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Abstract:

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Cabrillo, the Chumash, and Old World Diseases

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Seemingly all the changes were minor: a few European words in the languages, a few children of mixed blood, a few iron knives and pieces of cloth, perhaps a few ideas about the Christian religion. Otherwise, there is little or nothing to indicate an important European influence among the Indians of California prior to the eighteenth century.

[Kelsey 1985:502]

FOR the historical period, documentary evidence provides a tragic portrait of the devastating effects of Old World diseases on native American tribes. For decades, anthropologists, demographers, and historians have debated whether such diseases had a significant impact on native Americans during the "protohistoric" period of European exploration, in some cases even before Indian people had direct contact with Europeans. Recently, this debate was revitalized by a number of publications (e.g., Dobyns 1983; Upham 1986; Ramenofsky 1987; Thornton 1987; Stannard 1989), by a renewed emphasis on contact history stimulated by the 500-year anniversary of Columbus's belated "discovery" of the New World (see Thomas 1989, 1990, 1991), and by the desire to more

effectively integrate native American perspectives into historical reconstructions.

The evidence for protohistoric disease epidemics must be uncovered in different ways than their historic counterparts. Due to the sporadic nature of protohistoric contacts between Europeans and native Americans, few Old World disease epidemics were noted in the generally scanty written records of early explorers. Native oral histories can provide tantalizing clues (see Walker and Hudson 1993:20), but scholars must rely primarily on the archaeological record for signs of Old World diseases during protohistoric times.

So far, data from California have been marginal to this debate, although a number of scholars has mentioned the possibility of protohistoric epidemics (e.g., Brown 1967:78; Thornton 1987:84; Stannard 1992:24; Walker and Johnson 1992:128). The lack of significant attention to the possibility of protohistoric disease epidemics along the California coast is surprising given the fact that this area, beginning in A.D. 1542, was the scene of some of the earliest European contacts with native Americans along the Pacific coast of North America.

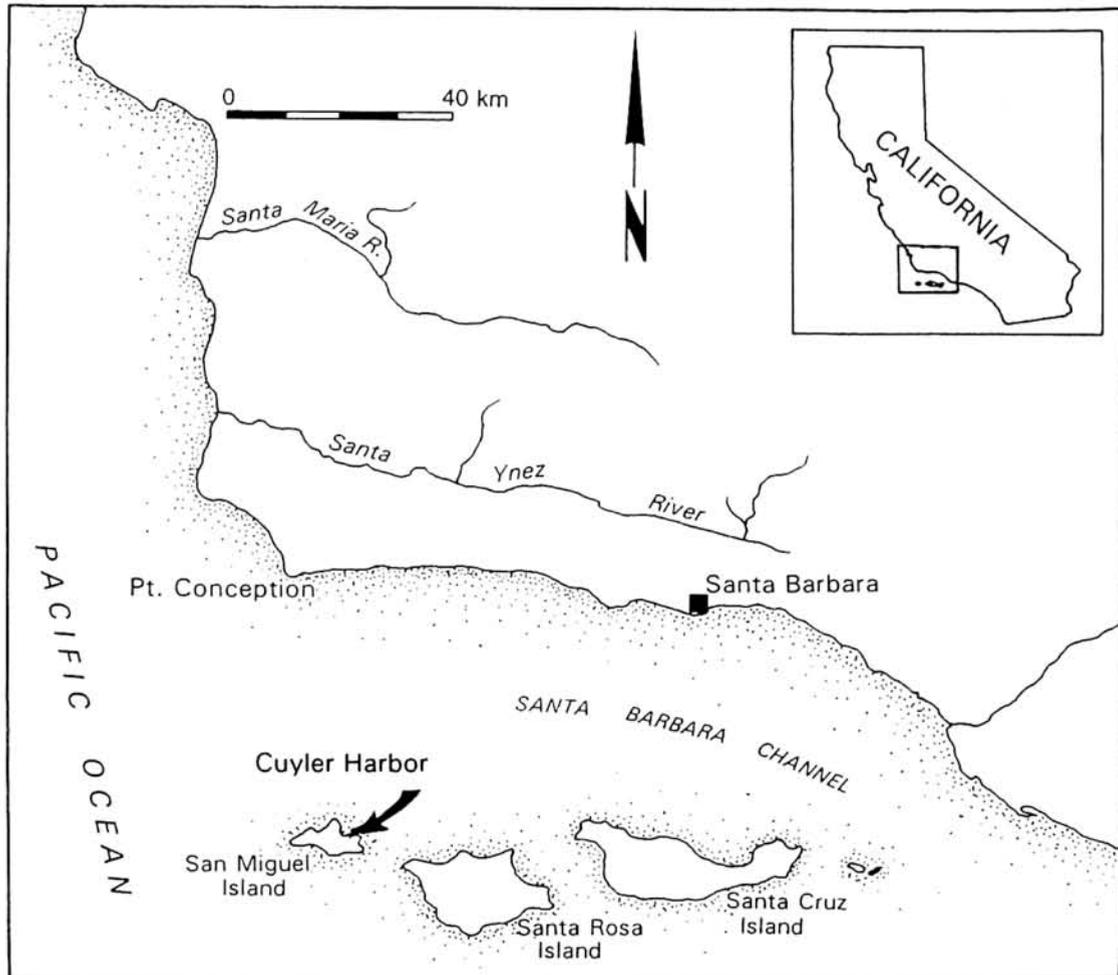


Fig. 1. The Santa Barbara Channel area, showing Cuyler Harbor on San Miguel Island, where Cabrillo appears to have wintered in A.D. 1542-43.

The best documented of California's coastal tribes are the Chumash Indians of the Santa Barbara Channel area (Fig. 1), for whom a wealth of historical, ethnographic, and archaeological data is available. Most accounts of the Chumash and their neighbors discount or ignore the possible effects of protohistoric European contacts on southern California's coastal tribes (e.g., Landberg 1965:19; Kelsey 1985; King 1990; Gibson 1991:67). In fact, many studies of contact begin in A.D. 1769, over 225 years after the Chumash first had sustained contact with Europeans. To our knowledge, there has been

no detailed study of (1) the susceptibility of the protohistoric Chumash to Old World disease epidemics, (2) the specific potential for disease transmission during protohistoric contacts between the Chumash and European expeditions, or (3) the problems associated with identifying evidence for protohistoric disease epidemics and associated cultural changes along the California coast.

This paper explores whether the Chumash and their neighbors were likely to have been affected by protohistoric contacts (either direct or indirect) with Old World diseases. It includes a

discussion of the susceptibility of the protohistoric coastal Chumash to epidemic diseases, then examines in detail Chumash contact history between A.D. 1542 and A.D. 1769. Our focus is on the Chumash because: (1) they lived in numerous relatively large villages with extensive intervillage interaction, traits that made them susceptible to the spread of epidemic diseases; (2) they had relatively substantial protohistoric contact with Europeans, especially with members of Cabrillo's expedition of A.D. 1542-43; (3) they buried their dead without cremation (unlike many of their Uto-Aztecan neighbors), allowing detailed studies of health patterns among historic, protohistoric, and prehistoric groups; and (4) there is considerable archaeological and ethnographic information available from the Santa Barbara Channel area. In many ways, however, the Chumash were similar to California's other coastal tribes, and aspects of this analysis could just as easily be tested against archaeological data up and down the coasts of Baja and Alta California.

The purpose of this paper is not to prove or disprove that protohistoric epidemics of Old World diseases significantly affected the Chumash and their neighbors. Rather, we hope to stimulate research and debate on the effects of protohistoric European contact on California's coastal tribes. By heightening awareness of some of the problems involved in such research, it is hoped that anthropologists and other scholars will be prompted to examine or reexamine the archaeological record for the protohistoric period along the California coast. Ultimately, knowing the effects of protohistoric European contacts on California tribes has major implications for reconstructing the size of prehistoric native California populations, comprehending the magnitude of the death and destruction that followed European contact, and assessing the validity of ethnographic models for precontact societies of the California coast.

A DEMOGRAPHIC DEBATE

The effects of European contact on native American societies have been debated for decades. Ramenofsky (1987:1) aptly summarized a century-old debate about the size of North American populations prior to European contact:

Three issues are at the heart of the debate (1) precontact population size and magnitude of post-contact decline; (2) timing of the decline relative to the earliest census counts; and (3) role of infectious disease in that decline. Ethnologists of the American Historical School (Helm 1965, 1980; Kroeber 1934, 1939; Steward 1949) generally take a conservative position on these issues. They do not accord disease a major role in the early post-contact period, but date the recognized onset of aboriginal decline subsequent to historical documentation and sustained European settlement. Ethnohistorians, typified by Dobyns (1966, 1981, 1983) and Krech (1978, 1983) and historical demographers, such as Cook (1976) and Borah (1976), envision an entirely different sequence of events during the contact period. They assume infectious diseases, a major cause in the destruction of aboriginal populations, reached regional groups decades, if not centuries, prior to historical documentation. Consequently, even the earliest census counts may describe populations as much as 95% reduced from precontact maxima. . . . Given contrasts between positions, it is no wonder that for A.D. 1492, suggested totals for aboriginal North America range from 0.9 million (Kroeber 1939) to 18 million (Dobyns 1983).

The polarized nature of this debate has been emphasized in a number of recent publications (see Dobyns 1989; Henige 1989; Snow and Lamphear 1989), but some scholars have begun to search for a middle ground. Milner (1980) and Blakely and Detweiler-Blakely (1989) suggested, for instance, that Old World disease probably spread to native American populations, but not as a radiating wave that left every tribe and region devastated in its wake. Instead, they proposed that diseases followed "corridors of least resistance, occasionally dying out in cul-de-sacs" (Blakely and Detweiler-Blakely 1989:62). Such cul-de-sacs may have been caused by geo-

graphical barriers, environmental conditions (Upham 1986), and the reduced viability of disease transmission due to lower population densities or reduced interaction. Ramenofsky (1987:168-171) called these "diffusion vectors" and considered them critical to the direction and speed of the spread of epidemic diseases.

A classic example of a geographically "confined" epidemic occurred historically in western North America. In the 1830s, mosquito-borne malaria spread from the Columbia Plateau, through the Willamette Valley in Oregon, and into the Central Valley of California, killing tens of thousands of native Americans before it ran its course (Thornton 1987:124-125). By the time substantial numbers of American settlers entered the Willamette Valley two decades later, and long before any accurate estimates of the native American population were collected, the Kalapuya Indians had been devastated by a succession of Old World disease epidemics that effectively preceded the written history of the valley.

Until recently, debate about the effects of early European contacts on native American societies was largely the province of ethnohistorians and historical demographers. Milner (1980:47-48) called for the application of archaeological data to help resolve such issues:

until archaeological data is marshalled to evaluate the impact of . . . epidemics, however, discussions of disease as an important agent in processes of change remain little more than unsubstantiated, although perhaps intuitively pleasing, just-so stories.

Ramenofsky (1982, 1987) provided compelling archaeological and historical evidence that Old World diseases decimated native American societies in the Southeast during the sixteenth century, but also warned that the potential effects of protohistoric disease epidemics should be evaluated region by region and group by group. Since that time, archaeological data have been used to evaluate the effects of Old World diseases on native American societies with vary-

ing results (e.g., Blakely 1988; Snow and Lamphear 1989; Campbell 1990; Ramenofsky 1990; Milner 1992).

DISEASE SUSCEPTIBILITY AND CHUMASH DEMOGRAPHY

Throughout the New World, Australia, and the Pacific Islands, indigenous peoples were devastated by Old World epidemic diseases to which they had no immunities. According to Ramenofsky (1987:4), "in the absence of medical assistance, initial introductions of infectious parasites typically result in large-scale epidemics with mortality ranging from 30 to 100%." Indigenous societies exposed to repeated epidemic disease outbreaks, particularly when combined with colonial domination and dispossession, sometimes experienced population losses of 95% or more during the decades after initial contact (Stannard 1992:x).

Recent studies have suggested that native peoples most susceptible to Old World epidemic diseases were those with high population densities, who lived in relatively large sedentary communities, and participated in extensive trade networks or other types of intervillage contact (Ramenofsky 1987:162-171; Stannard 1991:523-524; Dobyns 1992). All other factors being equal, such societies were much more likely to contract and transmit epidemic diseases than sparse populations organized in small bands having relatively limited external contacts. Other factors affecting a population's susceptibility to epidemic diseases include the history of prior disease exposure (with the development of partial or total immunities among the survivors), the overall health of a population at the time of exposure to newly introduced epidemic diseases, and the demographic structure of a population (children, the sick, and the elderly are particularly likely to be killed by most new and virulent epidemic diseases).

West of the Sierra Nevada, California Indians were renowned for large populations supported

by a diverse and productive food base. Estimated population densities for the Santa Barbara Channel area are among the highest in aboriginal California, with an average of at least 8.8 people per km.² along the mainland coast (Glassow and Wilcoxon 1988:39). The coastal Chumash and Gabrieleño epitomized the type of hunter-gatherer society most susceptible to the spread of Old World epidemic diseases. They lived in large and closely spaced coastal towns, with extensive social, political, and economic interaction between coastal communities and their interior neighbors (see Landberg 1965; Johnson 1988a). The Chumash and their neighbors had highly developed trade networks, facilitated by the use of shell bead money, the *tomol* (plank boat), and extensive trail networks (King 1971; Arnold 1992a).

The residents of Chumash towns were allied into political federations led by capital towns in which annual fiestas were held. During the winter, these fiestas brought together large numbers of people from many different villages. Inter-marriage between villages was also widely practiced (Johnson 1988a). Warfare and raiding reportedly were common during the protohistoric and historic periods (Landberg 1965:30; Brown 1967:75-76), and skeletal analyses indicate that violence was common during late prehistoric times as well (Walker 1989; Lambert and Walker 1991:970). Finally, paleopathological studies also suggest that the Chumash and their neighbors suffered from a variety of metabolic disorders related to periodic resource shortages, crowding, and sanitation problems (Walker and Lambert 1989:210; Lambert and Walker 1991:967).

These characteristics suggest that the protohistoric Chumash and their neighbors would have been highly susceptible to epidemics of Old World diseases (Walker and Hudson 1993:23). For such diseases to have affected California's coastal peoples, however, direct contact with disease-carrying Europeans or infected members

of neighboring tribes was required. It is these potential "vectors of death" (Ramenofsky 1987) that are the focus of this paper. Our analysis of the record of protohistoric contacts between native Californians and members of early European expeditions is based on the classic and authoritative syntheses of Henry Wagner (1929, 1941), as well as Paez's synopsis of Cabrillo's log (Moriarity and Keistman 1968).

CONTACTS WITH EARLY EUROPEAN EXPEDITIONS

The protohistoric period of the southern California coast consists of the 227-year interval between Cabrillo's voyage in A.D. 1542 and the initiation of Spanish settlement and administration that began with the overland Portolá expedition in A.D. 1769. Although European exploration took place by both land and sea during this period (e.g., the Ulloa, Urdaneta, Drake, and Gali expeditions), only four well-documented maritime voyages are known to have contacted the Chumash and their neighbors during the sixteenth and seventeenth centuries.¹ These were led by Cabrillo in A.D. 1542-43, de Unamuno in 1587, Cermeño in 1595, and Vizcaino in 1602-03. During the 1600s, however, the Chumash and their neighbors may have had contact with other Spanish vessels crossing the Pacific as part of the Manila Galleon trade (Walker and Johnson 1992:128). These galleons, which carried Spanish cargoes from Southeast Asia to the New World, generally followed favorable trade winds across the North Pacific. Usually encountering the California coast around Monterey, the galleons sailed south to Spanish ports in Mexico. Manila galleon crews must have reprovisioned themselves occasionally with fresh water and food along the California coast, but contacts (and opportunities for disease transmission) with native Californians probably were limited. Long trans-Pacific sea voyages also could have exhausted the communicability of some acute diseases (influenza?) characterized by a rapid

development and recovery.

More likely circumstances for Old World disease transmission occurred during the four historically documented voyages, all of which sailed from Mexican or Philippine ports rife with Old World epidemic diseases. The disease history of Mexico was forever altered with Cortez's subjugation of the Aztec and their neighbors. Between about A.D. 1520 and A.D. 1595, waves of epidemic diseases (probably including smallpox, measles, mumps, influenza, plague, and typhus) devastated native peoples over broad areas of central Mexico and Guatemala (Dobyns 1989; Cook and Lovell 1991:47, 59). During the conquest of Mexico, plague and smallpox epidemics spread by Spanish soldiers may have killed a third of the people of the Guatemalan highlands (Kelsey 1986). In 1535, Cortez described "distressing deaths from . . . disease" in the La Paz colony along the Pacific Coast of Mexico (Holmes 1963:76). In the four sections that follow, we summarize the extent and nature of protohistoric contacts between the members of the four documented Spanish maritime expeditions and the coastal tribes of southern California. Unless otherwise noted, the data presented are based on Wagner's (1929) classic account of the four voyages.

The Cabrillo Expedition, A.D. 1542-43

The first expedition known to have contacted the Chumash left the Spanish port of Navidad on June 27, 1542, with two or three ships commanded by Juan Rodriguez Cabrillo. Unfortunately, the original log of Cabrillo's voyage was lost (Wagner 1941) and Paez's summary (Moriarity and Keistman 1968) is sketchy, at times contradictory, with latitudinal reference points that are clearly in error. This has led to some confusion about the precise location of many place names mentioned in the log, problems amplified by difficulties in translating native place names into Spanish, and Spanish accounts into English.

From Navidad, Cabrillo sailed up the Pacific coast of Mexico, Baja California, and Alta California, repeatedly contacting native peoples. On October 10, the fleet sailed into Chumash territory at a village they called Las Canoas, probably located near Mugu Lagoon or Ventura. For the next eight days, the Spaniards sailed, anchored, and exchanged gifts with the friendly occupants of the "thickly populated" (Moriarity and Keistman 1968:11) coast between Las Canoas and Cape Galera. Between Cape Galera—almost certainly Point Conception—and Las Canoas, Chumash people provided names for roughly 40 mainland towns (Moriarity and Keistman 1968:10, 12). On October 18, strong winds from the northwest forced the ships offshore, where they found islands, including "one so large that it must be eight leagues from east to west, and the other about four leagues. On the small one there is a good port and villages. The islands are ten leagues from the mainland, and are called the islands of San Lucas" (Moriarity and Keistman 1968:11). During a fierce storm, Cabrillo's ships spent a week anchored on the island "farthest windward which has a very good port inside which no bad effects will be felt in any kind of sea weather. They named it Posesion" (Wagner 1929:87). Numerous scholars have agreed that the islands of San Lucas were the northern Channel Islands and that Posesion was San Miguel Island (e.g., Bancroft 1884; Wagner 1941; Bolton 1952).

On October 25, the ships left these islands, struggled to round Cape Galera, then explored the coast to the north for eight days without anchoring or making contact. On November 1, strong northwesterly winds forced them back to Cape Galera, where they went ashore at a large town called Xexo (Cojo?). They then proceeded to a town called "Sardinas" (Cicacut, at Santa Barbara?). For three days the Spaniards replenished their stocks of wood and water, assisted by the occupants of Sardinas. While at Sardinas, a female captain and "many other

Indians" spent two nights aboard one of Cabrillo's ships (Moriarity and Keistman 1968:12). On November 6, the expedition left Sardinias, arriving at Cape Galera four days later. Along the way, "they made use of the Indians, who came on board with water and fish, and appeared very friendly" (Moriarity and Keistman 1968:12).

From November 11 to November 23, Cabrillo again sailed north along the central California coast. Encountering stormy seas and weather, the Spaniards apparently did not anchor or go ashore. On November 23, they returned to the port of Posesion and the islands of San Lucas. It is almost universally accepted that Cabrillo and his men then wintered among the Chumash.² From November 23 to January 19, 1543, they sheltered their ships on the northern Channel Islands, probably at Cuyler Harbor on San Miguel Island (Bancroft 1884:77; Kroeber 1925; Wagner 1929:90, 1941:18, 20). On January 3, 1543, Cabrillo died "as a result of a fall" (Moriarity and Keistman 1968:14) and was buried on Posesion. About two weeks later, his men sailed for the mainland, but foul weather forced them to shelter behind the island they called San Sebastian (probably Santa Cruz Island). The ships circled the islands for eight days, returning to Posesion on January 27. Two days later, the Spaniards went to San Lucas (Santa Rosa Island?) to retrieve anchors left behind and to take on water.³ They remained there until February 12, when they sailed to the mainland town of Sardinias and spent two days obtaining a boatload of wood. On February 14, Cabrillo's men, now commanded by Bartolome Ferrero, sailed to San Sebastian and spent five days before sailing northward to further explore the California coast.

On February 18, one of the sailors died of unknown causes. For two weeks, the expedition battled the elements, fighting their way up the coast, and searching in vain for a sheltered harbor. On March 5, they returned to the island of Posesion, but could not enter the port due to

high seas and waves which blocked the harbor entrance. The ships became separated and one sheltered in the lee of San Sebastian for three days. On March 8, the ship sailed to the town of Canoas, where they brought four Indians aboard. The next day they departed for San Salvador, thought by most scholars to be Santa Catalina Island, and left Chumash territory en route to Navidad.

During their five-month voyage along the California coast, members of the Cabrillo expedition spent most of their time in Chumash territory, repeatedly exchanging goods with the Chumash, bringing Chumash people aboard, and sheltering for extended periods in harbors adjacent to populous Chumash villages. Sexual contacts—either forced or consensual—almost certainly took place between crew members and the Chumash, and opportunities for the exchange of epidemic diseases must have been numerous.

The de Unamuno Expedition, A.D. 1587

Around July 12, 1587, a single *frigata* commanded by Pedro de Unamuno left the Philippines to return to Mexico. De Unamuno's expedition, with a crew of Portuguese, Spaniards, and Luzon natives, took a northerly route across the Pacific to explore portions of the California coast. On September 3, de Unamuno's ship was damaged. The "masts were sprung, the vessel was small, and those aboard had little protection, not having come as well prepared to resist the cold and wet as was advisable" (Wagner 1929:142).

After almost three months in passage, de Unamuno's crew sighted land blanketed in fog. On October 18, they saw many fires onshore while anchored in what was probably Morro Bay in Obispeño Chumash territory. Here was "an unlimited quantity of fish of different kinds, trees suitable for masts, water, firewood, and abundant shell-fish with all of which a ship in need could supply itself" (Wagner 1929:143). On this same day, an expedition party spotted

two Indians onshore and decided to investigate. The shore party included de Unamuno, 12 soldiers in chain mail with harquebuses, Filipino crew members armed with swords and shields, and a priest who preceded the group carrying a cross. They encountered five Indians but could not catch them. They found some bundles the Indians had left behind, however, and exchanged two handkerchiefs for a single deerskin. Before returning to the ship, they claimed the land for Spain and may have recorded the first historical note of a California shell midden, describing a "great quantity" of shellfish remains located on a hill (Wagner 1929:144).

The next morning, de Unamuno, 12 soldiers, 8 Filipinos, and a priest followed a trail to an empty village of 17 semisubterranean houses. After exploring this village, the shore party continued up the trail. Finding no people or minerals, they camped ashore en route back to the ship. On October 20, they marched a league and a half to another abandoned village with 30 houses, where they found baskets, cordage net bags, and stored seeds. After fruitlessly searching for the inhabitants, the Spaniards were returning to the ship when they were ambushed by Chumash warriors. A Spaniard and a Filipino were killed, and many persons were wounded on both sides. The bodies of the dead crewmen were not recovered.

While de Unamuno was inland, at least six men from his ship went ashore on October 19 to replenish stocks of wood and water (Wagner 1929:148-149). The men were confronted by 23 Chumash Indians who took clothes, water casks, biscuits, and other items. A skirmish ensued with little injury to either side. With little powder and few men, the Spaniards decided not to go ashore again to fight the Chumash or retrieve their property. Instead, they sailed south on October 21. Poor weather prevented exploration of the coast on their voyage, and they arrived in Acapulco on November 22.

The Cermeño Expedition, A.D. 1595-96

On July 5, 1595, Sebastian Rodriguez Cermeño, a Portuguese captain, left Manila in command of a single ship (Wagner 1929). His intent was to explore the California coast as far north as possible en route to Acapulco. Cermeño sailed with a crew of Spanish, Portuguese, Filipino, and "Negro" sailors. After stops in Corregidor and Luzon, they left for Alta California on July 27. They battled hurricanes and poor weather before sighting the California coast on November 4, probably somewhere between Cape St. George and Trinidad Head (Wagner 1929:369). Due to the rugged coastline and rough waters, Cermeño remained half a league to two leagues offshore while sailing south. Battered by a storm, they spotted smoke and fire on the land but did not stop until they anchored, probably at what is now known as Drake's Bay. Many Indians appeared on the beach, one visiting the ship in a small boat similar to a "cacate [tule balsa?] of the Lake of Mexico" (Wagner 1929:157-158). The Spaniards gave the visitor—who stayed on board for some time—cotton cloth, silk, and a red cap.

The next day, four Indians in boats came alongside the ship, receiving cotton cloth and taffetas from Cermeño. After the visitors departed, Cermeño went ashore with 22 men, claimed the land for Spain, and marched inland to a village occupied by about 50 adults and an unknown number of children. Cermeño observed that the natives relied heavily on seeds, crabs, birds, and large deer. Accompanied by two or more villagers, the party continued inland for half a league where they were confronted by a band of hostile Indians. After the situation was defused, the Spaniards embraced the Indians and gave them sashes. In return, the natives gave the Spaniards their bows and arrows. The shore party continued inland to the top of a hill and encountered a man, woman, and child who en-

tertained them and gave them acorns. Seeing no more settlements from this hill, the Spaniards returned to the beach and fixed camp, building an entrenchment for defense. Indians repeatedly visited this camp, where they talked and received gifts.

At this point, the narrative contains large gaps and a confusing chronology. It is unclear how long the party first camped on the beach, but on November 15, Cermeño, eight soldiers, and a scrivener explored Drake's Bay by boat. They sighted three substantial Indian villages and reportedly clashed with natives who fired arrows at them, wounding a Spaniard. After firing their guns to scare off the Indians, the Spaniards reportedly took their food. The next entry is dated November 30 and follows the loss of Cermeño's ship and much of his crew. It appears that the survivors were based at the beach encampment following the wreck.

On December 8, the survivors left Drake's Bay in a launch and proceeded south. Coasting to the southeast, Cermeño noted a bare and empty landscape until December 12 when he anchored in front of villages that were probably in Obispeño Chumash territory. The Indians here shouted "Christianos" and "Mexico," leading Wagner (1929:372) to believe that they were from the same tribe encountered by the de Unamuno expedition. The Spaniards exchanged cloth and taffetas for desperately needed food, then sailed south on December 13, the crew "sick and weak" (Wagner 1929:161). After rounding Point Conception the next day, Cermeño followed the southeast-trending coast and "discovered" two islands (probably San Miguel and Santa Rosa). They anchored off the south coast of what Wagner (1929:372) believed was San Miguel Island, where two Chumash Indians traded fish and a seal for silk and cotton cloth. On December 15, Cermeño noted many fires, board boats, and people on the islands. Unable to find food, however, he and his crew weighed anchor and sailed southward.

The next day, Cermeño made it to the island of San Martin, where the crew anchored and went ashore to a village for food and water. They brought back cakes made from a yellow root (agave?), which caused sickness among some of the crew (Wagner 1929:372). To escape high winds, the Spaniards anchored off the south coast on December 17, where they obtained tuna, wild onions, and water from the natives. They left the island on December 22, and sailed to the Mexican port of Chacala or Navidad, arriving on January 7, 1596.

The Vizcaino Voyage, A.D. 1602-03

Three ships commanded by Sebastian Vizcaino left Puerto de Acapulco on May 5, 1602. The ships carried crews of sailors, soldiers, priests, and possibly slaves. Heading northward, they followed the coast of New Spain, battling northwesterly winds. On May 19, the ships reached Navidad, where they loaded ballast and supplies before departing three days later. They anchored near Cabo San Lucas in Baja California on June 8, and in Puerto de San Bernabe on June 11. At least 17 men went ashore here, where reportedly apprehensive Indians embraced the friars and accepted gifts of biscuits, glass beads, looking glasses, and other items. Due to unfavorable weather, Vizcaino's men stayed at San Bernabe until July 5, where they had daily contact with the Indians.

Continuing northward, two of the ships entered the Baja port of Magdalena on July 16. They stayed at Magdalena for 13 days, where the Indians brought gifts of incense and shellfish. Leaving on July 28, they anchored off a port called Ballenas two days later. Many Indians were on the beach, but the surf kept the Spaniards from sending boats ashore. An ensign who swam ashore was "badly treated by the sea, from which originated a sickness which ended his life" (Wagner 1929:208). The fleet left Ballenas early in August, after the seas had calmed. Upon arrival at the Isla de Cedros on

August 27, the Spaniards had little or no direct contact with the Indians, who constantly shouted for them to leave. The fleet left Cedros on September 9 and reached the mainland two days later. As the Spaniards sailed northward, the land reportedly was filled with Indians. Contacts with these peoples were peaceful until October 28, when a skirmish at a place referred to as "Baia de San Simeon y Judas" may have killed four Indians and wounded many others. Before the ships left this anchorage on October 30, the Indians offered gifts and made peace.

Vizcaino's ships appear to have arrived in the San Diego area on November 10. Suspicious at first, a group of Indians offered their weapons to Father Antonio (who was supported by six soldiers) in exchange for the embraces of the padre, colored glass, cord, and ribbon. The Spaniards and Indians exchanged goods and food peaceably for 10 days, until the fleet again sailed northward. On the ships, "there were many sick among the men, and some already had died," probably from scurvy (Wagner 1929: 234).

Along the coast, the Spaniards saw many fires and Indians, and the people reportedly gestured for them to come ashore. No suitable anchorage was found, however, and no direct contacts appear to have been made. On November 25, the crews sighted San Clemente and Santa Catalina islands. Vizcaino anchored at Santa Catalina, most likely at Avalon, where the crew "ran all over the island." Vizcaino reportedly brought six eight- to ten-year-old girls aboard "dressed them in shirts and drawers, gave them some necklaces and sent them back" (Wagner 1929:401). Many other Indians came aboard, and some had to be forced to leave when the fleet departed on December 1.

Vizcaino continued to explore nearby islands, probably Santa Barbara and San Nicolas. From one of these, "a line of islands large, small and of medium size" (Wagner 1929:239) was sighted, almost certainly Vizcaino's first

glimpse of the northern Channel Islands. These islands were densely populated and their residents traded with each other and mainland peoples. As the fleet passed between the islands and the mainland, a tomol came out with a crew that included a *capitan*. The Indians came aboard Vizcaino's ships, where the Chumash leader indicated that Indians from Santa Catalina had traveled to his settlement and told of the arrival of the Spaniards. Seeking gifts, the Indian leader tried to coax the Spaniards ashore by offering 10 women to each man to "serve and entertain them" (Wagner 1929:240). Vizcaino gave gifts to the Indians, who left the ship. A favorable southeast wind arose that night, however, and the fleet apparently weighed anchor without having gone ashore.

Sailing through the Santa Barbara Channel on December 3, a northwesterly storm separated the ships and some or all appear to have sheltered around the islands. A tomol with two Indians and a small boy from San Miguel visited one of the ships, but the extent of their interaction is unknown. With calmer weather on December 5, two of the ships sailed from the islands to explore and map the mainland coast, while the third ship seems to have remained among the Channel Islands. Vizcaino most likely rounded Point Conception on December 8, the feast day of La Purísima Concepción de Nuestra Señora. Sailing northward, the two ships were visited by four "rush canoes" (probably tule reed boats) with two Indians in each. The Indians traded fish for clothing and food. The next day, more Indians from the same tribe came out and invited the Spaniards ashore. They were given bead necklaces, clothes, and food. Vizcaino's third ship rejoined the fleet on December 11, the crew reporting that the islanders had entertained them (Wagner 1929).

The fleet continued northward, frequently in foggy weather, with no more Indian contacts until anchoring in Monterey Bay on December 16. Monterey reportedly was "surrounded by settle-

ments of affable Indians . . . willing to give what they have" (Wagner 1929:247). By this time, however, so many of the crew members were sick, dying, or dead of scurvy that the ships split up. On December 29, Vizcaino sent one vessel to Mexico with the sickest crewmen. After more than two weeks in Monterey, the two other vessels sailed northward on January 3, 1603.

After the two ships were separated, Vizcaino entered the "Puerto de San Francisco" to search for Cermeño's wreckage. They do not appear to have landed, however, sailing north to Cape Mendocino on January 12. Heavy storms forced the ship out to sea and, with most of his men sick or dying, Vizcaino decided to return to Mexico. On January 19, they sailed south and noted that the land "seemed to be all inhabited by Indians" (Wagner 1929:256). Around the Santa Barbara Channel, six Chumash came aboard the ship, exchanged gifts, and left. Vizcaino then set sail for the Isla de Cedros. Off Santa Catalina, Indians came aboard and exchanged fish and sealskins for necklaces of glass beads, scissors, and other trinkets. These Indians spent the night on the ship, but were caught with stolen goods in the morning and sent ashore (Wagner 1929:257). By this time, only three or four sailors were strong enough to work the sails. Around February 14, Vizcaino's ship reached Cabo San Lucas, and arrived in Acapulco on March 21. The other vessel, whose route and contacts during the intervening 11 weeks are unrecorded, arrived in Acapulco soon after.

OTHER POSSIBLE SOURCES OF OLD WORLD DISEASES

The logs of these four voyages document numerous opportunities for the direct transmission of Old World diseases to the Chumash, the Tongva (Gabrieleño), and their neighbors during the protohistoric period. Such contacts may have transmitted a variety of epidemic Old

World diseases to California natives, but the spread of sexually transmitted diseases like syphilis and gonorrhea seems particularly likely. Undocumented or indirect contacts during this period may also have spread deadly Old World diseases to Indian peoples of the California coast. Even though no documented land expeditions contacted the protohistoric Chumash, such expeditions greatly affected Indian tribes of the southwest United States and Baja California. In 1535-36, a small group of men led by Alvar Nuñez Cabeza de Vaca traveled through "Texas, Chihuahua, and Sonora to the Pacific Coast" (Bancroft 1884:7) after escaping slavery on the Texas coast. In 1539, a Spanish expedition to Zuñi, led by Marcos de Niza, had extensive contacts with Pueblo peoples. Following rumors of cities of vast wealth existing north of New Spain, Francisco Vasquez de Coronado journeyed northward with 300 Spaniards and 800 Mesoamerican Indians in 1540-42. This expedition visited many pueblos in the American Southwest, and may have reached Kansas. Fore-shadowing future Spanish colonial oppression, Coronado massacred hundreds, possibly thousands, of Pueblo Indians (Gutierrez 1991:45).

Within decades, Spanish conquest and missionization began in New Mexico and Baja California. In 1598, an expedition of soldiers, civilians, and priests led by Don Juan de Oñate began to establish Franciscan missions among the Pueblo peoples in New Mexico. These missions became centers for the spread of disease. Stodder and Martin (1992:66) listed at least 15 epidemics of Old World diseases (smallpox, measles, etc.) that devastated Indian peoples of New Mexico between 1636 and 1770.

Nineteen missions were founded by the Jesuits in Baja California between 1697 and 1768 (Moore and Norton 1992:201), hastening the spread of Old World diseases northward from central Mexico. Jackson (1994:167) listed 16 epidemics (smallpox, measles, dysentery, and possibly influenza) in northwestern New Spain

from A.D. 1697 to A.D. 1770. Baptismal and burial records are sketchy for the early years of the Baja missions, but the precipitous decline in the native population at several missions leaves little question that disease epidemics were occurring by at least the 1720s (see Jackson 1983, 1984, 1994).

The Spanish presence in the Southwest and Baja California did not go unnoticed by protohistoric peoples of the California coast. Native Californians were clearly aware of their presence and, in some cases, their cruelty. The journals of voyages previously described repeatedly mention coastal peoples knowing of "other men like them [i.e., Spaniards] who had beards and who had dogs, cross-bows, and swords" (Wagner 1929:83). As early as A.D. 1542, the Chumash told Cabrillo about "Christians going about inland" (Wagner 1929:86). Many native groups encountered by Cabrillo were openly fearful of the Spaniards because they heard the Spaniards were killing their interior neighbors (Wagner 1929:85).

While this fear of Spanish violence was justified, it is not certain if the Indians feared the invisible killers the Spanish carried with them. This fear of disease would have been well-founded. During a three-year period in the late 1760s, Spanish padres at six Baja California missions baptized only 425 Indians, while they buried 1,028 (Stannard 1992:136). The extent of knowledge among the Chumash and their neighbors about the magnitude of Spanish conquest to the south and east is uncertain, but clearly Old World diseases were closing in on native Californians during the protohistoric period. In view of the fact that a vast trade and interaction network connected southern California's tribes, the indirect transmission of Old World diseases from Baja California or the American Southwest remains a possibility that warrants further research (Walker and Hudson 1993:20-21).

DISCUSSION

Early accounts of European explorers are often frustratingly vague about the nature and exact location of early contacts with native Californians. Crucial gaps exist in some of the narratives, and important details about the whereabouts and activities of expedition members are lacking. Early historical accounts leave no doubt, however, that the Chumash and other coastal tribes had extensive, if sporadic, contacts with Spanish expeditions during the protohistoric period. For at least the Cabrillo and Vizcaino voyages, there seems to have been ample opportunity for contagious diseases to be transmitted to the Chumash or their neighbors. Members of coastal tribes exchanged food, clothes, and other goods with the Spanish. Indians came aboard Spanish ships to meet, eat, exchange gifts, and sometimes to sleep. Ships' crews also went ashore frequently, explored the local area, sought out native inhabitants, reprovisioned their ships' stores, left gifts of clothing and other novelties, and occasionally engaged in violent encounters that left dead or wounded on both sides. Such encounters provided numerous opportunities for the transmission of Old World epidemic diseases such as smallpox, influenza, and tuberculosis to native Californians. With little or no immunological resistance, native Californians would have been decimated by such diseases.

It is even more likely, however, that venereal or other sexually transmitted diseases were spread to native Californians during these protohistoric encounters. As far as the historical records indicate, Cabrillo's and Vizcaino's crews were exclusively male, mostly sailors or soldiers armed with sixteenth century attitudes about women and indigenous peoples. These men were isolated from contact with women for long periods of time. During extended stays of days, weeks, or months among the native peoples of

the California coast, with crew members possessing exotic items prized by the natives, numerous forced or consensual sexual encounters almost certainly occurred.

Such sexual encounters would have been likely sources for the spread of disease from crew members to native Californians. Diseases like syphilis and influenza are relatively benign and easily cured disorders today, but they had a rapid and devastating impact on many indigenous peoples first exposed to them in the sixteenth, seventeenth, and eighteenth centuries. When first introduced in Hawaii, venereal diseases rapidly killed thousands of native Hawaiians and left thousands more sterile (Stannard 1989). While there is some skeletal evidence that syphilis may have been present among the Chumash prior to European contact (Cybulski 1980; Walker and Lambert 1989), the dating or diagnosis of these skeletons is questionable. Even if these cases ultimately are confirmed, virulent new venereal strains from Asia or Europe could have devastated California Indians just as they did the Chumash during the Mission period (Walker and Hudson 1993:108). Further evidence of the devastating effects of syphilis on the indigenous peoples of the Pacific coast is found in the account of Jose Mariano Mozino, a doctor and naturalist on the Bodega y Quadra expedition to Nootka Sound in A.D. 1792:

This wantonness has surely been sad for those small settlements, which are gradually weakened by the ravages of venereal disease; within a few years it can ruin them so that the entire race will perish. . . . These, sterilized by this pernicious contagion, ought to fear the unfortunate fate of the people of Baja California, of whose race there scarcely remains one or two, the rest consumed by the raging syphilis which the sailors of our ships have spread among them [Wilson 1970: 43-44].

At roughly the same time as maritime voyagers were exploring the California coast, European diseases were also spreading overland from central Mexico into the American Southwest and

Baja California. By the late 1600s and early 1700s, numerous epidemics had devastated Indian peoples living on either side of the Gulf of California. Whether these Old World diseases spread to southern California tribes—and perhaps ultimately to the Chumash—is not known at this time. It is a question, however, that deserves further research.

The sketchy historical accounts for the protohistoric period only hint at the possible effects of early European contacts on California's coastal tribes. Considering the extent of such contacts, however, three models can be proposed for the possible consequences of contact on the Chumash and their neighbors during the sixteenth and seventeenth centuries A.D.

No Transmission

The prevailing view of most historians and anthropologists is that no significant disease transmission occurred during the protohistoric period. In this view, the period of European exploration had little effect on native Californians, other than to presage the devastation that would soon overwhelm them. In this case, there should be no observable effect of disease and limited evidence of contact-induced culture change in the archaeological record.

Limited Transmission

A limited "cul-de-sac" model would suggest that Old World diseases were transmitted to California Indians by protohistoric contacts, but epidemics were confined to relatively small geographic areas—perhaps to San Miguel Island or the northern Channel Islands. For instance, Walker and Johnson (1994) found only limited evidence for the spread of some smallpox and other disease epidemics between California missions in historic times, although quarantines and other measures may have helped contain such epidemics. Archaeologically, evidence for such epidemics should be found in restricted areas, but the impact on broader patterns of demo-

graphy and cultural development of the Chumash and their neighbors would be limited.

Regional Devastation

In this model, Old World diseases were transmitted to the Chumash or other California Indian tribes protohistorically, spread rapidly from group to group, and devastated populations on a regional or interregional level. We consider the nineteenth century malaria outbreak in Oregon and northern California to fall within this range of epidemic impact. Even in such cases, however, not every village or town would necessarily be affected by disease epidemics. Cook (1939) noted, for instance, that while the smallpox epidemic of 1844 killed people across much of California, the devastation was unevenly distributed. Archaeologically, evidence for regional devastation should be found over a broad (but not necessarily continuous) area and the effects on California Indian settlement, economic, and sociopolitical systems should be pronounced. If regionally devastating epidemics affected California Indians protohistorically, estimates of the maximum population levels attained by some or all tribes may be too low and, in the worst-case scenario, data from historical and ethnographic accounts may not be representative of precontact cultural patterns (see Dunnell 1991:562).

Testing the Models

Despite the possibility that Old World epidemic diseases may have impacted the Chumash and their neighbors prior to Spanish settlement of the region, there has been virtually no effort to systematically examine the archaeological record for evidence of such impacts. At first glance, the Santa Barbara Channel seems an ideal area to test these models. Numerous late prehistoric and historic cemeteries have been excavated from Santa Barbara Channel sites, where a relatively detailed chronology has been worked out, and large amounts of data have been com-

piled on the health of individuals buried in these cemeteries.

Unfortunately, there are several problems associated with the use of cemetery data to identify disease epidemics or related cultural impacts. As Ortner (1992:5) noted:

One of the limitations in studying infectious disease in archeological skeletal samples is that acute diseases are very rarely expressed in either the gross or microscopic morphology of the skeleton. Almost all the infectious pathological conditions that are evident are chronic diseases. This means that most of the great epidemics that have punctuated human history will leave, at best, non-specific and indirect evidence in skeletal samples.

A second problem is that many Chumash cemeteries were excavated long ago by antiquarians who kept poor records on the provenience and associations of individual burials. These problems are exemplified by a cemetery, excavated by Glidden in 1919, located in the vicinity of the historic Chumash village of Toan, above Cuyler Harbor on San Miguel Island. Glidden's notes appear to have been lost, but Heye (1921) described this cemetery as containing the remains of 19 children from six to 12 years in age. This is intriguing, not only because children are often more susceptible to epidemic diseases, but also because children's cemeteries are unusual in the Chumash area. Unfortunately, since Glidden appears to have lumped all the burials and grave goods he excavated from 12 San Miguel Island cemeteries together, it may never be possible to confirm the nature or age of this cemetery.

In fact, many Chumash skeletal collections are either undated or poorly dated. Some of the larger cemeteries contain hundreds of individuals and may have been used for long periods of time, potentially spanning one or more transitions between the prehistoric, protohistoric, or historic periods (Walker et al. 1989:350). A shell bead typology developed by King (1990) can sometimes isolate relatively short periods of cemetery use, but has no break corresponding

precisely to the protohistoric period. Today, high precision radiocarbon dating has the potential to roughly date cemeteries or village sites to the protohistoric era, but this requires calibration of radiocarbon dates to calendar years, a procedure still rarely done by California archaeologists. This problem is illustrated by a date on California mussel (*Mytilus californianus*) shells collected by Hubbs from a large village site (CA-SMI-536?)—conceivably the same one excavated by Glidden—located on the cliffs above the middle of Cuyler Harbor (Hubbs et al. 1965: 109). The shell from this site was dated to 575 ± 125 RCYBP (LJ-955), an uncorrected age that appears equal to about A.D. 1275, roughly 300 years prior to Cabrillo's visit. After correction and calibration (Stuiver and Reimer 1993), however, the midpoint of the resulting calendar date is equal to about A.D. 1520, within 20 years of Cabrillo's stay among the Chumash.

In the current legal and political climate, the excavation and dating of human skeletal remains or burial-related artifacts have become increasingly difficult. Fortunately, there are avenues of study that can inform us about protohistoric disease epidemics that do not rely on the destructive analysis of human skeletal remains or the excavation of new cemetery collections. If epidemic diseases decimated the protohistoric Chumash or their neighbors, for instance, there may have been large-scale abandonment and consolidation of coastal towns similar to those proposed for the Northwest Coast (see Inglis and Haggarty 1987; Erlandson et al. 1992:58). If so, studies of occupational continuity and settlement size across the late prehistoric, protohistoric, and historic periods might reveal a great deal about such settlement and demographic changes among California's coastal tribes.

Disease-induced abandonment and consolidation of towns might help explain the lack of correspondence King (1975, 1978:58) and others have noted between the names of many coastal towns recorded in Cabrillo's log and those re-

corded 250 years later in mission records.⁴ It might also help explain why favored settlement locations such as Tecolote Canyon west of Goleta seem to have been abandoned at roughly the time of Cabrillo's voyage, after virtually continuous occupation spanning at least the past 1,500 years.

If protohistoric disease epidemics ravaged the coastal Chumash or their neighbors, it also seems likely that it will be reflected in changes in the nature of burial practices or the organization of cemeteries. At CA-SRI-2 (Skull Gulch) on Santa Rosa Island, Orr (1968) excavated two burial plots in what he called Cemetery B. In the older of these plots, Orr found 26 burials arranged relatively neatly, including one that contained charred redmaids (*Calandrinia ciliata*) seeds dated to 600 ± 70 RCYBP. After calibration, the midpoint of this date is approximately A.D. 1350, with a range (at one sigma) of about A.D. 1300 to A.D. 1420. In the more recent cemetery, Orr (1968: 200) found an "unbelievable charnel of concentrated human bone" containing the badly disturbed remains of at least 83 people. No radiocarbon dates are available from this cemetery, but Orr (1968:218) believed the large village was "abandoned shortly before the discovery by Cabrillo in 1542." Charcoal from a hearth and wood from a nearby house produced uncorrected dates of 330 ± 50 and 400 ± 80 RCYBP, however, the younger of which provides calibrated midpoints of A.D. 1530, 1560, and 1630. Orr (1968:201) also noted that the jumble of human bones in the most recent cemetery at CA-SRI-2 was characteristic of a broader pattern that Rogers (1929) attributed to a "brief period in Late Canaliño times." Further research is necessary to document whether this pattern is confined to protohistoric and historic times, but it is possible that devastation wrought by Old World diseases overwhelmed the ability of Chumash survivors to bury their dead according to more orderly traditional rituals.

Due to the loss of labor, knowledge, and

leadership, economic disruptions associated with population decline should also be evident in the archaeological record. Protohistoric disease epidemics might help explain why some bead production villages on Santa Cruz Island were abandoned or saw declining activity during the protohistoric period (see Arnold 1992b:140-141). One might also expect to see a local or regional decline in the intensity of intervillage and long-distance trade, changes in subsistence patterns, and perhaps changes in mobility. However, despite the potential impact of one or more widely spaced epidemics—even devastating epidemics—population recovery within a generation or two might well make the identification of these patterns very difficult in the archaeological record, especially in mainland sites heavily disturbed by rodent burrowing and other site formation processes.

SUMMARY AND CONCLUSIONS

The Chumash and other coastal California tribes lived under social, economic, and demographic conditions that made them highly susceptible to epidemic diseases. Extensive protohistoric contacts occurred between the Chumash, neighboring tribes, and European maritime expeditions, particularly during Cabrillo's voyage of A.D. 1542-43 and Vizcaino's expedition of A.D. 1602-03. Less extensive contacts with maritime explorers, as well as opportunities for indirect disease transmission via Indian tribes of Baja California or the American Southwest, also occurred during protohistoric times. These contacts had the potential to transmit Old World epidemic diseases that could have devastated the Chumash and other California Indian societies long before any census data or detailed historical accounts of their cultures were collected.

Little direct evidence for such devastation currently exists, but this may be due to problems in identifying evidence for epidemic disease in human skeletons, the poor documentation associated with many cemeteries excavated by early

antiquarians or archaeologists, chronological problems caused by the lack of adequate dating for many existing collections, and the failure of archaeologists to calibrate uncorrected radiocarbon dates to the calendrical scale required to connect archaeological data with protohistoric events. These problems are not insurmountable, but few (if any) California archaeologists have systematically searched for evidence that would support or refute the idea that Old World disease epidemics significantly impacted California tribes in the protohistoric period.

Was the protohistoric period the final respite prior to the devastation wrought by European colonization, diseases, dispossession, and disenfranchisement (Castillo 1978:100)? Or were the Chumash and their neighbors devastated by Old World diseases during the protohistoric period? If such diseases impacted native Californians prior to sustained European settlement, how severe were the effects in various areas? How should such changes affect our understanding and interpretations of the development of society among the Chumash and their neighbors? Would large-scale protohistoric population losses prevent the use of historical accounts and ethnographic records as models of precontact patterns among California's native cultures (Dunnell 1991)?

Only further research can answer such questions. Certainly, ethnographic and historical data have been widely and often uncritically used by anthropologists seeking to understand the prehistory of California's coastal tribes. Unlike some parts of the New World, however, there seem to be few glaring contradictions or inconsistencies in the articulation of Chumash ethnography and archaeology. This does not necessarily indicate that disease epidemics and population losses did not result from protohistoric contacts with European explorers. Such contacts were sporadic enough that occasional disease epidemics could have killed a significant percentage of the people living in any given

area, followed by population increases during the long periods between episodes of contact. If anything, this review of the protohistoric contacts has deepened our respect for the remarkable persistence of the Chumash and their culture during a tumultuous period in their history.

In years to come, it is likely that many skeletal collections from the California coast now housed in museums will be repatriated and reburied. Today, many native Californians are philosophically opposed to radiocarbon dating (or other destructive analyses) of burials or burial-related artifacts—and to further excavations in native American cemeteries. As this process of repatriation and consultation unfolds, we hope that both anthropologists and native Californians will recognize the importance of documenting the history of the effects of European colonization on California's tribes. Given current laws governing the excavation and analysis of native American burial remains, no researcher should consider studying such sensitive issues without consulting representatives of the appropriate tribal groups. However, questions about how and when various California tribes were affected by European contact are crucial to understanding the history of California's native peoples. Therefore, we hope that agreements can be negotiated for the sensitive study of these and other research issues before skeletal collections are reburied. To those who died—as well as those who survived—we owe a full accounting of the tragic impacts that European contacts had on the first Californians.

NOTES

1. Johnson (1988b:3) briefly summarized poorly documented claims that the galleon *San Pedro* wrecked on Santa Catalina Island in A.D. 1598, followed by two salvage expeditions that may have used native divers to recover the lost cargo. Claims that Sir Francis Drake sailed into the Chumash area have not been substantiated, but Drake spent five weeks among the coastal Miwok in A.D. 1579 (Heizer 1947).

2. Kelsey (1986) argued that Cabrillo wintered on Santa Catalina Island. His arguments are internally inconsistent, however, and he appears to have misinterpreted the geographical descriptions in Cabrillo's log. After identifying Cabrillo's Puerto de Posesion as Cuyler Harbor, Kelsey (1986:157) diverged from the text of the log, alleging that "the ships did not remain there" because Cuyler is "a treacherous anchorage for most of the year." Paez (Moriarity and Keistman 1968) and Wagner (1929) do not mention the ships being forced from Puerto de Posesion by storm (or any other reason) and Kelsey's statement about the quality of Cuyler Harbor is incorrect. While the harbor entrance is narrow and may be impassable during strong northwesterly storms, the west side of the harbor is almost completely protected from the predominant northwesterly storms. Kelsey's other evidence that Cabrillo wintered on Santa Catalina revolved around a hypothetical confusion of Limu with Pimu, the latter a Tongva (Gabrieleño) name for Santa Catalina Island (Johnson 1988b:9). The place names for the three islands seem to be clearly of Chumash origin, however, not Tongva.

The native names given for the San Lucas Islands include Nicalque, very similar to the name of a historic village on the west end of Santa Rosa Island; Limu or Limun, virtually identical to the historic Chumash name (Limu) for Santa Cruz Island; and Ciquimuyumu, which seems to refer to San Miguel Island. Finally, the description of the geography of the three closely clustered San Lucas Islands leaves virtually no room for an interpretation that Cabrillo's ships wintered on the relatively isolated island of Santa Catalina, located no less than 25 km. from its nearest neighbor. We concur with Wagner (1929:335) and other historical authorities about the identification of Posesion: "this island was San Miguel and the port could hardly be any other than Cuyler Harbor."

3. Sailing away from Posesion to obtain water is also consistent with a winter anchorage on San Miguel Island, which contains very limited and only brackish water sources.

4. King (1978) also noted changes in protohistoric settlement patterns in the San Francisco Bay area.

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