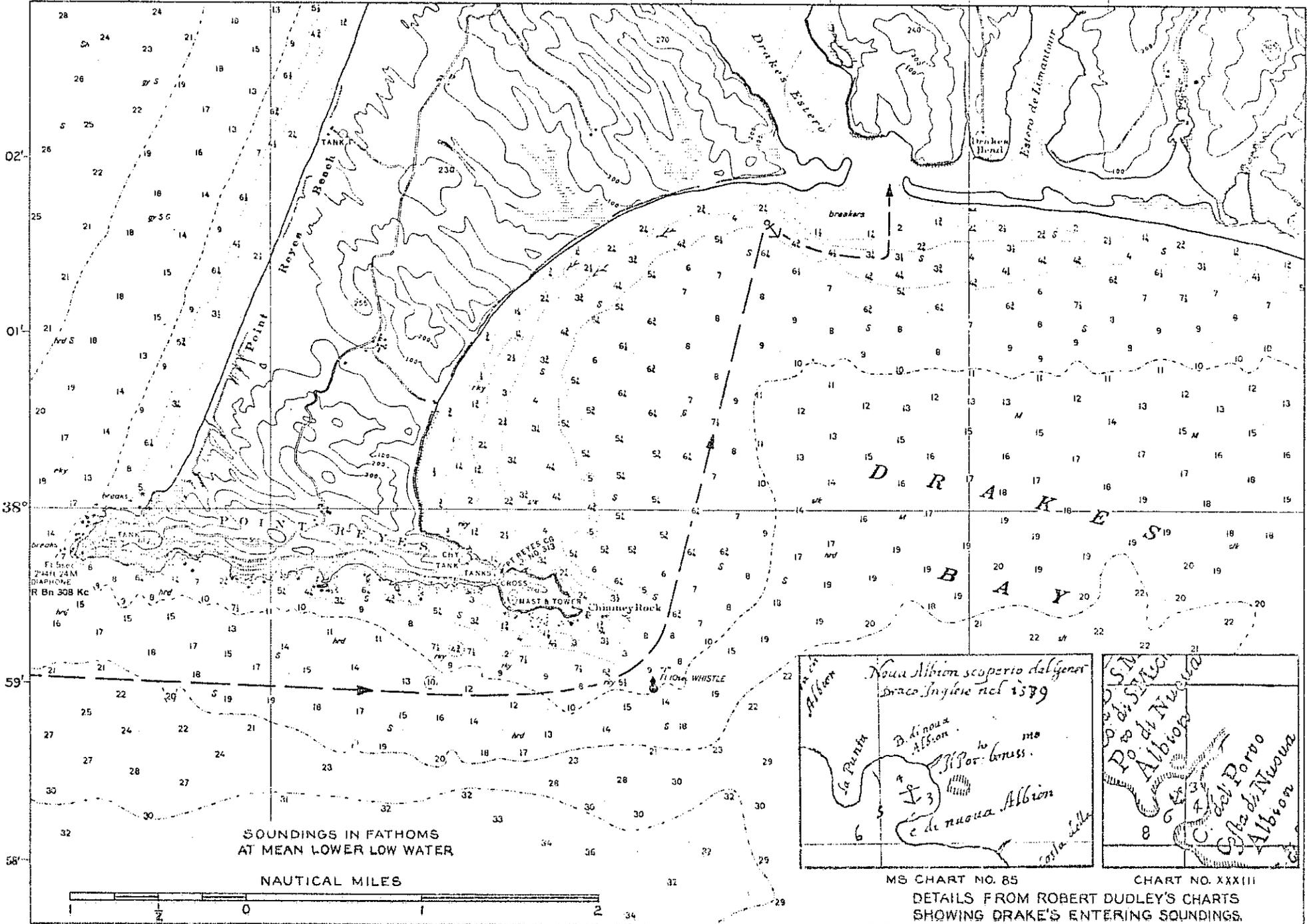
Based on C. & G. S. 5402. (Pt. Sur to San Francisco)

GULF OF THE FARALLONES

123°

55'

53'



Mercator Projection

From C. & G.S. 5599 (Drake's Bay)

RECONSTRUCTION OF DRAKE'S COURSE ENTERING DRAKES BAY

THE SEARCH FOR A FIT AND CONVENIENT HARBOR

Hind, only a "musket-shot" from this shore as he entered the "great en-senada" which opened to him inside Point Reyes.

As Drake cleared the east end of the Point, it was probably with great surprise that he suddenly found himself within a fine round bay extending 2-1/2 miles to the north -- the bay that now bears his name. Bordering the gently curving lee side of Point Reyes were seen high, whitish cliffs rising from six miles of gently-sloping sand beach broken by several inlets, all facing south. Here, a short tack with the prevailing northwesterly wind on the beam, Hakluyt's "good winde to enter the same," brought the Golden Hind to an anchorage up in the bay.

In support of identification of Drakes Bay, Robert Dudley's manuscript map #85 and Carta Particolare undoubtedly shows us the course by which Drake entered the bay and where he came to anchor -- a course unmistakably indicated by a line of soundings beginning with 6 fathoms just east of the point, and running northeasterly to an anchor symbol in 3 or 4 fathoms close by the entrance to a river or estuary corresponding to Drakes Estero.

Of great importance is the fact that Dudley makes a clear distinction on his maps between the bay entered by Vizcaino in 1603 (renamed by him Porto di Don Gaspar from Cermeño's La Baya de San Francisco), and the bay discovered by Drake and identified by Dudley as the B: dincua Albion. The fact that all three explorers had entered the same bay was not known to Dudley. Both Vizcaino and Cermeño located their bay in 38° 30', which is where Dudley places P^o: di Don Gaspar on his Carta prima Generale, published in Arcano del Mare, whereas the bay credited to Drake is placed in 38° on the same map. Vizcaino anchored in the southwest corner of the bay, but Cermeño followed a course similar to that shown for Drake. His recorded soundings are similar to those set down by Dudley, with the exception that Cermeño stated that he anchored in 7 fathoms.

It appears then, that late in the afternoon or early evening of June 17, 1579, Drake's two vessels doubled the east end of Point Reyes in 5 or 6 fathoms, less than a half mile off the east end of the Point, and came to anchor about seven or eight hundred yards from the shore in 3 or 4 fathoms close by the mouth of Drakes Estero.

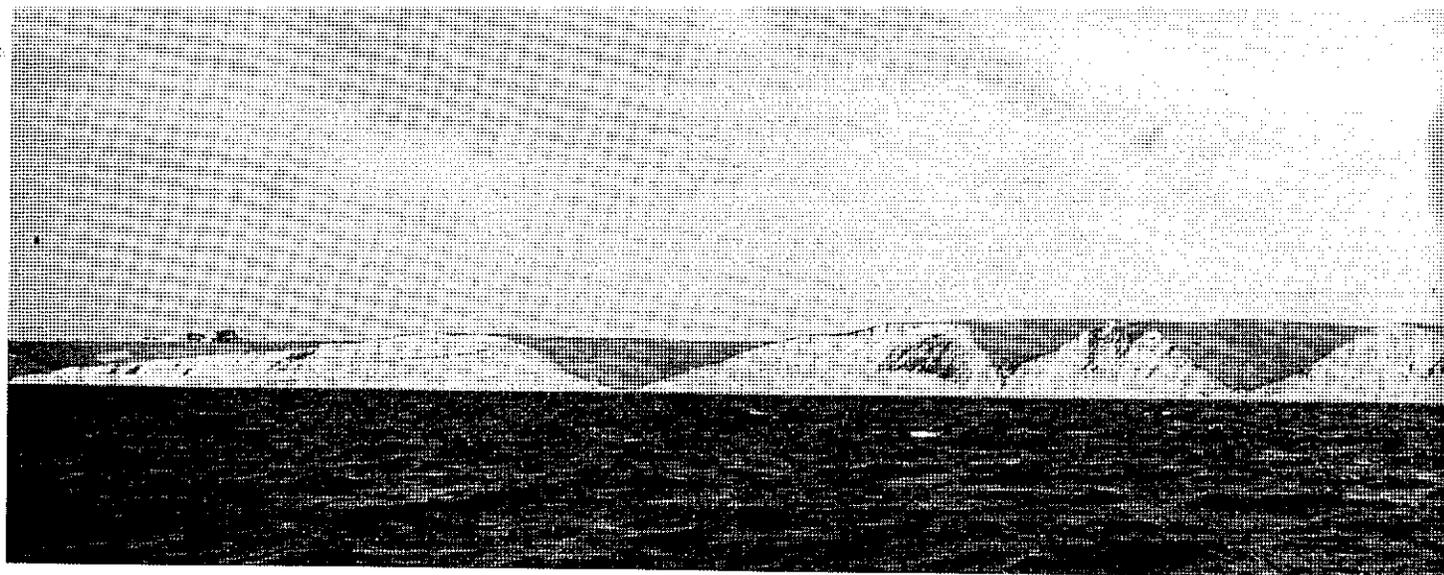
THE SEARCH FOR A FIT AND CONVENIENT HARBOR

Here, Drake and his men faced the great, rounding cliffs which uniquely resemble the Seven Sisters on the South Coast of Britain, the likeness including even the same barren terrain of rolling downs behind them and an estuary adjacent to them. So prominent are the Seven Sisters and the white cliffs at Dover that Britain's ancient name, Albion, springs from them. The name is perhaps Celtic, but the Romans connected it with Albus (white).

How appropriate then was Drake's choice when according to Hakluyt: "Our General called this country, NOUA ALBION, and that for two causes: the one in respect of the white bankes and cliffes, which lie towards the sea: and the other, because it might haue some affinitie with our Countrey in name, which some times was so called." In addition to facing the sea, the cliffs are almost entirely located on the northwest side of the bay, and thus, by their orientation they actually "lie towards the sea," or the ocean side of the bay.

By way of further landmarks, from within Drakes Bay, the Farallon Islands can be seen to the southward corresponding to the World Encompassed description that "Not farre without this harborough, did lye certain Ilands (we called them the Ilands of Saint James)."

According to the accounts, the position was fixed 14 days later when the sun finally broke clearly through the overcast, permitting Drake to pass a ray of light through the upper and lower sight holes in the sight bar or alidade of his astrolabe as it hung motionless ashore and read off a noon transit that gave his latitude as "38. degrees towards the line"; the true latitude of his campsite stands in exactly 38° 02' N.



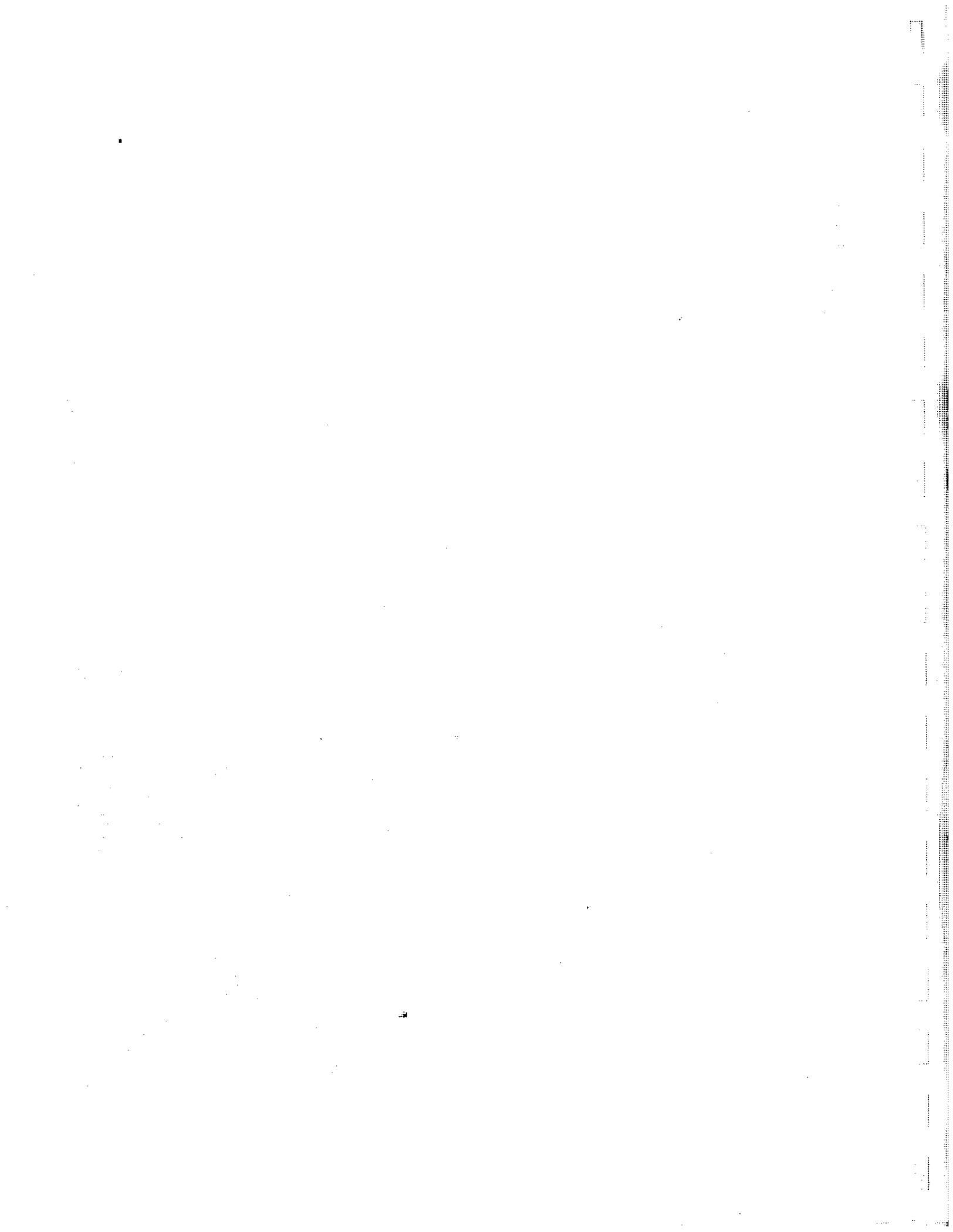
Robert W. Allen

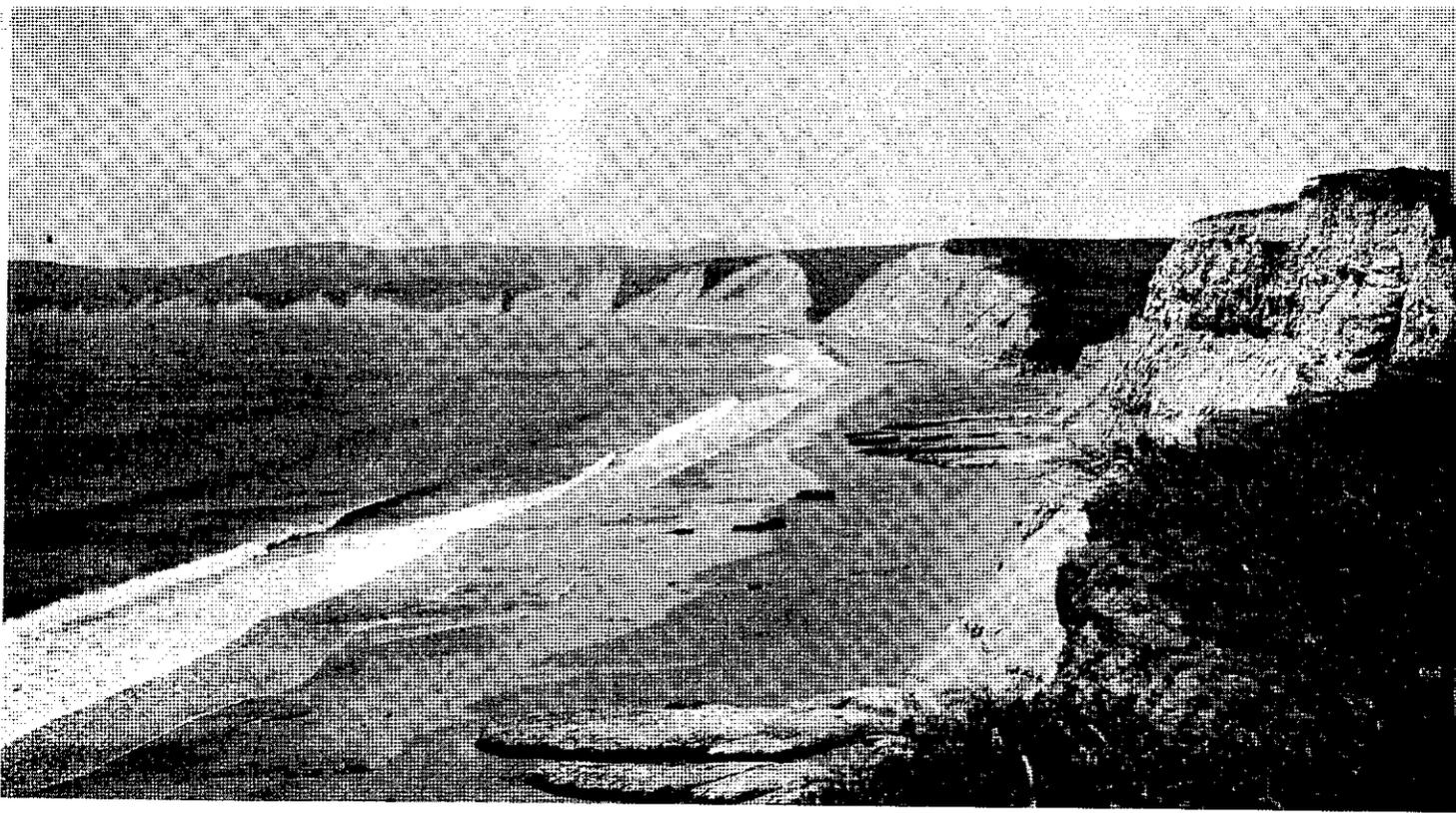
WHITE CLIFFS, DRAKES BAY



AERO Photographers

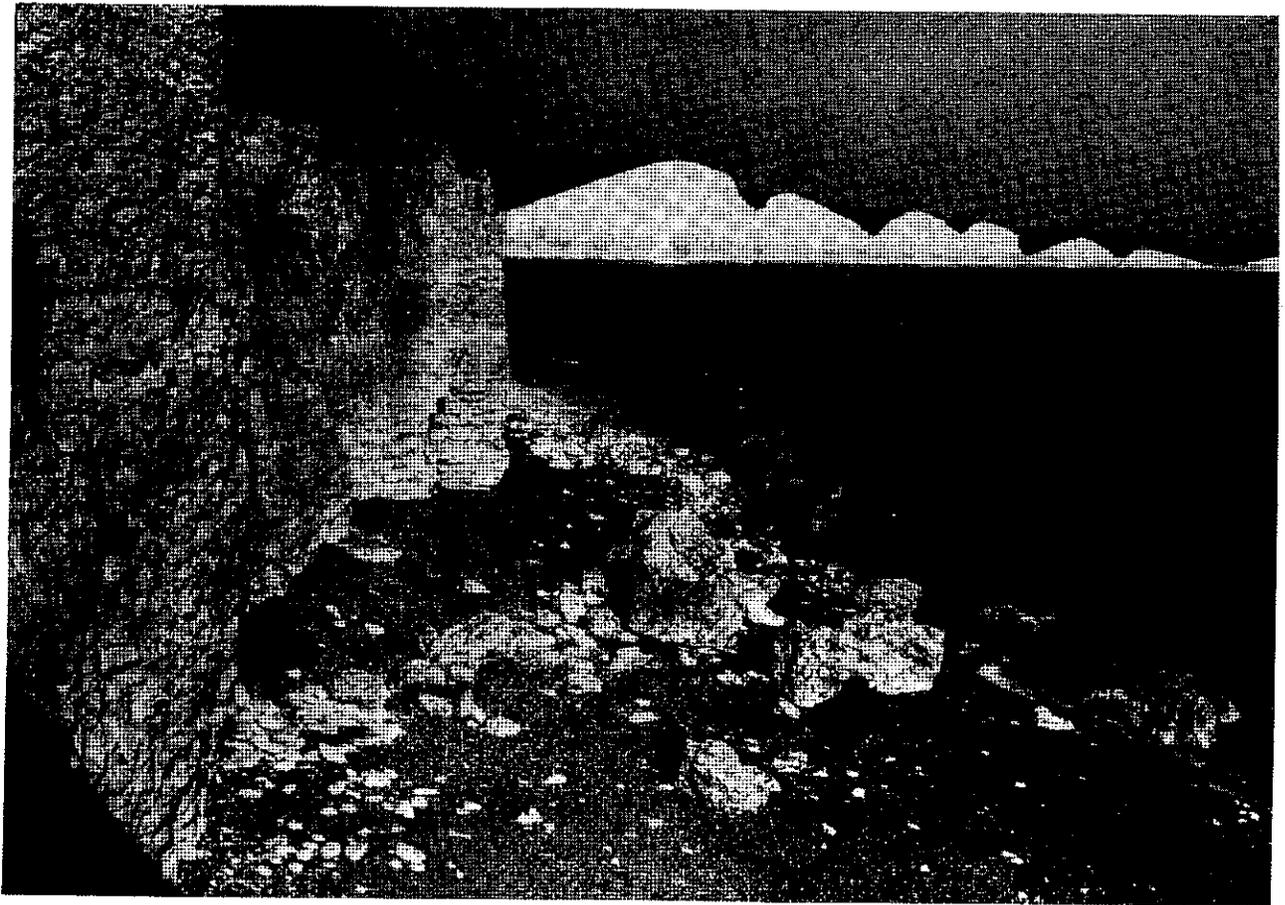
DRAKES BAY





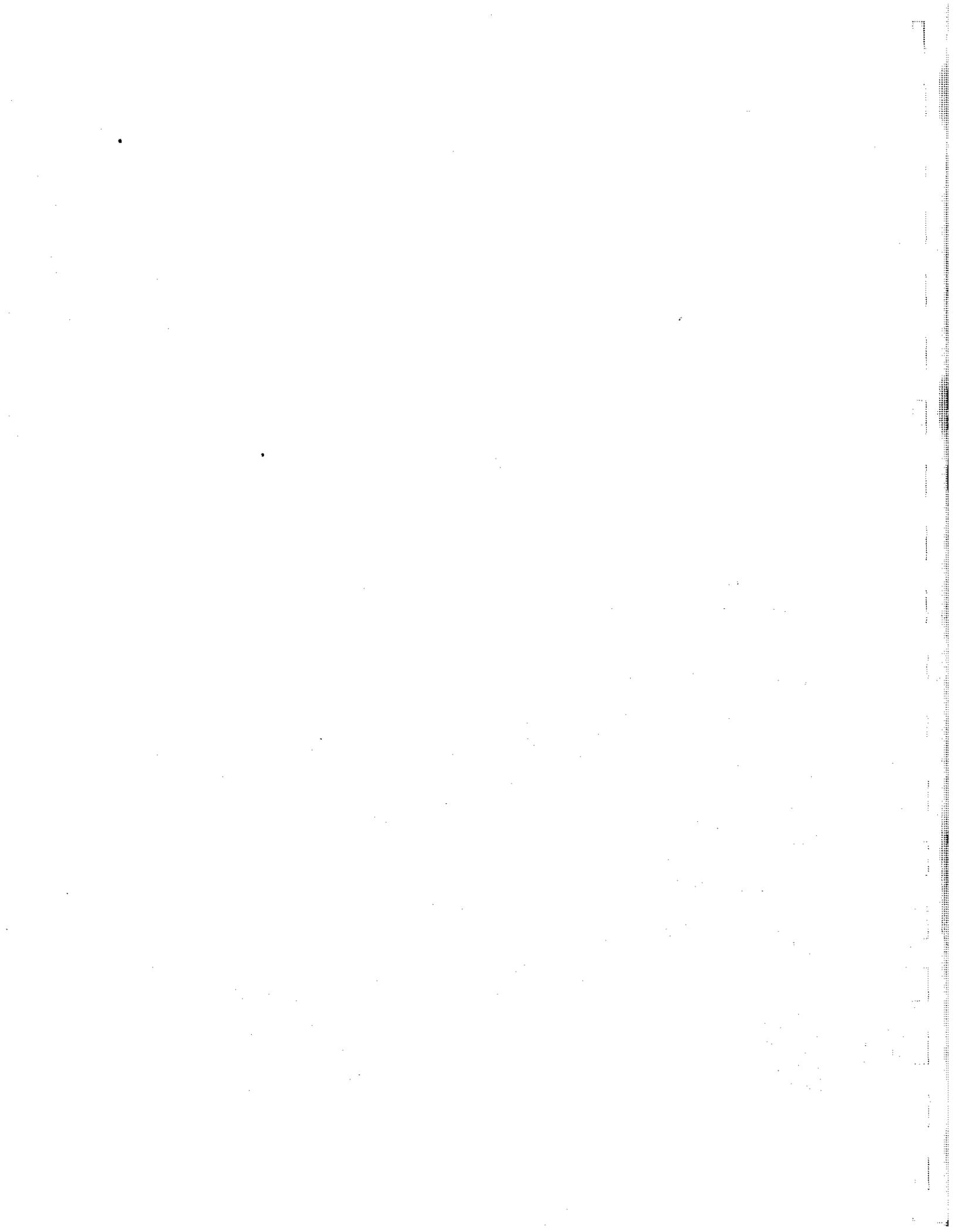
Robert W. Parkinson

THE WHITE CLIFFS OF DRAKES BAY



The Friends of Buckland Abbey

THE SEVEN SISTERS
OF SUSSEX, ENGLAND



CHAPTER VII

DISCOVERY OF THE PORT

The course shown by Dudley's line of soundings was a logical choice for Drake since the estero obviously gives promise of the sheltered harbor needed for careening the Golden Hind. Cermeño also headed for the estero with an objective somewhat similar to Drake's; that is, to find a port where the galleons in the Philippine trade could re-fit on the eastbound voyage from the islands to Acapulco. By anchoring close by the estero, little time is thereby lost in sending the boat to sound the channel. Drake may have judged that with luck he could kedge into this harbor on the next suitable tide, and with this intention, it would have been to his advantage to bring the vessel to the most convenient position from which to do this.

From several of the sources, it is manifest that Drake did actually put into an inner waterway adjoining a bay or road at 38° latitude. This is denoted by the use of the terms harborow (Anonymous Narrative), harborough (World Encompassed), Il Porto Bonissimo (Dudley), and Portus (J. Hondius).

No description is given in the accounts as to when or how the ships were brought into the harbor, but the event may be reconstructed in the following manner. If World Encompassed is interpreted literally, the Golden Hind was taken into Drakes Estero on the day of arrival; "... we fell with a convenient and fit harborough, and June 17 came to anchor therein, where we continued till the 23 day of July following." Subsequent relation of Drake's activities in this account read to the effect that he was then already within the harbor.

The likelihood is that Drake did enter the estero on the 17th. It was characteristic of him to take advantage of opportunity with bold and decisive action. For example: when he found Port San Julian on the South American coast -- which port is called a harbor in World Encompassed and other accounts -- similar in many respects to Drakes Estero, he went directly in with his ships on the very same day. The entry is described by Drake's Chaplain, Francis Fletcher, who wrote an account after the return to England, in which he said that as the ships ran in they found the port to be dangerously barred, one of them touching ground briefly but coming off without harm.

The tide tables which were prepared by the U. S. Coast & Geodetic Survey for Drakes Bay for the months of June, July and August of 1579,

DISCOVERY OF THE PORT

Appendix VIII, show that Drake could have kedged into Drakes Estero on a flood tide in the late afternoon of June 17th. High water was about six o'clock with a 5.4 foot tide. Cermeño recorded that on the bar at the entrance to Drakes Estero in 1595 there were three fathoms of water at high tide. This depth of water would have been more than ample for the Golden Hind, even if she were down to her laden draft of 13 feet.

For reasons to be discussed further in more detail, the entrance configuration of Drakes Estero in 1579 was likely to have presented a short and direct channel to an anchorage just inside the bar, easily reached by the method known as kedging if the wind was unfavorable for sailing in. This maneuver enabled a ship to enter or leave a port by allowing the tidal current to carry her along, even against the wind if the current was strong enough. A small anchor known as the kedge anchor, with a cable attached from the ship, was carried ahead by the ship's boat. In the event that the ship was coming too near the shore, the anchor could be dropped to allow those on board to haul the ship away, after which the anchor was picked up and the procession moved along as before.

If there was neither tide nor wind, the ship could be taken in by another maneuver called warping, whereby an anchor with a cable attached to it from the ship was carried across a bar and dropped to enable the ship to be hauled in by her windlass or capstan. Both of these maneuvers are clearly described by Sir Henry Mainwaring in his Seaman's Dictionary, c. 1620-1623, excerpts of which are contained in Appendix II.

The next day after coming to anchor, probably early in the morning, the Indians, who were described by Hakluyt as having their houses close by the waterside, showed themselves on the shore. This is the first time that Indians are mentioned. Any thought that these people were fearful of showing themselves seems to be dispelled by their open curiosity. That they were not mentioned on the day of arrival may be due in part to their cautious surveillance of the strangers whose sudden appearance late in the day probably took them by surprise. With great fanfare, as it were, one of their number was sent off to the ships in a small craft described as a "canow" in World Encompassed. This was undoubtedly the same type of craft seen by Cermeño 16 years later. His description makes it quite certain that it was a tule balsa.

Starting while still a little way from the shore and a great way from

DISCOVERY OF THE PORT

the ship, as it was said, the Indian in the "canow" spoke to those on the ship continually as he approached. At some distance from the ships, he stood off and then began a more solemn and tediously long oration, using many gestures and signs, and then concluding with a show of reverence and submission, returned to shore. Shortly afterwards, he came out a second time in the same manner, and again a third time bearing gifts of a bundle of black crow feathers and a small basket of an herb called "Tabáh". Both were cast into the ship's boat, which was evidently lying in the water alongside the Golden Hind. Drake immediately entered the boat with the intention of exchanging his own offerings of friendship but could not entreat the Indian by any means to come near and receive the gifts even though they were finally floated out to him on a board; the only thing that he accepted was a hat that was cast into the water from the ship.

There is a striking similarity to the welcome accorded Cermeño, and yet there are significant differences that might be taken as indication that the Indians seen by Cermeño had been in contact with white men before if we consider the two groups one and the same. In Cermeño's case, the Indians gathered on the beach immediately. With the same fanfare, one of their number was sent off in a balsa, but the caution and reserve shown by the spokesman sent to Drake is in sharp contrast to Cermeño's, who made only one trip out to the ship, and after delivering a similar lengthy oration was induced by kind words to come alongside. He readily accepted a number of gifts offered to him and with these he returned to shore, satisfied.

There is another interesting comparison between Drake's and Cermeño's contact with the Indians. When Cermeño anchored near Drakes Estero, it can be inferred from his account that the large group of Indians seen by him assembled on the beach were on the west side of the estero. At least one village that can be attributed to this period was located on the beach (DNG 4) and two other inland also on the west side of the estero (MRN 233 and MRN 235), all three of which were close by his anchorage. The inhabitants of Limantour Spit on the east side were more than two miles away, and consequently the odds for being the first on the scene favored those who lived the closest. For the same reason that Cermeño first saw the Indians on the west side, so also is it likely that Drake first saw them there at dawn of the next day after coming to anchor, as these would have been closest to him.

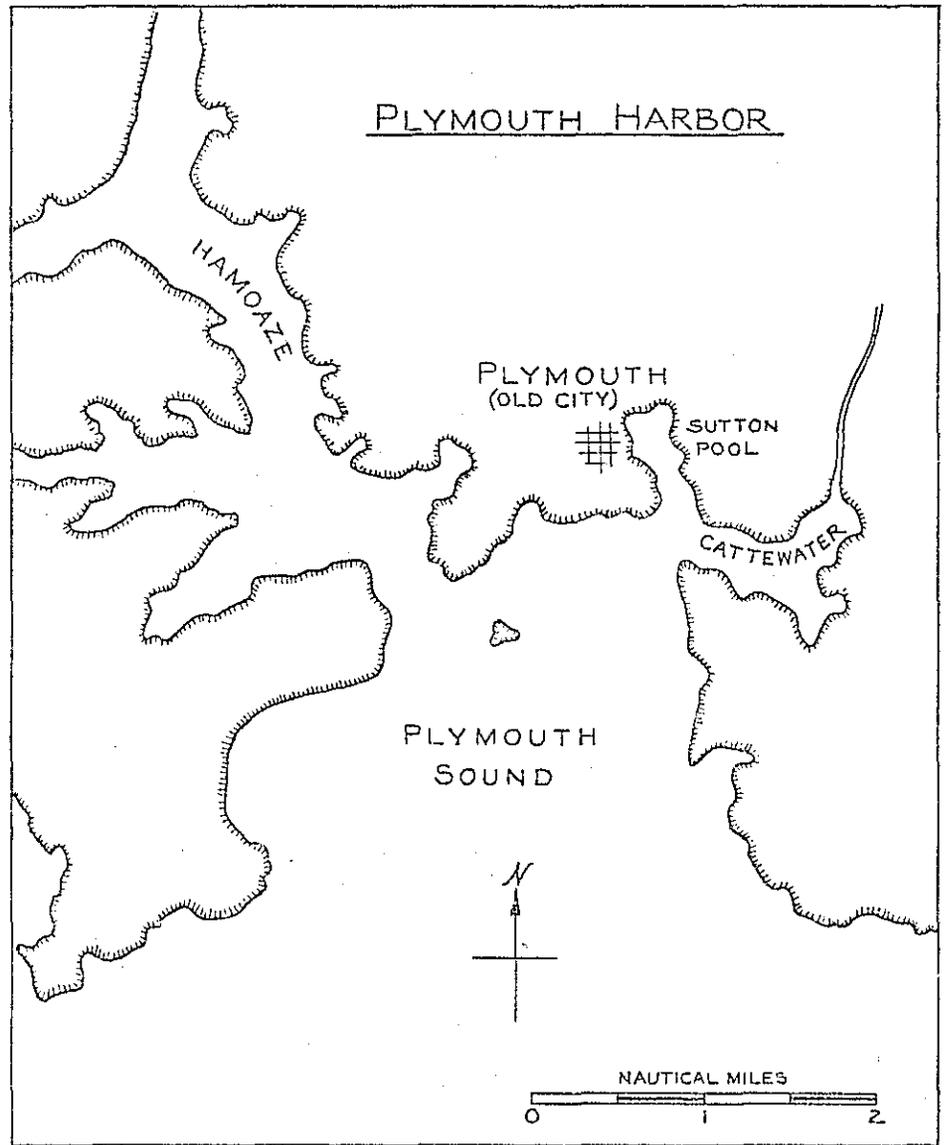
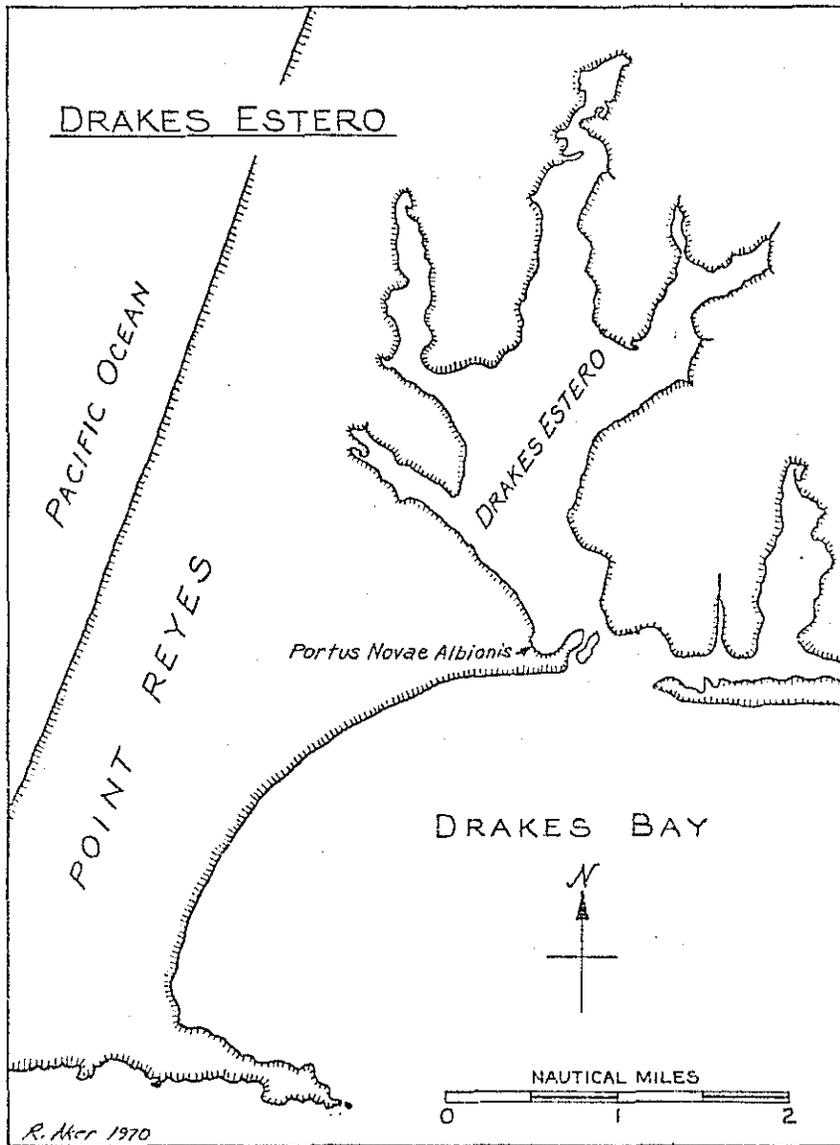
DISCOVERY OF THE PORT

There is a bare hint of the distance at which the ships were anchored relative to the Indians on the shore. The clue lies in the distance which a single human voice will carry across the water, as "...but a little from the shoare." the man in the "canow" began to speak to those on the ship. Although it was also said that he was still a great way from the ship, there is a practical limitation to the distance which a human voice will carry when merely speaking loudly as described in World Encompassed, "... the people . . . sending off a man with great expedition to vs in a canow. Who being yet but a little from the shoare, and a great way from our ship, spake to vs continually as he came rowing on." It seems hardly likely that the distance from which he began to speak could have been much more than 300 yards, if that, and thus the ship was anchored at a distance not much farther from the people mentioned. The fact that this distance is relatively limited provides some slight hint of anchorage within the estero.

Further indication that Drake was in the estero is the statement in World Encompassed following the Indian's return to his people on shore, "... After which time our boate could row no way, but wondering at vs as at gods, they would follow the same with admiration." Undoubtedly, Drake lost no time to explore the estero for a source of fresh water, as it had been 62 days since he obtained his last supply at Guatulco. The use of the ship's boat for this essential purpose, as also for taking soundings of channels, etc., is implied, but no hint is given that it entered an inner waterway from an anchorage outside. Though tenuous, it may be interpreted that inasmuch as the ship was already inside, the boat's movements were worthy of no further notice than the above.

The sense of the foregoing quotation is perfectly suited to Drakes Estero since it is known to have been inhabited on all sides by Indians. There is no place that the boat could have gone within the estero without attracting the attention of the inhabitants or where they could not follow it closely along the shore. The boat party could have clearly observed the inhabitant's curiosity and wonder as they followed along.

Robert Dudley states that Drake found his "port" while searching for water. The statement is ambiguous if viewed in the light of a comprehensive search of the coast. There can be little doubt that there was a need for fresh water by the time that Drake made his way down the coast, but it was not pressing as water could have been obtained at



COMPARATIVE SCALE OF PLYMOUTH HARBOR AND DRAKES ESTERO



DISCOVERY OF THE PORT

several anchorages enroute that were evidently passed because it is said that he did not land. Following Drake's course into Drake's Bay, the "port" referred to by Dudley could scarcely be in reference to the "harbor" which World Encompassed says that he "fell" with. However, if the interpretation of "port" is narrowed to its original usage as denoting a relatively small cove or basin where ships could be berthed for the purpose of loading or unloading cargo out of tidal currents or surge from the sea, then Dudley's statement becomes meaningful. The "port" to which he refers does not then refer to the whole harbor, but as it often did, to only a small place conveniently located within the harbor, as for example, Sutton Pool in Plymouth Harbor.

In that sense, it becomes logical that while Drake searched the estero in his ship's boat for a convenient source of fresh water, he found the "port" that he needed so badly for overhauling the Golden Hind. This introduces the prime piece of evidence for the specific site of the "port", the Portus Novae Albionis. The inset shows only a single cove or bay with no inner shelter and the Golden Hind is riding fully exposed to whatever weather or surge that could chance to come in. In view of the basic unsuitability of an outer cove of this nature and the likelihood that "Portus" refers to the type of port considered in the preceding paragraph, the site of the "port" found by Drake while searching for water must be sought somewhere within Drakes Estero.

CHAPTER VIII

IDENTIFICATION OF PORTUS NOVAE ALBIONIS

We have, so far, retraced Drake's course down the west coast from his first landfall to a haven in Drakes Estero. The next and most important step is to identify the specific site of Portus Novae Albionis within Drakes Estero.

When the Guild started to search for the portus in 1952, many important descriptive clues embodied in the accounts had not yet been recognized, or had been misinterpreted. As data accumulated, however, it became apparent that the Portus Novae Albionis inset showed a specific, very small anchorage and not an overall presentation of a general locality as assumed by earlier researchers.

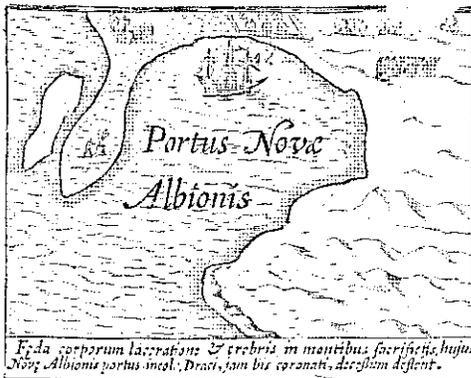
This conclusion raised a new set of questions. Had the terrain changed since 1579? Were there now shoals where once there was deep water? Where was the best source of potable water, firewood and stone for building the fort described in the accounts? At the bottom of which hill was the camp located? Did Drake seek a site within the innermost recesses of the estero to escape discovery, or entrench himself in a position from which he could prevent entry into the port by the Spanish? It was clear that the shores and waterways of the estero system must be explored carefully, and field trips were undertaken with that purpose. Documentary research was continued for clues that would define the site, and as the field trips continued, a file of photographs of the area was accumulated. After each trip, the photographs were carefully studied for similarity to the descriptions given in the sources, and particularly for any correlation with the Hondius inset view.

The break came on November 24, 1952, when a photograph taken from a high bluff on the west side of Drakes Estero revealed a resemblance between the inset view and a small cove immediately below which had formed within the sand spit separating the estero from Drakes Bay. The major clue here was the seal-head shape of the cove, a characteristic of the one depicted in the inset. Because it was formed of sand and therefore transient in nature, it was realized that this cove could not constitute positive identification, but it invited close inspection to see if there were any permanent features that would cause it to be characteristic of the site or, in other ways, provide positive correlation with the inset.

The photograph provided a second, and very important clue, in

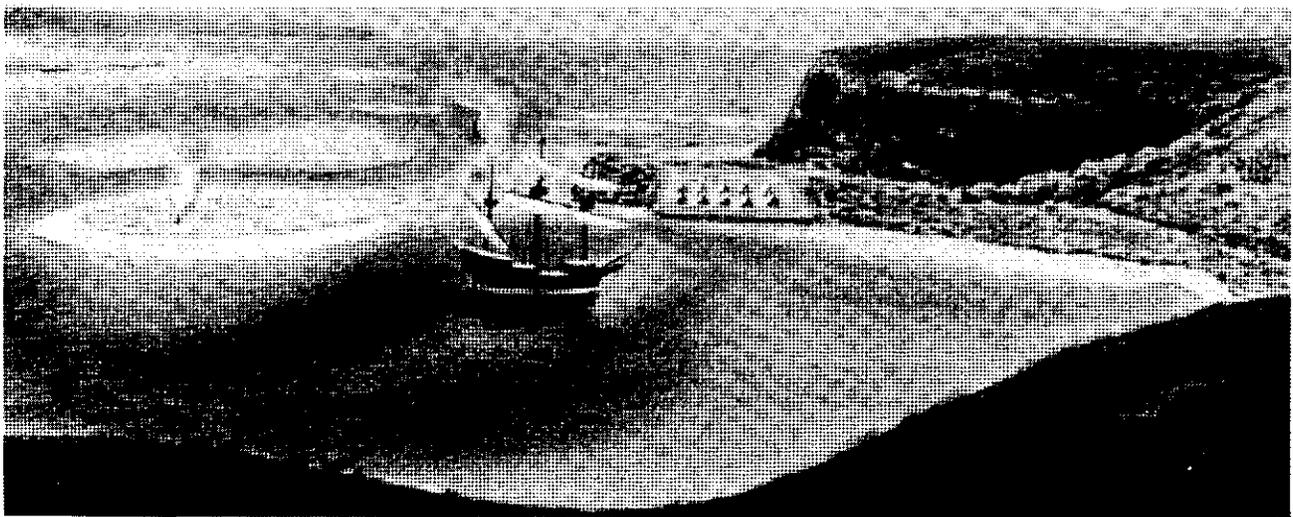


Matthew P. Dillingham



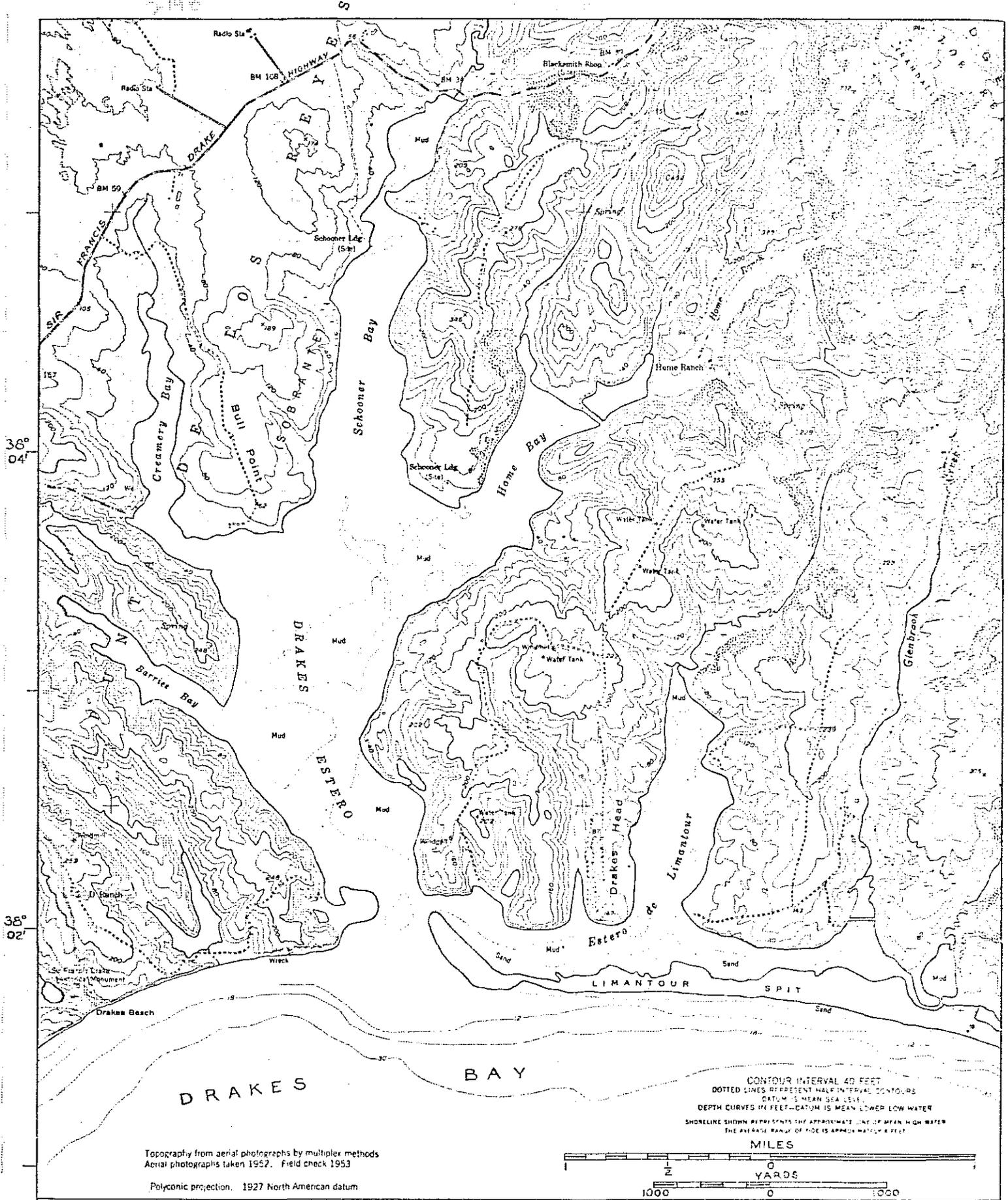
INSET FROM HONDIUS' BROADSIDE MAP

THIS PHOTOGRAPH TAKEN AT THE MOUTH OF DRAKES ESTERO NOVEMBER 22, 1952, LED TO IDENTIFICATION OF THE SITE OF PORTUS NOVAE ALBIONIS.



Matthew P. Dillingham

EARLIEST CONCEPTION OF DRAKE'S COVE OF 1579.



From U.S. Geological Survey map, DRAKES BAY QUADRANGLE

DRAKES ESTERO

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IDENTIFICATION OF PORTUS NOVAE ALBIONIS

that the most misleading factors in previous attempts at identification -- the point and its adjacent island -- were merely a sand spit and a sand island, or bar. When previous investigators studied the area, these features were possibly not in a configuration as to invite comparison with the point and island shown in the inset, and as a consequence they were not recognized for what they were.

The site was not recognized in the field because, first, the searchers were not certain of what to expect from the inset view, and second, the cove site has changed since Drake's time because of intrusion of sand fill and a cover of long established vegetation. The photograph chanced to put a frame around the one feature that was most typical of the inset and enabled it to be studied at leisure without the distraction of a vista ranging from horizon to horizon.

The logic of Drake's choice of this site was immediately apparent. It was just a step removed from the bay where the evidence placed him, yet it offered the protection of an inner cove with all of the advantages he required.

Through further study of the cove, it was found that the seal-head shape of the cove in the inset view was matched by permanent features of terrain at the site, which only indirectly influenced the formation of the cove observed in 1952. Other comparisons were also found, but the difficulty of precisely correlating the cove with the inset was due at first largely to a question of how accurate was the inset. The Guild's first opinion was that it was a landscape sketch, drawn as an artist views the scene, but modified to make it an aerial perspective view more nearly in accordance with the vertical viewpoint of a map. With this conception of the inset, fairly good agreement was expected and soon found, but in the early phases of correlation it also implied a certain amount of artistic latitude with respect to the orientation and exact contours of the cove, the location of Drake's fort, and the extent of the sand spit and island. Also, there was a question as to how much distortion may have been introduced at the original rendering and again in the process of copying by Hondius, who may have copied it from still another source. A true map representation of the cove was neither expected nor sought.

Not until September, 1958, was the full extent of Drake's Cove realized. Because it was initially expected that Drake's fort would be

IDENTIFICATION OF THE PORTUS NOVAE ALBIONIS

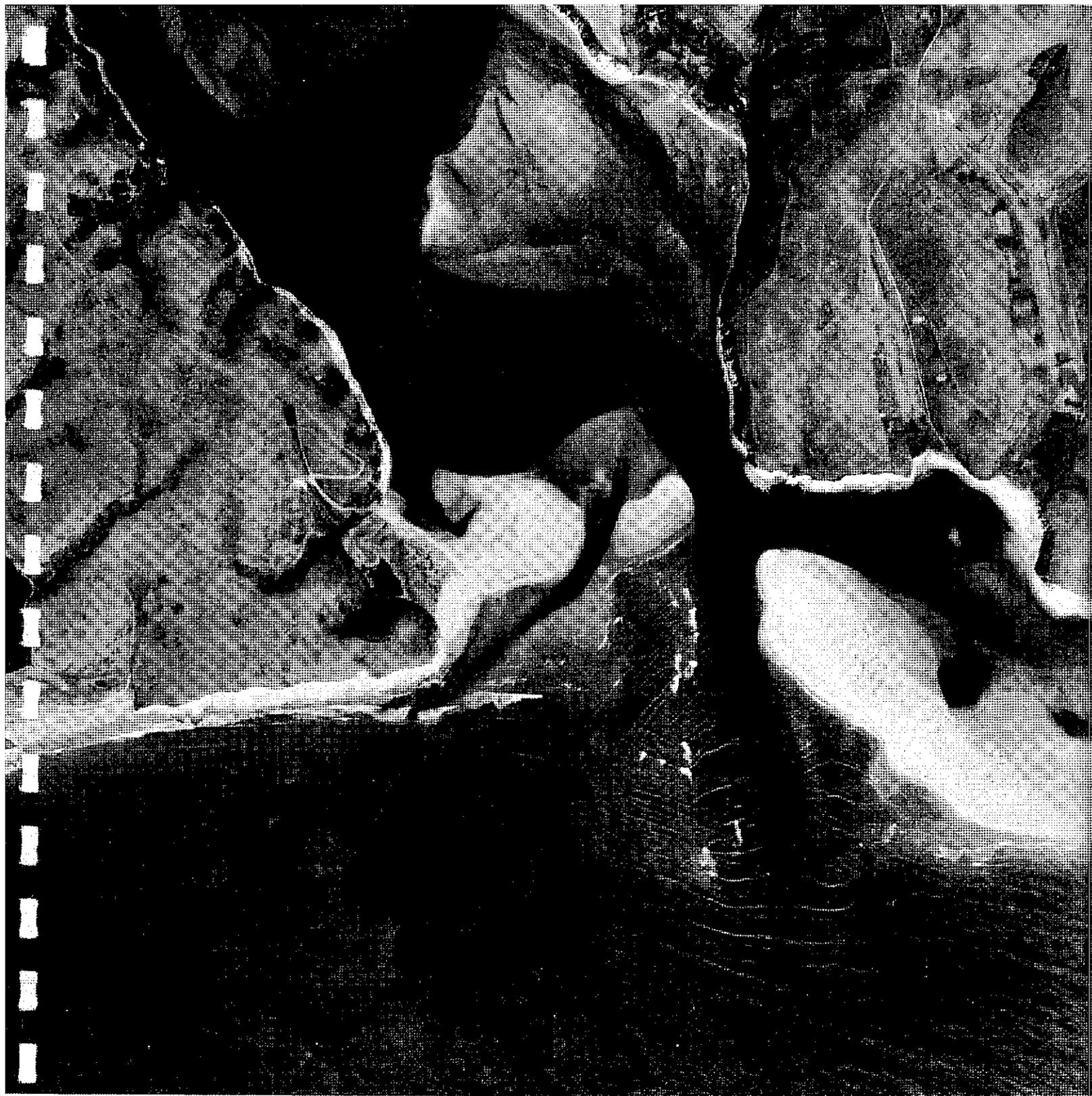
found on the fill in the cove area, extensive digging was conducted there for traces of his visit, but instead of producing positive indications of this, the work gave evidence that at high water, the entire area of the cove enclosed by the hills was open to the estero. This gave specific dimension to the cove and makes it possible to locate the fort to within a few yards of its original position. Because the inner part of the cove has been well protected, its shoreline has not been eroded by the sea, and except for minor earth slides from the hillsides, it has changed little since Drake and his men walked around it nearly four centuries ago.

Fortuitously, also in 1952, in the course of an aerial survey of the Point Reyes Peninsula made for the U. S. Department of Agriculture, a high altitude photograph was taken of the entrance to Drakes Estero. Unfortunately not acquired by the Guild until 1956, this photograph made possible a very accurate correlation between the inset and the site, and revealed that the inset view was a far more accurate drawing than at first believed. It was now recognized as a fairly accurate map projection modified to give the effect of a landscape view instead of an eyewitness sketch.

The most important feature of the 1952 aerial photograph is that it chanced to capture the entrance to Drakes Estero when its configuration was analogous to the inset view, and its bars and channels were in the situation that necessarily existed when Drake entered in 1579. In this photo, the controversial point and island can be seen in relation to the elements that account for them; underwater features are clearly visible and it shows the all important channel leading from the bay, through the bar, and to the cove. It was most fortunate that the photograph was made at this time, as a similar situation has not occurred since and may not again for many years.

By means of the aerial photograph and extensive work in the field at this site, an exacting correlation can be made with the Portus Novae Albionis inset view.

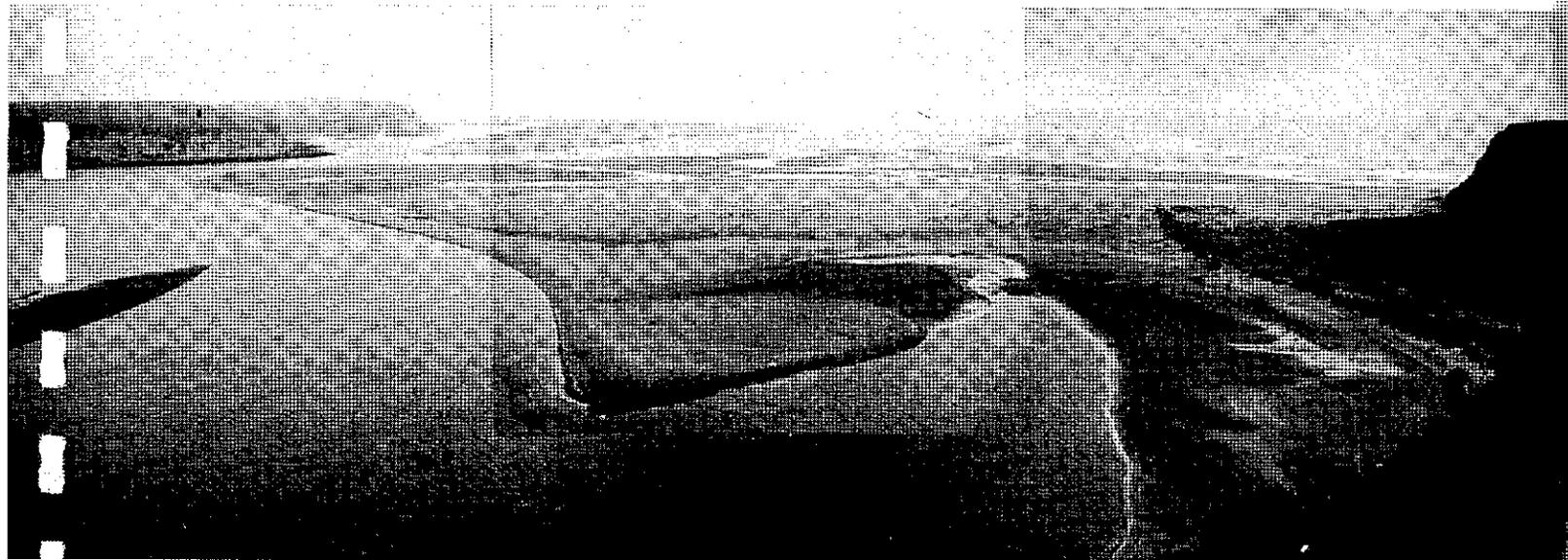
The topographic symbols shown in the inset are particularly significant in their relationship to the site. The rounded, hill, or mountain symbols have their counterpart in the rolling hills surrounding the cove on the north, west and first few hundred feet of the south side, but following the practice with such symbols, they merely serve to indicate the



U.S. Department of Agriculture

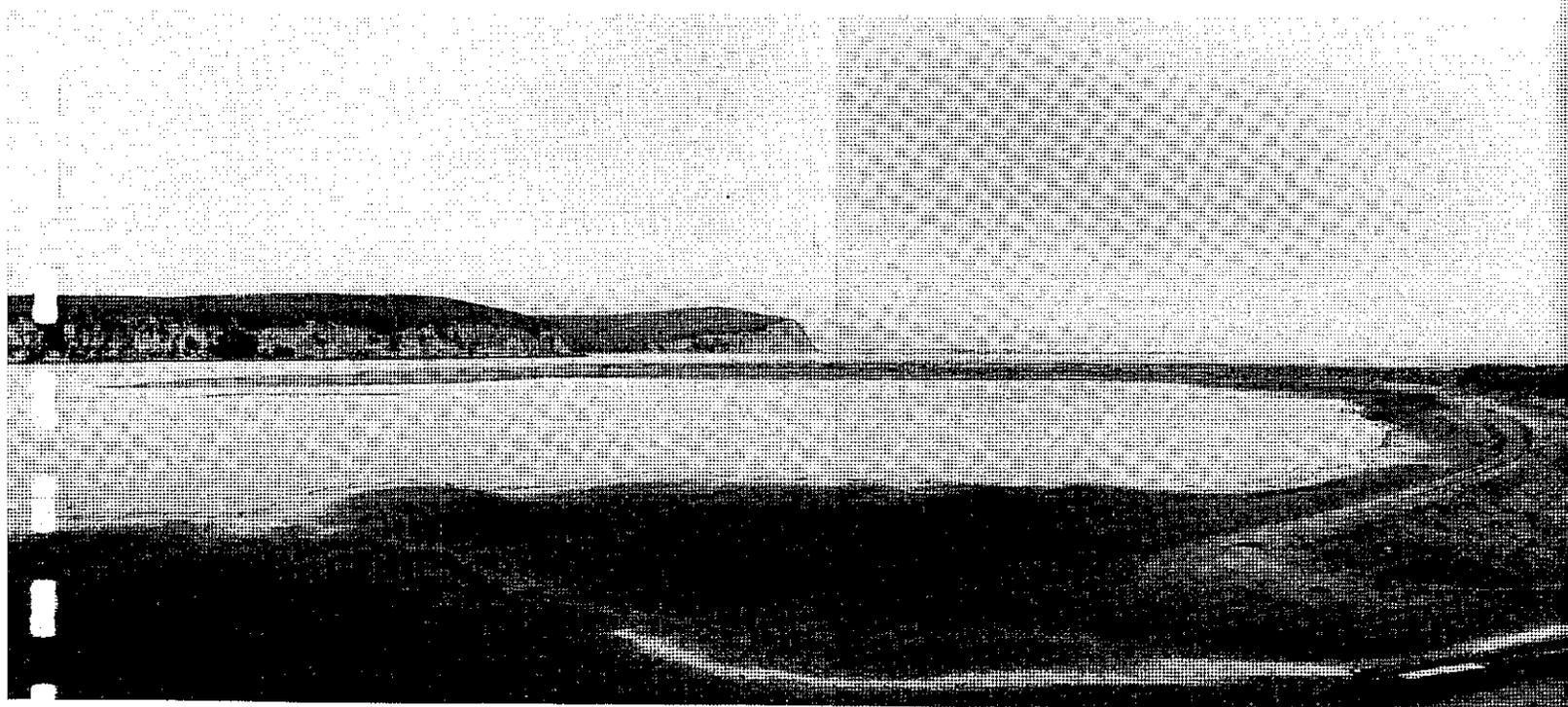
ENTRANCE TO DRAKES ESTERO

Air Photo, September 11, 1952.



Matthew P. Dillingham

MOUTH OF DRAKES ESTERO, MARCH 7, 1953.
THE SPIT AND BARS ARE IN SIMILAR RELATION
TO THE SITUATION THAT DRAKE FOUND IN 1579.



Matthew P. Dillingham

DRAKE'S COVE, APRIL 26, 1952.
THIS COVE WAS SUFFICIENT
TO CAREEN A SHIP THE SIZE OF
THE *GOLDEN HIND*.

IDENTIFICATION OF PORTUS NOVAE ALBIONIS

character of the terrain without making any pretense to topographic fidelity, hill for hill. One possible exception here is that the large hill mass shown near the right center of the inset may be an attempt to indicate the deep cleft that divides the north and west hills at the northwest corner of the cove.

The bluffs shown at the bottom of the inset have a direct relationship to those outside the cove bordering the west side of Drakes Estero, and there is a similarity between their profiles. Curiously, these bluffs are characterized by deep shadows near their crests at certain times of the day as well as by a dark, heavy growth of patchy vegetation that seemingly corresponds to the dark shading at the top of those in the inset, though it may be questioned whether the shading is intended to represent this feature.

The topographic symbols, consisting of dots and short, horizontal dashes, beginning at the fort in the inset and continuing to the left of it, have their counterpart in the flat terrain of the sand spit at the site. The single line outline of the point corresponds to the absence of elevation, or drop-off at the edge of the spit. In 1952 and up through 1956, debris, consisting of clumps of seaweed, driftwood and beach stones resembled the texture depicted by Hondius. An excellent example of this effect can be seen in the 1955 appearance of the spit. Like that in the inset, this also shows only the outline provided by the juncture of sand and water. Its smooth, spatulate outline should be compared with that in the inset.

The island shown in the inset is devoid of texture, and like the point, shows no indication of elevation. The absence of texture may be interpreted to mean that it was a sand island swept clean by the tides, as is the case with similar islands at Drakes Estero.

The symbols for trees, or a wooded area, shown in the upper left corner of the inset correspond in a general way to the bushes and small, stunted trees that exist at the site on the leeward face of the hill on the south side of the cove and continue into the draw at the southwest corner of the cove. The remainder of the terrain about the cove is clad with grass or brush for the most part. The vegetation will be discussed in more detail in a later chapter, particularly as it relates to the written accounts.

IDENTIFICATION OF PORTUS NOVAE ALBIONIS

The aerial photograph showed the exact outlines of the cove and surrounding features, which were lacking on available charts and maps, and made it possible for an extremely close comparison with the inset view. Beginning with the cove, it can be seen that the snout of the seal-head shape has very close correspondence with the profile of the present pond where it is enclosed by the hills. There are some differences in outline because of earth slides, some of which are comparatively recent, but the inset view correctly reflects the permanent, basic contours of the surrounding hills. (1) When the cove was open to the estero this soft debris would have been removed by action of wave and tides. Angular agreement between the basic shoreline profiles in the cove and their counterparts in the inset are found to fall within a range of only three to four degrees.

It was mentioned that the inset view appears to have been drawn as a map projection, modified to make it a landscape view. A comparison between the outer shore of the cove toward the bottom of the inset and the corresponding shoreline at the cove site appears to show a serious departure from fidelity; in the inset it comes to a pronounced, well defined point, whereas at the cove there is only a gently rounding contour from the cove to the shore of the estero. On casual inspection, the two shorelines present a puzzling comparison, but it was discovered very early in the field trips to the site that in accordance with the draftsman's intent to construct an oblique view, or at least to give that effect, he showed only the crest of the bluff overlooking the cove. Here, his outline corresponds point for point with features found at the top of the bluff.

Until the aerial photograph was acquired, it was not realized that there was also a considerable degree of angular correspondence between

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1. For example: at the south end of the nearly straight inner shoreline of the cove, a slide has produced a convex outline, whereas the inset shows a straight section in that area. Yet the basic form of the bluff here is straight. In the southwest corner of the cove there is an alluvial fan produced by a recent slide where the inset shows an indentation, and along the south shore another slide has produced a bump in the outline where there would otherwise be none.

IDENTIFICATION OF PORTUS NOVAE ALBIONIS

the crest of the bluff and the outline in the inset. Further, an important key to identification was found in a comparison between the small point shown at the outer corner of the bluff in the inset and a very similarly shaped point in the corresponding location at the site. This can be clearly seen in the photograph, and it is very apparent at the site itself.

The crest of the bluff overlooking the north side of the cove can be roughly discerned in the aerial photograph as the boundary between the dark masses of brush on its face and the light coloring of the grass back from the edge. Although the vegetation tends to break up this outline in the photograph, the basic form with its indentations can be discerned and easily followed on foot. The small point mentioned in the preceding paragraph can be seen slightly north of the pier jutting out from the shore at the mouth of the cove, and is followed by a decided indentation corresponding to the first indentation in the inset view. The second indentation corresponding to that in the inset is not as easily seen in the photograph as it is from the site, but lies slightly north of a point directly above the boathouse at the corner of the present cove. There is a small cleft here in the face of the bluff that merges into a sweeping bulge which falls away to the inner corner of the cove. Thus, the outline shown here in the inset begins at water-level in the corner of the cove, then rises and blends into the crest of the bluff at the cleft indicated by the second indentation. The bluff reaches a height of some 150 feet, and no attempt has been made to show the rest of the shoreline below, which, in fact, cannot be seen in its entirety from any single point on the bluff.

At the outer bluffs in the inset, there is also angular agreement for a short distance with the shoreline of the estero north of the pier, then it is shown raked back with no counterpart at the site. Since there is good agreement otherwise with most of the site, it must be assumed that the draftsman did this intentionally as a convention, or artistic liberty, to impart the effect of third dimension to his oblique view.

It may be expected that if true angular relationship is found, there should also be agreement in linear distance. To check this, the straight sided snout of the seal-head, or west side of the cove, was selected as a base line. At the cove this measures approximately 500 feet, but for purposes of comparison we will assign it a unit value of one.

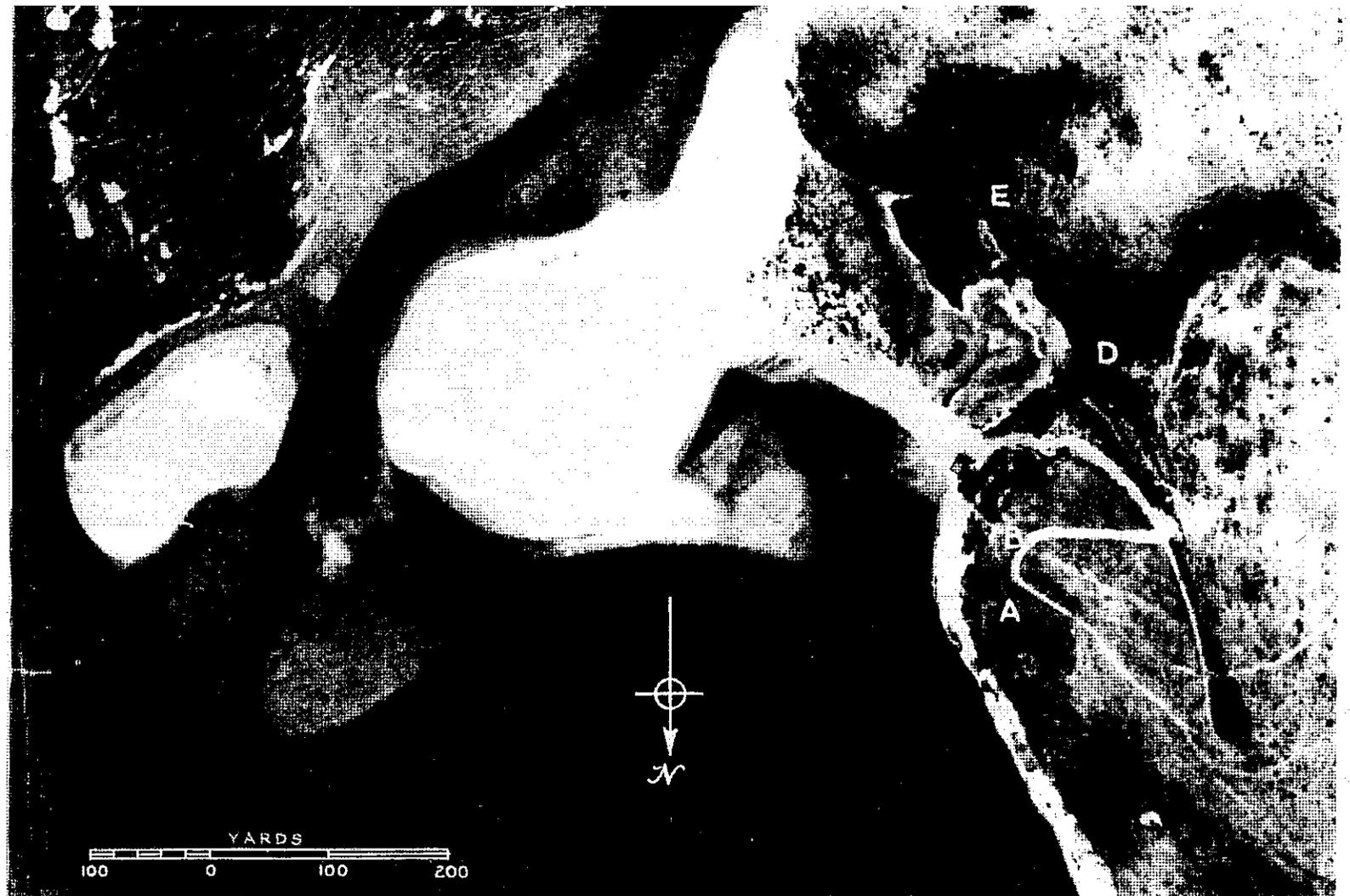
IDENTIFICATION OF PORTUS NOVAE ALBIONIS

If we concede that Drake's fort was adjacent to the foot of the hill on the south side of the cove, as the accounts indicate that it was, a fairly good relationship is found to exist between that side and the base line. It is impossible to give an exact ratio because the end of the hill is not clearly defined in the inset, but the slight change of direction in the shore at the right hand corner of the fort may be assumed to have its counterpart in the existing hill where it turns away from the cove. In this case, the ratio is 1 to 0.5 in both inset and photograph.

At the crest of the bluff on the north side of the cove there is very poor comparison. The ratio between this side in the inset and the base line is 1 to 2.2, whereas in the photograph it is 1 to 1.6; in other words, the inset shows this side to be about 300 feet longer than it should be. This would seem to cancel out the presence of scale in the inset, but the discrepancy can be accounted for by two reasons. First, the crestline of the bluff is very difficult to measure from the cove because of its abrupt rise. Second, in accordance with the rule of perspective that near objects are shown larger in relationship to those farther away, the crestline may have been deliberately enlarged in creating the landscape view of the inset.

There is agreement in scale on the north side of the cove if the shoreline is measured from the inner corner to where it turns at the boathouse. At the cove, the ratio between the base line and the boat-house is about 1 to 0.8; the same ratio applied to the inset falls at a similar point where the profile turns abruptly to match the crest of the bluff above the cove. Within this short distance in the inset there is a slight indentation which bears the ratio of 0.25 to 1 from the corner of the cove which is matched by a similar indentation and ratio at the site.

With close agreement in angular correlation between the inset view and the cove site, as well as fair agreement in linear distances, an element is introduced that makes it more than likely that the inset is more sophisticated than a freehand sketch made on the scene. In freehand sketching, low angle perspective introduces distortion in angular relationships, particularly between distant objects and those near at hand. So also is the artist unable to estimate the true depth or width of objects at a distance from him. In a freehand sketch, drawn without mechanical assistance and synthesized from a low angle to a nearly vertical viewpoint, true proportions and angular relationships cannot be expected.

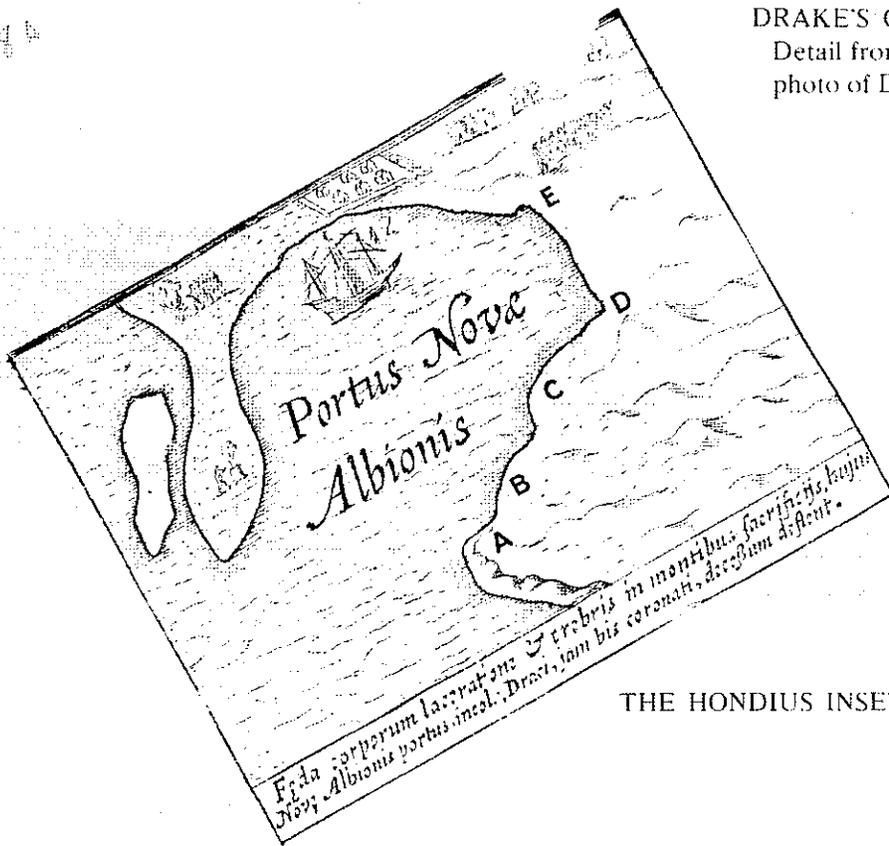


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U.S. Department of Agriculture

DRAKE'S COVE

Detail from 1952 air
photo of Drakes Estero.



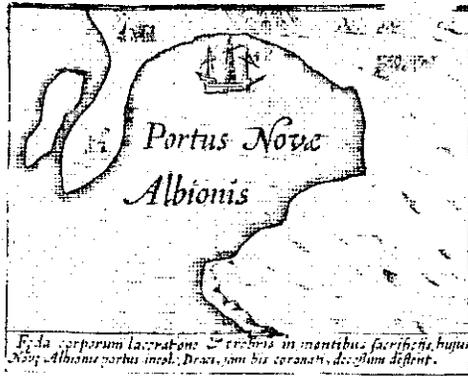
ORIENTATION
OF THE INSET

THE HONDIUS INSET



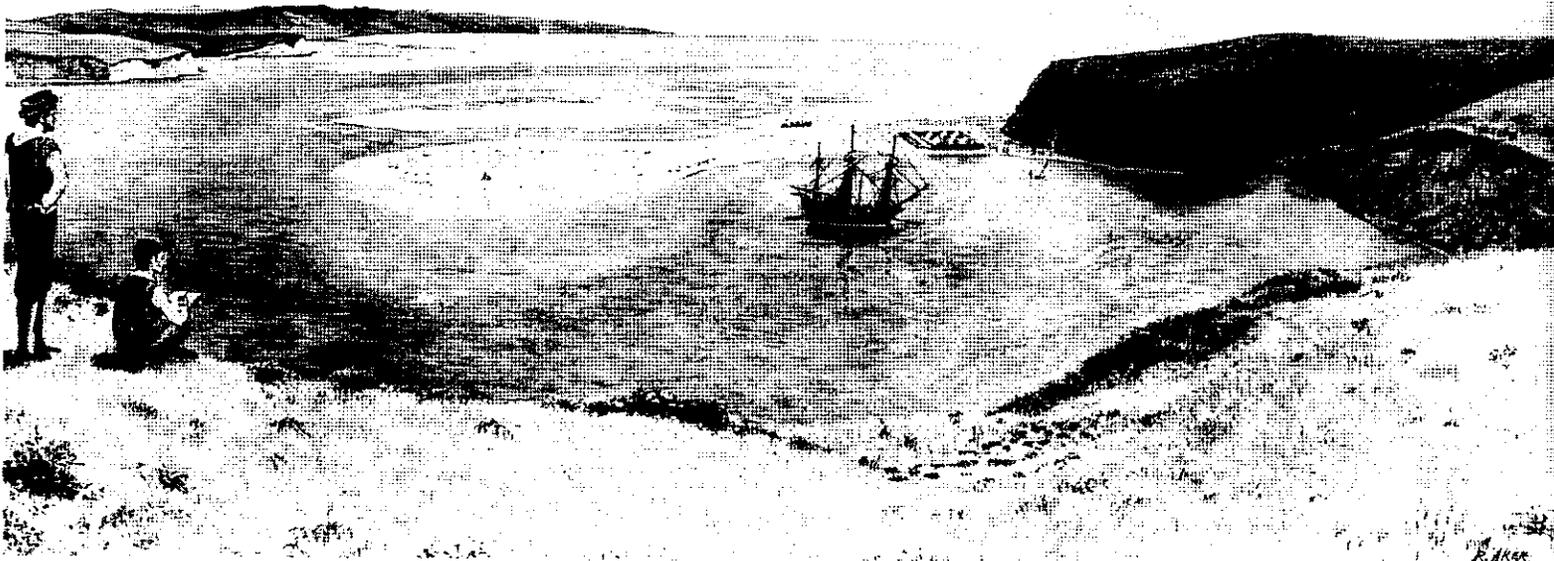
Matthew P. Dillingham

DRAKE'S COVE
February, 1955



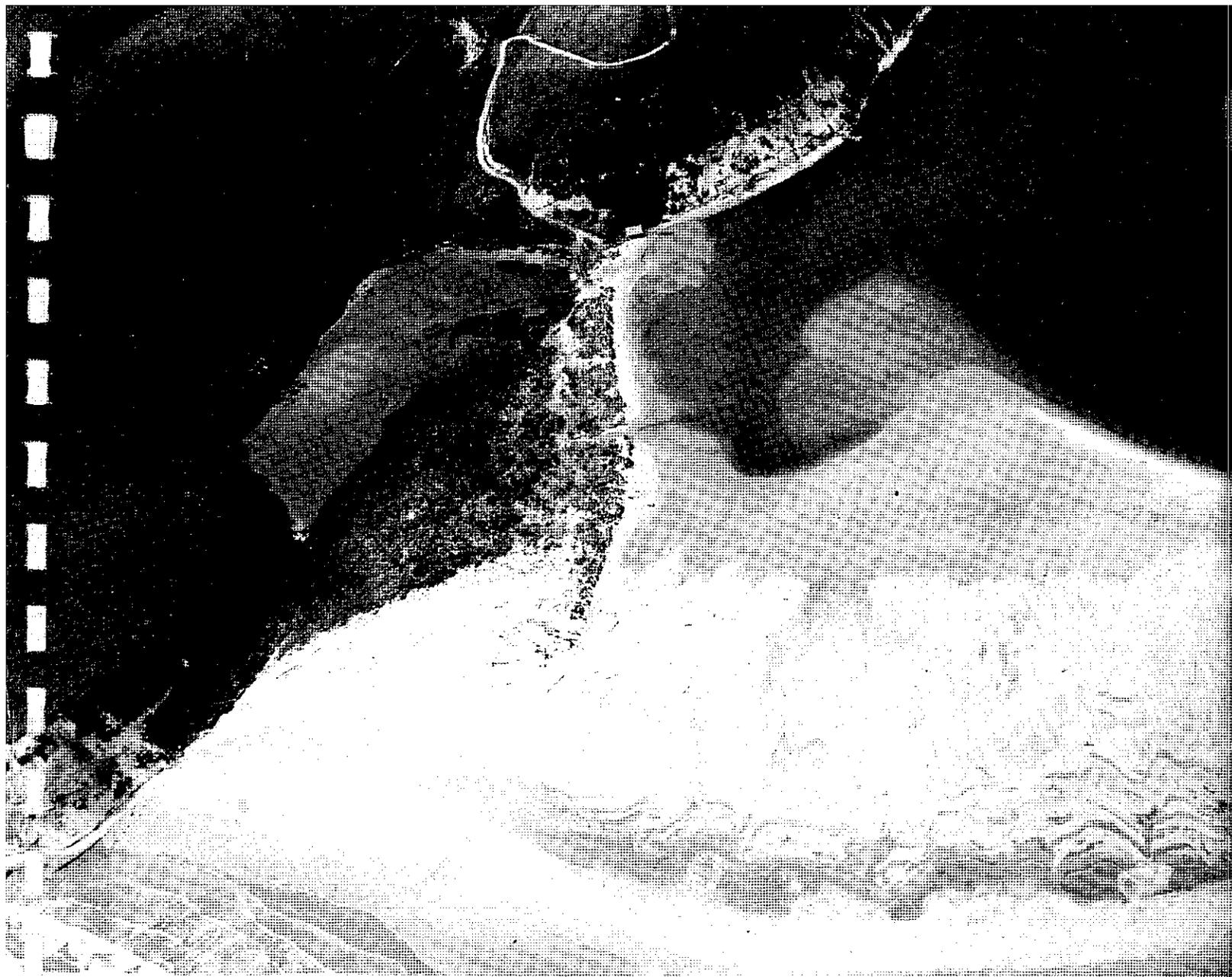
HONDIUS' INSET.

RECONSTRUCTION



Raymond Aker

CONJECTURAL APPEARANCE OF
DRAKE'S COVE IN SUMMER OF 1579.



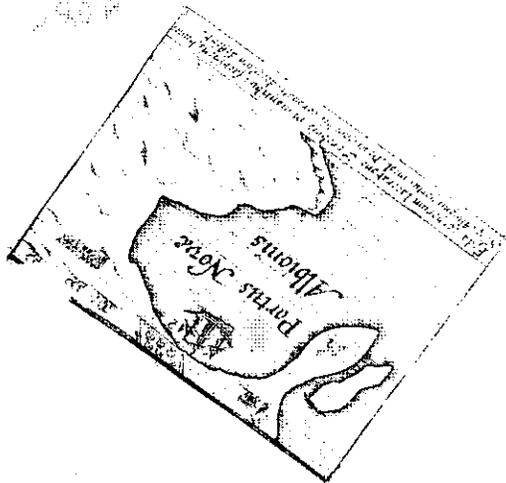
U.S. Army Corps of Engineers.
30th Base Topographic Battalion

VIEW LOOKING NORTHWEST

April 29, 1953

THE COVE

BELOW—VIEW OF INNER COVE
LOOKING SOUTHWEST

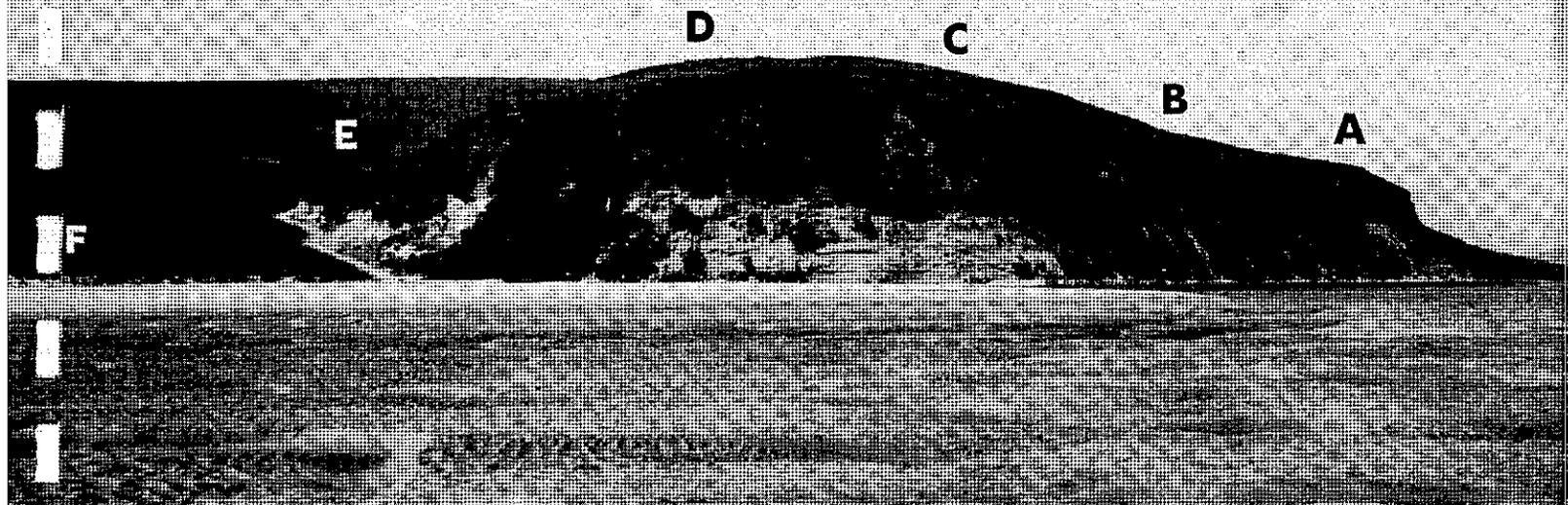


HONDIUS INSET



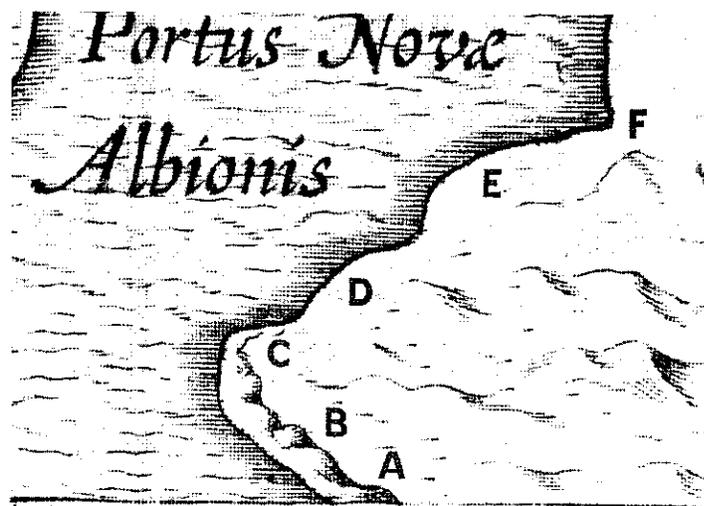
Robert W. Parkinson

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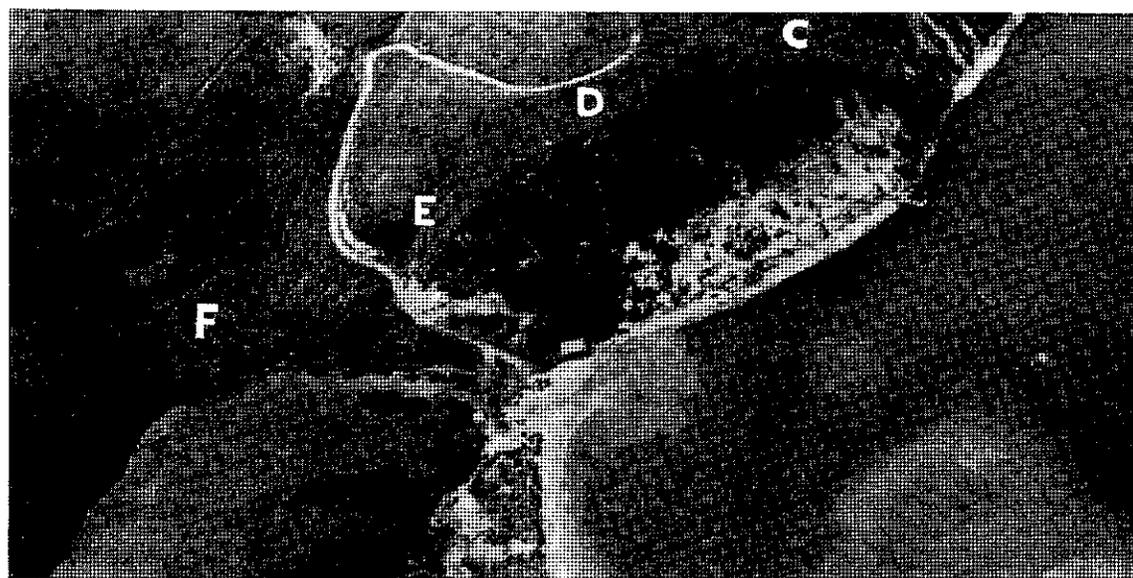
Robert W. Parkinson

VIEW OF BLUFFS FROM THE SPIT



THE BLUFFS

COMPARE THE POINT-FOR-POINT
FEATURES WITH THE DETAIL
FROM THE HONDIUS INSET
AT LEFT.



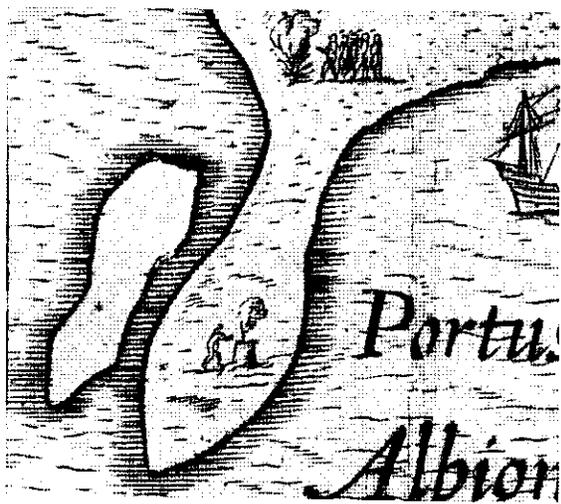
U.S. Army Corps of Engineers,
30th Base Topographic Battalion

AERIAL VIEW OF BLUFF
FACING DRAKE'S COVE



Robert W. Parkinson

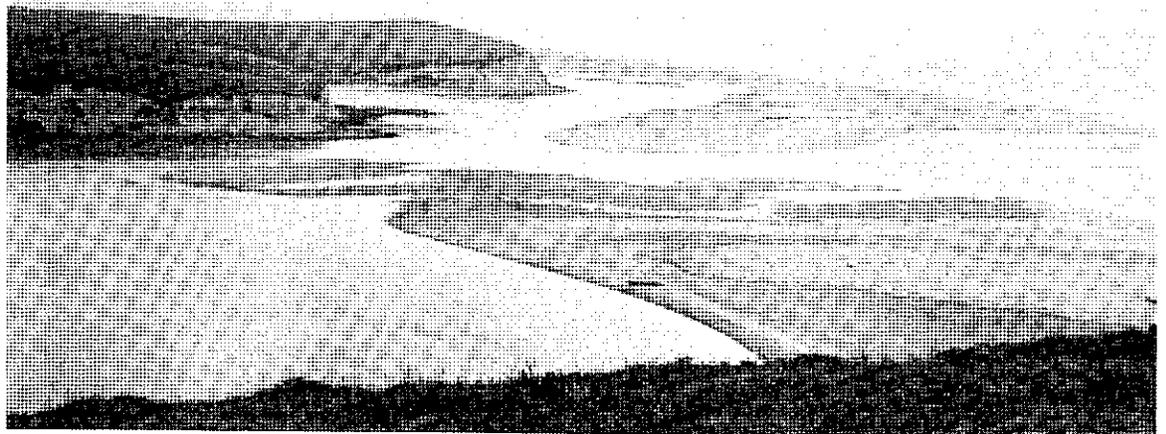
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SPIT AND BARS AT LOW TIDE, 1955.

COMPARE THE HIGH WATER OUTLINE AND TEXTURE OF THE SPIT WITH THAT IN THE DETAIL FROM THE HONDIUS INSET AT LEFT.

THE SPIT
AND ISLAND



Matthew P. Dillingham

ISLAND AT END OF SPIT.

May, 1953

IDENTIFICATION OF PORTUS NOVAE ALBIONIS

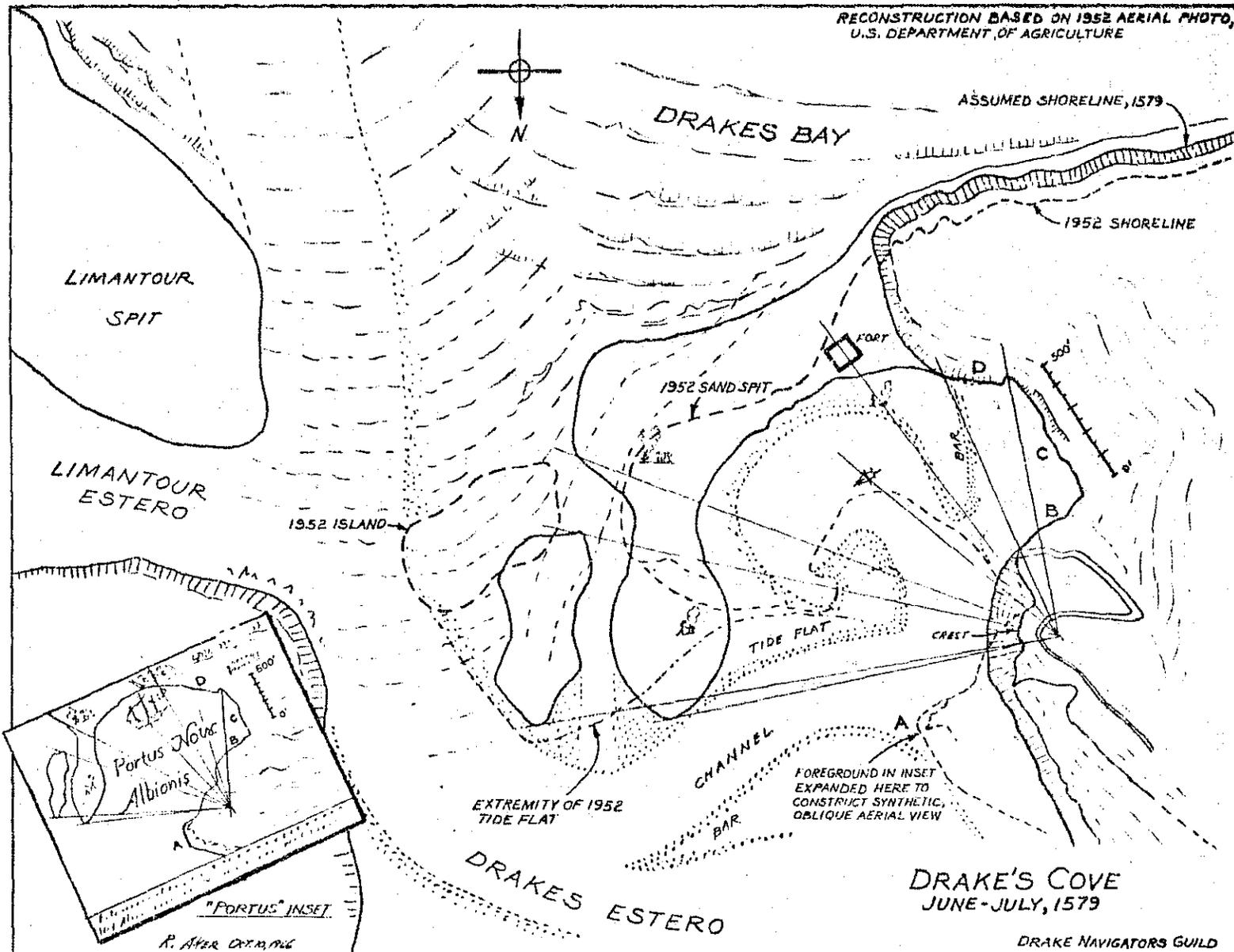
plane table construction. In this way, he enlarged his foreground in accordance with the basic rule of perspective that near objects appear to be larger than those at a distance.

This conception of the Portus Novae Albionis inset raises the interesting speculation that by plotting similar vectors from a point in the inset and from a matching point in the aerial photograph, we could thereby locate Drake's fort, the Golden Hind's anchorage and plot the location of the sand spit and the island, the position of which heretofore could only be guessed at.

The proper location and orientation of the sand spit and the island has always been puzzling; such impermanent features suggest that there might be great latitude in interpretation. The 1952 aerial photograph bears strong similarities, but it cannot be assumed that it is just like the one shown in the inset view. The photograph is valuable as a demonstration of the inherent ability of the estero to reproduce that configuration, and we can see the forces that would have produced it.

When the spit and island were plotted in accordance with vectors from the inset view, it was found that they fell in the area seen in the photograph as the submerged tips of the 1952 spit and island. During 1953 and 1954 the spit moved into this submerged area, and a photograph taken from the bluff on the north side of the cove in May, 1953, shows an island with a channel separating it from the spit which is very similar to that in the inset. In the winter of 1954 and 1955, storms vastly reduced the spit to where it was no more than a short stub on the west side of the estero, but it still retained the characteristic spatulate form shown in the inset when viewed from the bluff north of the cove.

By reconstructing the 1579 estero entrance on the basis of the inset view, it is found that the beach outside of the cove would have been a broad barrier beach somewhat of the magnitude of the spit shown on the 1941 U. S. Coast and Geodetic Survey chart of Drakes Bay, No. 5599. Also, with respect to this beach, some account must be made for an unknown amount of erosion on the cliffs facing Drakes Bay, as if they stood farther out into the bay, the beach line would tend to form farther out than it does today; 200 to 400 feet would probably be a reasonable estimate as the erosion observed in the last 15 years does not appear to be appreciable.



RECONSTRUCTION OF PORTUS NOVAE ALBIONIS

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IDENTIFICATION OF PORTUS NOVAE ALBIONIS

By plotting the corner of the beach seen above the spit in the inset view according to the scale of the base line and by vector from a reference point on the bluff north of the cove, we can find one corner of this outer beach. The spit and island were similarly plotted and were given the same axial direction, but because of the effect of foreshortening due to low angle perspective, it seems probable that they were considerably broader as viewed from directly above than they are shown in the inset. The fine, spatulate form of spit photographed from the bluff in 1955 was in reality found when measured, to be very broad in relation to its length. The inset draftsman would have attached less importance to surveying the spit and island than to the more permanent or important features of the site, such as the extent of the cove or location of the channel, and they were probably drawn much as they appeared to him from the bluff overlooking the cove. If the reconstruction is viewed from a low angle, it will be seen that the broad shapes of the spit and island take on the aspect of those in the inset.

To continue with the reconstruction, the inner part of the cove need only conform to existing contours of the hills and the remainder plotted according to the scale of the inset. If the inset scale is applied to the Golden Hind, it appears that she has been enlarged on the order of 4 to 1, which would make her about 70 feet between perpendiculars, a figure that compares well with an estimated length of slightly less than 80 feet by reconstruction. The figure is not particularly important with respect to the ship, but if we assume that the draftsman drew the fort in proportion to the ship, then the wall visible to us in the inset would have measured about 110 feet, about as large as we might expect it to have been. The fort will be discussed in greater detail in Chapter X.

A vector through the Golden Hind in the inset places her comfortably in the deep basin that would have formed in that part of the cove through natural processes which will be discussed in the next chapter. By plotting a vector through the center of the fort and locating one corner at the edge of the cove as shown in the inset, we find that the west wall would have been about 160 feet from the base of the hill, or 250 feet from its brow. This distance was probably ample when we call to mind that the Indian bow and arrows were described as more fit for children than men, doing no great harm because of their weakness.

By following the dictates of the inset, we are presented with a

IDENTIFICATION OF PORTUS NOVAE ALBIONIS

reconstruction that is compatible with a known hydrographic pattern for Drakes Estero and the existing land configurations. Thus, for example, the indentation in the outer shore of the island shown in the inset can be seen to have been cut by a refracted wave moving in echelon as the parent wave moves into the channel from the sea. The facet on the outer corner of the island is produced from the same cause. The outside facet of the point, facing toward the bottom of the view, is seen to be shaped by the channel as it turns past it. Its inside face, of slightly concave shape, corresponds to that on the 1952 island. The concavity is produced when the flood tide carries sand past the extremity of the island. The inner side of the sand spit is shaped by an eddy from the ebb tide as it enters and leaves the cove in a counter-clockwise rotation.

Wagner truly stated: "The most important piece of evidence known to us is the plan of the 'portus'." Its influence has been subtle, but once seen, its agreement with the small cove on the west side of Drakes Estero cannot be denied, nor can it be keyed accurately to any other site within the entire suspect area of Drake's landing except by gross distortion.

The Portus Novae Albionis and the Portus Javae Majoris insets were safe bits of hydrographic information from the standpoint of their value to England's rivals. Neither inset shows anything that could particularly help rival navigators to locate the ports or assist them in any way to pilot themselves through their entrances and channels; yet each is a true presentation and proof of discovery and temporary occupation by Drake.

CHAPTER IX

THE CAREENING BASIN

Maps, photographs and observations of Drakes Estero made over a period of years reveal that the outer basin of Drake's Cove is not by any means a permanent feature, and like the spit and island, it exists at the whim of nature. As may be expected of the entrance to any harbor barred by sand, the mouth of Drakes Estero is in a continuous state of change; its bars and channels are subject to shifting by the sea and tides; spits and barrier beaches are altered by the building effect of small waves on the berm, the destructive erosion of the berm by large waves, and the positive or negative effects of longshore littoral currents which transport beach materials laterally along the face of the beach and across the mouth of the estero. (1)

In 1952, the Guild had the good fortune to observe for a short time a small cove or basin in the sand at Drakes Estero that seemed to parallel the configuration of the Portus Novae Albionis inset, and this in turn led to accurate identification of the terrain shown on the inset. Obviously, by the amount of natural fill in the cove area, the small cove in the sand which led to identification of the site bore only a slight resemblance to the much larger cove shown in the inset. From surface indications and underlying stratigraphy in the fill it is evident that water occupied the entire cove at one time. The inset shows this to be the case in 1579, and because it also shows the Golden Hind comfortably at anchor within, the cove was accessible and deep enough for Drake's purpose.

It is important to examine briefly the nature of the variables and forces at work to see how it came about that Drake found the particular configuration at the cove recorded in the inset and why its basin tended to repeat this configuration in recent years and presumably will again in the future. This becomes especially important if we are to make a reasonable reconstruction of the situation at the mouth of Drakes Estero in 1579.

Drake's Cove must be regarded as of two parts; one, a permanent, natural cove formed by a recess in the hills on the west side of the estero, the innermost part of which has survived to this day as a shallow basin

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1. See Willard Bascom, Waves and Beaches, the Dynamics of the Ocean Surface, for description of shore processes specifically written for the student and general reader.

THE CAREENING BASIN

or small lagoon. It has probably changed very little since Drake's visit. For countless numbers of years before his time and continuing to the present day, the sea has progressively built a bar across the mouth of the cove from incursions of sand, gravel and rocks from its outermost headland so that as erosion cut the outer shore on Drakes Bay ever closer to the cove, it was all but cut off from the estero except for a small, connecting slough. This can be seen in the aerial photograph of 1943 before it was closed by a dam built to impound fresh water in the cove. This part of the cove was undoubtedly shallow when Drake was on the scene, but it probably had a larger tidal prism (1) and correspondingly wider entry passage.

The other part of the cove, and the one that was important to Drake, was the outer basin which comprised the largest part of it in 1579, the deepest part of which was his careening basin or careenage.

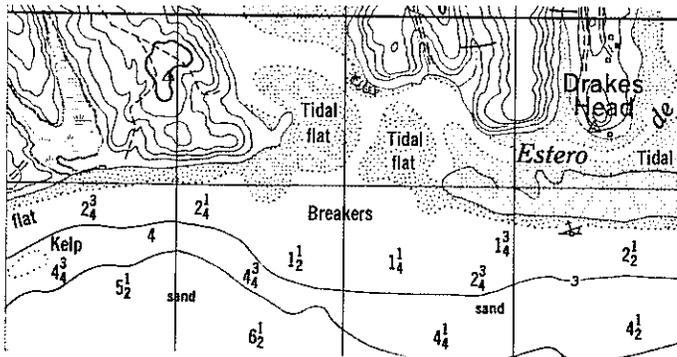
From what has been seen of the pattern of change at the mouth of Drakes Estero in recent times, Drake's careening basin formed in the course of transition between two greatly different and fairly well defined extremes of configuration at the mouth of the estero. One is the situation where the entrance channel from Drakes Bay is located far to the east toward Limantour Estero, as illustrated by the 1943 U.S. Department of Agriculture aerial photograph. The other is the situation where the mouth of the estero is entirely open to Drakes Bay and the entrance channel curves to the west as illustrated by the oblique aerial photograph taken in 1960. For several years between these dates a basin existed at Drake's Cove that was accessible to Drakes Bay by a primary deep water channel, as shown by the aerial photograph of October, 1947, and incorporated in the 1951 issue of the Army Map Service map of Point Reyes (2) and the U.S. Department of Agriculture photograph of Drakes Estero dated 1952. By mid-1956, water borne sand had completely

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1. Tidal prism is the volume of water in a bay or harbor that is enclosed between the planes of mean higher high water and the mean lower low water, thus the average volume of water that flows in during the flood tide or out with the ebb tide.
 2. AMS SERIES V795, Sheet 1460 III, 3rd Edition, POINT REYES, CALIFORNIA, Army Map Service, Corps of Engineers, U. S. Army. Aerial photography Oct. 1947.

DRAKES ESTERO ENTRANCE

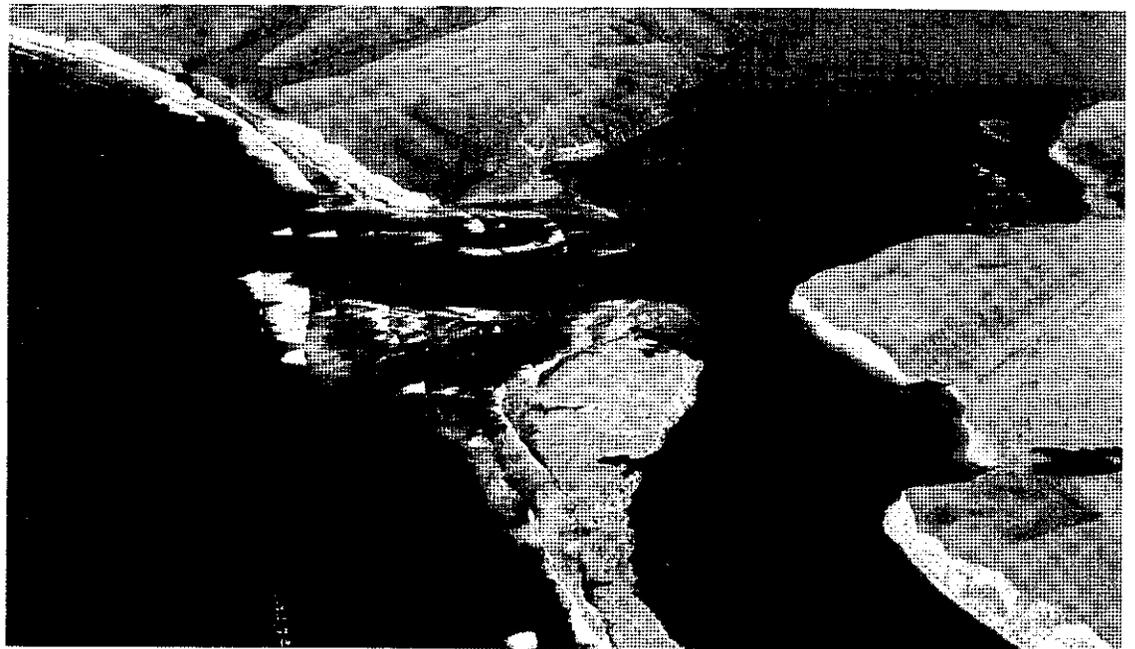
DETAIL FROM AERIAL
PHOTOGRAPH,
OCTOBER 12, 1943.

U.S. Department of Agriculture



DETAIL FROM ARMY MAP
SERVICE MAP BASED ON
AERIAL PHOTOGRAPHY OF
OCTOBER, 1947.

AMS SERIES V795, Sh. 1460 III
3rd Edition, Point Reyes, California



AERO Photographers

OBLIQUE AERIAL PHOTOGRAPH
LOOKING NORTHWEST, DECEMBER 20, 1960.

THE CAREENING BASIN

filled the basin and the protective sand spit was all but gone. A broad, sand beach, which is part of a large spit crossing the mouth of the estero once more, obliterates all traces of the basin today. (1)

The formation of the careening basin has its beginning in the situation where the entrance channel to Drakes Estero is in its eastward position on the Limantour side of the estero. Under these conditions, as shown in the 1943 aerial photograph, an extensive sand spit completely crosses the mouth of Drakes Estero, starting as a continuation of the outer beach on the west side. Within the estero, a tidal channel runs close along the inner side of the spit and sweeps past the cove to become part of a single channel connecting with all of the tributaries from the inner reaches of the estero.

During the ebb tide, the bulk of water returning to the sea from within Drakes Estero flows along the western shore at the narrows just above Drake's Cove and continues past the cove and along the inner face of the spit. The ebb flows very strongly and swiftly and thereby scours a deep, well defined channel outside the cove and along the inner side of the spit. The flow is perhaps the eventual undoing of the spit, as in the photograph it appears narrow in the center with the sea nearly breaching it; in the 1947 aspect, the entrance channel has shifted and thrusts deeply into the estero at this spot; the bed of the old entrance channel exists as a cove in the bar at the end of Limantour Spit.

When the spit was broken through and mostly destroyed, the waves and tides moved an immense quantity of sand through the breach, thus cutting off the channel which previously flowed past Drake's Cove, leaving it as a deep basin in the sand and connected with a new east-west channel crossing farther within Drakes Estero. This factor is an important part of the correlation of the Portus Novae Albionis inset, since for

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1. The large spit developed in 1966 and persisted with little change through 1969. It could herald a major change in configuration of the mouth of Drakes Estero and continue to grow to the extent of the 1943 spit or repeat the cycle of recession followed by the 1952 spit and island. Sixteen years after Drake, Cermeño apparently found the entrance to Drakes Estero on the Limantour side similar to the 1943 aspect.

THE CAREENING BASIN

the most part, Drakes Estero is relatively shallow except where scoured by tide channels, Drake had a deep draft ship which probably drew about 12 feet of water when it entered the estero. Even when the ship was lightened for careening afterwards, it is probable that she drew at least 7 or 8 feet, and for careening it must be borne in mind that the ship must be afloat throughout the operation; hove down, she would have drawn between 6 and 7 feet. For Drake's purpose, any cove **accessible from the main** channels had to be deep enough to allow this operation.

In 1947, a small spit protected the basin from sand intrusion from the sea, forming a sort of natural breakwater. By 1952 it had grown greatly, thus further protecting the basin for a time, although when the Guild arrived on the scene, a bar had begun to form across its mouth. Soundings taken in 1954 showed depths from 6 feet at its head deepening to 15 feet as the outer channel was approached. One of the features of this basin was that the inner shore lying toward the sea was steeply contoured by eddy currents from the tide. The effect of these apparently had much to do with shaping the inner side of the spit shown in the inset. It is an interesting point of correlation that the Golden Hind is shown moored with her bow to the natural, counter-clockwise tidal circulation of the cove, a circulation generated by both the ebb and flood tides. This was the logical and natural riding attitude for a ship in this cove, even aside from the effect of prevailing winds.

The ability of Drake's Cove to recur periodically rests strongly on the fact that as the waters of Drakes Estero move out to sea on the ebb tide, they are funneled toward the west bank where the estero narrows, just above the cove. This relatively permanent feature can be seen on numerous maps and aerial photographs of Drakes Estero which show the pattern of tidal channels. The channel at this point is deep and ebb currents tend to impinge powerfully on any sand formations outside the cove as well as on the inner side of the spit.

Though it may seem to belabor the point, it is important also to recognize the capability of reaching this cove from the sea, as obviously any cove, no matter how deep, could not have been of service otherwise. On October 22, 1967, soundings were taken in the cross channel from Drake's Cove to the entrance of Drakes Estero. At this time the spit from the west side crossed the mouth of the estero in a manner similar to that of 1952 (minus careening basin) and was somewhat repeating



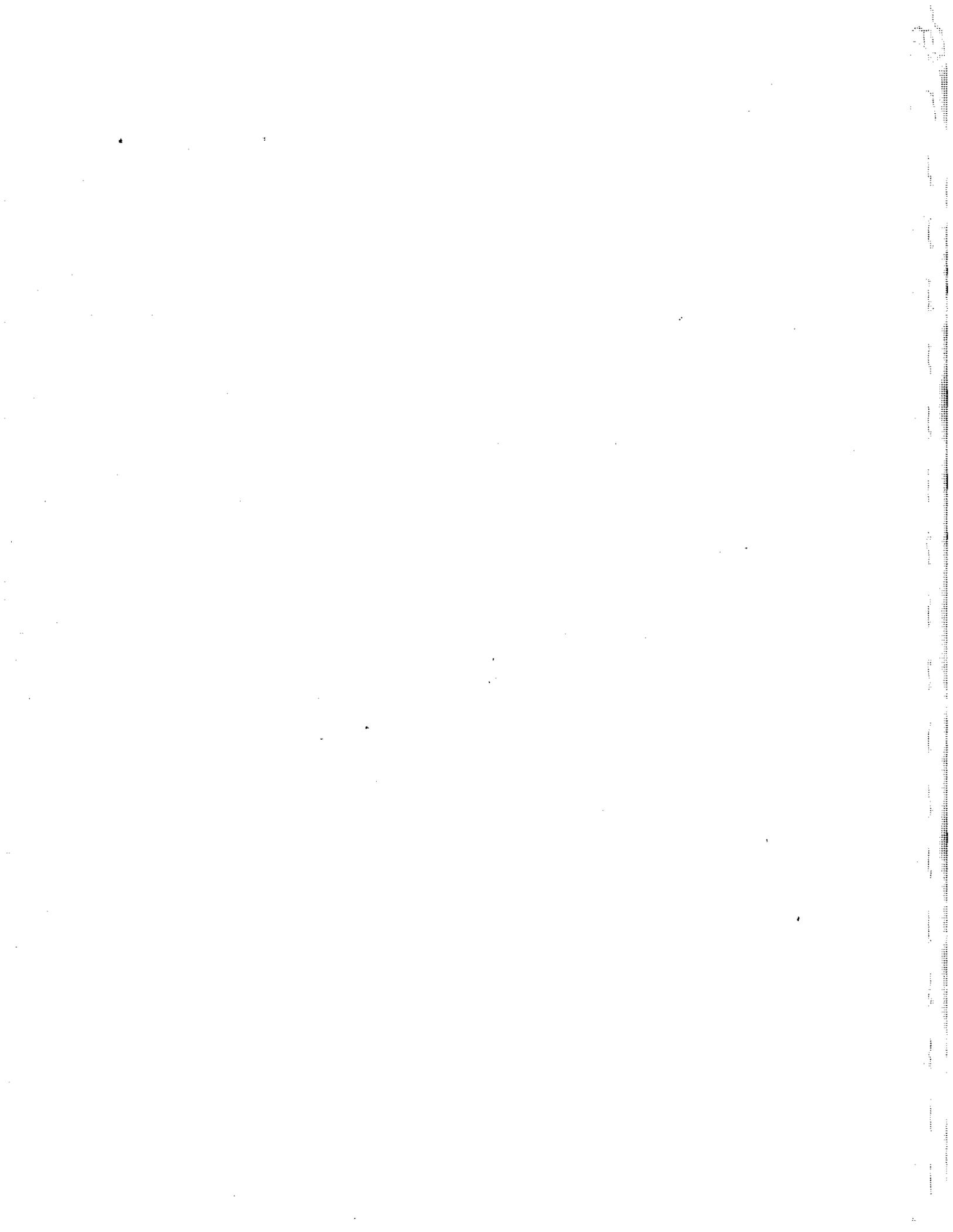
Matthew P. Dillingham

LOW TIDE VIEW OF DRAKE'S COVE FEBRUARY 19, 1955, SHOWING SCOURING OF THE BANKS BY TIDAL FLOW WITHIN THE COVE.



Matthew P. Dillingham

AT LEFT, VIEW OF THE COVE MARCH 10, 1956 WITH THE *GOLDEN HIND* OUTLINED IN THE SAND. STORM WAVES HAVE OVERTOPPED THE SPIT AND BEGUN FILLING THE COVE.

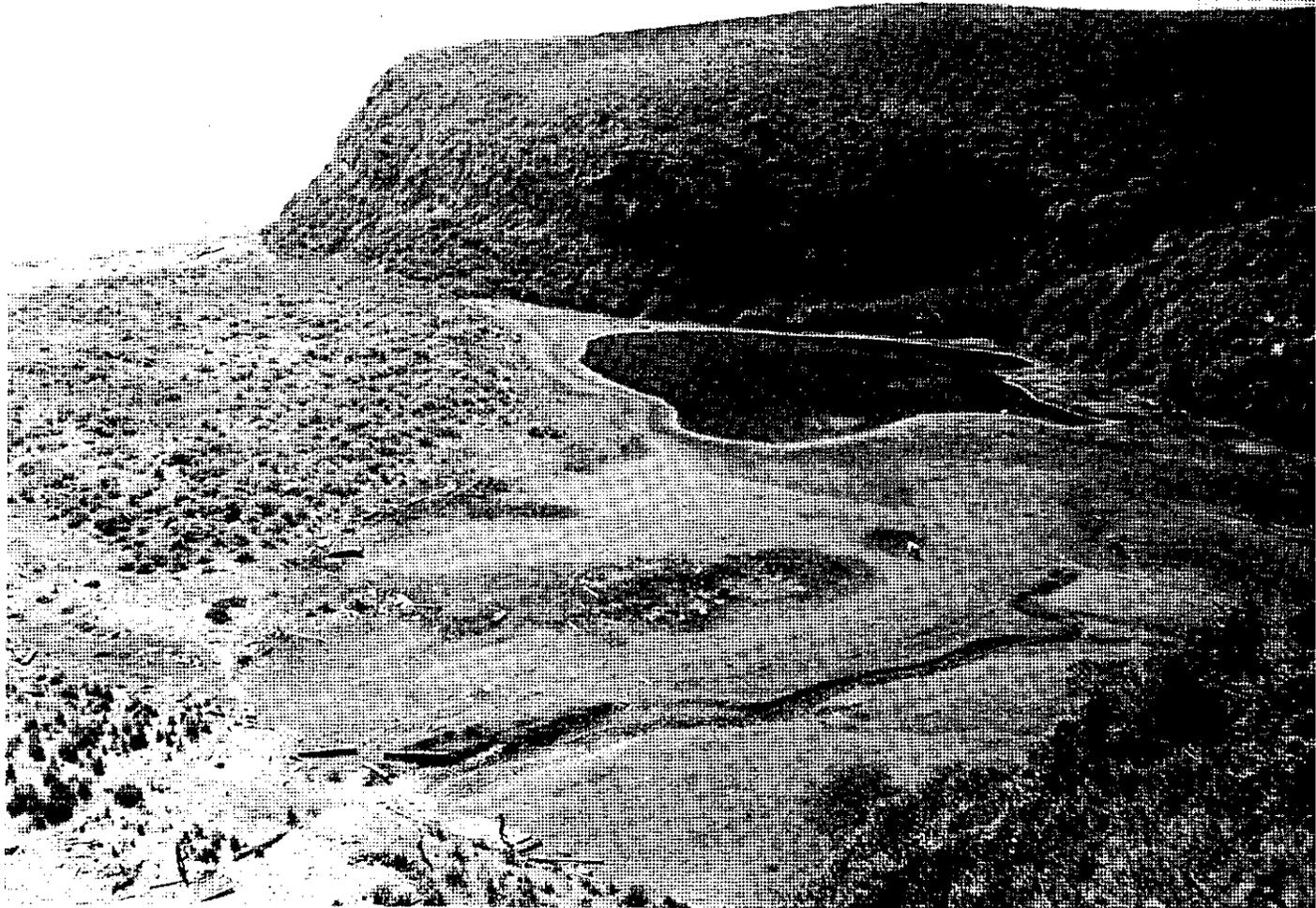


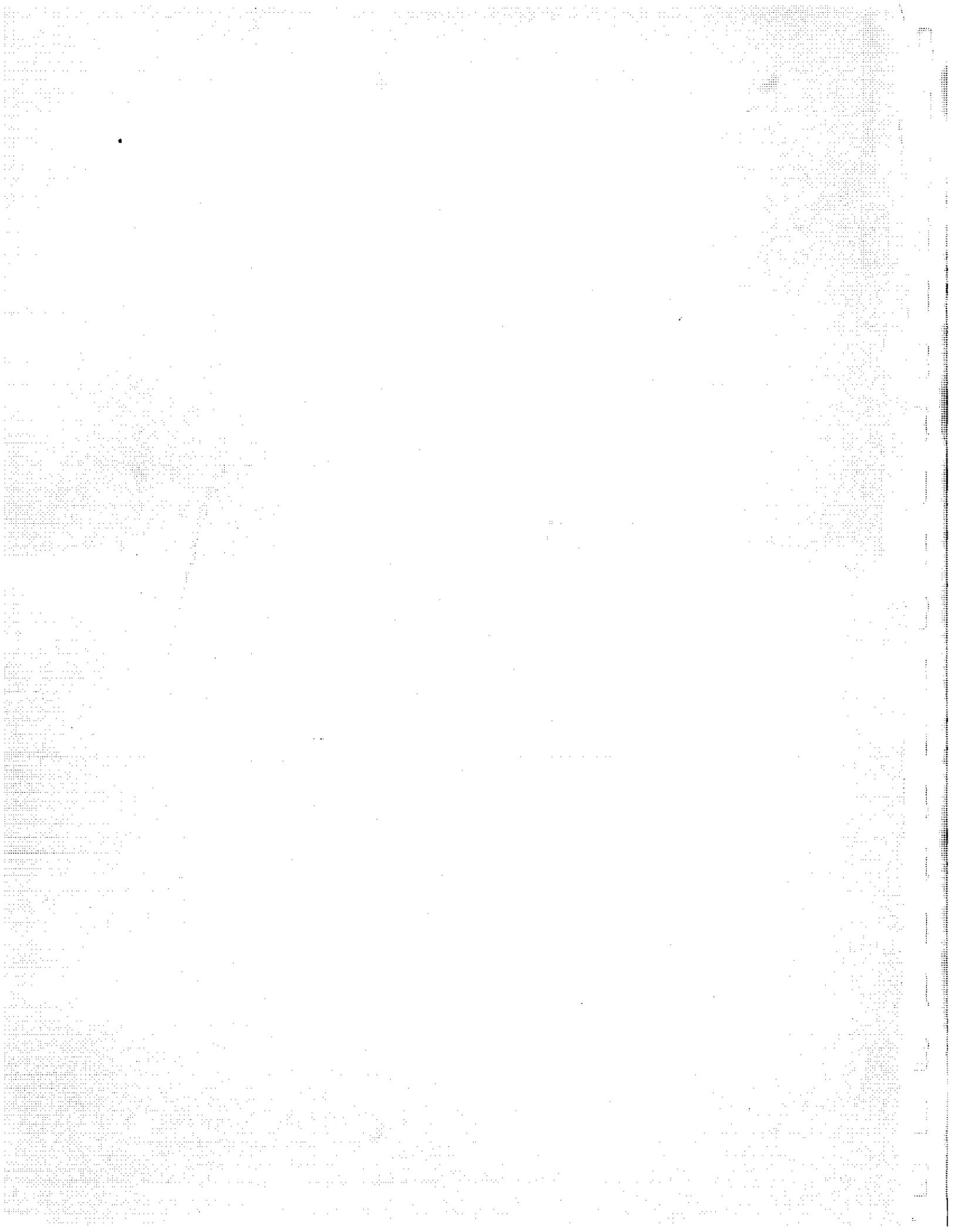


IN 1943, WHEN THE AERIAL PHOTOGRAPH AT LEFT WAS TAKEN, THE INNER COVE WAS STILL OPEN TO THE SEA. IN THE VIEW BELOW, TAKEN IN THE SUMMER OF 1953, THE COVE HAD BEEN CLOSED OFF BY AN EARTH FILL, BUT THE TIDE SLOUGH IS STILL VISIBLE.

Matthew P. Dillingham

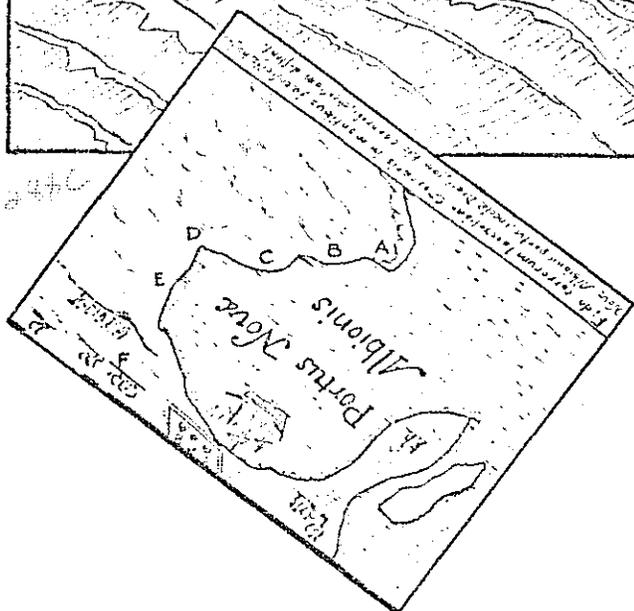
2978







Drake Navigators Guild



Hondius Inset

RECONSTRUCTION OF LOW TIDE ASPECT
OF DRAKE'S COVE, JUNE-JULY, 1579

THE CAREENING BASIN

the situation that existed when Drake arrived. At high water of 5.2 feet on this date, depths from 15 to 18 feet were found throughout the deepest parts of the channel. Rough seas prevented the taking of soundings in the entrance channel and on the bar, however, when in September of 1951, the Guild entered Drakes Estero with Captain W. W. Wood, commercial diver, in his work boat, M. V. Salvager, 13 feet of water was sounded on the bar with depths reaching 30 feet inside of the entrance. Captain, R. W. Dale, California Department of Fish and Game entered Drakes Estero on June 30, 1959, and reported soundings of 8 feet on the bar at low tide with depths increasing to 12 feet in the entrance channel.

It has been pointed out in the correlation of the Portus Novae Albionis inset that the sand spits and island correspond to a great degree with the 1952 aspect of the estero's entrance. In this situation, the entry channel to the estero was constricted on either side by sand spits which created a relatively narrow entrance through which the total volume of the tide, or tidal prism, was constrained to flow in or out. In conformance with Venturi's principle of fluid mechanics, this constriction tends to increase the velocity of the flow and thus maintain a well defined channel of good depth. In addition, a nozzle effect is produced, which, in the case of the ebb tide, tends to cut an unimpeded channel directly into the sea. A reverse effect caused by the flood tide can be seen to have cut a separate channel deep into the tide flats facing the entrance. When the tide ebbed on the occasion of the Salvager's visit to Drakes Estero, the current was found to run at 5 or 6 knots.

In concluding the subject of channels in Drakes Estero and their relation to the historical pattern of 1579, it is worth noting that in a study of bays on the U. S. Pacific Coast made by Morrrough P. O'Brien in the late 1930's, he found a constant ratio existing between the natural cross section area of the entrance channels and the volume of the tidal prism. ⁽¹⁾ It is a matter of interest as well as historical record that when Cermeño explored the estero in 1595, he reported finding 3 fathoms of water on the bar at high tide; the Spanish fathom, or braza, equals 5.49 feet, thus giving 16.5 feet over the bar. This is somewhat more than has been found in recent years and would seem to indicate that

1. Bascom, Waves and Beaches, p. 249.

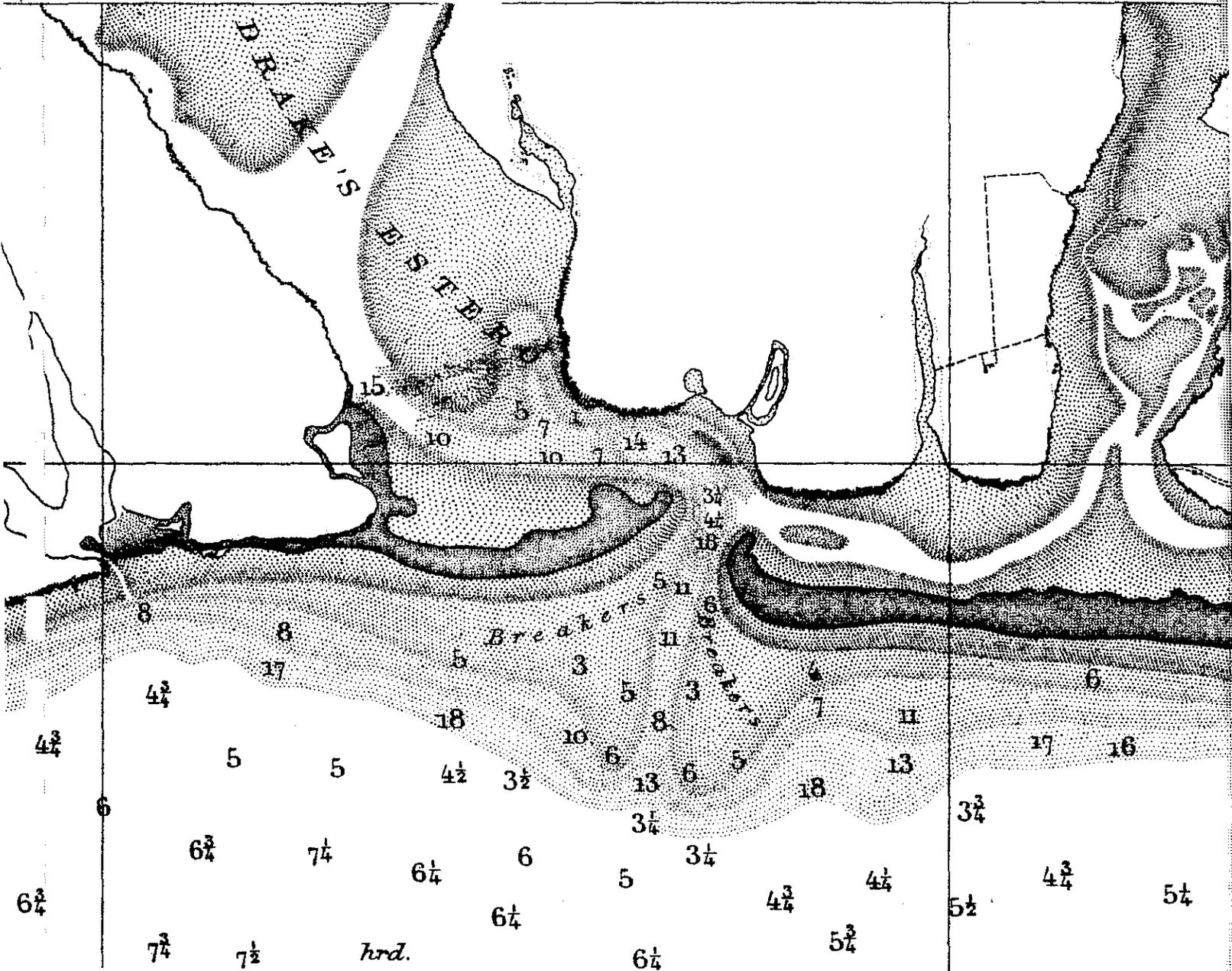
THE CAREENING BASIN

there was a larger tidal prism than that in 1959, which might be expected after 364 years. The progressive silting that occurs in most estuaries favors a lesser tidal prism today. Much of it in Drakes Estero comes from the sea where sedimentary materials are churned into suspension in the water by breakers at the mouth and then carried in by the tide. The suspended materials then settle out in quiet waters inside. Farming in historical times has undoubtedly added to the silting by soil erosion.

Change in sea level has apparently been slight, judging from indications on the shore, such as water cuts and sites of Indian villages on Limantour Spit dating back to the sixteenth century. Mr. A. J. Galloway, Research Associate with the Department of Geology, California Academy of Sciences, gave the following opinion: "The area is one of active earth-movement, so that there probably has been some local vertical movement of the land relative to the ocean. It is clear from the geology that Drakes Estero is a recently depressed area, hence the invasion of the sea into these 'drowned valleys.' My guess would be that this sinking is still going on, geologically speaking; but over the past 390 years the amount would be measured in inches rather than in feet."⁽¹⁾

When Cermeño took his sounding, the indications are that the entrance was located in approximately the position shown in the 1943 aerial photograph and was also a constricted channel confined between two sand spits.⁽²⁾ Francisco Bolaños, a sailor with Cermeño and pilot with Vizcaino in 1602, described the estero entrance in a derrotero written on the latter's voyage: ". . . On the northeast side [of Drakes Bay] ⁽³⁾ there are three white cliffs very near the sea, and in front of the one in the middle an estero enters with a very good mouth without breakers."⁽⁴⁾ Vizcaino anchored close inside the east end of Point Reyes, remained only overnight and made no landing. As a consequence, it is highly likely that Bolaños made his description on the basis of his experience with

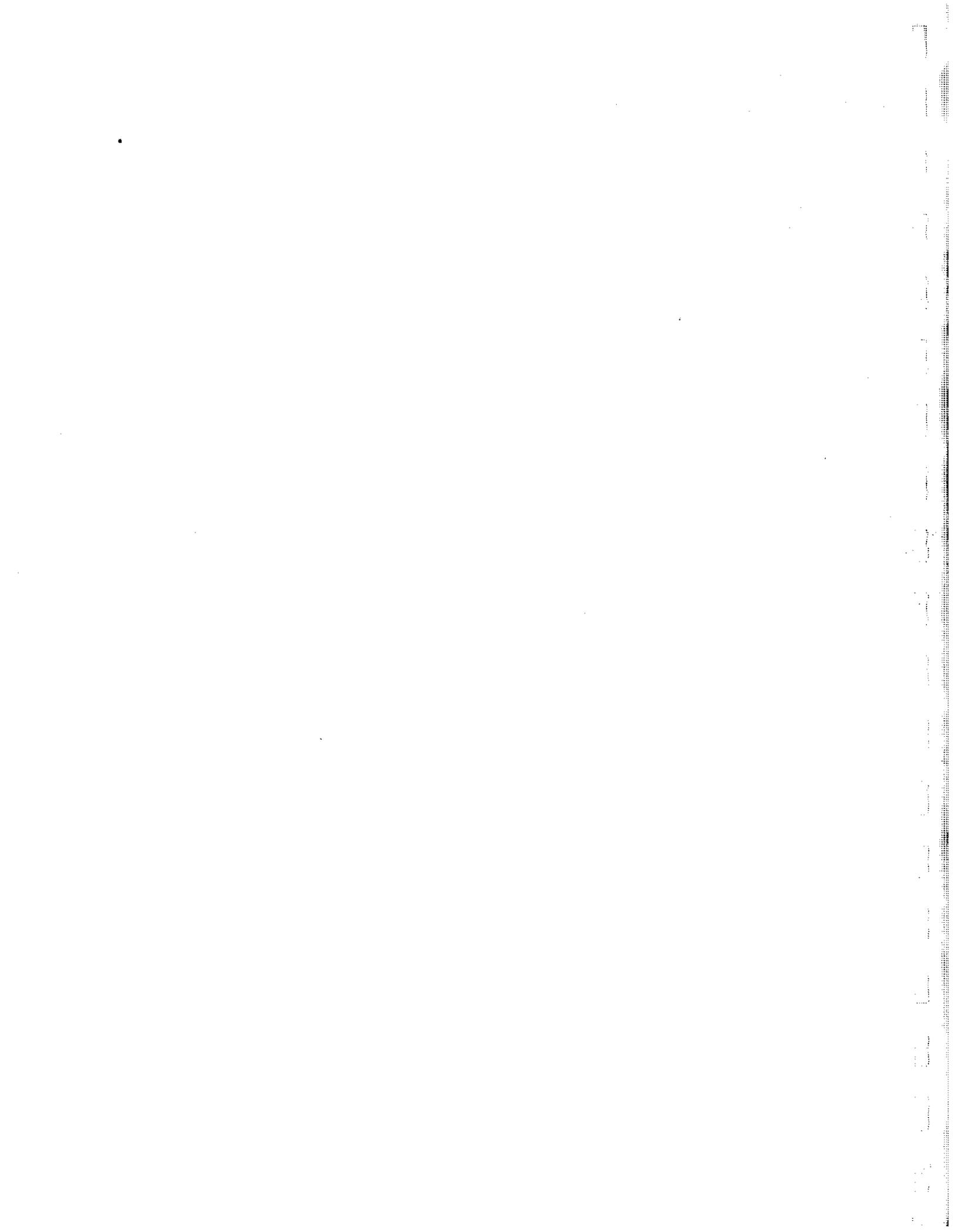
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1. Personal correspondence.
 2. See R. Aker, The Cermeño Expedition at Drakes Bay, 1595, chapter entitled, "Exploration of Drakes Estero," p. 32.
 3. Brackets by Ed.
 4. See the "Bolaños-Ascension Derrotero," Wagner, Spanish Voyages, Appendix VII, p. 435.



SOUNDINGS

The Soundings are expressed in feet to 18 feet, or within the dotted surfaces, beyond them in fathoms and show the depth at the mean of the lowest low water of each 24 hours the plane of reference. The dotted surfaces beyond low water mark represent the bottom within the respective depths of 6, 12, and 18 feet. The characteristic soundings only are given on the map, they are selected from the numerous soundings taken in the survey, so as to represent the figure of the bottom.

DETAIL FROM U.S.C. & G PRELIMINARY CHART OF DRAKES BAY, CALIFORNIA, 1860, SHOWING SOUNDINGS IN DRAKES ESTERO.



THE CAREENING BASIN

Cermeño, assuming that the channel had not materially relocated in the intervening seven years. There is good reason to believe that a channel in that position remains fixed for a relatively long period of time (1) The depth of water on the bar reported by Cermeño was more than ample to bring in the Golden Hind even if she had been down to the 13 foot draft recorded in World Encompassed when grounded in the Celebes. (2)

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1. The pocket in the bluffs seen just inside the entrance in the 1943 aspect acts as an elbow in a pipeline and forces the ebb tide current to turn here where it then tends to jet through the outer bar. The natural tendency of the west spit to move inward from the action of the sea tends to lock the channel into this position. It probably persists for a relatively long time here until a breach occurs that permits a new channel to form away from the influence of the bluffs.
 2. Penzer, ed., The World Encompassed; p. 80. The account stated: ". . . our ship, who required thirteene foot of water to make her fleet."

CHAPTER X

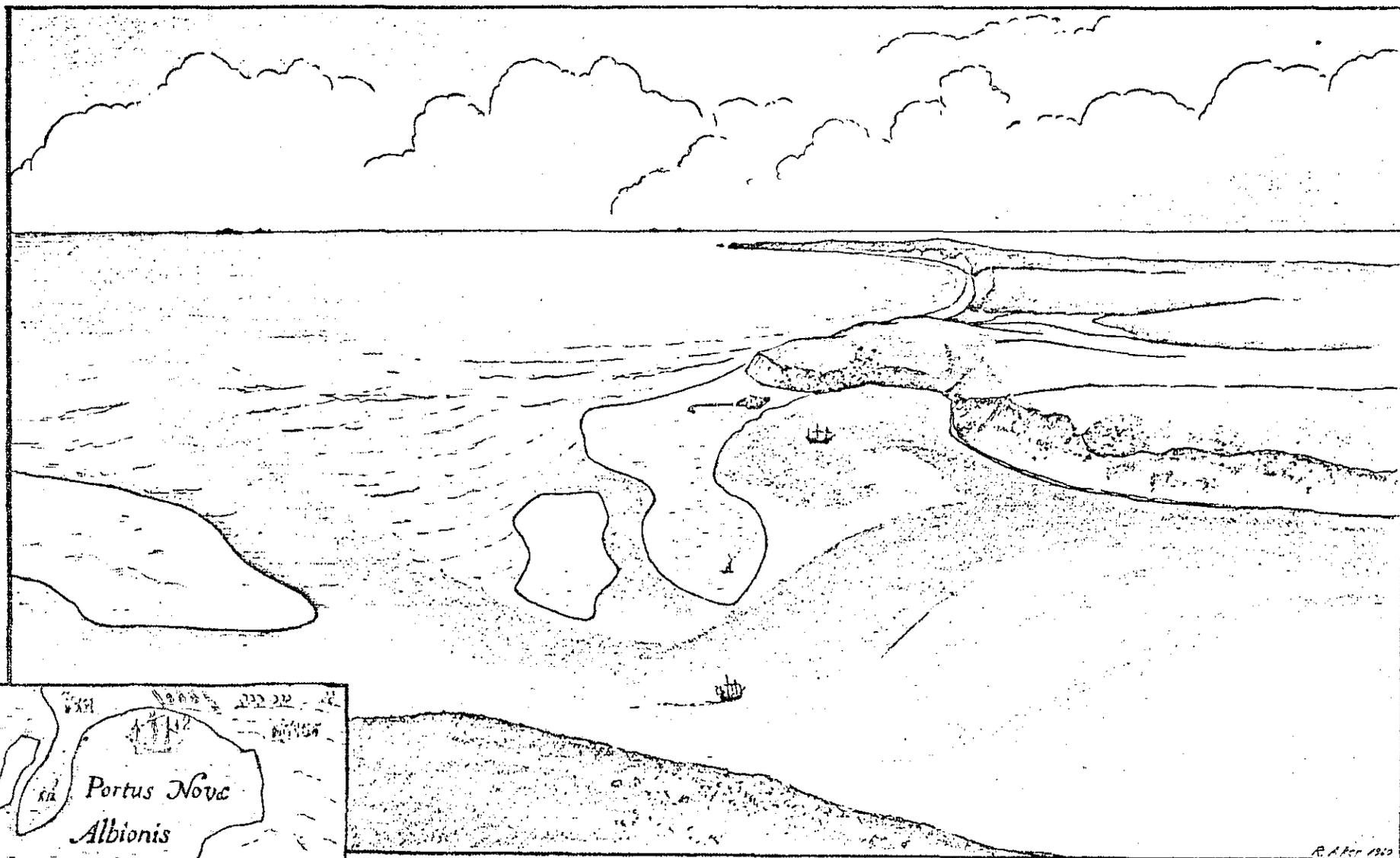
DRAKE AT PORTUS NOVAE ALBIONIS

With Portus Novae Albionis identified, the descriptive details from the accounts take on substance, and the events which are described can be orientated to the stage on which they occurred. Geographic implications are revealed in the surrounding land masses.

To resume our reconstruction of Drake's sojourn at Nova Albion, World Encompassed states that on June 21st "our ship hauing receiued a leake at sea, was brought to anchor neerer the shoare, that her goods being landed, she might be repaired." Here again, we have some slight indication that the Golden Hind was in the estero at that time and not in the bay outside. There is nothing to indicate that she was brought in; merely that she was brought "neerer" to the shore, thus implying that she was relatively near the shore before she was moved.

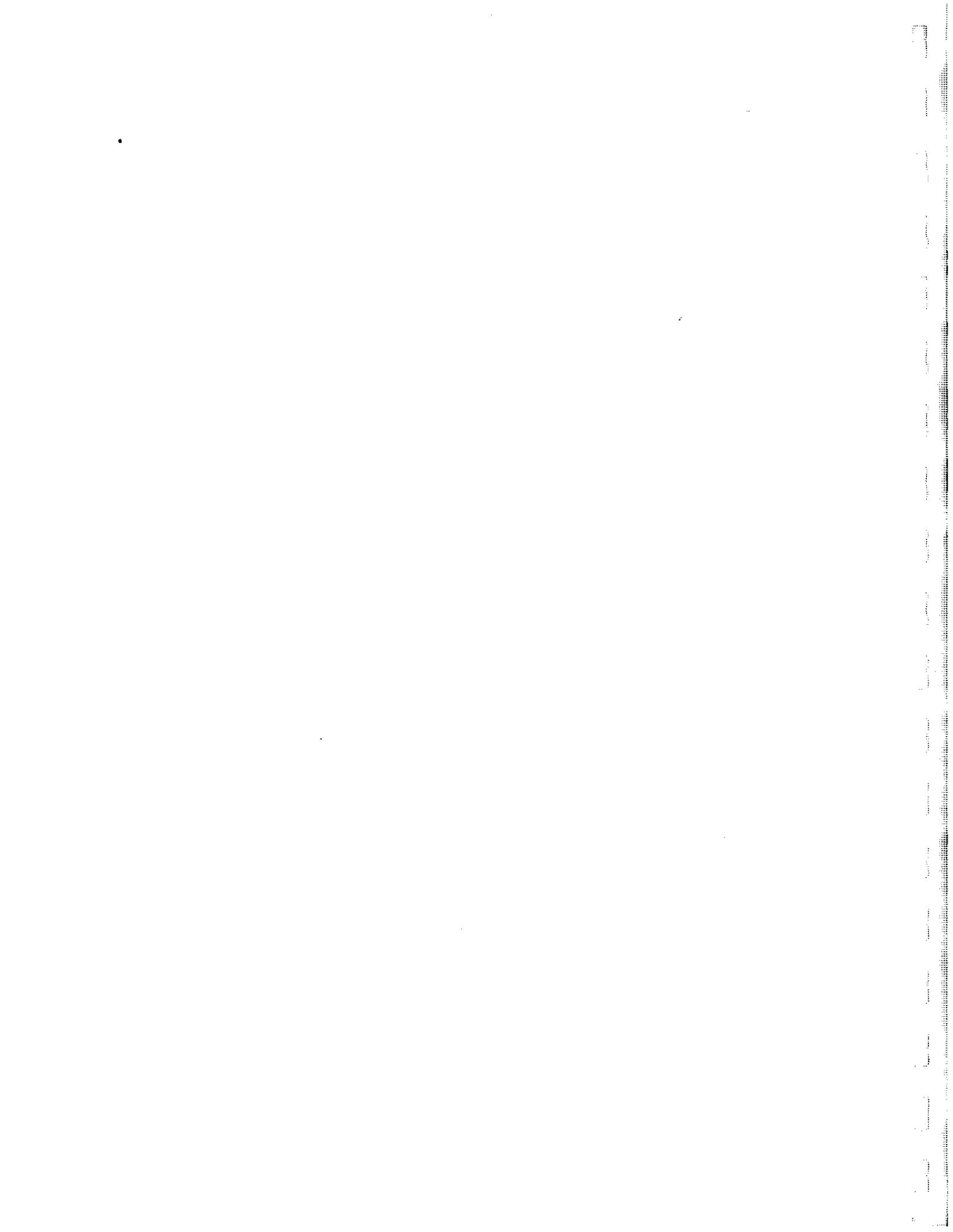
Assuming that the Golden Hind was anchored in the tidal stream, or road, within the mouth of the estero, we can envision that on this day she was kedged and warped on the tide to the new anchorage in the small cove identified as the Portus Novae Albionis on the west side of the estero. Here her goods could be conveniently unloaded preparatory to careening and graving. The tidal prediction for this date shows a small flood tide running in the morning with a 4.2 foot high tide occurring around 10:30. The ship probably moved an hour or so before this to take advantage of the flood and increasing depth of water.

Continuing with World Encompassed's description, Drake's first act on this day after moving the ship was to land his men with all necessary equipment to set up tents ashore and build a fort for defense and protection of the goods to be landed to lighten the Golden Hind for careening. This fort was so situated that whatever might befall in the relations with the Indians, the necessary business of repairing the ship could be completed in safety under its shelter. Its location in the Portus Novae Albionis inset clearly satisfies the latter requirement. It was on the beach practically at the water's edge, and its position commanded the entire spit on which the ship's work was performed; careening, heating of tar and tallow, blacksmithing, coopering and sailmaking, to name some of the many details of overhaul. The position of the fort was also such that small arms and cannon could command all approaches to the cove, the



RECONSTRUCTION OF THE ENTRANCE TO DRAKES ESTERO
AS IT PROBABLY APPEARED TO DRAKE IN 1579

Hondius Inset



DRAKE AT PORTUS NOVAE ALBIONIS

only exception being that a war party could have harassed it from the hill immediately adjacent to it. However, here they would have been confined to the crest, and anyone attempting to descend would become a prime target. The Indians' own weapons proved to be too insignificant in any event to have posed a serious threat from this vantage point.

While the Golden Hind was being moved to her new anchorage in the cove, a large gathering of the local inhabitants were evidently watching the proceedings from the hills and bluffs above. When Drake's men were perceived by them to be landing and making preparations to build their fort, World Encompassed states:

... as men set on fire to war in defence of their countrie, in great hast and companies, with such weapons as they had, they came down vnto vs, and yet with no hostile meaning or intent to hurt vs: standing, when they drew neere, as men rauished in their mindes, with the sight of such things as they neuer had seen or heard of before that time: their errand being rather with submission and feare to worship vs as Gods, then to haue any warre with vs as mortall men. Which thing, as it did partly shew itselfe at that instant, so did it more and more manifest itself afterwards, during the whole time of our abode amongst them.

With respect to the Indians' impression of the Englishmen, Heizer points out in Francis Drake and the California Indians, 1579, that throughout Drake's stay their wonderment was but an extension of the attitudes they had shown up to this time. "The English were looked upon as unusual, perhaps supernatural, visitors, since nothing is more clear than the fact that they were not treated as ordinary mortals. Kroeber has suggested that the Indians regarded the English as the returned dead, and there is much to be said for this view..."⁽¹⁾ Heizer cites evidences from the accounts which confirm the likelihood for this belief, as demonstrated by actions and artifacts usually associated with the attitudes of the Central California Indians toward the dead, such as weeping, moaning, self-laceration, use of feathered baskets, sacrifice of shell beads and feathers in fire. As a further indication, he cites the phrase recorded

1. See R. F. Heizer, Francis Drake and the California Indians, 1579, p. 263.

DRAKE AT PORTUS NOVAE ALBIONIS

by Madox, Nocharo mu, "touch me not", as an indication that the Indians avoided being touched by the whites as though they were dead persons, the fact that the phrase was remembered by Drake's men being due to the frequency with which it was uttered. (1)

In a little while more and more people, men and women alike, joined the first visitors until there were a great number of them on the scene. All possible means were taken by Drake to establish friendship; gifts of shirts, linen cloth, etc., being bestowed on each of them to cover their nakedness. The Indians in turn reciprocated with such possessions as they had on hand, such as feathers, cawles of network, quivers of arrows, etc. Having had their fill of visiting, it is stated that the Indians departed with joy to their homes, though oddly, they did not appear among the Englishmen again until two days had elapsed when a larger gathering, evidently from neighboring villages, came to the camp.

An interesting and important point of correlation is that it was said that as soon as the Indians had returned to their houses from the first visit, "being neere about 3 quarters of an English mile distant from them", they began among themselves a "kind of most lamentable weeping and crying out" and "the women especially extending their voices in a most miserable and dolefull manner of shrieking."

Today, on the west side of Drakes Estero at the waterside, north of the cove, there is a well known Indian shell mound, Mrn. 235; the site of a former Indian village which archaeologists have dated back to the sixteenth century. This village site is estimated to have served about 50 inhabitants at one time, and it would have been known to the English very soon by reason of their survey of the estero by boat. A number of artifacts of European origin have been found in the site, though none of them can be specifically identified with Drake or the Spanish expedition of Cermeño which was shipwrecked outside the estero sixteen years afterward. The site will be discussed further, but at this point its probable association with the English description of a village "neere about 3 quarters of an English mile distant" is highly significant. As pointed out earlier, the English mile of the 16th century measured 5,000 feet. Three

1. See R. F. Heizer, Francis Drake and the California Indians, 1579, p. 273.

DRAKE AT PORTUS NOVAE ALBIONIS

quarters of that distance equals 3,750 feet, or 1,250 yards, as compared with the approximately 1,300 yards distance from Drake's camp site at the cove to Mrn. 235.

Tests have demonstrated that on relatively calm days, the human voice, combined with the echo-reflecting nature of the surrounding cliffs and the prevailing north wind in the estero carries from this upwind Indian site to Drake's Cove. Conditions suitable for this often prevail on overcast, foggy days in the morning hours, before strong afternoon winds come up, or late in the evening.

The first meeting and exchange with the Indians was evidently brief as it is said that afterwards the tents and fortification were put up with all expedition and quickly finished, lest the friendship change to hostility. The account seems to imply that this was done on this same day. The nature of the fort is described in both World Encompassed and Famous Voyage, the former being the most descriptive. World Encompassed states: "we set vp our tents, and intrenched ourselues with walls of stone." It also uses the terms "fort," "fenced place," and "bulwarke." Famous Voyage uses only "fenced place" and "our bulwarkes and tents." The Hondius inset shows a fort of square, or rectangular pattern with some indication of a ditch around the walls. The actual structure may have had bastions at the corners, as was usual for the time, but there is no indication of any in the inset. The tents referred to in the accounts are shown within, six in number.

Under ordinary circumstances in the field, a military fort of this type was constructed as an earthworks by digging a ditch, or entrenchment around a perimeter, and the excavated material used to form the inner walls or parapet. It was something that could be quickly thrown up by a company of men with no need for materials other than the soil on which the fort stood. Had Drake built his fort on a firm shore within the estero, this construction would have been completely adequate, but the indications are that he built it on a beach site in the sand. Although the trench could have been easily accomplished, it is relatively impossible to make a lasting parapet of sand without bolstering it with a facing of some other material. In this case, the large number of stones that litter the beach on the west side of the estero's entrance were readily available to form a more effective wall, perhaps with sand and rubble from the trench between two parallel walls of stone to give more bulk.

DRAKE AT PORTUS NOVAE ALBIONIS

Fortunately, we have a precedent for Drake's action in the form of an account of his voyage to the Spanish Main in 1572-73, ⁽¹⁾ and from this we can gain some idea of Drake's methods and the probable size of his fort at Nova Albion. Two forts are described in some detail. On this voyage, he had 73 men and boys with him, slightly less than the number of people he had at Nova Albion. Both of his forts on the Main were of simple design, each being apparently adapted to the local conditions for most expedient construction and best defense.

Drake's first fort on the Main was set up at a former hideout named Port Pheasant in the Gulf of Aruba, where his company was unexpectedly reinforced by an additional 30 Englishmen who arrived on the scene under a Captain Ranse. His intent here was to remain only long enough to assemble three pinnaces which had been brought from England in sections, and for this purpose he chose on the shore "a most fit plot of three-quarters of an acre of ground." The fort was necessarily hewn out of a thick jungle forest, and for expedience, trees and brush that were cut away to clear the site were merely dragged and piled up together, branches and all, to form the walls, which are said to have reached 30 feet in height. The only gate was at the waterside. The form of the fort is described as follows:

The whole plot was built in a Pentagonal 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 Pinnaces. The other foure equall sides were holely (excepting the gate before mentioned) firmly closed up. Without, instead of a trench, the ground was rid for fiftie foote space, round about.

The second fort, Fort Diego, was built in the Gulf of San Blas on a small, flat island of three acres of ground, four cable lengths from the mainland, and being intended to be occupied for several months, was of more formal construction than the former; "Our fort was then made (by reason of the place) triangle wise with maine timber and earth, of which the Trench yeilded us good store, so that we made it thirteene foot in height." Here, all of the ship's ordnance and artillery and all of the provisions were brought on shore, and two large houses were set up for the whole company. Boards and planks from a captured ship were used for

1. See Appendix I.

DRAKE AT PORTUS NOVAE ALBIONIS

making platforms to plant the ordnance within the fort. The account states that "great trees" were brought over from the mainland in the pinnaces. These may have been intended for a pallisade, but perhaps more likely were used as a facing for an earth or sand parapet constructed from the material removed from the trench. Considering the probable nature of the geology of the islands in this area, the soil was very likely sandy and loose.

At Nova Albion, lacking any specific written description of the fort, we are left to interpret the Portus Novae Albionis inset. In the light of Drake's former practice, the simple square design shown should probably not be regarded as being oversimplified. When the square is oriented to the cove site, it is found to be well suited to the situation. As previously pointed out, the west wall would have been about 160 feet from the base of the hill on the outer beach. By reconstruction, it is found to parallel the crest of the hill, and so afford maximum protection to the defenders from that sector. The approaches to the fort at the base of the hill, both from the seaward side and the cove side, were covered by the apex of an angle and the two adjacent walls. Both the entering channel to Drakes Estero and the mouth of the cove are found to be similarly covered. Ordnance from the Golden Hind placed in each of the four corners would have ensured complete command of this site, whether from the Indians or any Spanish force that may have followed Drake to the Northwest.

The inset shows no gate or entry to the fort, but logic favors its being on the northeast wall facing the spit and thus farthest removed from the direction of probable attack by land. Also, it would have been on this side of the fort that the work on the ship would have been performed; careening, etc.

The area of the fort at Port Pheasant would have produced a square 180 feet on a side. However, considering the lesser number of people to accommodate at Nova Albion and the fact that the former allowed also for the construction of three pinnaces within the walls, Drake's fort at Nova Albion was very likely much more compact. In the absence of any specific guide, the proportion between the ship and the fort shown in the Portus Novae Albionis inset gives approximately 110 feet for the length of the wall nearest to view. On this same basis, the end walls of the tents measure about 10 or 12 feet wide, and assuming that there were only six, as shown, each tent may have accommodated 10 to 12 men at

DRAKE AT PORTUS NOVAE ALBIONIS

a time. A few of the company would necessarily be stationed on the Golden Hind for guard duty during the night hours, thereby reducing the number of persons required to be sheltered in the fort. The tents shown were probably sufficient.

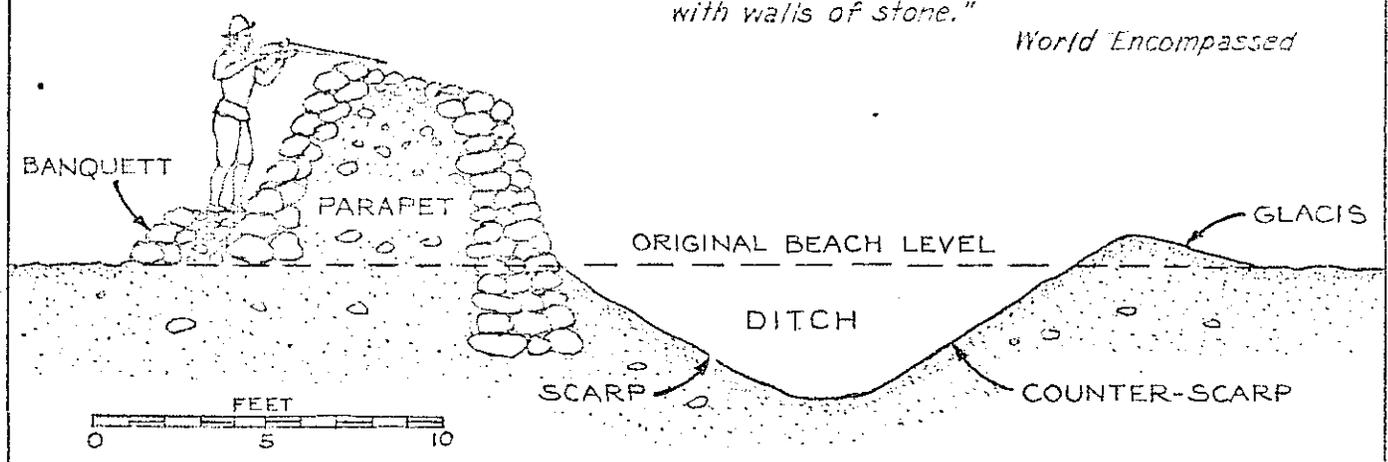
The location of the fort at the bottom of a hill is verified by Famous Voyage and World Encompassed in particular, and the context of the accounts indicates that it was fairly close to the hill. Throughout Drake's entire stay some condition evidently existed also that made it convenient or necessary for the Indians to reach the fort from the hill, since they are always mentioned as coming down to where it stood. From the account we can also derive some indication of the nature of the hill.

Two days after the first visit, on the 23rd, "a great assembly of men, women, and children" appeared on the scene, and it was said that "when they came to the top of the hill, at the bottom whereof wee had built our fort, they made a stand," where one of their number delivered a long and tedious oration in a voice extended to his utmost strength, accompanied by strange and violent gestures. In conclusion of this introductory ceremony, the men were seen to lay their bows on the hill and then they came down with their presents for Drake, leaving the women and children behind. While the men were visiting those at the fort, the women on the hill were seen performing an unnatural ritual of violence on themselves;

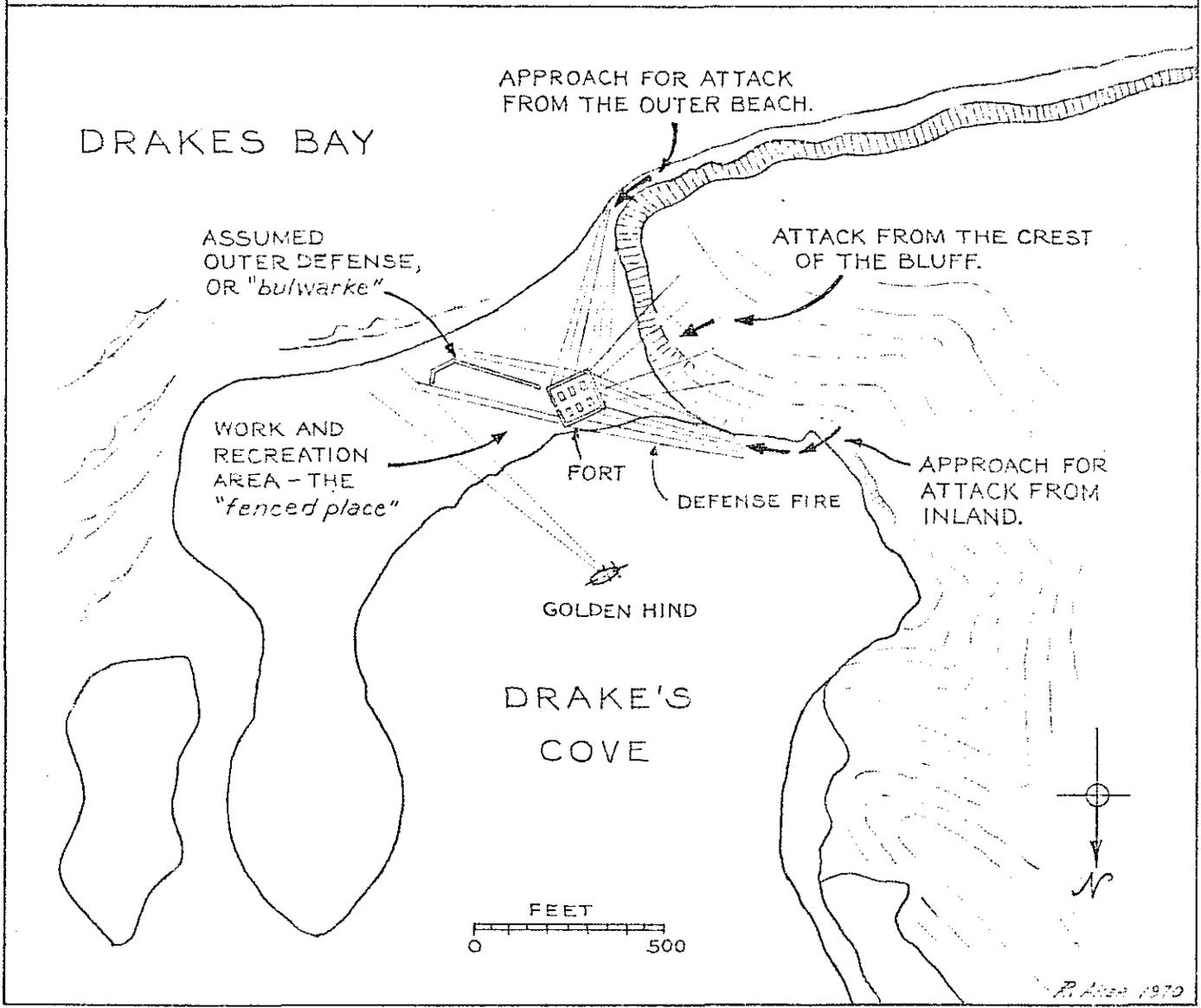
... crying and shrieking piteously, tearing their flesh with their nails from their cheekes in a monstrous manner, the blood streaming downe along their breasts, besides despoiling the vpper parts of their bodies of those single coverings they formerly had, and holding their hands about their heads that they might not rescue their breasts from harme, they would with furie cast themselves vpon the ground, neuer respecting whether it were cleane or soft, but dashed themselves in this manner on hard stones, knobby hillocks, stocks of wood, and pricking bushes, or whateuer else lay in their way, itterating the same course againe and againe.

From the foregoing, the fort was apparently near enough to the top or crest, of the hill that the human voice could be easily heard by those within, and the actions of the Indians could be observed with

"...we set up our tents, and intrenched ourselves with walls of stone." *World Encompassed*



SECTION SUGGESTING THE POSSIBLE APPEARANCE OF DRAKE'S FORT COMBINING AN ENTRENCHMENT WITH WALLS OF BEACH STONE.



P. Allen 1970

Drake Navigators Guild

DRAKE'S FORT AT PORTUS NOVAE ALBIONIS

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DRAKE AT PORTUS NOVAE ALBIONIS

enough clarity to enable them to be fully described. The hill mentioned is undoubtedly the one on the outer beach adjacent to the site of the fort as it is located by the Portus Novae Albionis inset. Its crest would have been scarcely more than 250 feet from the fort -- far enough that a man must raise his voice to the limit in speaking and yet near enough that his listeners could clearly discern details of his companions' actions. "Hard stones, knobby hillocks, stocks of wood, and pricking bushes" are characteristic of this hill today; the stocks of wood existing primarily as the dead stubs of the ceanothus, which abound in the area; the pricking bushes as the salmon-berry, a native found growing here.

Three days after this visit, on June 26th, "the greatest number of people which wee could reasonably imagine to dwell within any convenient distance round about" were seen approaching the fort at some distance. With these people, a "king", or great chief, came attended by a guard of about 100 tall and warlike men and all of the assembly arranged in a formal procession with the women and children following last. Their visit need not be detailed here, however, inasmuch as the account in World Encompassed is entirely sufficient, except to orientate the description with the cove site.

While still a distance from the fort, two ambassadors were sent to Drake to announce the visit of the "king", and upon receiving acknowledgement from Drake and returning, "their king (making as princely a shew as possibly he could) with all his traine came forward." In coming forward, it should be noted that they could be clearly seen and heard; "In their coming forwards, they cryed continually after a singing manner, with a lustie courage. And as they drew neerer and neerer towards vs, so did they more and more striue to behaue themselues with a certaine comelinesse and grauity in all their actions."

At Drake's Cove, the group was apparently first seen coming over the crest of the hill at the northwest corner of the cove. This hill is the terminus of a high and unobstructed ridge, a natural highway connecting with the interior country and a logical approach to the cove. As the Indians came on it seems likely that they kept to the flank of the hill

DRAKE AT PORTUS NOVAE ALBIONIS

bordering the cove rather than descend to its shore, which, because of its restricted width could not have been in keeping with the dignity of the occasion as it is described.

Before the final descent to the fort, the Englishmen were addressed somewhat as they were on the previous visit by the Indians, but on this occasion the speaker was apparently not standing on the same hill as before. The fact that it was necessary to explain that he was audible, indicates he was at a greater distance. The final route down the hill to the fort was apparently not an easy, clear descent, however, for the description implies that it was necessary to break ranks and perhaps descend single file and then regroup at some point at the bottom.

When they were come somewhat neere vnto vs, trooping together, they gaue vs a common or generall salutation, observing in the meane time a generall silence. Whereupon, he who bare the Scepter before the king, being prompted by another whom the king assigned to that office, pronounced with an audible and manly voice what the other spake to him in secret, continuing, whether it were his oration or proclamation, at the least halfe an houre. At the close whereof there was a common Amen, in signe of approbation, giuen by euery person: and the king himselfe, with the whole number of men and women (the little children onely remaining behind) came further downe the hill, and as they set themselues againe in their former order. (1)

The next paragraph continues with the "king" and his retinue near the fort. Here "bulwarke" is used for the first time in the account relative to the defense work, and although the term properly signifies a substantial defensive work of earth or other material, its use in the singular sense raises a question as to whether it refers to the fort or some additional feature, such as a wall closing off the spit as a whole. Again, in this paragraph, the relationship between the hill and the fort should be noted; here the Indians are at the foot of the hill and yet near the fort -- the distance could not have been great.

And being now come to the foot of the hill and neere our

1. See pp. 164, 165, supra.

DRAKE AT PORTUS NOVAE ALBIONIS

fort, the Scepter bearer, with a composed countenance and stately carriage began a song, and answerable thereunto observed a kind of measures in a dance: whom the king with his guard and euery other sort of person following, did in like manner sing and daunce, sauing onely the women, who danced but kept silence. As they danced they still came on: and our Generall perceiuing their plaine and simple meaning, gaue order that they might freely enter without interruption within our bulwarke. Where, after they had entred, they continued their song and dance a reasonable time, . . . (1)

The impression of a wall in conjunction with the fort is somewhat heightened by the description of Drake's precaution to assemble his men and prepare for a defensive stand. Here, the expression "fenced place" is used; outer defense or fort? "Wherefore euery man being in a warlike readinesse, he marched within his fenced place, making against their approach a most warlike shew (as he did also at all other times of their resort), whereby if they had beene desperate enemies, they could not haue chosen but haue conceiued terrour and fear, with discouragement to attempt anything against vs, in beholding of the same." It seems incongruous that Drake would have allowed the multitude to crowd into the fort itself, where no doubt most of the goods and provisions unloaded from the ship were stored and where a hostile act would have placed the Englishmen in an extremely awkward position. We see later on in the course of this event that several of the youngest members of the crew had to be conveyed from the presence of the Indians to the tents because of the Indians' fearful interest in them.

Logically, it would have made a great deal of sense to close off the entire outer end of the spit to permit the work on the ship to proceed with a minimum of interference, and the task of doing so would probably not have been too difficult to accomplish. We can see from the statement about Drake's preparations for defense on all occasions of the Indians' visits that he did not completely trust them. His experience on at least two prior occasions on this voyage had taught him to be guarded. Further, tools and goods lying about, as necessarily they must in the course of the work, would have invited their loss had there been free access to

1. See p. 165, supra.

DRAKE AT PORTUS NOVAE ALBIONIS

the working site. In addition, an area was needed where Drake's men could find their recreation without fear of molestation. If an outer defense had been a part of the scheme, then it may not have been a coincidence that one corner of the fort is shown at the water's edge in the Portus Novae Albionis inset. On the other side a wall may have extended to the shore of the bay, and thus, the outer spit may well have been the "fenced place" referred to where Drake marched his men to make a war-like show.

After the assembly had entered the defense works, or bulwark, and ended their dance and song, they bade Drake to be seated, and in the ceremony which followed, the "king" and several of his subjects implied by speech and signs that they would resign to him their right and title in the land and that they and their descendants would become his vassals. In conclusion, Drake was crowned by the chief, or "king," and honored by the title of Hyoh, the title which was similarly used to denote the chief who crowned him.

The English were apparently under no illusions as to why this unusual honor was bestowed upon Drake. Inasmuch as it is now fairly certain that the Indians actually regarded them as the returned dead, and therefore supernatural, the writer of the account was not too far wrong when he noted that they still regarded the Englishmen as "gods" and were pleased that "the great and chiefe God was now become their God." However, as much as the English apparently did not want themselves to be regarded as supernatural, Drake prudently refrained from rejecting the honor so as to give the Indians no cause to distrust or dislike him. Though it was also said that he did not know what political or material advantages this might bring, perhaps the most immediate and practical reason was "that being the onely place, wherein at this present, we were of necessitie inforced to seeke reliefe of many things," he could not afford any chance of alienating these people. It appears evident from this statement that to the minds of the English no other careening site was potentially available, either in coming down the coast or in this vicinity. This fact would have appeared particularly true among the small harbors immediately north of San Francisco, but would have been inappropriate to the relatively limitless opportunities on San Francisco Bay.

Following the crowning ceremony, the common people dispersed themselves among Drake's company, diligently examining every man,

DRAKE AT PORTUS NOVAE ALBIONIS

until they found "such as pleased their fancies (which commonly were the youngest of vs)," when they then offered their sacrifices and lamentations to them, accompanied by self-laceration. Heizer interpreted this to mean that they had supposedly found relatives who were returned from the dead, and hence performed the usual mourning observances. (1) As previously mentioned, it became necessary for those whom they worshiped to be taken into the tents for safety.

Following this, World Encompassed states that there were few days that the Indians were absent from the camp, but every third day they brought their sacrifices until they were discouraged from performing them, although the impression that the English were supernatural did not seem to change. The Indian bow and arrow were compared with the English long-bow, with which we know some of Drake's men were armed, and the former was found to be greatly inferior for range and strength, "being by reason of their weakenesse more fit for children then for men." The physical description of the Indian men, "commonly so strong of body, that that which 2 or 3 of our men could hardly beare, one of them would take upon his backe, and without grudging carrie it easily away, vp hill and downe hill an English mile together," is fitting to the characteristic up-and-down, rolling terrain of the moorlands and downs in the area of the camp. There is also a suggestion of English foraging expeditions on which the Indians probably offered assistance and thereby occasioned a comparison of strength, as on occasions for foraging for firewood, rushes or other combustibles with which to bream the hull of the Golden Hind, and game for food at the camp.

Although Portus Novae Albionis was most "fit and convenient" for Drake's operations, it was not chosen for comfort. In the very first paragraph of World Encompassed which describes this place, it is stated that from June 17th to July 23rd, (2) "notwithstanding it was in the height of summer, . . . yet were wee continually visited with like nipping colds as we had felt before." We are also told that for the first two weeks "neither could we at any time in whole fourteene days together, find the

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1. See R. F. Heizer, Francis Drake and the California Indians, p. 271.
 2. Correction for calendar conversion makes the dates June 27 to August 2, and thus places nearly all of Drake's sojourn in one of the two most foggy months on the Pacific Coast; July and August.

DRAKE AT PORTUS NOVAE ALBIONIS

aire so cleare as to be able to take the height of sunne or starre." Only one thing can account for this in summer on the California coast, and that is the coastal fog which prevails in these months. Reference is subsequently made to this as "those thicke mists and most stinking fogges, which increase so much the more, by how much higher the pole is raised." (1)

The author of the California portion of World Encompassed used nearly a thousand words to complain of, describe, and explain the wind, fog and cold at this place; this in addition to a lengthy dissertation on the unpleasant state of the weather found at landfall. In the second paragraph of his account describing Drake's port, he begins; "And here hauing so fit occasion (notwithstanding it may sceme to be besides the purpose of writing the history of this our voyage), we will a little more diligently inquire into the causes of the continuance of the extreame cold in these parts." He was careful to explain that it was not due to the tenderness of the Englishmen's bodies after coming so soon from the tropics, but the "very extremitie of the cold itself, that caused this sensibleness in vs." He carefully pointed out in addition that the Indians with whom they had had long and familiar intercourse here and who were the natural inhabitants of the place, and accustomed to the cold as second nature, "yet vsed to come shivering to vs in their warme fures, crowding close together, body to body, to receiue heate one of another, and sheltring themselues vnder a lee banke, if it were possible, and as often as they could labouring to shroude themselues vnder our garments also to keepe them warme."

Well said were the author's words when he wrote that "if violent exercises of our bodies, and busie employment about our necessarie labours, had not sometimes compeld us to the contrary, we could very well haue been contented to haue kept about us still our winter clothes; yea (had our necessities suffered vs) to haue kept our beds." The coastal fog is well known for its penetrating quality, as more than one visitor has noted even in modern times, and yet, with its high relative humidity, physical exercise soon compels one to shed his heavy clothing. (2)

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1. See Appendix IX.
 2. This phenomem was experienced many times by Guild Members during the course of archaeological work at Drake's Cove.

DRAKE AT PORTUS NOVAE ALBIONIS

To make it quite clear that this was an unusual phenomenon and constant throughout the entire stay at Portus Novae Albionis, he concludes with; "some of our mariners in this voyage had formerly been at Wardhouse, in 72 deg. of North latitude, who yet affirmed that they felt no such nipping cold there in the end of the summer, when they departed thence, as they did here in those hottest months of June and July." To the sixteenth century European, the weather was truly unusual. A globe or world map shows that the areas of the world in 38° North Latitude to which he was accustomed are warm in the summer: Greece, Italy, Spain, and Portugal. Even the highest latitudes reached by Drake on this part of the voyage were no higher than those of Tuscany and Rome, as mentioned by Robert Dudley. (1)

World Encompassed gives specific attention to the wind, which is no less a notable feature of the Point Reyes Peninsula and Drakes Bay than the fog and cold in the summer months. The account states: "... the North and North-west winds are here constant in June and July, as the North wind alone is in August and September, we not onely found it by our owne experience, but were fully confirmed in the opinion thereof, by the continued observations of the Spaniards." We can see it also in the actions of the Indians seeking shelter under a lee bank. The account mentions that sometimes the sudden violence of the wind helped to scatter and break through the fog, and it is notable that a sunny day in June at Drakes Bay is not necessarily a pleasant experience because of the strong northwest wind which frequently accompanies it.

The inclusion of "North wind" here is somewhat significant in itself of the site being described. The northwest wind is the prevailing wind on the coast, but at Drakes Estero this prevailing wind is funneled from the north down the estero and is felt at Drake's Cove as a north wind.

The writer of World Encompassed attributed the cold and fog to the great spreading of the North American continent from whose "high and snow-couered mountaines, the North and North-west winds (the constant visitants of those coasts) send abroad their frozen nimphes." He ascribed the appearance of the land to the cold; "Hence comes the generall squalidness and barrenesse of the countrie." In the preceding paragraph

1. See . 181 , supra.

DRAKE AT PORTUS NOVAE ALBIONIS

he stated; "Besides, how vnhandsome and deformed appeared the face of the earth itsef! shewing trees without leaues, and the ground without greennes in those moneths of June and July."

The lack of greenness, of course, is in sharp contrast to similar coastal areas in England in the summer months, though by no means unique to much of California because of the absence of rain during this season. The Point Reyes Peninsula, however, is not only dry in summer, but the wind and fog blowing across the open downs in the spring and summer contrive to produce a thin and stunted ground cover in all exposed areas, a feature notably true in the vicinity of the cove.

All of the foregoing description of the land near the shore is in marked contrast with what Drake found in the interior of the country. Toward the end of his stay at Portus Novae Albionis, after his "necessary businesses were well dispatched," he made a "iourney vp into the land" with his gentlemen and many of his company to see the Indians' manner of dwelling and to become better acquainted with the nature and commodities of the country. There, it was said, "The inland we found to be farre different from the shoare, a goodly country, and fruitful soil, stored with many blessings fit for the vse of man..." Here he found the Indians' dwellings to be of the same construction as those near the shore, and "being many of them in one place, made seuerall villages here and there." Here he saw "very large and fat Deere" in a herd which, as was supposed, might number in the thousands, and a multitude of a "strange kinde of Conies" which seemed to exceed by far the number of deer.

There are three notable points in the passage concerning this journey inland. The first is that a remarkable difference was noticed between the inland and the shore in the vicinity of the camp; something apparently not discernable until found to be so on this journey. Second, it was said that Drake went "vp into the land." Though this does not necessarily imply elevation, it must be pointed out that earlier in World Encompassed, a statement with respect to riches and treasures of the country specifically indicates elevation; "wherewith in the vpland countries it abounds." Third, during this journey the account notes the houses of the Indians "were all such as we have formerly described, and being many of them in one place, made seuerall villages here and there."



AERO Photographers

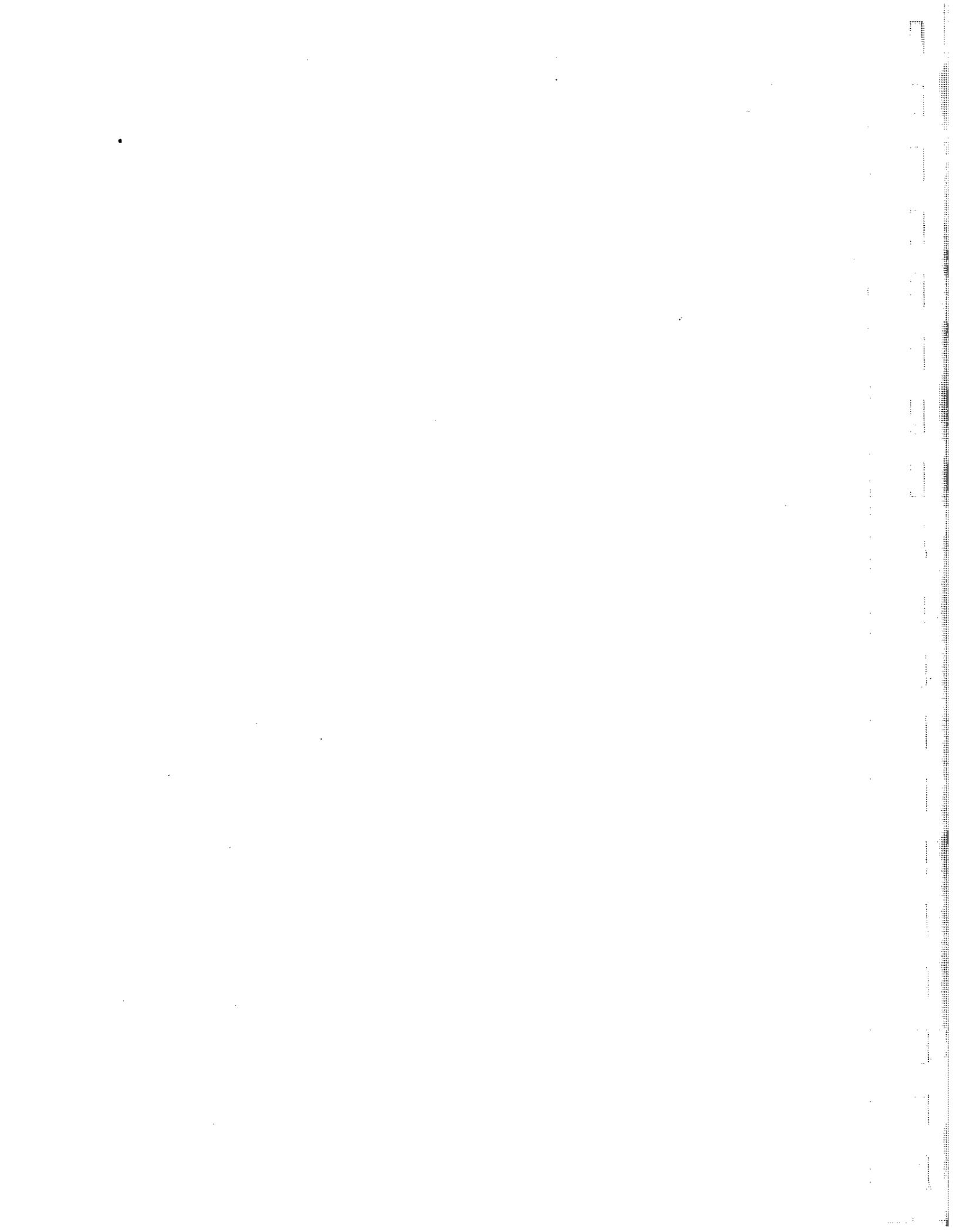
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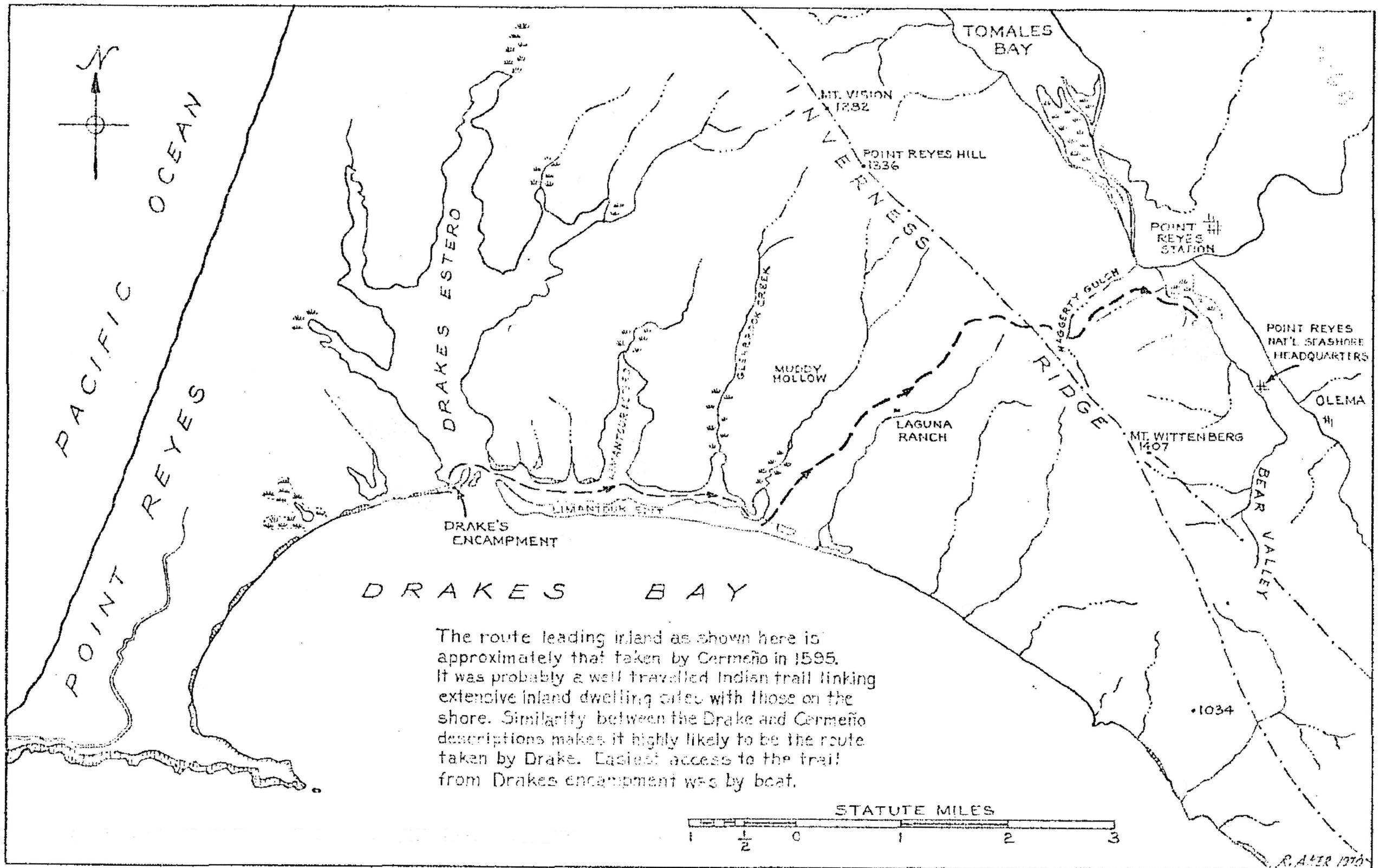
FROM DRAKE'S COVE, "a journey up into the land"
NECESSARILY LEADS EAST AND EAST-NORTHEAST
OVER INVERNESS RIDGE.



Robert W. Allen

VIEW FROM EAST END OF LIMANTOUR SPIT SHOWING THE
ROUTE OVER INVERNESS RIDGE LEADING TO FORMER INDIAN
SETTLEMENTS IN OLEMA VALLEY. INLAND ROUTE FOLLOWS
SPUR AT LEFT. THE PLATE OF BRASS WAS FOUND
IN 1933 NEARBY RANCH HOUSES IN VALLEY AT CENTER.



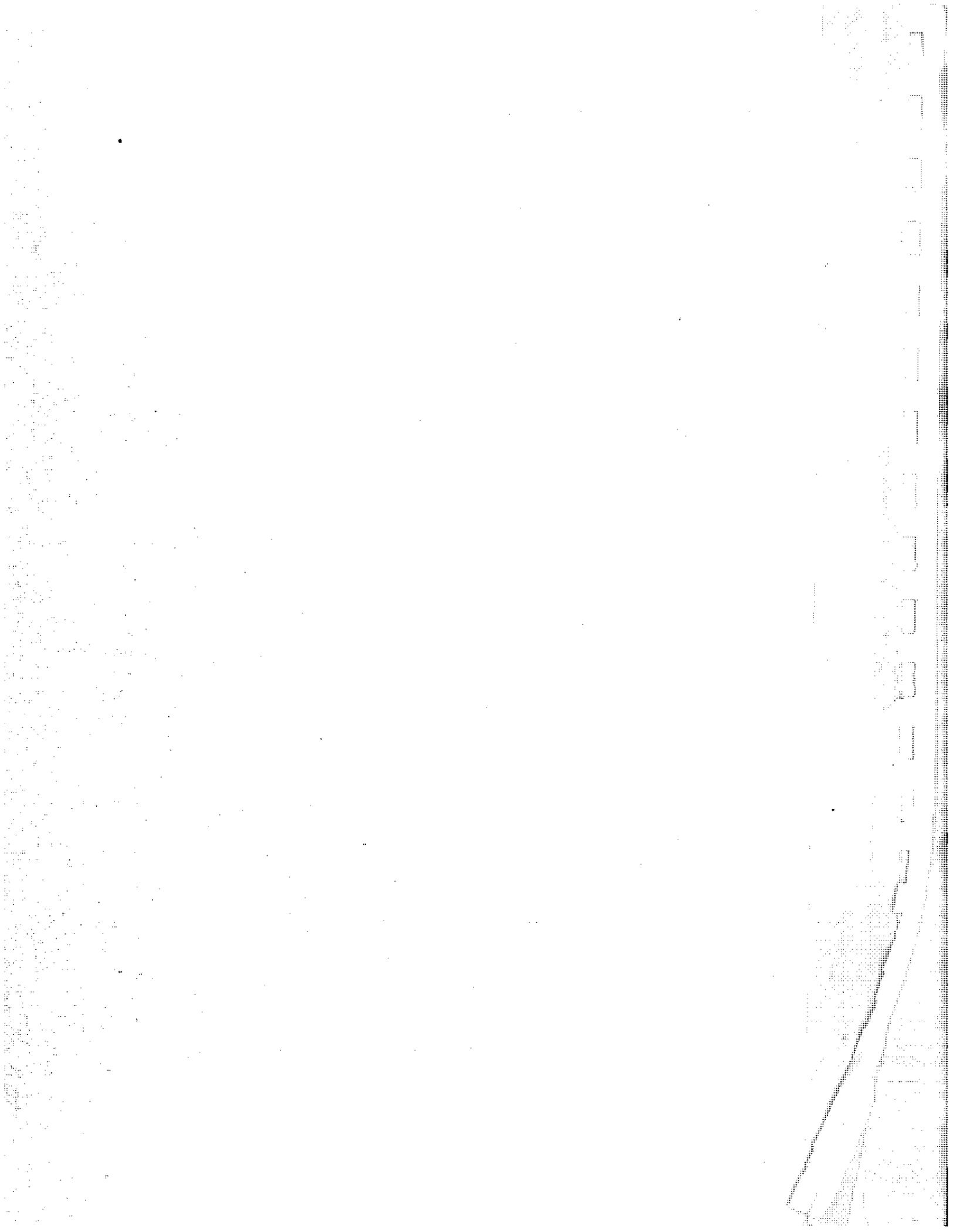


The route leading inland as shown here is approximately that taken by Cermeño in 1595. It was probably a well travelled Indian trail linking extensive inland dwelling sites with those on the shore. Similarity between the Drake and Cermeño descriptions makes it highly likely to be the route taken by Drake. Easiest access to the trail from Drake's encampment was by boat.

R. A. HER 1970

Drake Navigators Guild

DRAKE'S INLAND JOURNEY



DRAKE AT PORTUS NOVAE ALBIONIS

From Drake's camp at the mouth of Drakes Estero, a journey up into the land must necessarily take an east or northeasterly direction and therefore up and over the Inverness Ridge. As one of the stated purposes was to see the manner of the Indians' dwelling, it is quite likely that he had an Indian guide and followed an established trail to the inland villages. The location of these villages can be narrowed to the Olema Valley where today traces of middens indicate extensive Indian habitation along the stream paralleling Bear Valley Road and on the shore of a fresh water marsh, once known as Lake Olemas, at the northwest end of the valley. These were the villages visited by Cermeño 16 years later and described in his accounts. This area was an ideal habitat for large numbers of Indians with ample open country bordering the stream and marsh with an abundance of game, plant food and acorn-bearing oaks.

Undoubtedly there were other Indian habitations north of Olema Valley on the inland side of Inverness Ridge, but since there is no mention of Tomales Bay, nor even a hint in the accounts that any notice was taken of it, one is forced to seek a route from which it could not have been seen, or was seen at such a distance that no great importance was attached to it. In the latter instance it may have been assumed to be a lake, of which the stream in Olema Valley was but a tributary. It is notable, however, that when Cermeño visited Olema Valley, he also made no mention of Tomales Bay. The apparent reason is that nowhere did he see it from any elevation where it was not screened by trees or by intervening spurs of the flanks of Inverness Ridge.

The Cermeño accounts indicate that the main Indian route to the villages in Olema Valley crossed the ridge between Mt. Wittenburg and Point Reyes Hill. (1) Between these heights there is an elevated pass which can be reached easily from the shore of Drakes Bay by a spur. On the inland side of the pass three spurs south of Haggerty Gulch provide convenient access to the village sites. The pass affords the most practical direct route by which to reach these sites and is very likely the one taken by Drake. By crossing to the east side of the estero by boat, he could have reached these inland villages by a trek of 7 or 8 statute miles, a distance that would easily have allowed him to return

1. See R. Aker, The Cermeño Expedition at Drakes Bay, 1595.

DRAKE AT PORTUS NOVAE ALBIONIS

to camp before dark. Nothing is said about how long the journey took, but since nothing is said about spending a night, or several, away from camp, it must be assumed that the journey comprised only one day. Logically it would, as there was too much at stake to leave the camp for very long.

On the inland, or leeward side of Inverness Ridge, an entirely different weather and ecology prevails because the coastal fog and wind is cut off by the ridge. Here the slopes are thickly grown with forest and verdant in the summer months. At the foot of the ridge in the valley, the forest of Douglas fir, madrone, California bay and live oak yields to open grasslands which continues on over the hills to the east. This is interspersed with small groves or single trees of oak or bay. The stream and marsh area abounds with willows and alders, as well as numerous herbs and greens. (1)

The fruitful and goodly aspect of Olema Valley was particularly noted by Cermeño's scrivener, Juan del Rio:

.... This witness went about inspecting the quality of the land and its character, and saw not only on the bank of the lake but in the little valleys many trees bearing acorns and many kinds of food, on which the natives lived, hazelnut trees like those of Castile and many herbs, such as thistles and other fragrant ones like those of Castile. He saw a number of partridges and a great quantity of deer horns. One of these which he measured was sixteen palms from tip to tip, with a number of points. The country appeared to him to be well adapted to sow and reap any kind of seed, as it looked like the country of Castile and was of good character. (2)

The path of Drake's journey over Inverness Ridge leads to an interesting possibility that from its height the writer of the original notes

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1. See R. W. Allen, An Examination of the Botanical References in the Accounts Relating to Drake's Encampment at Nova Albion in 1579, 1969.
 2. See H. R. Wagner, Spanish Voyages to the Northwest Coast, p. 166.



Robert W. Parkinson

OLEMA VALLEY, LOOKING EAST

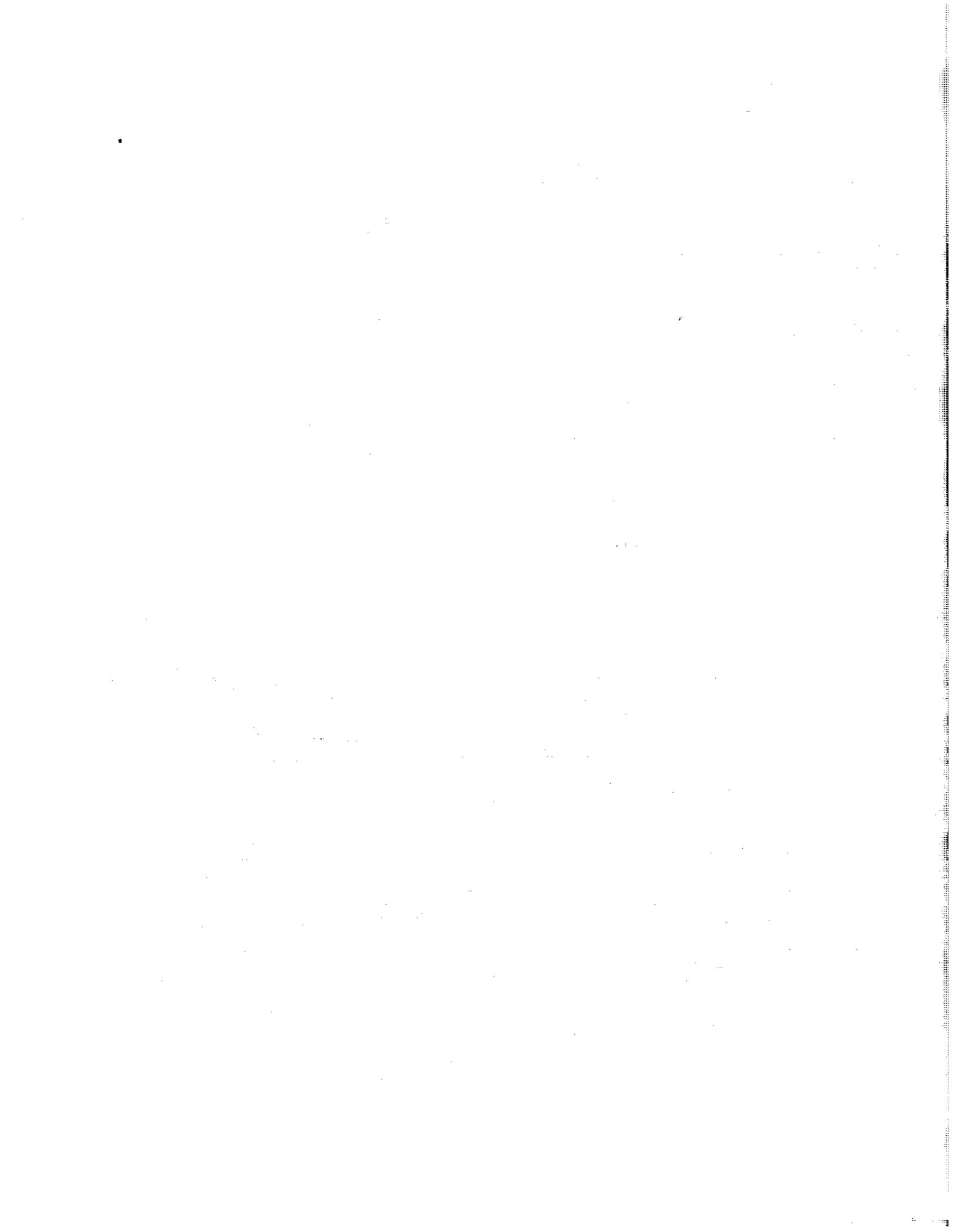


Robert W. Allen

LEEWARD SIDE OF INVERNESS RIDGE AT SITE OF
FORMER INDIAN SETTLEMENTS, OLEMA VALLEY.

*"The inland we found to be farre different from the shoare,
a goodly country, and fruitfull soyle, stored with many
blessings fit for the vse of man."*

World Encompassed



DRAKE AT PORTUS NOVAE ALBIONIS

in World Encompassed may have likened the coastal fog to a "second sea," (1) as nowhere except from above the fog is this impression so evident. The pass in the ridge reaches an elevation of 800 feet with elevations of over a thousand feet accessible on either side.

In Chapter III reference was made to the descriptions of animal and plant life contained in the accounts. They are briefly discussed here for the purpose of correlation, but certain aspects are treated in detail by Robert W. Allen and Robert W. Parkinson in separate studies, (2) which are summed up in the following conclusions. The descriptions that can be correlated with the Point Reyes area are:

1. An infinite company of "very large and fat Deere."
2. A multitude of a "strange kinde of Conies."
3. "Muscles, Seales and such like" utilized as food by the Englishmen.
4. Birds and "foules" which did not dare to leave the nest after their eggs were laid.
5. Fish "like a pilchard."
6. Fish which were seen and taken near shore by the Indians.
7. Trees without leaves observed near the camp site.
8. Stocks of wood seen near the camp site.
9. Pricking bushes seen near the camp site.
10. Bulrushes and rushes used for women's skirts, floor covering in the Indian houses and for construction of reed canoes.
11. A "certain downe, which groweth vp in the country vpon an herbe, much like our lectuce, which exceeds any other downe in the world for finenesse."
12. A "roote which they call Petáh, whereof they make a kind of meale, and either bake it into bread, or eat it raw."

1. See p. 157, supra.

2. See the following Drake Navigators Guild research reports: R. W. Allen, An Examination of the Botanical References in the Accounts, 1969; R. W. Allen, Identification of "an herbe much like our lectuce...", 1969; R. W. Allen and R. W. Parkinson, Identification of the Nova Albion Conie, 1969.

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The deer noted on the journey inland were exceptional and were seen in a large herd, which according to World Encompassed, supposedly numbered in the thousands. The animals seen today on the coast were probably observed by Drake's people, but these are not of sufficient size to occasion any special notice as being "very large and fat." There can be no question that the animal described was the Roosevelt Elk, which were common over much of Northern California. Dudley's statement regarding native horses, "which the Spaniards had never seen before in America" may have been an error in recording from an earlier account, or might possibly have been from information from a member of Drake's crew who seeing a cow elk at a distance believed that he had seen a horse. Elk were observed in Marin County by Richard Henry Dana in his narrative, Two Years Before the Mast, (1) wherein he made the following description of these animals as seen from the Alert departing San Francisco Bay, December 27, 1835.

The tide leaving us, we came to anchor near the mouth of the bay, under a high and beautifully sloping hill, upon which herds of hundreds and hundreds of red deer, -- beautiful hind, and the stag, with his high branching antlers, were bounding about, looking at us for a moment, and then starting off, affrighted at the noises which we made for the purpose of seeing the variety of their beautiful attitudes and motion.

Specific reference to these animals on the Point Reyes Peninsula was made by Lt. Joseph Warren Revere, U.S.N., in an account of an elk hunt on one of the Spanish ranchos there in August, 1846. Approaching the animals on Point Reyes, he wrote; "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." (2) As previously noted, the Cermeño accounts mention great quantities of antlers seen in the interior.

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1. See R. H. Dana, Two Years Before the Mast, John Haskell Kemble, ed., Vol. I., p. 228.
 2. See Appendix VII, p. 414.

DRAKE AT PORTUS NOVAE ALBIONIS

The "strange kinde of Conies" are identified by Allen and Parkinson as the Botta Pocket Gopher, the only mammal meeting all of the descriptions of the Nova Albion coney. (1) World Encompassed describes the animal as follows:

... their heads and bodies, in which they resemble other Conies, are but small; his tayle, like the tayle of a Rat, exceeding long; and his feet like the pawes of a Want or moale; vnder his chinne, on either side, he hath a bagge, into which he gathereth his meate, when he hath filled his belly abroad, that he may with it, either feed his young, or feed himselfe when he lists not to trauaile from his burrough. (2)

Some previous researchers have identified the animal with the California ground squirrel, largely on the basis of the description of the tail. However, they chose to disregard that the ground squirrel's general shape, furry coat, bright eyes, and bushy tail is definitely squirrel. The account plainly states that the animal was strange to the Englishmen; the squirrel was not, however.

The strongest piece of evidence is the very clear description of the external pouches, which are not characteristic of the ground squirrel, but are found in the Botta Pocket Gopher, one of only two native mammals of Marin County possessing this feature. The other is the Heerman Kangaroo Rat which does not meet the full criteria of the description given in the accounts.

Of the tail, many animals have long tails, but the circumferentially ringed, scaly and nearly naked tail is the mark of a rat. None of the accounts imply that the coney's tail was in all respects like that of a rat, however, but instead, a condition of texture. In comparison with the coney's or rabbit's tail, it was exceedingly long as well as rat-like. The pocket gopher's tail, though short by comparison with the rat's tail, is

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1. See R. W. Allen and R. W. Parkinson, Identification of the Nova Albion Conie, 1969.
 2. See also Hakluyt's description of the animal in Famous Voyage, p. 131, supra.

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nearly identical in texture to the last 3-1/2 inches of a Norway Rat's tail.

Of the feet, both World Encompassed and Famous Voyage assign the feet of a mole with the former further likening them to a paw. The European mole's forefeet are very large, hand-like, and have strong, blunt claws for moving earth. His hindfeet are much narrower and smaller, with very sharp claws. These are also characteristic of the pocket gopher, the basic difference being that the mole's fore claws are worn from digging; whereas the gopher's are long and sharp, inasmuch as most of his digging is done with his upper incisor teeth, his chest and paws being used to move the earth.

The country about Drakes Bay and the inland is riddled with gopher holes. Although each gopher burrow is occupied by only one mature animal and has many entrances or exits, the Englishmen were thinking in terms of the gregarious rabbit and understandably magnified the population of the gophers.

The mention of subsisting on "Muscles" is not surprising, for Drakes Estero abounds with a variety of shellfish which provided a very large part of the diet of the local Indians, as attested by the amount of shells in their middens. Many shellfish could have been obtained very close to the camp, and the ship's boat provided an opportunity to range farther afield for them.

On at least one prior occasion during the voyage, seals were hunted for food, as many as 200 in an hour being taken on the Argentine coast at the present-day Bahia de Los Nodales, which Drake named Seal Bay. In World Encompassed they are mentioned at Nova Albion where food shared with the Indians consisted of "such victualls as we had provided for our selues, as Muscles, Seales, and such like." The seal is mentioned again at departure when they were found on the Farallon Islands, "hauing on them plentifull and great store of Seales and birds, with one of which wee fell July 24, whereon we found such prouision as might competently serue our turne for a while." The mammal that one would be most apt to associate today with the description is the California Sea Lion (Zalophus californianus). However, in the early history of California, the sea lion was apparently vastly exceeded in numbers by the California fur seal (Arctocephalus Townsendi).

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Within historical times the fur seal was found in herds of hundreds and thousands on the California coastal islands. In two years alone, 1808-09, one American sealing party took 130,000 seal skins on the Farallons. (1) We can only speculate as to where Drake's people found their seals at Drakes Bay. Today, however, a large herd of sea lions congregate on the south face of Point Reyes, and a few harbor seals are frequently seen sunning themselves on sand bars within Drakes Estero, though these are wary and quickly slip into the water when disturbed. However, fragments of bones of the young animals found in the Indian middens indicate that these, or perhaps others killed on Point Reyes were used as food by the Indians. The fur seal was trusting and easily taken on land by simply clubbing it on the head, whereas the sea lion quickly flees to the water. Drake had a very serviceable tender with him, and it would have been a routine matter to send a foraging party out to Point Reyes every so often for enough seal meat to last several days, with plenty to share with Indian visitors to the camp. It is also likely that a quantity of the meat was salted and laid down in casks as victuals for the voyage home.

No positive identification has been made of the "birds and foules" mentioned in World Encompassed, which describes them as follows:

The poore birds and foules not daring (as we had great experience to obserue it), not daring so much as once to arise from their nests after the first egge layed, till it, with all the rest, be hatched and brought to some strength of nature, able to helpe itselfe. Onely this recompence hath nature affoorded them, that the heate of their owne bodies being exceeding great, it perfecteth the creature with greater expedition, and in shorter time then is to be found in many places.

Because the commentary on the birds is a part of the description of the cold, unpleasant nature of Drakes Bay, it is probable that the birds inhabited this coastal area. The statement that Drake's people had "great experience to obserue" their nesting habits suggests familiarity,

1. See Peter Townsend Furst, "Happy Seals are Here Again," Fortnight, Sept., 1956, p. 35.

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or opportunity to see them often. That they noted the exceptional body heat is probably due to the likelihood that the birds were taken as food, or the nests were robbed for eggs.

One of the birds may be the California Valley quail (Lophortyx californicus), whose hen will not leave the nest until an intruder is quite close. The quail is commonly found on the Point Reyes Peninsula and very likely inhabited the brushy area around the camp where it would have been frequently seen. It would come under the description of "foules", or game birds.

Other possibilities are sea birds. Point Reyes is an ideal rookery for numerous species of these birds, which include the Brandt cormorant and the California murre, both large birds, and no doubt they were observed by the English as the Golden Hind passed the point and often again during the course of the foraging expeditions. The murre's egg is about as large as a goose egg, and it was much sought for the commercial market in the early days of San Francisco.

The taking of sea birds for food is described at least twice in World Encompassed; once in the Strait of Magellan, when at least 3,000 penguins were killed in one day and were described as "a very good and wholesome victual", and again ten weeks later off the coast of Peru two islands were found, "being, as it were, storehouses of most liberall prouision of victualls for vs, of birds." (1) Considering the number of birds taken in the first instance, it is probable that the meat was salted.

The "broyled fishes like a pilchard" referred to in World Encompassed, which were brought by the Indians from inland, could have been herring from Tomales Bay. The sardine (Sardinia pilchardus), which is called pilchard in Britain, resembles the herring and attains a length of 8 to 10 inches; a less likely possibility is that they were smelt.

The only other reference to fish in the account describes a curious method of catching them; "One thing we obserued in them [Indians]

1. See N. M. Penzer, ed., The World Encompassed, p. 24 and p. 36.

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with admiration, that if at any time they chanced to see a fish so neere the shoare that they might reach the place without swimming, they would neuer, or very seldome, misse to take it."

The statement was made in context with the description of the physical strength and agility of the Indians, as for example, how "they are also exceeding swift in running." Since no fishing implement is indicated, such as a net, or a spear, which is eliminated by the statement that the Indians had no other weapons than the bow and arrow, it can be assumed that the fish were caught in the bare hands. This fishing involved dexterity of a remarkable type worthy of special mention. The narrator leaves us to guess the manner of accomplishing it "without swimming," but it is known that catching fish in the hands by diving, or plunging, for them from a stream or river banks was practiced as a sport by some California Indians, ⁽¹⁾ though it is not recorded for the Coast Miwok. The implication of the statement could be in the sense of exceptional skill in diving to seize the fish, as an example of agility and swiftness, or skillful stalking by wading in shallow water.

The steep sided channels of the estero in the vicinity of Drake's camp provide conditions ideal for diving for fish. The water is very clear and often quite smooth; seals have been seen swimming in relatively deep water, well below the surface, only a few feet from the bank, though, significantly, large fish are rarely seen here. Good conditions for stalking and wading, however, are provided by the extensive, shallow sandbanks of the estero, on which shark and skate bask and feed on shellfish. An ideal site for this type of fishing existed in the shallows along the inner shores of Drake's Cove. The small sand shark, leopard shark, and skate abound, and could be the fish caught; the rough skin of sharks would have helped to retain a firm hold. Remains of leopard shark and skate have been found in Drakes Bay middens. ⁽²⁾

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1. See G. W. Hewes, Aboriginal Use of Fishing Resources in Northwestern North America, Ph. D. dissertation, University of California, Berkeley, 1947.
 2. See W. I. Follett, Fish Remains from a Sixteenth Century Site on Drakes Bay, California, Annual Report, 1963-64, Archaeological Survey, University of California, Los Angeles, pp. 31-41.

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The "trees without leaues" were cited in World Encompassed as an example of the inhospitable quality of the country surrounding the camp site. At Drake's Cove, these can be identified with the Blue Blossom (Ceanothus thyrsiflorus), a large, evergreen shrub growing to the size of a small tree but with a short life span. Their naked forms seen in the wind and fog, and draped with fructicose lichens, emphasize the severe aspect of the land.

"Stocks of wood" upon which the Indian women threw themselves in sacrifice within sight of the camp were mentioned earlier. The use of "stock" denotes a bare, standing stem of a tree or stout bush, and in this case it had to be rather low, not much above waist-high. The Marin County shrubs of the outer coast meeting this criteria are the Blue Blossom again and the more prevalent Coyote Bush, both of which are short lived and found together on the hills above Drake's Cove, where their dead stocks are commonly encountered. (1)

The "pricking bushes" on which the Indian women dashed themselves during the same sacrifice were previously identified as the Salmon-berry. This bush, which is a member of the rose family, is one of the only three kinds of pricking bushes known to be native to the Point Reyes Peninsula, the other two being the California Wild Rose and the Gooseberry. The latter two plants are only found occasionally here and not normally in dense thickets. Allen points out that the Salmon-berry thrives near the ocean and is found in abundance at Drake's Cove, and Indians coming down the hill to Drake's camp would have had to pass through dense thickets of the plant. It has many short, easily detached, needle-like prickles on its main stems and can produce numerous, small pricking wounds.

"Bulrushes" were mentioned in Famous Voyage and World Encompassed as an article of the Indian women's clothing, which being combed in the manner of hemp and knitted above their middle, hung down as a loose skirt. The cat-tail (Typha latifolia), which was well known in England as bulrush, is commonly found in the marshes and lagoons around

1. See R. W. Allen, An Examination of the Botanical References in the Accounts.

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Drakes Bay. Rushes are spoken of as being strewn over the floor of the Indian houses as floor covering and bedding. Although the construction of the Indian canoes is not described in the accounts, it may be taken as certain from the specific descriptions in the Cermeño accounts that they were made of rushes. The descriptive wording used in the Drake accounts for this vegetable fibre denoted a reed-like plant growing in marshy ground, which would correspond to the tule (*Scirpus* spp). Six varieties can be found in the Point Reyes area, the most common in the estero and lagoons bordering Drakes Bay being *Scirpus paludosus*. (1)

Drake may have used torches of cat-tail or tule to bream the bottom of the Golden Hind while she was careened.

The "downe" which grew on an herb similar to the English lettuce and was laid on net caps of certain of the Indian king's guards must be sought for on the inland side of Inverness Ridge, inasmuch as it was said to grow "vp in the country." The seeds were said to be used only in sacrifice to the gods, and the down "exceeds any other downe in the world for finenesse," The plant answering to the description given in World Encompassed is undoubtedly the *Rafinesquia californica*, a native species closely related to the wild lettuce of England, and is found in the Olema Valley. The plant bears a very soft down. (2)

The root called "Petáh" is identifiable as a common native plant of the Point Reyes area and the interior, bearing common names indicative of its use, such as Squaw Potato, Bread-root, Indian Potato, and otherwise as Yampa. (3) The Range Plant Handbook (4) indicates that the Yampa root was used in various ways not unlike the description given in World Encompassed. The handbook states that in addition to being boiled or prepared as with other vegetables, "the roots were also eaten raw, ground into flour and made into bread, or used with other roots and seeds to make a meal or gruel." It describes the Yampa root as being fleshy and

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1. See R. W. Allen, An Examination of the Botanical References in the Accounts.
 2. See R. W. Allen, Identification of "an herbe much like our lectuce..."
 3. See R. W. Allen, An Examination of the Botanical References in the Accounts.
 4. See U.S. Dept. of Agriculture, Range Plant Handbook, Sect. W 48.

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tuberous, resembling tiny sweet potatoes, growing up to three inches long and three-fourths of an inch thick. The tubers have a sweet, nutty, creamlike flavor and were eaten extensively by the Indians. The plant occurs both in the Olema Valley and on the hills above Drake's Cove.

The Tabáh and Tobâh, mentioned in World Encompassed as being given to Drake in a basket, and in bags, as gifts by the Indians, elude positive identification. (1) Tabáh, in each case of its mention, was always attached to a stick, or scepter, and delivered by a male emissary, whereas Tobâh was merely carried in the hands; on one occasion by women. Neither appears to have been brought as a food. Tobâh is referred to specifically in one place as being intended for sacrifice, and Tabáh was presented each time with feathers, which are usually associated with ceremonial intent.

Although it has been doubted by Heizer and Kroeber that Tabáh and Tobâh are Indian words, (2) the spelling, consistent use of diacritic marks, and frequent rendering of other Indian words makes it evident that the narrator was recording something heard rather than a corruption of the word tobacco. Also, despite the fact that the words appear to be so similar as to be construed as meaning the same, there is good evidence that they were different, as for example, the use of both in describing the events of one day, June 26.

In Famous Voyage, Tabáh appears as "TABACCO" at the same point as in World Encompassed, but the difference appears to have been introduced by Hakluyt as a clarification, possibly on the advice of someone who had been on the voyage and who likened the herb to tobacco. Heizer, however, points out that the Coast Miwok word for tobacco is Kaiyau. (3) If the English had seen it being smoked, they would unquestionably have commented on it, inasmuch as the use of tobacco was not common to them at this date. (4) Tabáh was in each case referred to as

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1. See R. W. Allen, An Examination of the Botanical References in the Accounts.
 2. See R. F. Heizer, Francis Drake and the California Indians, pp. 261-262.
 3. Ibid., p. 261.
 4. In 1579 tobacco was fairly new to the English, and it was not widely used by them until 1589.

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an herb. It was probably dried, and in this respect it may have resembled tobacco.

Allen suggests that both Tabáh and Tobâh may have been either of the Daturas (Datura metaloides and Datura stromonium var. Tatula), commonly known as Jimson weed, which grows inland in the Point Reyes area. It was used ceremonially by many California Indians and called toloache. The ground-up root of the plant was taken with water to produce intoxication and visions, though it is not as potent as the leaves. Tobâh may have been the root, and being ground, its original state would have been unrecognizable and therefore not defined. Tabáh could have been shredded leaf, however, which would be recognizable as a plant leaf and thus defined as an herb.

The sixteenth century explorer was always on the lookout for precious metals and gems, and Nova Albion evidently held promise in this respect too. Hakluyt, in the 1589 edition of Famous Voyage, wrote, "There is no part of the earth here to be taken up, wherein there is not a reasonable quantity of gold or silver." In his 1600 edition this was less positively, and more accurately, changed to read "some probable shew of gold or silver." (1) World Encompassed reflects the same opinion with "riches and treasures thereof (wherewith in the vpland countries it abounds)."

Though by no means an exclusive regional characteristic, the Point Reyes Peninsula has in fact a geological configuration that is often associated with the presence of gold and silver. Because of the granitic nature of the peninsula, there is a distribution of mica flakes throughout the soil of the area, and also black magnetic sands in the beaches. Metallic oxides occur on Inverness Ridge and in various geological mineral contacts in the area. On the inland journey, Drake may have seen extensive mineralization which is often associated with gold and silver ores; granite (diorite), mica, quartz, limestone, and iron pyrites.

Before leaving Portus Novae Albionis, it is of some interest to reflect on the choice of the name given to this small port. Is there a deeper implication in the use of the name than merely a Latinized

1. See p.131, supra.

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rendering for Drake's port in Nova Albion? Although "portus" was also used for the name of Drake's port of call in Java, Portus Iavae Majoris, it is not found on other maps or harbors on Hondius's Broadside Map, and it is seldom found on other maps of the period. In Chapter III the general usage of the word "portus" as a term for the mouth of a river or estuary, as well as port of lading, was mentioned, and as it was applied to the Portus Novae Albionis inset, it must be assumed that it refers to this small port within Drakes Estero.

The word "portus" as used for a protected port of lading can be traced back to the harbor of Ostia, the port of entry to ancient Rome; a man-made harbor constructed at the mouth of the Tiber River. The educated man of sixteenth century England was probably familiar with this fact, inasmuch as he was reasonably competent in the use of Latin for classical and even commonplace utterances in that day. We have seen that an archaic Latin name for England was used in naming the country for the white cliffs at Drakes Bay.

The Roman Portus was formed by two long, curving moles opening directly to the sea and enclosed an anchorage of 130 acres. Between the ends of the moles a concrete island was constructed to give maximum restriction to the entrance and yet provide two channels for entry and departure. The purpose was to provide a deep-water port at the mouth of the Tiber, protected from the prevailing southwest winds and free from the silting that normally occurred there, and from which goods could be easily trans-shipped to Rome by barge. A canal on the southeast side of the harbor communicated with the Tiber. In A. D. 101-104 the Emperor Trajan added a hexagonal basin with an additional 78 acres behind Claudius' harbor. The port was the gateway for a vast commerce with ancient Rome. It continued as a harbor of importance until the Middle Ages, when it was abandoned because of silting on the north side of the Tiber. To this impressive harbor, Claudius simply gave the name common for harbors, Portus, or, the port. (1)

Drake's Cove was similar in several respects to the ancient Portus. In effect, it approximated that artificial harbor, though created by the whim of nature. The protecting spit corresponds to a

1. See Lionel Casson, The Ancient Mariners, p. 225.

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curving mole, and like the ancient Portus, it was located on the left-hand side of the estuary as one enters from the sea. One can only speculate, but it seems reasonable that Drake was inspired to call this Portus, the gateway to a rich and fertile hinterland.

CHAPTER XI

DEPARTURE

Shortly before Drake departed from Portus Novae Albionis, he erected a monument on which he posted his now famous Plate of Brass, proclaiming both evidence of presence and his claim of possession to Nova Albion for his sovereign, Elizabeth. (1) The details of finding the plate and its authentication were given in Chapter II. However, it is of some interest to consider where this monument was located in relation to the site of Drake's encampment.

Although one can only speculate as to where the monument was set up, we have fairly specific reference to its appearance. In all cases it is referred to as a "great post," with World Encompassed adding that it was "firm" and Famous Voyage stating that it was a "faire great poste." Elizabethan use of great denoted thick, stout, massive, bulky -- big as opposed to small. "Faire" implies that it was smooth and reasonably straight. Obviously, it was intended to be an impressive monument to the act of taking possession, and by the implication of "firme," it was undoubtedly set well into the ground with the intention that it remain for some time. (2)

Timber of a size that might be called "great" is not found growing near Drake's encampment; a driftwood log provides the obvious answer for the post. It is not unusual to find large logs cast up on the beach bordering Drakes Bay. These are brought down on coastal currents from northern rivers, usually following floods during the rainy season. The Guild has found such logs on the beach at Drake's Cove measuring up to 3-1/2 feet in diameter, often debarked and smoothed by the surf. Douglas Fir and Coast Redwood are the most likely choices, both of which grow naturally straight and account for a large part of the driftwood littering the beach. Size would not have presented any unusual handling problem to Drake's seamen. They had tackle available for bousing and lifting heavy weights, and there was a relatively large number of men available to provide the necessary labor.

The unstable beach on which the camp was located seems the least desirable location for a monument. Logic, bolstered by past practice

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1. See p. 131, 168-169, supra.
 2. See paper by R. W. Allen, An Examination of the Botanical References in the Accounts.

DEPARTURE

in similar situations, favors an elevated position of prominence from which a monument could be seen easily by anyone entering Drakes Estero from the sea. The hills and bluffs surrounding Drake's Cove offer prominent positions, but in relation to the entrance to the Estero they tend to be out of the way, and in this respect, it is perhaps significant that the monument is not shown in Hondius' inset view of Portus Novae Albionis, which depicts Drake's departure. Headlands were often favored by early navigators as prominent points on which to erect monuments attracting attention to their visit; in view of this the headlands on the east side facing the entrance are eminently suitable as the setting for Drake's "faire great poste." Here, the monument not only would have faced the outer bay, but it would have been relatively close to view from any ship or boat which might come into the Estero. The likelihood of such a site is favored by the finding of the Plate of Brass east of Drakes Estero on the Laguna Ranch.

There is no indication that Cermeño saw the monument when he explored Drakes Estero in November, 1595, though if he had it is unlikely that he would have left the Plate of Brass to posterity. There are no marks on the Plate from prying or vandalism by European tools, but the face has many large and small indentations, presumably made by the stone tools or weapons of the Indians, as well as numerous, random scratches that were probably made with an arrow point or other sharp piece of stone. (1) It is unlikely that these blows loosened the Plate from the grip of the ship's spikes that secured it to the post, but whether the act of striking the plate stemmed from an attempt to remove it or mere curiosity provoked by the strange toughness of this shining piece of metal and the unfamiliar metallic sounds produced by the blows, the Plate may have remained long enough to acquire a patina of atmospheric corrosion which forms the underlying of the two distinct layers of corrosion products found by Dr. Fink and Dr. Polushkin. (2)

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1. The indentations were commented on by Fink and Polushkin in Drake's Plate of Brass Authenticated, pp. 11 and 12, but not the random scratches. The indentations were reasonably shown to have been made by local Indians in an experiment where a modern sheet of brass was struck with a stone ax typical of the type used by them. The scratches were made on the face of the plate after the letters had been engraved.
 2. Ibid., pp. 12-14, 17, 18, and 25.

DEPARTURE

The outer patina was found to be a curious conglomeration composed of mineral products from the soil into which the Plate eventually found its way, and a black deposit consisting chiefly of finely divided carbon, some particles of which had a distinctly fibrous structure resembling charcoal. It was the opinion of Drs. Fink and Polushkin that the outer coating undoubtedly covered the whole surface of the plate originally and protected it from further corrosion. (1) Particularly important is their conclusion that the outer coating was formed during a long period of time, a conclusion strongly reinforced by the finding of petrified organic tissue in the coin groove. Neither the find-site at Greenbrae nor that at the Laguna Ranch contains a carbonaceous soil that can account for the black coating. (2) One might speculate that the Indians burned the monument and left the Plate in the ashes, but it seems doubtful that sufficient carbonaceous material could have remained to create this black coating; further, the heat would have created an additional condition not found.

More plausible is the suggestion made by Dr. Aubrey Neasham, former State Historian, that the carbon could be attributed to the fact that the Plate had rested for a long period of time in an Indian midden with its soil of characteristically high carbon content. (3) We may conclude that after the Plate had become separated from the post it was carried to a nearby village site either on the bay or on the estero, a considerable distance from where Caldeira found it. Here it was either intentionally buried or discarded and eventually trampled into the soil. By then the Plate had undoubtedly lost its metallic lustre and attractiveness, and it is notable that there are ~~few or~~ no defacing marks on the reverse side.

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1. See Fink and Polushkin in Drake's Plate of Brass Authenticated, p. 14.
 2. Soil samples from the two find-sites and from two sites on Drakes Bay were analyzed. It is significant that none of these soils showed the high degree of carbon content necessary to produce the carbonaceous coating on the plate. One element, boron, which was found in the patina, was found only at Drakes Bay. See Fink and Polushkin, p. 24.
 3. Dillingham and Aker, A Review of the Findings of Dr. Adan E. Treganza Relative to the Site of Drake's Landing in California, p. 27.