PAMPLONA SEARIDGE 1779-1957

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When the Spaniard Don Ignacio Arteaga first discovered and caused to be charted a dangerous rocky shoal off the Alaskan coast in 1779, he did not realize the consternation which would follow in the next 100 years. Formerly charted 60 miles offshore from the head of the Gulf of Alaska in depths subsequently found to be more than 1500 fathoms, it constituted a real menace to navigation. In fact the Russians, who were colonizing Alaska at the time, reported the wreck of a galiot upon this shoal. Nothing was heard of this danger in the last century, although repeated search was made by various American ships at the time Alaska became a territory of the United States. Pamplona Rock appears on the map of North Western America compiled for the Department of State by the Coast Survey in 1867, but it was subsequently considered nonexistent and removed from the charts. Recent surveys may have found this former shoal, now delineated as an extensive submarine ridge lying 30 miles from shore.

BAJO PAMPLONA DISCOVERED

The only known first-hand report is contained in the log and journal of Arteaga's voyage from which extracts are published in the Pacific Coast Pilot, 1883 [1]*.

« The dark clouds which covered the coast disappeared on the sixteenth (July, 1779) and we descried it at the distance of ten leagues, and also rediscovered the high promontories (Mt. St. Elias) which bore in part northeast at the 28th degree of the first quadrant, and in part more to the southeast, which was lower and at the 45th degree of the same, whereof an adjacent point bore NE 1/4 E; and also appearances which, at the distance of a mile indicated a shoal (bajo), which was not examined on account of the fresh and favorable wind for continuing upon our course. » (Extract from the log.)

« As in this latitude when the sky is clear it is hardly dark at night, we saw on the 16th, at one o'clock in the morning, the land which some days before we had discovered, and also discovered ourselves at five in the morning to be in the vicinity of a shoal which we considered to be in north latitude 59°02' and in west longitude 35°40' from (cape) St. Lucas, (145°32' W. Gr.). On the 16th, at two in the afternoon, we observed at the distance of a league Cape St. Elias (Cape Suckling) with the point of the island near it named Carmen (Kayak Island) and sounded in forty fathoms of water in the bay between the island and the cape. » (Extract from the journal.)

* This and succeeding numbers apply to the list of References appearing at the end of the article.

The log lists a position in latitude 59°22', longitude 145°49'; the chart accompanying the log places Bajo Pamplona in latitude 59°10', longitude 146°24'; and, as noted above, the journal records latitude 59° 02', longitude 145° 32'. The incorrectness of these recorded positions is established by several factors. After discovering Bajo Pamplona Arteaga sailed into Prince William Sound and anchored in Port Etches. The longitude he assigned to this place was found to be in error 4° 03' westward.[2] On his next landfall at the end of Kenai Peninsula the error was found to be 2°30', indicating a revision in the dead-reckoning longitude. Arteaga had been on dead-reckoning since leaving Mexico five months before.

Arteaga's bearings on Mt. St. Elias and Mt. Cook, corrected for the stated 26° compass variation, intersect between longitudes 142° and 143° (fig. 1). Spanish cartographers placed Bajo Pamplona in latitude 59°07', longitude 142°41', west of Greenwich. One of their maps published in 1802 is shown in figure 2. It depicts the voyage of Malaspina in 1792. Don Alejandro Malaspina was, like Colombus, an Italian in the service of Spain who was seeking the Pacific entrance to a possible passage through to the North Atlantic. Malaspina Glacier bears his name.

Other reports of rocky shoal

Fifteen years after Arteaga's visit to this area, Captain George Vancouver sailed the coastline, bays, and inlets along the Alaskan coast in his *Voyage of Discovery to the North Pacific Ocean and Round the World*. Assisted by Lt. Peter Puget, he commanded two ships here in 1794, the *Discovery* and the *Chatham*, in further search for the Northwest Passage. Yakutat Bay, east of Mt. St. Elias and Malaspina Glacier, had previously thought to offer such a possibility.

When Puget entered Yakutat Bay with the *Chatham* he found an old acquaintance, the Russian trader Portof who had sailed from Cooks Inlet and Kodiak Island with a large number of Indians and their skin canoes. They were hunting sea otters. Portof was planning to hunt on a very dangerous rocky shoal about fifteen miles long, lying by compass south by west 63 miles from a place Puget considered to be at the east entrance to Icy Bay.[3] Portof made annual visits to the shoal taking sea otters, and reported that the first discovery of this danger was when a Russian galiot wrecked on it some years before. His comments to Puget led the latter to believe that the Russians made little use of the compass when steering for this shoal; they shaped their course from points on the coast and never failed to hit some part of the shoal, thus confirming its extensiveness.

Subsequent to Puget's report of this conversation with Portof, Vancouver received confirmation from the Spaniards that a very dangerous rocky shoal called Roca Pamplona existed in this area. They reported taking great pains to locate it S 41° E, 26 leagues from Cape Suckling. Vancouver determined this position to be 8 miles from the Russian position.

A chart of this area, published in 1849, is included in a Russian Atlas of the Northwest Shores of America compiled by Tebenkof. The chart shows Pamplona Rock as taken from Spanish charts in latitude 59°03', longitude 142°40'. Notes accompanying the atlas include a reference to the rock observed by the Spanish Captain Arteaga in 1779 in the latitude of Dry Bay and approximate longitude 142°40'.[4] Tebenkof further states that the rock was observed again in 1794 by Talin, mate of the Russian vessel *Orel* (Eagle), who named the rock in honor of his vessel. Talin did not, however, determine its position.

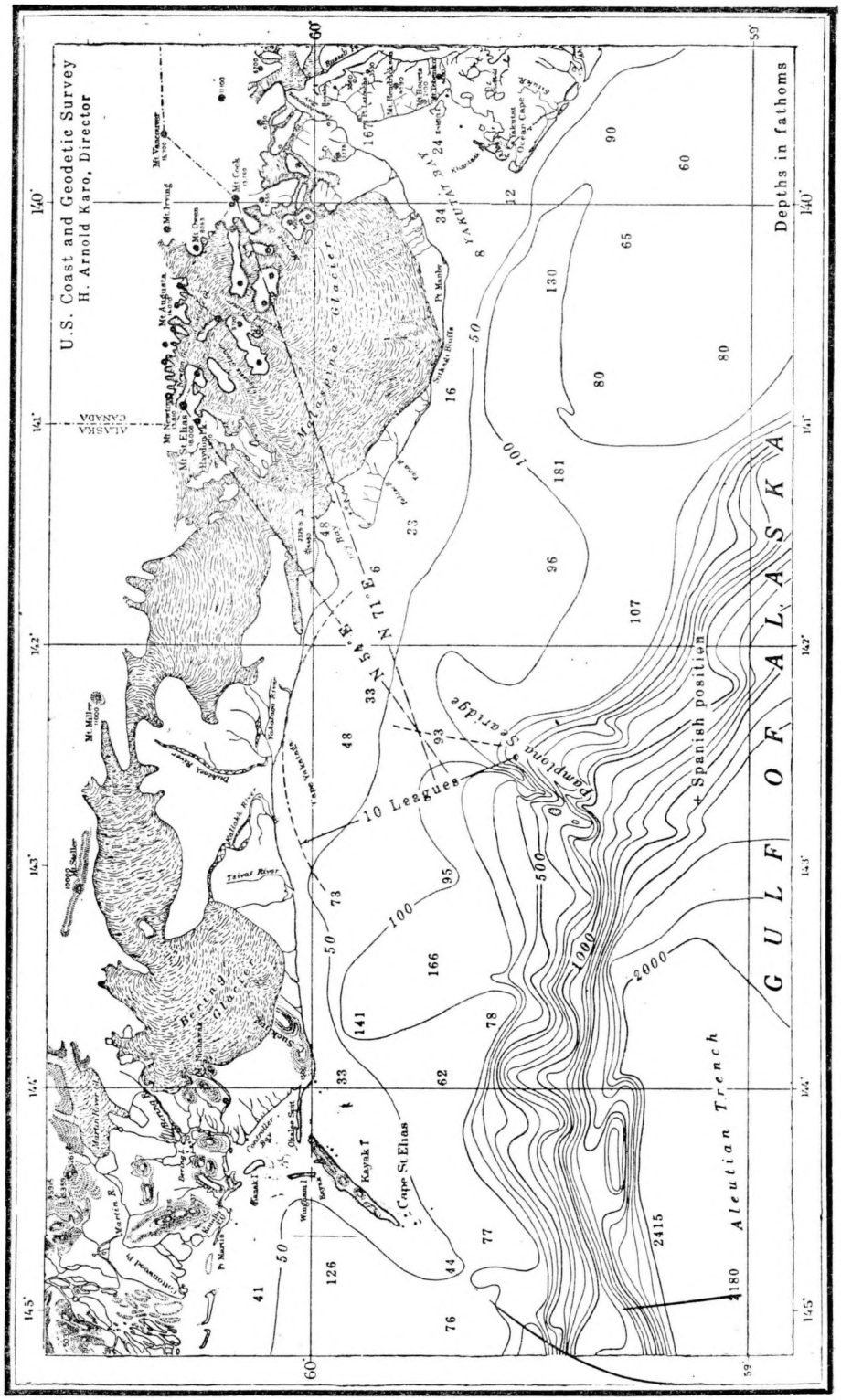

Fig. 1.
Bathymetric chart showing the positions of Pamplona Seariage and original observations.

SUBSEQUENT SEARCHES

When the Western Union Telegraph Expedition visited Sitka in 1865, inquiry was made in regard to Pamplona Rock. It was stated by Russian authorities that a steamer had been sent out a year or two before on a cruise of several weeks investigation, and no bottom was found within 100 fathoms of the surface in a radius of 30 miles of the alleged position given by Tebenkof.[1]

The U.S. Coast Survey made a geographical reconnaissance of Alaska in 1867. George Davidson was in charge of this work which was carried out aboard the U.S. Revenue steamer *Lincoln* while that ship was engaged in its regular duties. Davidson compiled the first Alaska Coast Pilot, and in his concluding comments about Pamplona Rock he states that the circumstantial evidence appears too strong to doubt existence of this rock.[5] Although the intended search for it was not made, a lookout was posted in clear weather while passsing four miles north of the reported position.

A lookout was again posted aboard the Coast Survey schooner *Yukon* in 1874, but no indications of a shoal were seen. W. H. Dall and Marcus Baker conducted a comprehensive survey and study of Alaska on this voyage. They established the names of many prominent features, such as Malaspina Glacier, and compiled a bibliography of publications on Alaska.[6] Baker's Geographic Dictionary of Alaska is a standard reference for Alaska place names.[7]

In 1892 and again in 1903 the Coast and Geodetic Survey conducted reconnaissance hydrographic surveys over an extensive coastal area in this vicinity. These surveys were extended seaward to include a large area embracing the reported shoal. No bottom was sounded by sea lead at depths of 150 to 1200 fathoms.

It was concluded when the 1883 summary report was prepared for the Coast Pilot that it was highly improbable that any shoal sufficiently near the surface to break in ordinary weather existed in the position previously assigned to it. It was disregarded in subsequent charting. Support for this decision was given by knowledge that in addition to the above searches, no recent reports of the shoal were heard of despite the increased activities in these waters. The area had been a favorite ground for right whalers who would have surely seen and reported the dangerous shoal of Arteaga, Talin, and Portof. One of these whalers, Captain Fisher of the *William Gifford,* reported sinking and recovering a right whale in 75 fathoms in the locality assigned to the shoal.[1] Another whaler, Captain Bryant, reported a submarine range here.[5]

SUBMARINE RIDGE SURVEYED

Although several deep-sea sounding lines had been run across the area of the old Pamplona Shoal several years ago by Coast and Geodetic Survey ships enroute to and from Southeast Alaska and working grounds in Western Alaska, it was not until lately that the lines of continuous echo soundings were run nearer to the Coast, along the continental slope between Yakutat Bay and Cape St. Elias. The first inner crossing revealed a prominent spur projecting out from the shelf. In succeeding years the crossings were spaced at about 3-mile intervals to trace its seaward extent. Detailed development was unnecessary at this time, for the ridge appeared to be truncated at about 85-fathom depths and was not dangerous

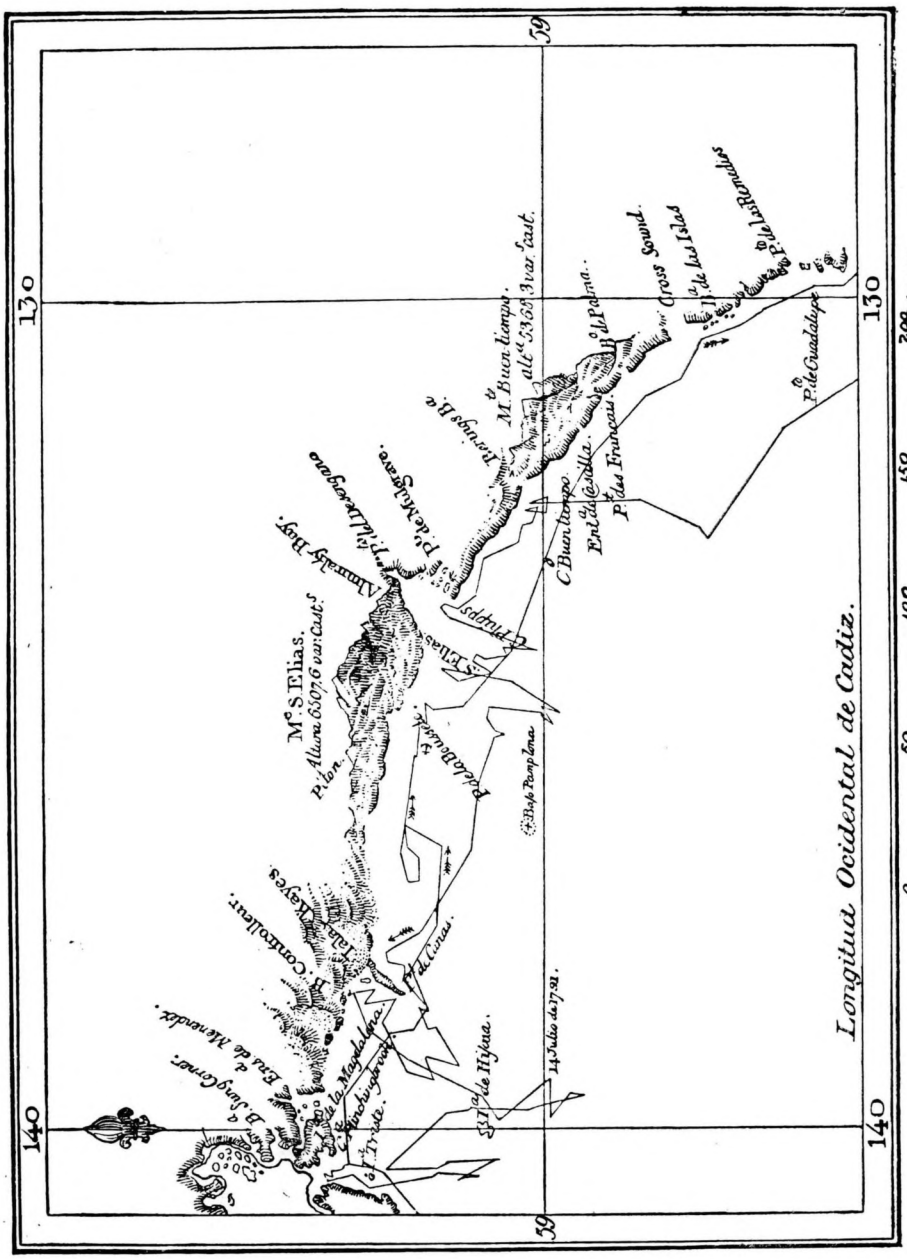

Fig. 2.
Spanish chart, 1802, showing the track of Malaspina's voyage and the Bajo Pamplona previously reported by Arteaga.

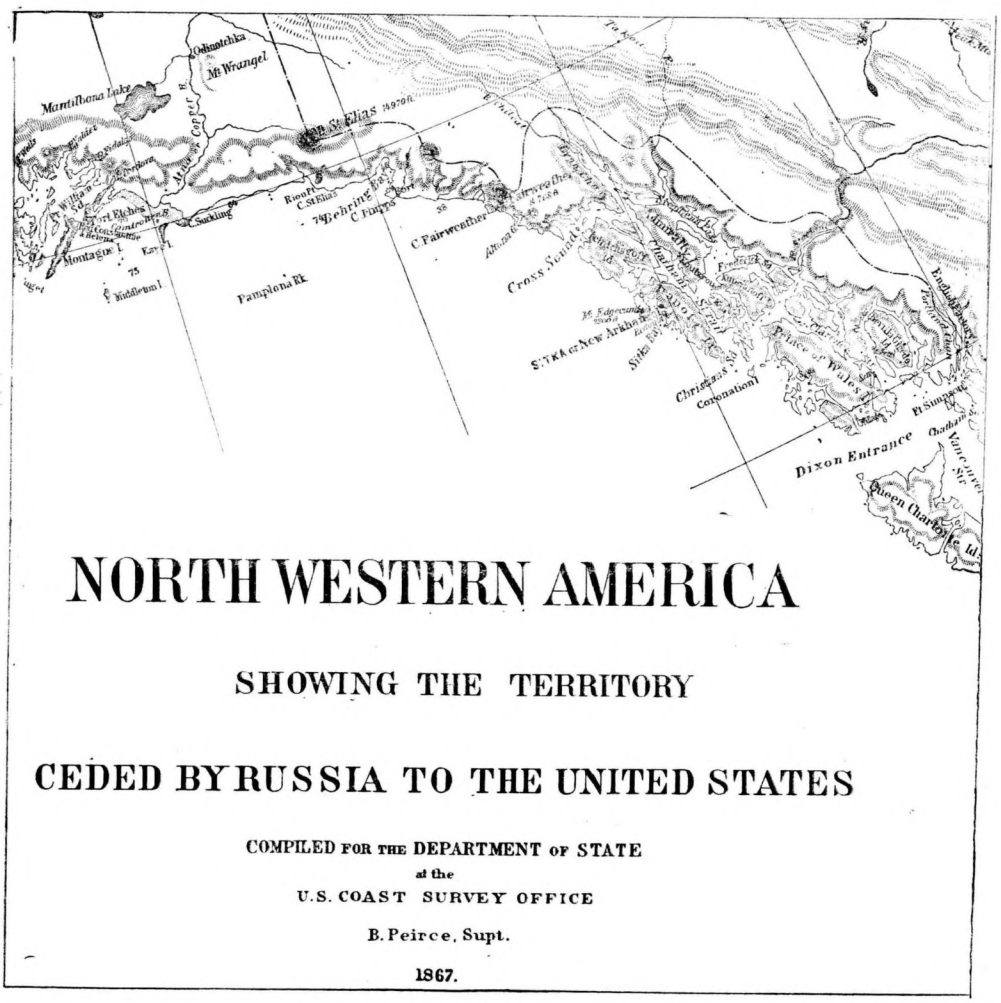

Fig. 3.
Pamplona Rk. on original map of Alaska.

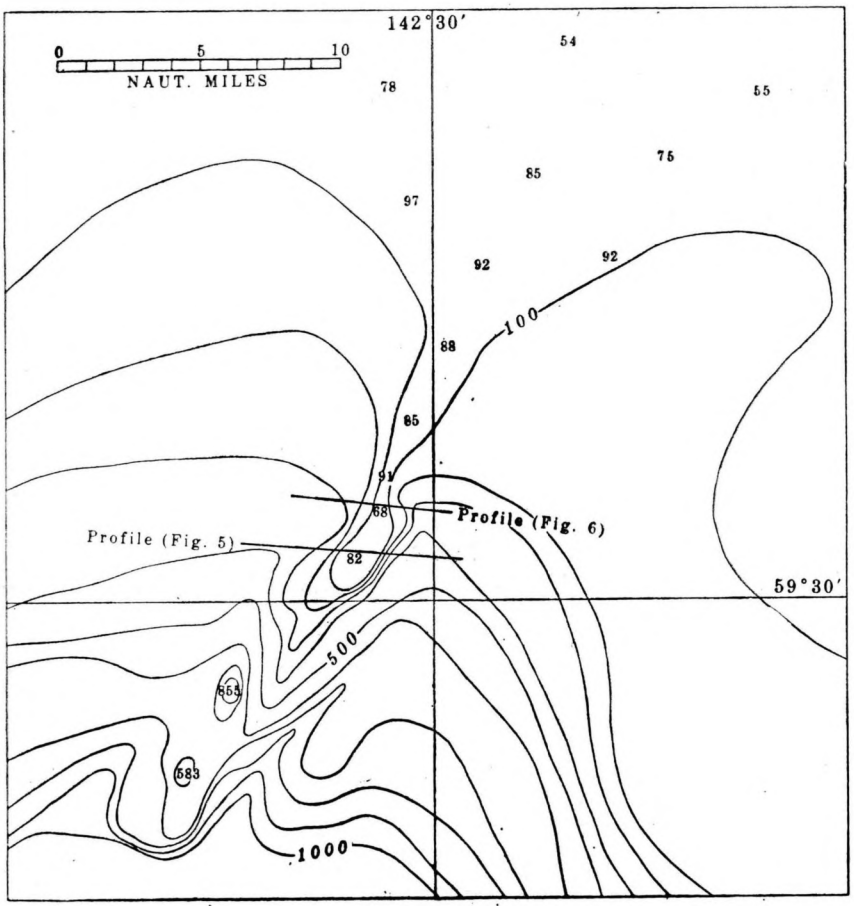

Fig. 4.
Large-scale bathymetry of Pamplona Searidge.

to navigation. When the limits were defined, however, the deep-sea sounding lines were interrupted for a detailed survey. The ridge was found to be nearly 15 miles long and to be surmounted near the end by apparently rocky irregularities rising about 100 feet.

The ridge is delineated at large scale on the bathymetric chart in figure 4 which also indexes the echo-sounder profiles shown in figures 5 and 6. Figure 5 shows a skew profile near the end where the top is 1.6 miles wide and the base has a spread of 4 miles. This asymmetrical profile shows slopes up to 25° on the east side and 12° on the west. Figure 6 near the neck shows average 19° slopes on each side, and it is noticeable that the west side is concave, whereas the east side is convex. The neck is 2000 feet wide at the crest. A constructed profile along the top of the ridge is shown in figure 8.

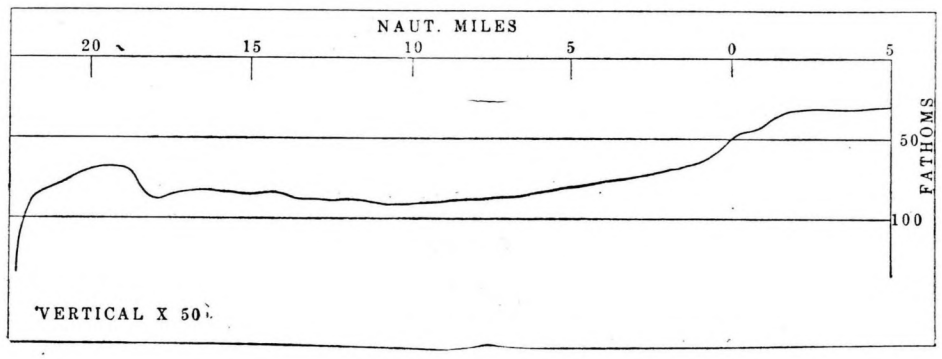

Fig. 8.
Profile along the top of the ridge, with distances shown from the 50-fm contour.

Several questions arise concerning this ridge. Is it the historic Pamplona Shoal; and if so, how can the discrepancies in position and depth be explained?

Relation to Pamplona Shoal

The English explorer Puget considered from Portof's remarks that the Russian hunters of sea otter used landmarks instead of compass in heading for this offshore shoal. It is evident that his reported bearing and distance originated with Spanish charting. Talin of the Russian vessel *Orel* obtained no position when he saw the rocky shoal. It is very doubtful that the galiot which reportedly wrecked on it was 60 miles offshore.

That Arteaga found the shoal nearer shore is attested to by his recorded observations. The log records the distance to have been 10 leagues from land, which in terms of 4×1480 meters, or 3.2 nautical miles, for the Spanish marine league, converts to 32 nautical miles. A 10-league distance from shore is shown in figure 1, together with the observed bearings. The locus of the angle included by the two bearings revolves along the east side of the submarine ridge, indicating that any compass adjustment to true bearings would have no appreciable effect on east-west positioning of the points of observations. It is apparent that Arteaga's observations were close to the submarine ridge discovered and surveyed by the Coast and Geodetic Survey ships.

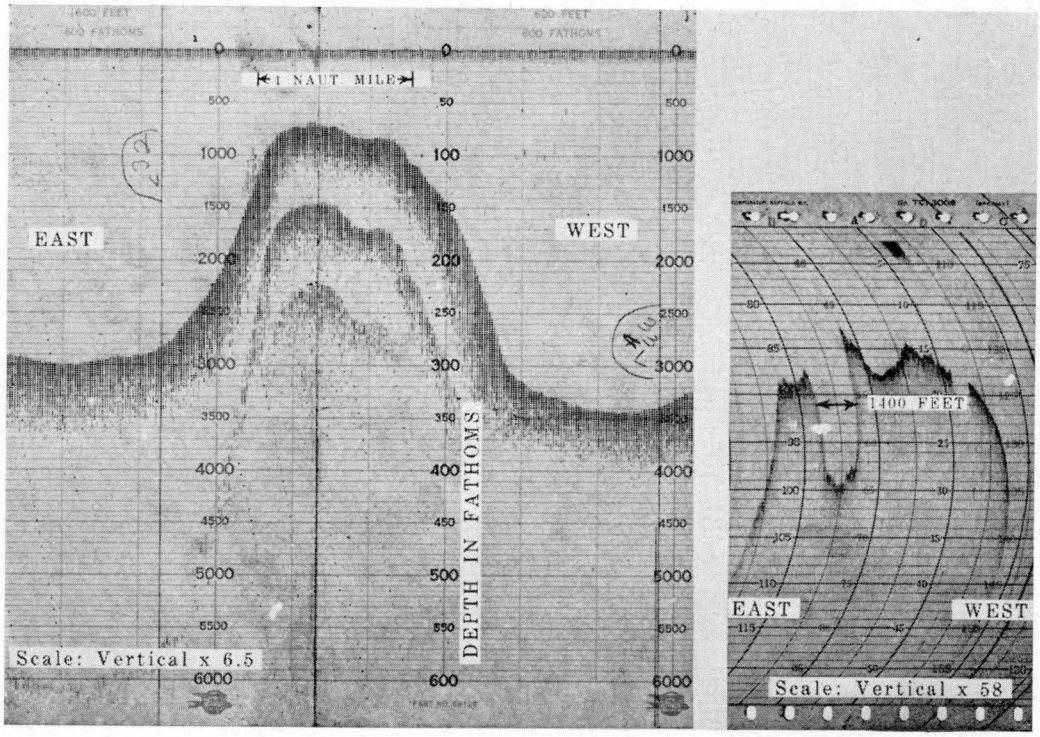

Fig. 6.
Profile across the neck, as visualized facing seaward.

Fig. 7.
Same profile as fig. 5 reversed, from companion echo sounder which produces enlarged vertical-scale recording.

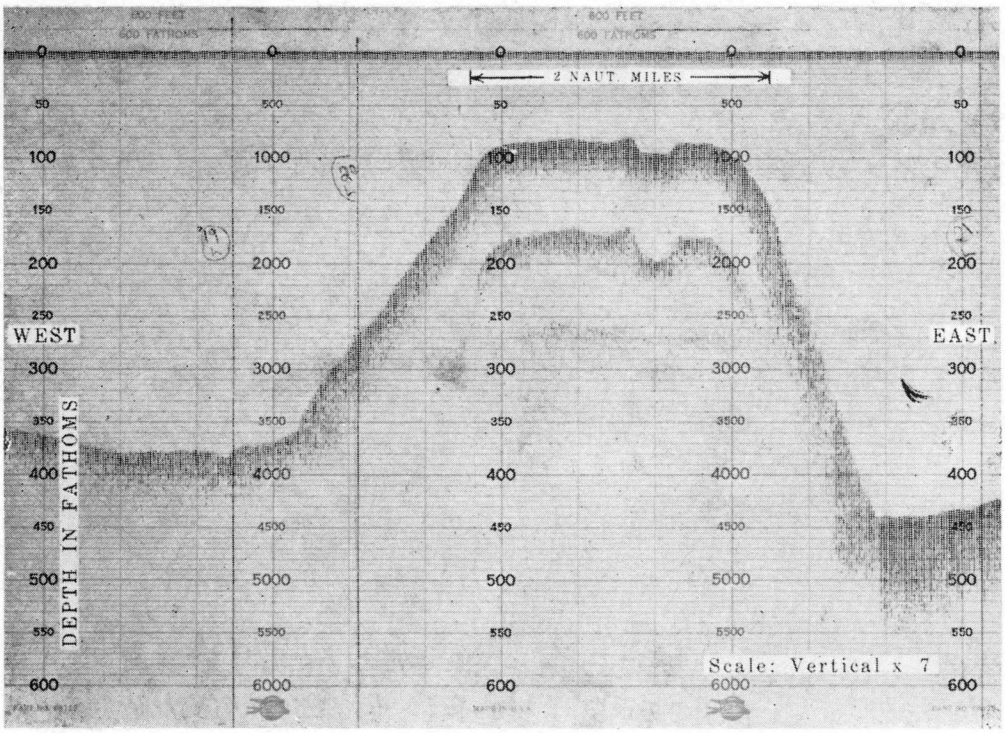

Fig. 5.
Fathogram profile indexed on fig. 4.

MORPHOLOGICAL IMPLICATIONS

The existence of a 15-mile searidge lying within the scope of Arteaga's observations and in the vicinity of the 15-mile rocky shoal reported by Portof and the rock reported by Talin would seem to be more than coincidental. If Pamplona Shoal, or Orel Rock, and the searidge are one and the same, there is still some 400 feet of Gulf of Alaska water over its top to account for. It seems inconceivable that such a great change could have occurred in such a short period. Comparable subsidence or uplift on land is unheard of except as a result of volcanic eruptions. Reported sudden subsidences on continental margins are generally considered due to slumping of sediments. The elevation of marine terraces several hundred feet high attest to uplifts in recent geologic time; and there are of course the mountain ranges like the nearby Chugach-St. Elias range which have been pushed up thousands of feet above sea level. Part of the nearby shore of Yakutat Bay was elevated 47 feet during a series of earthquake shocks which extended over a period of 17 days.[8] But changes have also included subsidence which is revealed by drowned tree trunks and shorelines in Yakutat Bay. Vancouver made a similar observation during his visit to Chalmers Bay in Prince William Sound.[9] He commented that he had never seen such a rapid encroachment of the sea as apparently occurred since the visit of other English explorers 7 years before. Also northward, vegetation buried 20 to 40 feet in the Copper River and Bering Lake area, further attests to subsidence of the coastal lowlands.[10]

Considering that the surface of the earth is ever subject to change because of forces generated within its crust and shifting loads along continental margins, it is not inconceivable that some major changes occur in the sea undetected except for seismological and tidal sea-wave observations. Mute testimony of tremendous subsidence relative to sea level is provided by the continuing network of deep-sea sounding lines run across the Gulf of Alaska and Northeast Pacific by ships of the Coast and Geodetic Survey. Many seamounts are found to have truncated, wave-planed tops at depths more than 500 fathoms.[11] One of these lies in the Aleutian Trench, the bottom of which drops more than a mile below the abyssal plain of the ocean. This trench and other foredeeps adjacent to continents and insular arcs are loaded with thousands of feet of sediment eroded from land. The weight of this material depresses continental margins, causing down-warping or faulting of the slopes. In areas adjacent to mountains, glaciers, and rivers, the sediment transport and deposition is large. Such is the case in the Gulf of Alaska, in the area of Pamplona Searidge which rests on the inner slope of a major foredeep, the Aleutian Trench.

Some consideration has been given to the thought that this feature is terminal or interlobate moraine. Its axis, projecting fifteen miles seaward from the edge of the continental shelf, at right angles to glacial fronts, appears to reject consideration of a terminal moraine composition. In any advance beyond the edge of the continental shelf, the front of the glacier or glaciers would have broken off and floated free without leaving an unbroken train of moraine behind. Its 15-mile length is about seven times the 2-mile length of the so-called Solomon Railroad, a prominent morainal ridge on the north shore of Lituya Bay, southeast of Yakutat Bay. Furthermore, it is doubtful if a morainal ridge could have maintained a scarp-like slope rising more than 2000 feet under the open-sea condition here. Submarine terminal moraines at the mouths of Icy and Yakutat Bays are broad ridges

with a maximum relief of about 300 feet, and they are believed to mark the boundary of a recent glacial advance.[12]

Pamplona Searidge is believed to be bed-rock structure which was uplifted in the complex building of the major Chugach-St. Elias range and to have foundered subsequent to its discovery as a dangerous rocky shoal. The foundering probably occurred gradually, for any sudden great change or changes would have been indicated by reports of local earthquakes and tidal waves. Yet the absence of such reports might not be conclusive because of the location 20 to 30 miles offshore from the then uninhabited coastline. Local earthquakes and volcanic eruptions around the rim of the Gulf of Alaska have occurred frequently.[13] The Sanak and Shumagin Islands were subjected to tremors and tidal waves in 1788. Mt. Wrangell, northwest of Mt. St. Elias, erupted in 1819. A general earthquake around the Gulf of Alaska occurred in 1847; it was severely felt at Sitka. During the last century earthquakes were felt nearly every year in Prince William Sound. And then there was the major quake in Yakutat Bay in 1899.

Foundering appears to be indicated by embayments on each side of the searidge. Bathymetry in figure 1 reveals a considerable indentation of the 1000-fathom contour, and the 300-fathom contour has an embayment of 8 miles at the neck of the ridge. The adjacent continental shelf is indented by other embayments, but they are not of the magnitude and type under discussion. The natural slope of the continental shelf is shown in figure 8 to be interrupted by a concavity beginning in 50-fathom depths, from which the searidge rises irregularly to 68-fathom depths, 17 miles seaward of comparable shelf depths. Irregularities on top of the ridge at the outer end are revealed in figure 5, notably the trench which is more than 80 feet deep. This trench is emphasized in figure 7, a profile obtained on a companion echo sounder which records a greater exaggeration of the vertical scale. The two records also differ in that they are read from opposite directions. It is noticeable that the cross-section profiles in figures 5 and 6 do not show aprons at the bottom of the slopes. Strong currents might flush out aggraded material on one side, but the same condition would not be expected on both sides.

Inasmuch as Pamplona Searidge trends nearly at right angles to the coast and, more significantly, to the axes of the mountain ranges and most of the ridges inside the coast, the suggestion that it is bedrock might be considered equally vulnerable as the consideration of a morainal composition. There are, however, several parallel structures nearby. Most obvious is Kayak Island at Cape St. Elias. Northward of this island are several ridges having the same north-northeast trend—Suckling Hills, Mt. Campbell, Nichawak and Gandil Mountains. More significant, however, are observations that Brower Ridge, lying just inside and parallel to the coastline north of Pamplona Searidge, marks the upthrown side of the Sullivan fault which swerves seaward in an extensive reef at Cape Yakataga.[14] This at least marks a close-by structural uplift which trends about normal to the coast. Further indications of a line of faulting are revealed by soundings and the bathymetry south of the searidge. Extending beyond a 1 500-foot depression and a 400-foot knoll, marked by 855- and 583-fathom soundings in figure 4, is a slight ridge which possibly branches northward from the side of an extensive trough which has been traced more than 250 miles out into the Gulf of Alaska. These submarine features are to be surveyed and investigated further by the Coast and Geodetic Survey in its continuing survey program in Alaskan waters. It is hoped that further evidence will be obtained which will help to definitely resolve the status of Pamplona Searidge.

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